



## Attitudes towards choice architectural nudge interventions to promote vegetable intake among Danish adolescents

Houlby, Louise; Nørnberg, Trine R.; Skov, Laurits Rohden; Perez-Cueto, Armando

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III World Congress of Public Health Nutrition

II Latin American Congress of Community Nutrition

V Congreso Iberoamericano de Nutrición y Salud Pública

X Congreso de la Sociedad Española de Nutrición Comunitaria



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## Abstracts of the

### III World Congress of Public Health Nutrition

### II Latin American Congress of Community Nutrition V Congreso Iberoamericano de Nutrición y Salud Pública X Congreso de la Sociedad Española de Nutrición Comunitaria

**Las Palmas de Gran Canaria, Spain, November 2014**

### Organised by:

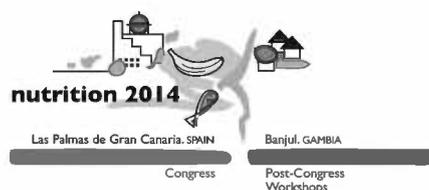


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# **International Journal of Community Nutrition**

## **November 2014**

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**III World Congress of Public Health Nutrition**  
**II Latin American Congress of Community Nutrition**  
**V Congreso Iberoamericano de Nutrición y Salud Pública**  
**X Congreso de la Sociedad Española de Nutrición Comunitaria**

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## Foreword

### NOW IS THE FUTURE FOR PUBLIC HEALTH NUTRITION WORLDWIDE

I am very proud and honoured to write these lines presenting this first issue of a new Scientific Journal: International Journal of Community Nutrition that includes all the abstracts of the conferences, oral communications and posters presented during the III World Congress of Public Health Nutrition. This is a great and critical momentum to improve nutrition and health and the environment worldwide, enhanced by the increased understanding and commitment among a very wide range of stakeholders and interdisciplinary experts. Momentum started in 2006 in Barcelona, with the I World Congress of Public Health Nutrition, the first interdisciplinary encounter where public health professionals and nutritionists, including anthropologists, physicians, pharmacists, nurses, dietitians and sociologists, shared their knowledge and experience to build a new discipline in science.

Nutrition has many problems to face on a global level. The rise of obesity has been a rapidly growing issue with severe long-term consequences and in fact has prioritized the nutrition scenario in higher-income countries, where lower-income populations tend to present a greater risk. The economic constraints that these countries are facing, after decades of wealth and development, seem to have paradoxically increased these figures of overweight and obesity, which are in fact linked to poor nutrition. This is due to the reduced access to a balanced diet, the loss of traditional diets and/or lower access to physical activity. However, obesity has probably taken on too much protagonism and has diverted relevance away from other important conditions.

In a worldwide perspective, hunger and undernutrition continue being the most important challenges for public health nutrition. Chronic undernutrition constitutes the main nutritional problem as it is a key obstacle for development, and the window of opportunity for preventing the most critical consequences of stunting is very small: from conception to two years of age. Stunting at two years of age is associated with ill health (including infections), poorer school performance, and an increased risk of obesity, diabetes and other chronic diseases later in life. Economic analysis indicates the negative effects of poor nutrition in early life on the overall economic development of nations. Nutrition is therefore a first priority issue to reduce the gap of opportunities among children worldwide.

Prevention of undernutrition requires a nutritious diet. A balanced diet must satisfy the nutritional needs of almost all population groups but it requires a foundation of sustainable agriculture and basic disposable income. A limited access to a safe water supply is often a major barrier for a proper nutrition in developing countries. Solutions for undernutrition vary between those oriented to increase the intake and status of selected nutrients (iodine, vitamin A, Zinc), increase the consumption of targeted foods/food preparations or/and enhance the quality of the whole diet by means of sustainable agricultural and food policies. Only the combination of short term and long-term food and nutrition security policies will contribute to reduce stunting in developing countries as part of a sustainable process.

Many United Nations Agencies and NGOs are currently contributing to fight against undernutrition in developing countries in collaboration with national governments; and even if the role and scope of these different stakeholders seem defined, sometimes there is a need for better coordination of the different policies and programmes. The progress in reducing undernutrition usually requires strong governance systems and firm leadership. The empowerment of communities and particularly of their women to lead the nutrition activities in the field is a necessary step towards success. Advocacy is a key tool in the battle against malnutrition, and innovation can also play a role. Collaboration between public and private sectors has just begun to grow in the field of community nutrition: the potential opportunity for harnessing public-private collaboration exists in several forms, including developing food products and systems, scaling up effective nutrition solutions, providing sustainable cost-effective answers for information sharing, and conveying much-needed educational messages to consumers. Finally, the importance of continued prioritization and investment in high-quality research must not be neglected. Generating the best empirical evidence of what works better in what context is needed. Rather than trying to find conflicts of interest with the Private sector, we should try to find solutions of interest. More than 300 young researchers and practitioners have failed to join us these days in Las Palmas de Gran Canaria due to the lack of support from the public and private sector; why haven't certain food industry representatives supported such an important Conference as this? Where are those multinational firms that take pride in their support of nutrition internationally? I really thank those that have been supporting this important meeting, which has been very complicated to organize in times of economical constraints and international uncertainties. The solution for undernutrition calls for a way that we should walk together now; without delays and rhetoric. Without so many unexplainable refusals.

The III World Congress of Public Health Nutrition represents an important step to continue this way shared with many others and aims to coordinate our actions for better nutrition in a better World. I am very pleased to welcome all of you to this crucial event and I hope you enjoy these days of working together in Las Palmas de Gran Canaria, Spain, and a few months later in Banjul, The Gambia. The Ebola crisis is certainly not contributing to the progress against undernutrition; the figures of acute undernutrition in the areas most affected by the disease have risen around 25% and the impairment of the GNP will probably deteriorate these figures in the near future. The important meeting scheduled in Gambia just before the Congress in Gran Canaria has been postponed to April-May 2015. It was one of the most unpleasant decisions in my professional life. The organization and infrastructure there were very advanced and The Gambia has been Ebola-free until now. It was really not an objective reason to postpone the event, but the international opinion was so alarming and pessimistic about the Region that it forced us to make this decision.

I am also proud to announce this new integrative and rigorous Organization: The International Association of Community Nutrition (IACON) which will be constructing an international and interdisciplinary framework to coordinate evidence-based sustainable solutions for the most important nutrition related diseases and conditions worldwide. You are very welcome to join us. We need all of you.

Thank you for your active participation and valuable contribution.

**Lluís Serra-Majem, MD, PhD**  
*President,*  
*III World Congress of Public Health Nutrition*



## Sunday Nov 9th

18:00-18:30

SINFÓNICA **Official opening - Opening ceremony**

18:30-19:30

SINFÓNICA **Opening Lectures**  
CHAIR:  
*Lluís Serra-Majem, Spain*  
SPEAKERS:  
*Isatou Jallow, Italy*  
*Andrew Prentice, The Gambia*

19:30-20:00

SINFÓNICA **Welcome reception**

## Monday Nov 10th

08:00-10:00

SINFÓNICA **PLENARY SESSION**  
**The achievements in malnutrition**  
CHAIRS:  
*Benjamín Caballero, USA*  
*Hélène Delisle, Canada*  
SPEAKERS:  
*Irwin Rosenberg, USA*  
*Per Pinstrup-Andersen*  
*María Neira, Switzerland*  
*M.G. Venkatesh Mannar, Canada*  
*Alexandre Meybeck, Italy*

10:00-10:30 COFFEE BREAK

10:30-11:30

SINFÓNICA **PLENARY SESSION**  
**Hidden Hunger in the "First World" - how is economic crisis affecting undernutrition?**  
CHAIRS:  
*Carmen Pérez-Rodrigo, Spain*  
*Noel Solomons, Guatemala*  
SPEAKER:  
*Hans Konrad Biesalski, Germany*

11:30-13:00

SINFÓNICA **PLENARY SESSION**  
**Funding nutrition research in the 21st Century: sharing benefits from public private partnership in nutrition**  
CHAIRS:  
*Ángel Gil, Spain*  
*Laura Fernández, Belgium*  
SPEAKERS:  
*Massimo Massi-Benedetti, Italy*  
*Marta Neira, Switzerland*  
*Lynnette Neufeld, Switzerland*  
*Rhona Applebaum, USA*  
*Walter Willett, USA*

POLIVALENTE **PLENARY SESSION**  
**Cost Effectiveness of Market driven Fortification to address Hidden Hunger**  
CHAIRS:  
*Jörg Spieldecker, Switzerland*  
*Noel Solomons, Guatemala*  
SPEAKERS:  
*Andrew Prentice, The Gambia*  
*Patrick Detzel, Switzerland*  
*Simon Wieser, Switzerland*  
NESTLÉ RESEARCH CENTER

13:00-14:30 **LUNCH**  
**Cheese Tasting**  
*Antonio González Mendoza, Spain*

13:30-14:30

POLIVALENTE **TRIBUTE: JOSE M<sup>a</sup> BENGÓA**  
LEADERSHIP:  
*Javier Aranceta, Spain*  
*Lluís Serra-Majem, Spain*

14:30-16:30

POLIVALENTE **PARALLEL SYMPOSIA**  
**Towards the Expo Milan 2015: challenges for dietary patterns sustainability using the Mediterranean Diet as a case study**

WELCOME:  
*Lluís Serra-Majem, Spain*  
CHAIR:  
*Domenico Lacirignola*  
INTRODUCTION:  
*Sandro Dernini, Italy*  
*Roberto Capone, Italy*  
MODERATOR:  
*Alexandre Meybeck, Italy*  
SPEAKERS:  
*Elliot Berry, Jerusalem*  
*Antonia Trichopoulou, Athens*  
*Felice Adinolfi*  
*Xavier Medina, Spain*  
*Rekia Belahsen, Morocco*  
CIHEAM-BARI

CÁMARA

**PARALLEL SYMPOSIA**  
**Public-Private Partnerships: public nutrition services and private sector engagement - a conflict or reality?**

CHAIR:  
*Klaus Kraemer*  
SPEAKERS:  
*Eva Monterrosa*  
*Stefan Germann*  
*Saskia de Pee*  
*Ines Reinhard*  
*Shubha Jayaram*  
FACILITATOR:  
*Jane Badham*  
PANELISTS:  
*Mirrdyn Denizeau, Anthony Hehir, Samuel Kwame Ntim Adu*  
SIGHT AND LIFE, WORLD FOOD PROGRAMME

GRAN CANARIA

**SATELLITE SYMPOSIA**  
**Hydration and public health**

CHAIRS:  
*Ronald Maughan, UK*  
*Jane Holdsworth, UK*  
SPEAKERS:  
*Ahmed El-Sharkawy, UK*  
*Ronald Maughan, UK*  
*Ibrahim Elmadfa, Austria*  
*Maria Kapsokefalou, Athens*  
EUROPEAN HYDRATION INSTITUTE (EHI)

TENERIFE

**SATELLITE SYMPOSIA**  
**Risk factors for healthy aging: Insight from the CHANCES Project**

SPEAKERS:  
*Antonia Trichopoulou, Athens*  
*Ben Schöttker, Germany*  
*Martin Bobak, UK*  
*Mark O'Doherty, UK*  
*Christina Bamia, Greece*  
*Eugène Jansen, The Netherlands*  
CHANCES  
(CONSORTIUM ON HEALTH AND AGEING: NETWORK OF COHORTS IN EUROPE AND THE UNITED STATES)

16:30-17:00 COFFEE BREAK

17:00-19:00

POLIVALENTE **PARALLEL SYMPOSIA**  
**The value of multi-stakeholder initiatives against NCDs**

CHAIR:  
*Ricardo Uauy, Chile*  
SPEAKERS:  
*Jaap Seidell, The Netherlands*  
*Monique Raats, UK*  
*Ronit Endevelt, Israel*  
*Petra Dekker, The Netherlands*  
*Elizabeth Dunford, Australia*  
*Ricardo Uauy, Chile*  
CHOICES INTERNATIONAL

CÁMARA  
SESSION IN  
SPANISH  
**SATELLITE SYMPOSIA (SENC-SLAN)**  
**Las encuestas alimentarias y su impacto en acciones de promoción de la salud**  
MODERADORES:  
*Javier Aranceta Bartrina, España*  
*Gemma Salvador Castell, España*  
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*Gregorio Varela Moreiras, Spain*  
*Susana Socolovsky, Argentina*  
*María Nieves García-Casal, Venezuela*  
*Blanca Román Viñas, España*  
*Javier Aranceta Bartrina, España*  
THE COCA-COLA COMPANY

GRAN  
CANARIA  
**SATELLITE SYMPOSIA**  
**Yogurt: A daily partner for health**  
INTRODUCTION:  
*Andrew Prentice, The Gambia*  
*Luis Moreno, Spain*  
SPEAKERS:  
*Frans Kok, The Netherlands*  
*André Marette*  
*Luis Moreno, Spain*  
*Seppo Salminen, Finland*  
YOGURT IN NUTRITION - INITIATIVE FOR A BALANCED DIET

TENERIFE  
**PARALLEL SYMPOSIA**  
**Nuts in health and disease**  
CHAIR:  
*Jordi Salas Salvadó*  
SPEAKERS:  
*Jordi Salas Salvadó*  
*Joan Sabaté, USA*  
*Cyril Kendall, Canada*  
*Ying Bao, USA*  
INTERNATIONAL NUT AND DRIED FRUIT COUNCIL

ATLÁNTICO  
**Developmental Origins of Health and Disease (DOHaD) and its overarching relationship with nutrition in developing countries**  
CHAIR:  
*Rebecca Kanter, UK*  
SPEAKERS:  
*Sarah Kehoe, UK*  
*Sophie Moore, UK*  
*Matt Silver, UK*  
*Shane Norris, South Africa*  
CONCLUDING REMARKS:  
*Rebecca Kanter, UK*  
*Shane Norris, South Africa*  
DOHaD

19:00-20:00

POLIVALENTE **TRIBUTE: RAINER GROSS**  
CHAIR:  
*Noel Solomons, Guatemala*

## Tuesday Nov 11th

---

08:00-10:00

POLIVALENTE **PARALLEL SYMPOSIA**  
**Sugar in health and disease: need for a new threshold?**  
KEYNOTE:  
*Ángel Gil, Spain*  
SPEAKERS:  
*Carmen Gómez Candela, Spain*  
*Dolores Corella, Spain*  
*Jo Jewell, Switzerland*  
*John Stevenpiper, Canada*

CÁMARA  
**PARALLEL SYMPOSIA**  
**Community based actions - a shortcut to sustainable public health nutrition?**  
CHAIR:  
*Agneta Yngve, Sweden*  
SPEAKERS:  
*Agneta Yngve, Sweden*  
*L. Suzanne Suggs, Switzerland*  
*Bent Egberg Mikkelsen, Denmark*  
*Elva Gisladdottir, Iceland*

GRAN  
CANARIA  
**SATELLITE SYMPOSIA**  
**How can Phytase improve Public Health Nutrition**  
CHAIRS:  
*Richard F. Hurrell, Switzerland*  
*Barbara Troesch, Switzerland*  
SPEAKERS:  
*Saskia de Pee*  
*Richard Hurrell, Switzerland*  
*Damiet Koenders*  
*Olayiwola Adeola, USA*  
*Parul Christian, USA*  
DSM

TENERIFE  
SESSION IN  
SPANISH  
**PARALLEL SYMPOSIA**  
**Programas de alimentación escolar sustentables**  
CHAIRS:  
*Betzabeth Slater Villar, Brasil*  
*Carmen Pérez-Rodrigo, España*  
SPEAKERS:  
*Betzabeth Slater Villar, Brasil*  
*Claudia Andrea Rodriguez Mora, Brasil*  
*Flavia Schwartzman, Brasil*

ATLÁNTICO  
**SATELLITE SYMPOSIA**  
**Immunonutrition**  
CHAIR:  
*Ascensión Marcos, Spain*  
SPEAKERS:  
*Mauro Serafini, Croatia*  
*Ibrahim Elmadfa, Austria*  
*Ascensión Marcos, Spain*  
*J. Alfredo Martínez, Spain*

10:00-10:30 COFFEE BREAK

10:30-12:30

POLIVALENTE **PARALLEL SYMPOSIA**  
**Assessment of body composition for better understanding of infant, child and adolescent malnutrition**  
CHAIR:  
*Benjamín Caballero, USA*  
SPEAKERS:  
*Christine Slater, Austria*  
*Shane Norris, South Africa*  
*Victor Owino, Kenya*  
*Florencia Vasta, USA*  
*Christine Slater, Austria*

CÁMARA  
**PARALLEL SYMPOSIA**  
**Food systems sustainability: food security and nutrition**  
CHAIR:  
*Lluis Serra-Majem, Spain*  
KEYNOTE ADDRESS:  
*Per Pinstrup-Andersen*  
SPEAKERS:  
*Parviz Koohafkan*  
*Isatou Jallow, Italy*  
*Elliot Berry, Jerusalem*  
*Alexandre Meybeck, Italy*  
FAO

GRAN  
CANARIA

**SATELLITE SYMPOSIA**  
**Effectiveness and safety of low and non  
calorie sweeteners revisited**

CHAIRS:

*Pilar Riobó, Spain*  
*Adam Drewnowski, USA*

SPEAKERS:

*Arturo Anadón, Spain*  
*Carlo La Vecchia, Italy*  
*Walter Willett, USA*  
*Adam Drewnowski, USA*

FIN (FUNDACIÓN PARA LA INVESTIGACIÓN NUTRICIONAL)  
- ISA (INTERNATIONAL SWEETENERS ASSOCIATION)

TENERIFE

**PARALLEL SYMPOSIA**  
**Folate-preventable congenital anomalies:  
using the WHO research strategy to guide  
effective actions in public health**

SPEAKERS:

*Luz Maria De-Regil*  
*Elizabeth Tejero*  
*Juan Pablo Peña-Rosas*  
*Lisa Rogers*

WHO / CDC

ATLÁNTICO

SESSION IN  
FRENCH

**PARALLEL SYMPOSIA**  
**Repenser la formation universitaire en  
nutrition en Afrique**

INTRODUCTION:

*Hélène Delisle, Canada*

SPEAKERS:

*Roger Sođjinou*  
*AG Iknane Akory*  
*Gaëlle Julien, France*  
*Cheikh M.H. Dehah, Mauritania*  
*Hélène Delisle, Canada*

**12:30-14:00** LUNCH

**13:30-16:30**

POLIVALENTE

**ORAL COMMUNICATIONS**

MODERATORS:

*Helmut Schröder, Spain*  
*Monique Raats, UK*

- Sodium intake is associated with higher blood pressure in children of 4-5 years old. *Valera-Gran D., Navarrete-Muñoz EM., Garcia de la Hera M., Rodríguez-Bernal CL., Ballester E., Vioque J.*
- Body fat and inflammation in Cuban school children. *Hernández-Triana M, Ruiz-Álvarez V, Díaz-Sánchez ME, Viera-Cosiñol C, Hernández-Hernández H, Pita-Rodríguez G*
- Antenatal and Early Infant Predictors of Postnatal Growth in Rural Vietnam: A Prospective Cohort Study. *Hanieh S, Tran T.H, Simpson J.A, Tran T.D, Fisher J., Biggs B.A.*
- National Prevalence of Overweight and Obesity among adolescents: I.R.IRAN, Trends of 2001-2012. *Pouraram H1, Siassi F, Mohammad K, Djazayeri A, Dorosty AR, Abdollahi Z*
- The effect of malnutrition on the sensory motor development among children from 8 to 24 months, in Mayahi District, Maradi Region, Niger. *Rivero Ea, Aboubacar Mb, Charles Pa*
- The Effect of Daily Vitamin B12 and Folic acid Supplementation on Growth in 6-30 Month Old Children in India: A Randomized Controlled Trial. *Tor A Strand, Sunita Taneja, Tivendra Kumar, Mari S Manger, Helga Refsum, Chittaranjan S Yajnik, and Nita Bhandari*
- Effect of n-6 and n-3 polyunsaturated fatty acids intake at 4 years old on body fat patterns at 7 years old in the Generation XXI birth cohort. *Santos S., Lopes C., Oliveira A.*
- Obesity, physical inactivity, and homeostasis model assessment (HOMA) as predictors for prediabetes among Egyptian adolescents. *Nibal A. A., Dina I. S., Awatif A.A., and Mervat A. I.*
- The effect of socioeconomic and biological factors on infants' weight gain: Brazilian Demographic and Health Survey - 2006/07. *Silveira JA, Colugnati FA, Poblacion AP, Taddei JA*
- Dietary patterns and overweight among 4-years-old children. *Durão C., Severo M., Oliveira A., Moreira P., Guerra A., Lopes C.*
- Impact of underweight on pneumonia mortality in children: results from a twelve years national database in Malawi and a systematic review of literature. *Sonego M., Pellegrin M.C., Seward N., Lazzarini M.*
- Dyslipidemia and lifestyle in children in anti-retroviral treatment. *Sonego M., Sagrado M.J., Rivas E., Escobar G., Martin-Cañavate R., Custodio E.*
- The contribution of yellow cassava to nutrient adequacy of primary school children; the use of linear programming. *Talsma E.F, Borgonjen-van den Berg K.J, Melse-Boonstra A, Ferguson E.L, Kok F.J, Brouwer I.D.*

## MODERATORS:

*Maira Bes-Rastrollo, Spain*  
*Inmaculada Bautista, Spain*

- Greenhouse gas emission of diets in the Netherlands and associations with food, energy and macronutrient intakes. *Temme EHM, Toxopeus IB, Kramer GFH, Brosens MCC, Drijvers JMM, Tyszler M, Ocké MC*
- Intrapersonal, social-environmental, and physical-environmental factors which predict healthy eating practices in Dutch adults. *Swan, E, Bouwman, L, Hiddink, GJ PhD, Aarts, N PhD, Koelen, M PhD*
- Manoeuvring between health benefits and health losses by following or neglecting dietary guidelines: where do we stand?. *Van Raaij J.M.A., Büchner F.L., van Duijnhoven F.J.B., Hoogenveen R.T., Toxopeus I., Hoekstra J.*
- Food-choice behavior and coping strategies to deal with food insecurity in low-income Portuguese families: the preliminary results of an exploratory study. *Gregório MJ, Nogueira PJ, Graça P*
- Early eating behaviours in relation to fruit and vegetable intake and a healthy diet variety score at 4-5 years of age – a prospective analysis in three European birth cohorts. *Lopes C., Oliveira A., Jones L., Lauzon-Guillain B., Emmett P, Charles M.A.*
- Race is associated with obesity independent of socioeconomic status among Brazilian adults: 2008–2009 Household Budget Survey. *Araujo M.C., Baltar V.T., Souza B.S.N, Rodrigues P.R.M., Yokoo E.M., Sichieri R.*
- The burden of obesity in the population of Cape Verde using different anthropometric approaches. *Semedo MRS, Barros H*
- Soy Supplementation: Objective & Subjective Health Markers in Preschool Children in Bukoba, Tanzania. *Singh, N*
- The Determinants of Diet and Physical Activity (DEDIPAC) Knowledge Hub. *Lakerveld J, van der Ploeg H., van 't Veer P, Lien, N., De Bourdeaudhuij I., Brug J. - On behalf of the DEDIPAC Consortium*
- Trans fatty acids in Europe: where do we stand?. *Mouratidou T, Livaniou A, Saborido CM, Wollgast J, Caldeira S*
- Associations between FTO variants and energy intake in adults : a systematic review and meta-analysis. *Livingstone K.M., Celis-Morales C., Lara J., Ashor A., Mathers J.C., on behalf of Food4Me Study*
- Sizing it up: Adherence to the Mediterranean Diet and anthropometric and financial measures of the MEDIS study elderly. *Piscopo S., Polychronopoulos E., Panagiotakos DB., for the MEDIS study investigators*
- Environmental relevance of human nutrition. *Efkes S, Strassner C*
- Vitamin A stability in Nigerian retailed flour and fortification compliance level. *Uchendu F, Atinmo T.*

## MODERATORS:

*Jesús Vioque, Spain*  
*Itandehui Castro, Spain*

- Local vs. Global food chain performance in Denmark. *Nymand-Grarup A., Perez-Cueto FJA.*
- An evaluation of the effects of Food and Health Dialogue targets on the salt content of bread, breakfast cereals, and processed meats. *Trevena H., Wu J., Dunford E., Neal B*
- Validation of a picture book used to estimate food portion to be used in dietary surveys. *Vilela S., Severo M., Guiomar S., Rodrigues T., Lopes C., Torres D.*
- Standardisation of food selection for portion sizes quantification using photos in pan-Latin American dietary monitoring surveys: Report from Brazil. *Crispim S.P., Fisberg R.M., Nicolas G., Knaze V., Bel-Serrat S., Slimani N.*
- Olive leaf extract favourably modifies cardiovascular risk markers. *Lockyer, S, Yaqoob, P, Spencer, J.P.E, Stonehouse, W, Rowland, I*
- The effect of timing of iron supplementation on iron absorption and haemoglobin in post-malaria anaemia: a longitudinal stable isotope study in Malawian toddlers. *Glinz D., Phiri K., Kamiyango M., Zimmermann M.B., Hurrell R.F., Wegmüller R.*
- Greenhouse gas emissions from production of foods for the American diet. *Rose D.; Storck K.*
- Thermic effect, substrate oxidation, and satiety sensation of fish and chicken protein-based diets in middle-aged women. *Tsani AFA., Son HR., Kim EK.*
- EMBRACE-ME BOWL: An assessment of a new plate-ware designed to improve nutrition and commensality. *Virgen Castro DJ., Souza BSN., Santos Q., Perez-Cueto FJA.*
- Photo voice - a powerful tool for mapping the obesity facilitators in the Arab Israeli women population. *Adler D., Saliva S., Abed El Razic M., Harari R.*
- The precarious livelihood in waste dumps: a report on food insecurity and health risk environmental factors among Brazilian recyclable waste collectors. *Wallace S., Santos LMP, Hoefel MGL., Gubert MB., Carneiro FF, Nogueira TQ, Amate EM.*
- The effect of iron-fortified complementary food and intermittent preventive treatment of malaria on anaemia in young children: a 2x2 randomized controlled intervention trial. *Glinz D., Wegmüller R., Zimmermann M.B., Brittenham G.M., N'Goran E.K., Hurrell R.F.*
- Incentivising healthier vending options using price discounting: a multi-centre study in central Scotland. *Mooney J.D., Anderson A.S., Graham T., Frank J.*
- Effectiveness of eHealth tailored interventions in achieving weight loss and reducing central obesity in adults: a systematic review and meta-analysis of randomised controlled trials. *Celis-Morales C., Livingstone K., Abraham S., Lara J., Ashor A., Mathers J., on behalf of the Food4Me Study*

14:00-16:30

TENERIFE

**COMUNICACIONES ORALES (SENC-SLAN-GLANC)**

MODERADORES:

*Rosa María Ortega, Universidad Complutense de Madrid, España*  
*Patricia Henríquez, Universidad de Las Palmas de Gran Canaria, España*

- Nutrientes de Aloe vera. Eliminación de la aloína. *Zeni R., Toledo Marante F. J., Toledo Mediavilla J. A.*
- Diversidad alimentaria y su asociación con el retraso del crecimiento en niños de 6-23 meses. Perú, 2008-2010. *Aramburú A.*
- Consumo de calcio en embarazadas puérperas en un Sanatorio privado de la Ciudad de Buenos Aires, Argentina. *García S., Boretti Y., Casalta F., Chirico L., Leal M., Carrazana C., Lavanda I.*
- ¿Desigualdad en la Educación Física Chilena? Diferencias en intensidad y actividad física total en escuelas de distinto nivel socioeconómico. *Cerda Rioseco Ricardo*
- Influencia de una intervención nutricional a través de una dieta individualizada sobre el control de la diabetes gestacional en mujeres embarazadas que acuden al Hospital de Clínicas. *Arguello RI, Cáceres ME, Alsina S, Bueno ED, Noguera SD, Planas MB, Romero Aufeld MJ, Figueredo-Grijalba R*
- Asociación entre el índice de masa corporal pregestacional y patologías durante el embarazo. *Silva del Valle MA., Sánchez Villegas A., Serra-Majem L.*
- Proyecto "BCN Comparteix El Menjar": Implementación de una red de aprovechamiento de alimentos elaborados excedentes del sector de la hostelería en la ciudad de Barcelona. *Vidal M, Milà R, Homs C, Martín J, Giménez D, Salvador G, Serra-Majem L*
- Proyecto "Piecitos Colorados": evaluación de la implantación de una intervención educativa y nutricional en escuelas de América Latina. *Milà R, Sampedro I, Duran R, Homs C, Martín J, Vidal M, Serra-Majem L*
- Evaluación del programa "Seis pasos hacia la salud del niño escolar" en el estado de Querétaro, México. *Arellano Jiménez María del Rocío, Rangel Peniche Diana Beatriz, Hernández Gómez Roxana Gabriela, Campos Juárez Rodrigo, Suárez Lira Karen Guadalupe, Caamaño María del Carmen*
- Costo- Eficiencia de la implementación de la dieta mediterránea en un hospital. *Duchateau M, Llorens R, Arriaga M, González T, Zander T, Cabrera Y, Navarro R, Maynar M*
- KIDMED. Prevalencia de la baja adherencia a la Dieta Mediterránea en niños y adolescentes. *García Cabrera S, Herrera Fernández N, Rodríguez Hernández C, Nissensohn M, Serra-Majem L*
- Influencia de la adherencia a la dieta Mediterránea en el estado de salud autopercebido en población joven. *Barrios R., Navarrete Muñoz EM., García de la Hera M., Gonzalez-Palacios S., Valera-Gran D., Vioque J*

14:00-16:00

ATLÁNTICO

SESSION IN  
SPANISH

**PARALLEL SYMPOSIA**

**Nutrición fetal y desarrollo neuroconductual del niño**

CHAIR:

*Mabel Carrera, Argentina*

SPEAKERS:

*Cristina Campoy, España*

*Victoria Arijá, España*

*Jordi Julvez, España*

SOCIEDAD ESPAÑOLA DE NUTRICIÓN COMUNITARIA

16:30-17:00

COFFEE BREAK

17:00-19:00

POLIVALENTE

**SATELLITE SYMPOSIA**

**Energy balance as a public health drive**

MODERATORS:

*J. Alfredo Martínez, Spain*

*Gregorio Varela Moreiras, Spain*

SPEAKERS:

*Gregorio Varela Moreiras, Spain*

*Dolores Corella, Spain*

*Eva Negri, Italy*

*Gregory Hand, USA*

THE COCA-COLA COMPANY

CÁMARA

SESSION IN  
SPANISH

**PARALLEL SYMPOSIA**

**Pobreza y malnutrición en Latinoamérica: desnutrición y obesidad Infantil**

CHAIRS:

*Luis Peña, Spain*

*Reynaldo Martorell, USA*

SPEAKERS:

*Arturo Jiménez Cruz, México*

*Montserrat Bacardí Gascón, México*

*Miriam Bertran Vilá, México*

*Abel Albino, Argentina*

GRAN  
CANARIA

**SATELLITE SYMPOSIA**

**Vitamin E – new emerging data, the way forward**

SPEAKERS:

*Manfred Eggersdorfer, Switzerland*

*Peter Weber, Switzerland*

*Szabolcs Péter, Switzerland*

*Maurice W. Dysken, USA*

*Keith P. West, USA*

DSM

TENERIFE

**SATELLITE SYMPOSIA**

**The challenges of interventions against micronutrient deficiency**

CHAIRS:

*Lynnette Neufeld, Switzerland*

*Rekia Belahsen, Morocco*

SPEAKERS:

*Juan Pablo Peña-Rosas*

*Luz María De-Regil*

*Lynnette Neufeld, Switzerland*

*Christine Hotz, Canada*

*Izzeldin Hussein, OMAN & UK*

*Reina Engle-Stone, USA*

GAIN (GLOBAL ALLIANCE FOR IMPROVED NUTRITION)

ATLÁNTICO

SESSION IN  
SPANISH

**SATELLITE SYMPOSIA**

**Educación y cuidados en nutrición**

CHAIR:

*Tensy Calero Fabelo, España*

SPEAKERS:

*Carmen Martín Salinas, España*

*Ana Domínguez Maeso, España*

*Marina Francés Pinilla, España*

*Mari Lourdes de Torres Aured*

VEGENAT

20:30

**OFFICIAL DINNER,  
Hotel Santa Catalina**

## Wednesday Nov 12th

08:00-10:00

POLIVALENTE

### PARALLEL SYMPOSIA

#### Reaching the unreached: determinants of access to health care and nutrition interventions

CHAIR:

*Luz María De-Regil*

SPEAKERS:

*Gerardo Zamora*

*Juan Pablo Peña-Rosas*

*Jacqueline Kung'u*

*Daniel Albrecht*

*Theary Chan, Cambodia*

WHO/MI

CÁMARA

### PARALLEL SYMPOSIA

#### Choice architecture (nudging) and public health nutrition

CHAIR:

*Armando Pérez-Cueto, Copenhagen*

SPEAKERS:

*Armando Pérez-Cueto, Copenhagen*

*Laurits Rhoden Skov, Copenhagen*

*Trine Nørnberg, Copenhagen*

*Rasmus Friis, Copenhagen*

*Louise Houlby, Copenhagen*

*Laurits Rohden Skov, Copenhagen*

GRAN

CANARIA

### PARALLEL SYMPOSIA

#### The challenges and opportunities of hydration research

CHAIRS:

*Mariela Nissensohn, Spain*

*Ronald Maughan, UK*

SPEAKERS:

*María José Soto, Guatemala*

*Agata Bialecka, Poland*

*Ahmed El-Sharkawy, UK*

*Marianna Frangeskou, UK and Spain*

TENERIFE

### PARALLEL SYMPOSIA

#### Connecting the dots: a global leadership movement for a healthy world

CHAIRS:

*Lluís Serra-Majem, Spain*

*Maria Kapsokefalou, Greece*

SPEAKERS:

*Umi Fahmida, Jakarta*

*Jane Badham, South Africa*

*Simone Frey*

*Karl Raats*

ATLÁNTICO

### ORAL COMMUNICATIONS

MODERATORS:

*Miguel Ángel Martínez, Spain*

*Ramón Estruch, Spain*

- Study of the Effect of Turmeric on Glycemic Status, Lipid Profile, Total Antioxidant Capacity and hs-CRP in Hyperlipidemic Type 2 Diabetes Mellitus Patients. *Eghetesadi S, Adab Z, Vafa M, Heidari I, Shojaei A, Eghetesadi M, Haqqani H*
- Fruit and vegetable consumption and mortality in Eastern Europe. *Stefler D, Pajak A, Maljutina S, Kubinova R., Bobak M.*
- The APOB insertion/deletion polymorphism (rs17240441) influences the postprandial triacylglycerol and insulin response in healthy Caucasian adults – insights from the DISRUPT cohort. *Vimal K.S., Gill R., Minihane A.M., Lovegrove J.A., Williams C.M., Jackson KG, Yue Li*
- Reducing our Environmental Footprint and improving our Health: Greenhouse Gas Emission and Land Use of Usual Diet and Mortality in EPIC-NL. *Biesbroek S., Bueno-de-Mesquita H.B., Peeters P.H.M., Verschuren W.M.M., van der Schouw Y.T., Kramer G.F.H., Tyszler M., Temme E.H.M.*
- Adiposity has a greater impact on hypertension in lean than not-lean populations: a systematic review and meta-analysis. *Arabshahi S., Busingye D., Subasinghe A. K., Evans R. G., Riddell M., Thrift A. G.*
- Association of selenium status and selenoprotein gene variation with colorectal cancer risk. *Hughes DJ., Fedirko V, Méplan C., Schomburg L., Freisling H., Riboli E., Hesketh J., Jenab M. (on behalf of EPIC Group)*
- Effect of pomegranate extract consumption on CVD risk factors, stress and quality of life in human volunteers - a double-blind, randomised, placebo-controlled trial. *Stockton A.E.V; Al-Dujaili E.A.S; Drummond S. and Davidson I.*
- Life-course dietary patterns and type 2 diabetes by Silvia Pastorino. *Pastorino S., Richards M., Pierce M., Ambrosini G.L*
- Soft drink, and juice and nectar consumption and risk of pancreatic cancer in the European Prospective Investigation into Cancer and Nutrition. *Navarrete-Muñoz EM., Wark PA., Romaguera D., Bhoo-Pathy N., Molina-Montes E., Bueno-de-Mesquita H.B(as), on behalf of EPIC investigators*
- Mediterranean Diet and Invasive Breast Cancer Risk in the PREDIMED trial. *Toledo E, Salas-Salvadó J, Corella D, Fitó M, Estruch R, Martínez-González MA for the PREDIMED investigators*
- Association between dietary intakes of polychlorinated biphenyls (PCBs) and the incidence of hypertension in a Spanish cohort: the SUN Project. *Donat-Vargas C., Gea A., Sayon-Orea C., De la Fuente C., Martínez-González MA., Bes-Rastrollo M.*

10:00-10:30 COFFEE BREAK

10:30-12:30

POLIVALENTE

### SATELLITE SYMPOSIA

#### Public health challenges related to nutrition: the physical activity perspective

CHAIR:

*Marcela González Gross, Spain*

SPEAKERS:

*José Antonio López Calbet, Spain*

*Steven N. Blair, USA*

*Marcela González Gross, Spain*

THE COCA-COLA COMPANY

CÁMARA

### SATELLITE SYMPOSIA

#### Under and over nutrition in children: status and approaches to prevention

CHAIR:

*Ángel Gil, President, Spain*

SPEAKERS:

*Benjamín Caballero, USA*

*Jean-Michel Borys, France*

*Kathleen Reidy, USA*

NESTLÉ NUTRITION INSTITUTE

GRAN  
CANARIA

**SATELLITE SYMPOSIA**

**Finding opportunities for enhancing research quality and impact, and reducing waste in public health nutrition**

CHAIRS:

*Roos Verstraeten, Belgium*

*Laura Fernández, Belgium*

SPEAKERS:

*Jaap Seidell, The Netherlands*

*Patrick Kolsteren, Belgium*

*Karl Raats*

TENERIFE

**PARALLEL SYMPOSIA**

**Nutrition, mental health and quality of life**

CHAIR:

*Almudena Sánchez-Villegas, Spain*

SPEAKERS:

*Tasnime Akbaraly, UK*

*Alfredo Gea, Spain*

*Cristina Ruano, Spain*

*Anu Ruusunen, Finland*

ATLÁNTICO

**ORAL COMMUNICATIONS**

MODERATORS:

*Susana Socolovsky, Argentina*

*Carmen Pérez-Rodrigo, Spain*

- Investigation of the nutritional status of children and the nutrition knowledge of child and youth care workers in residential care settings in Durban, South Africa. *Grobbelaar H., Napier C., Oldewage-Theron W.*
- Lead and cadmium in maternal blood and placenta in pregnant women from a mining-smelting zone of Peru and transfer of these metals to their newborns. *Castro J, López de Romaña D, Bedregal P, López de Romaña G, Chirinos D*
- Maternal knowledge and practices of exclusive breast feeding and anthropometric indices of their infants in southeast Nigeria. *Ibeanu V. N., Uchenna S. C.*
- Nutritional status and risk factors for malnutrition among preschool-age children in São Tomé and Príncipe. *Silva D, Valente A, Dias C, Almeida F, Cruz JL, Neves E, Almeida MD, Caldas-Afonso A, Guerra A, and Study Group*
- Is dietary diversity associated with biomarkers of micronutrient status among non-pregnant adolescent Mozambican girls in two different seasons? *Korkalo L., Erkkola M., Heinonen A., Freese R., Selvester K., Mutanen M.*
- Community health workers prevent harmful infant feeding and caring practices among mothers of children under 2 in Palestine. *Al-Rabaadi H*
- Nutritional Status of Primary Schools Children in the Oio and Cacheu Region in Guinea-Bissau. *Schlossman N. P., Batra P., Balan E., Coglianese N., Wood L., Santoso M. V., Pruzensky W., Saltzman E., Roberts S. B.*
- Dietary patterns associated with socio-economic status in HIV-infected Salvadorian children. *Martin-Cañavate R., Sonogo M., Sagrado M.J., Escobar G., Rivas E., Custodio E.*
- School Nutrition Pilot in rural and urban Bangladesh: evaluation of nutritional and cognitive effects. *Rifat Afroze, Avonti Basak Tukun, Zakir Akanda, Julian Wolfson, Greg Garrett, Eline Korenromp, Rebecca Spohrer*
- School based malaria clearance in Mali: impact on anemia and cognition. *Diarra S., Roschnik N., Clarke S., Rouhani S., Bamadio M., Sacko M.*
- The provision of a free school meal in underprivileged areas of Greece. *Petralias A., Lykou A., Veloudaki A., Haviaris A., Zota D., Papadimitriou E., Linos A.*

12:30-13:30

POLIVALENTE

**DEBATE**

**Taxing foods as public health measure**

MODERATOR:

*Beatriz González López-Valcárcel, Spain*

SPEAKERS:

*Guillem López Casasnovas, Spain*

*Nathan Tefft, USA*

CÁMARA

**DEBATE**

**Experiments or observations?**

MODERATOR:

*Miguel Ángel Martínez, Spain*

SPEAKERS:

*Joan Sabaté, USA*

*Walter Willett, USA*

GRAN  
CANARIA

**DEBATE**

**Wine versus beer**

MODERATOR:

*Adam Drewnowski, USA*

SPEAKERS:

*Henk F.J. Hendriks, Netherlands*

*Ramón Estruch, Spain*

CENTRO DE INFORMACIÓN CERVEZA Y SALUD

TENERIFE

**SATELLITE SYMPOSIA**

**Vitaminas, hueso y salud pública**

CHAIRS:

*Rosa María Ortega Anta, España*

*Vanessa Díaz González, España*

SPEAKERS:

*Manuel Sosa Henríquez, España*

*Mónica Bulló, España*

INSTITUTO PULEVA DE NUTRICIÓN

13:30-14:30

SINFÓNICA

**TRIBUTE: NEVIN SCRIMSHAW**

LEADERSHIP:

*Ricardo Uauy, Chile*

*Irwin Rosenberg, USA*

13:30-14:30

LUNCH

14:30-15:30

SINFÓNICA

**BEST FIVE ORAL COMMUNICATIONS**

MODERATORS:

*Rita Wegmüller, The Gambia*

*Almudena Sánchez-Villegas, Spain*

- The need for global partnership in encouraging the production and utilization of traditional crops, a perfect way of combating malnutrition. *Adedotun. J. Owolabi*
- Healthy diet indicator score and metabolic syndrome in the Czech Republic, Russia, and Poland: cross-sectional findings from the Health, Alcohol, and Psychosocial factors in Eastern Europe study. *Huangfu P., Peasey A., Pikhart H.*
- Nutrient patterns and prospective weight change in adults from 10 European countries: results from the EPIC-PANACEA study. *Freisling H, Pisa PT, Moskal A, Ferrari P, Byrnes G, Slimani N, on behalf of the EPIC-PANACEA collaborators*
- Ten year change in individual monetary diet cost predicts changes in diet quality and weight development in Spaniards. *Schröder H., Serra-Majem L., Funtikova A., Gomez SF, Fito M., Elosua R.*
- Focused ethnographic Study on Infant and Young Child Feeding Behaviors, Beliefs, Contexts and Environments in three Arid and Semi Arid counties in Kenya. *Faith M. Thuita, Gretel H. Pelto*

**15:30-17:00**

SINFÓNICA

**PLENARY SESSION**

**Nutrition research in the new era**

CHAIRS:

*Ángel Gil, Spain*

*Lluís Serra-Majem, Spain*

SPEAKERS:

*Reynaldo Martorell, USA*

*Martin Binks, USA*

*Lorraine Brennan, Ireland*

*Ángel Gil, Spain*

*Andrew Prentice, The Gambia*

**17:00-18:00**

SINFÓNICA

**CLOSING CEREMONY**

CLOSING LECTURE:

**Celebrating 20 years of the Nutrition  
Leadership Programmes**

CHAIR:

*Noel Solomons, Guatemala*

SPEAKER:

*Jean-Michel Antoine, France*

**18:00-18:45**

SINFÓNICA

**CLOSING CEREMONY**

CLOSING LECTURE:

**The Role of Food and Nutrition in Space  
Exploration**

CHAIRS:

*Jose Ramón Calvo Fernández, Spain*

*Lluís Serra-Majem, Spain*

SPEAKER:

*Ellen Baker, USA*

HOSPITALES SAN ROQUE

## SPEAKER ABSTRACTS

### Nutrition research and development in Africa

Prentice A.M.

MRC International Nutrition Group, London School of Hygiene & Tropical Medicine, Keppel Street, London, WC1E 7HT & MRC Keneba, The Gambia

It can legitimately be asked whether Africa requires any more nutrition research in order to reach its full development potential. Or do we simply need to effectively implement what is already known? The second parsimonious 'straight to intervention' route has much in its favour for certain nutritional challenges and has been highly effective for iodine and vitamin A. But for other challenges with significant public health implications there are still gaping holes in our basic understanding of the causes, consequences and solutions to diet-related diseases. The potential discovery space remains vast and we now have powerful new investigative tools with which to attack old problems. New knowledge in these fields can accelerate the path to translation. Such challenges often require 'big science' collaborations across multiple institutions worldwide, and this generates rich opportunities for African scientists. Africa is home to problems searching for a solution. Technologically advanced nations frequently have solutions looking for problems. The astute fusion of these two ends of the spectrum can be mutually beneficial in generating research funds and driving education, training and discovery. The American scientist with next-generation methods for conducting single cell metabolomics requires training in the ethics and practicalities of conducting clinical studies in the African bush just as much as the reverse. For Africa to succeed in nutrition research we first need to recruit the finest minds with an appetite for discovery science. Physicians, molecular biologists, geneticists, behavioural scientists, computer programmers, mathematicians and more will all be welcomed to our field. Horizontal acquisition of intellectual input from these specialities will enrich our discipline. Second we need to maintain the centre of gravity in Africa itself, or at least with a healthy equipoise. Africa must not be a research hotel and must negotiate equal partnerships in nutrition research. This requires the strengthening of indigenous institutions at all levels of competencies, and especially in financial management so that grant-giving bodies can have confidence in disbursing funds directly to African universities and institutes, rather than channelling them through Western partners. Africa has enormous untapped potential for nutrition research. The future will be bright.

### Food Security Improvements.

Pinstrup-Andersen P.

Cornell University and University of Copenhagen. High Level Panel of Experts on Food Security (HLPE).

There are no reliable estimates of global household-level food insecurity, when using the FAO definition of lack of access to a healthy and nutritious diet. Proxies include FAO's estimates of undernourishment and various indices such as IFPRI's hunger index and EIU's food security index. These proxies indicate a very slow rate of improvement during the last 25 years and significant variation among countries, with China accounting for a very large share of the improvements. However, even if these proxies provide reliable estimates of dietary energy intakes (they do not attempt to estimate access), they all but ignore nutrient intakes, overweight and obesity. They also ignore the very rapid dietary changes currently occurring in most developing countries. Thus, the overall nutritional status of the world population has clearly deteriorated if measured as the number of people who suffer from one or more of the three burdens of malnutrition: calorie deficiencies, nutrient deficiencies, and overweight and obesity. This would be case both globally and for developing countries. There is a need for new and improved metrics to measure progress to achieve good nutrition for all. As the prevalence of overweight and obesity increases rapidly in both developing and developed countries and widespread micro-nutrient deficiencies continues, merely relying on existing metrics is insufficient to guide future action. A number of alternative metrics have been proposed but none has been scaled up to the global level. It is critically important that appropriate metrics be agreed upon and included in the post-2015 development goals.

### The achievements in Malnutrition Micronutrient Malnutrition.

Venkatesh Mannar M.G.

University of Toronto, Canada.

The knowledge and solutions needed to effectively alleviate micronutrient deficiencies and malnutrition more broadly is ready to be applied at a very low cost. Over the past decade there has been significant progress in addressing deficiencies in micronutrients such as iodine, iron,

zinc, folic acid and vitamin A in many regions of the world. The Copenhagen Panel of Economists has repeatedly ranked micronutrient interventions among the most cost effective development initiatives. There have also been significant efforts to raise awareness and accelerate action through the Scaling up Nutrition (SUN) movement. This paper traces the progress made over the past decade to address widespread deficiencies – primarily through salt iodization to address iodine deficiency, administration of high-dose vitamin A capsules to children 6 months – 5 years old, fortification of cereal flours to correct iron and folate deficiencies. Zinc treatment of diarrhea along with oral rehydration therapy is also emerging as a major intervention to treat diarrhea and reduce infant mortality. The paper stresses that these efforts need to be significantly accelerated and expanded through coordinated multisectoral efforts in order to enable all people to reach their full development potential that would support the achievement of the millennium development goals to eradicate extreme poverty, improve maternal health and significantly reduce child mortality.

### Sustainable Food Systems for Food Security and Nutrition

Meybeck A.

FAO, Agriculture and Protection of Consumer Department, Rome.

As the world is debating the post 2015 development agenda it is important to assess what has been achieved in terms of food security and nutrition and to look ahead to measure what has still to be done and the challenges to address. Considerable progress has been. 63 countries have achieved the Millennium Development Goal of halving the percentage of their population who are undernourished. But there are still 805 million undernourished persons worldwide. It is less than in 1990; it is still unacceptable. And there are still 2 billion persons malnourished, lacking essential micronutrients. At the same time the number of overweight and obese is increasing. There are now 1.4 billion overweight worldwide. Food systems will also be confronted to considerable challenges in the future. Population growth and changing diets towards more animal products are driving demand growth, estimated by FAO at + 60% towards 2050, increasing pressure on natural resources, which are also impacted by competition for other uses and by climate change. Urbanization and globalization are profoundly modifying the organization of food systems; which in turn impact the way food is consumed, diets and nutrition. Such challenges call, more than ever, for sustainable food systems, which, as defined by the HLPE, "deliver food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised". It requires to better integrate nutrition concerns in agricultural, food, and related policies and actions. This is why FAO and WHO are organizing in Rome this month ICN 2, the second International Conference on Nutrition.

### Hidden hunger in the "First World" – how is economic crisis affecting undernutrition?

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Hidden hunger is hidden in two ways: 1. because this type of hunger, even despite a full stomach, develops without typical clinical signs or symptoms and 2. due to missing public and political awareness. Hidden Hunger is responsible for impaired childhood development, high maternal mortality and at least for millions of death in children before the age of five. Hidden hunger describes chronic inadequate supply with essential micronutrients through the diet. In particular vitamin A, iron, zinc, iodine and folate. Further essential micronutrients might be absent in the diet but those mentioned above contribute to the majority of cases worldwide: 2 Billion worldwide suffer from iron deficiency, one billion from iodine- and zinc- and 0.2-0.5 billion from vitamin A deficiency. Young females, pregnant women and children aged 1-5 years are primarily affected from hidden hunger. They are placed on a hunger carousel, which they cannot leave, by their own. Hidden hunger during pregnancy results in inadequate supply of the growing child and has a negative impact on early development. Iodine deficiency during pregnancy may result in severe cognitive impairment and deafness. Folate deficiency results in neural tube defects and vitamin A deficiency in different malformations and impaired lung function. Malnutrition during the 1000 days, from conception to the end of the second year of life results in stunting (reduced height for age) with physical and cognitive impairment. Stunting however, is irreversible! The consequences will have a strong impact on later life and reduce the possibility that the vicious cycle of poverty and malnutrition will end for the children and their later offspring.

The major reason for hidden hunger is missing food sources e.g. fruits, vegetables, meat. One third of the human population lives in poverty and needs to cover up to 85% of their daily energy need with grains.

However, grain (maize, rice, wheat) is a good source for energy and protein and creates satiety but a rather poor source for micronutrients. These staple food are globally available and, compared to higher quality food, less expensive. Poverty results in a poor food pattern with low diversity and consequently in a poor supply of essential micronutrients. The reasons for poverty are manifold but they all interact finally with food prices and at least promote hidden hunger. Even short price shocks independent from what reason will have deadly consequences. The nutrient density score clearly shows that low price food is correlated with high energy but poor micronutrient density in contrast to food with a higher price. The food insecurity report of the US from 2012 clearly documented that the number of households living in moderate and serious food-insecurity increased as a consequence of the 2008 economic crisis. The consequences are an increased number of children with a poor nutrition and a strong negative impact on physical and cognitive development.

Children are the one side of the hidden hunger medal - elderly the other. In the "First World" the problem of hidden hunger, in particular vitamins D, B12, iron and iodine is overlooked. In Europe up to 60% of elderly living in nursing homes are suffering from malnutrition. Malnutrition is frequently associated with depression and increased risk for cognitive impairment and immobility.

A couple of national surveys clearly show that in different groups adequate intake of micronutrients is indeed a problem. Folate, vitamin D, Calcium, Iron, Iodine but also Vitamin E and A are more or less below the recommendations. We do not know whether and how this might have an impact on human health but epidemiological and experimental data show that a diet poor in one or more micronutrients is associated with risks for different diseases such as coronary heart disease, cancer, neurodegenerative diseases etc. To further evaluate that we need an assessment tool which allows to follow the nutrition behavior of risk groups and to have an early detection system for micronutrient inadequacy.

### **Funding nutrition research in the 21st Century: Sharing benefits from public private partnership in nutrition.**

Massi Benedetti M.  
Hub for International health ReSearch, Italy.

Effect of globalization on food and nutrition  
Nutrition as a component of the Geopolitical scenario  
Nutrition as a major determinant of health  
Concept of sustainable development  
Shared value economic doctrine  
Public-private partnership as the only way forward  
Terms for partnership: factors to be taken into consideration  
Facilitating factors  
Barriers  
External interfering factors

### **Funding nutrition research in the 21st Century: Sharing benefits from public private partnership in nutrition.**

Neufeld L.M.<sup>1</sup>, Arabi M.<sup>2</sup>

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The field of nutrition benefits from a strong evidence base and regular updates of evidence through systematic reviews and focused peer-reviewed paper series, among other methods to summarize and disseminate evidence. Despite this, many gaps remain from basic understanding of biology (for example the influence of gut health and the microbiome on nutrient absorption, child growth), to methods for delivery of and effectiveness of nutrition interventions at large scale, and optimal combinations of nutrition interventions to improve health outcomes and optimize use of scarce resources. Such evidence gaps often limit the progress towards improved nutrition by limiting the quality of program design and delivery but may also limit private sectors investment in nutritious products and services. As the processor and distributor of food to the majority of the world's population, the private sector can play an important role in nutrition through the development and marketing of nutritious products and services but evidence gaps may limit their ability and willingness to do so. This presentation will provide an overview of models by which the nutrition community can engage the private sector in identifying and filling evidence gaps and channel additional resources to nutrition research through investment of corporate social responsibility funds but also by identifying and addressing gaps in evidence that might foster making nutrition more relevant to business, while ensuring neutrality and the highest scientific standards.

### **Sharing benefits from public-private partnerships and collaborations in advancing health and well-being —one industry perspective.**

Applebaum R.S.  
Science and Health Office, The Coca-Cola Company.

Public-private partnerships and collaborations (PPPs and PPCs) can be very effective in addressing some of the toughest challenges in the world today. Questions that usually follow such a definitive statement often revolve around the 'Why' and 'How'? In short, it is because such PPPs and PPCs leverage the power of the Golden Triangle of business, government and civil society organizations, with each sector doing what it does best. Trust, honesty, respect and transparency are essential for any PPP/PPC to succeed—regardless of its size or focus.

There are many examples of such PPPs and PPCs working to drive solutions to the many sector and category challenges facing our global society. With the topic at hand, my presentation will focus on the PPPs and PPCs designed to help people live better lives.

Our industry shares in a global responsibility to help develop solutions to the diverse spectrum of nutrition and health challenges. At Coca-Cola, we care about people's health and well-being, and realize that the success of our company relies on responding to these consumer needs. Consequently, our focus has been to focus on what can be done to ensure healthy energy balance.

With our technical and marketing expertise, our reputation and network of influence, and our global production and distribution system, we are striving to make a meaningful difference in the well-being of the public across each of the more than 200 countries we serve. But we know we cannot do this in isolation. We must work with many public and private sector partners. To that end, we work with industry partners, foundations, NGOs and government organizations to reduce the caloric contribution of our beverages, while also providing opportunities for the public to increase their activity levels—across all ages and genders.

However, while we continue our efforts to address the issue of over-nutrition, we are continuing efforts to resolve the other global malnutrition burden that impacts nearly 1 in 7 people. With a focus on workable solutions, The Coca-Cola Company has developed Golden Triangle PPPs and PPCs to provide schoolchildren who may be at risk for malnutrition with nutritionally beneficial beverages.

Moreover, Coca-Cola works with government partners and NGOs to help solve broader health challenges. For example, we provide distribution expertise to public health organizations in Ghana and Tanzania, helping improve the distribution of medicine alongside other partners including USAID and the Bill and Melinda Gates Foundation. The goal is simple—to do what we can to strengthen healthcare systems globally. Examples of other Golden Triangle PPPs and PPCs will be presented during the panel discussion.

### **Efficient nutritional programs at national level: challenges and opportunities - the developing world strategies focusing on micronutrient deficiencies.**

Detzel P.  
Nestlé Research Centre, Switzerland.

The latest global hunger index 2014 from IFPRI points at one form of hunger that is often ignored or overshadowed by hunger related to energy deficits and protein deficiency is hidden hunger—also called micronutrient deficiency—which affects some 2 billion people around the world. This shortage in essential vitamins and minerals can have long-term, irreversible health effects as well as socioeconomic consequences that can erode a person's well-being and development. By affecting people's productivity through physical weakness or due to long term effects of impaired mental development, it also takes a toll on countries' economies.

Poor diet, disease, impaired absorption, and increased micronutrient needs during certain life stages, such as pregnancy, lactation, and infancy, are among the causes of hidden hunger, which may "invisibly" affect the health and development of a population.

Possible solutions to hidden hunger include food-based approaches: dietary diversification, which might involve growing more diverse crops in a home garden; fortification of commercial foods; and biofortification, in which food crops are bred with increased micronutrient content. Food-based measures will require long-term, sustained, and coordinated efforts to make a lasting difference. In the short term, vitamin and mineral supplements can help vulnerable populations combat hidden hunger. Different stakeholders have a role to play. To illustrate this we will focus on the way public health actors and private food manufacturers develop their approach of fortification of packaged or staple food.

The main challenges facing public health actors when it comes to fortification of food products are linked with the financial sustainability of such programs, their capabilities to raise knowledge and awareness on micronutrient deficiencies, the issues of compliance of food manufacturers to

implement these programs but more importantly of the acceptability of the food interventions by the consumers.

Market driven fortification programs led by private food manufacturers are in general designed to differentiate a product from its competitors. This more opportunistic approach has compared with the public health approach some advantages. The production and distribution of fortified food is financially sustainable and not dependent on fundings. The costs of fortification and distribution are priced in the product offering. Furthermore the fortified packaged products are normally widely used and known by the consumers. For example, condiments and sauces are widely and frequently used by consumers, including the poorest ones who are the one in need. The challenges of this approach are different. The level of fortification are lower for regulatory and safety reasons, meaning it will help reduce the micronutrient deficiency gaps but in general (with the exception of specific products such as fortified infant cereals) will not be enough to close the gap. Another important challenge is related with the measurement of such interventions. Presently they are based on output, like number of servings sold. Measuring or modeling the role of the market driven programs are difficult to assess.

The conditions to better coordinate these two approaches are the strengthening of a common language based on concepts such as global burden of disease, disability adjusted life expectancies, cost-effective methodology. All stakeholders need to further develop a better understanding of the determinants of food choices, nutrient intake via dietary intake assessment and biomarker status of the population. Validated modeling methods to estimate the impacts of these interventions need to be further developed. This will help the public health actors to be more "consumer" oriented and private actors to better assess their role and contributions to reduce hidden hunger.

### **Health economic evaluation of market driven fortification programs: the Philippines example.**

Wieser S.

Winterthur Institute of Health Economics, Zurich University of Applied Sciences, 8401 Winterthur, Switzerland.

**Objectives:** Micronutrient deficiencies (MNDs) are a major public health problem in the developing world and particularly harmful during early childhood due to their impact on the physical and cognitive development. We estimate the cost-effectiveness of price-based interventions with packaged fortified powdered milk (FPM) for the reduction of MNDs in 6-23-month-old Filipino children.

**Methods:** We first build a health economic model simulating the consequences of MNDs in childhood over the entire lifetime based on a health survey and a nutrition survey. Health consequences of MNDs are modelled based on information extracted from literature. The cost-effectiveness estimation is based on a survey and marketing experiment conducted in 2013 among 1800 households, combined with the health economic model and the results of a systematic review on the efficacy of food fortification.

**Results:** Total lifetime costs of MNDs in 6-59-month-old children amounted to direct medical costs of 30 million dollars, production losses of 618 million dollars and intangible costs of 122,138 disability adjusted life years (DALYs). Demand for FPM is considerably more elastic in poor households and a price discount of 20% for the poorest 20% of the population has a cost-effectiveness ratio of 329 USD per DALY saved.

**Key finding:** MNDs lead to substantial costs in 6-59-month-old children in the Philippines. Costs are highly concentrated in the lower SES and in 6-23-month-old children. Interventions specifically targeting poor households are more cost-effective because of the higher prevalence of MNDs, lower levels of current consumption and higher price elasticity of demand.

### **The need to revitalize the Mediterranean diet, not just for health.**

Demini S.

FAO / Forum on Mediterranean Food Cultures, Rome, Italy.

The Mediterranean diet, scientifically well-characterized in the past as a healthy dietary pattern and acknowledged by UNESCO as an intangible cultural heritage, recently became also object of increasing studies on its sustainability.

By considering the increasing non adherence of the Mediterranean diet model in many Mediterranean countries, a new interdisciplinary and intercultural approach is required towards its revitalization as a sustainable dietary pattern as well as a sustainable contemporary lifestyle. But it's not easy to go back, and it's now necessary to act now to reconstruct, at least partly, for the Mediterranean diet a more appropriate food cultural context, more suitable to the times and for all people.

There is rising evidence of the cost of diets on the environment, society and public health nutrition. Food consumption and production trends and patterns are among the most important drivers of environmental

pressures. The sustainable diets' concept highlights the role of sustainable consumption as a driver of sustainable food production.

The Mediterranean diet has nutritional, economic, environmental and socio-cultural characteristics that make it particularly relevant as a case study for characterizing sustainable diets in different agro-ecological zones.

The 2015 EXPO in Milan can be the ideal place for presenting the Mediterranean diet, not only as a healthy diet, but also as a model for the development of sustainable dietary patterns, a contemporary sustainable lifestyle, a new revitalized dietary model which must include the idea of sustainability.

Since 2010, FAO has been conducting a series of activities on the Mediterranean diet as a case study for evaluating the sustainability of diets and food consumption. Activities which contributed to a definition of the concept of sustainable diet as "low environmental impact diets which contribute to food and nutritional safety and to a healthy life for present and future generations. Sustainable diets protect and respect biodiversity and ecosystems, are culturally acceptable, accessible, economically appropriate and convenient; are nutritionally suitable, safe and healthy, and optimise natural and human resources."

### **Assessment and valorization of the sustainability of quality products, typical of the Mediterranean diet of the Apulia region, Italy.**

Capone, R.

CIHEAM-Bari, Italy.

The project "Agriculture & Quality" is a project of Apulia Region, which is technically and scientifically supported by the Italian seat of the CIHEAM (Centre International de Hautes Etudes Agronomiques Méditerranéennes). Its main objective is the qualification and enhancement of typical food products of the Apulia region, through the creation of the quality scheme "Quality Products of Puglia (PdQP)" that ensures superior quality compared to other products on the market, and it aims to ensure origin and quality of agro-food products from Apulia region by complying with the product technical specification/standard of reference approved by Apulia region authority.

In particular, in the framework of this project, in addition to the issues of quality, CIHEAM-Bari, with Apulia Region authority has started a pilot project to assess and promote the sustainability of the products belonging to the quality scheme PdQP, typical of the Mediterranean Diet.

The main objective of this pilot project is to ensure that the products which adhere to the quality scheme PdQP comply not only with the quality requirements defined by the technical specifications, but also with the sustainability requirements.

This pilot project is one of activities started after the international seminar organized by CIHEAM in collaboration with the FAO on "Sustainability of food systems in the Mediterranean Area", held in Malta in September 2012, on the occasion of the Meeting of Ministers of Agriculture of Member Countries of the CIHEAM. In this seminar was presented by FAO-Sustainable Food Systems Programme and CIHEAM-Bari a methodological approach to assess the sustainability of the Mediterranean diet, and a set of indicators to assess the impacts in its four dimensions (economic, environmental, socio-cultural and nutritional-health) in different specific territorial contexts from the Mediterranean region. The project, "Evaluation and valorization of the sustainability of quality products of Apulia, typical of the Mediterranean Diet" aims to apply the methodology proposed in Malta in 2012 to a well-defined territorial context, that of Apulia Region - Italy, to identify and develop the most appropriate indicators to assess and promote the sustainability of the Apulian products adhering to the quality scheme PdQP, typical of the Mediterranean Diet. As a pilot experience, the project aims to contribute to the further implementation of the methodological approach developed by addressing all the critical issues that arise from such an application with respect to a macro-region context as the territorial reality of Apulia region.

### **The Mediterranean diet in its environment**

Meybeck A.

FAO, Agriculture and Protection of Consumer Department, Rome.

The Mediterranean diet, described from traditional diets in the Mediterranean area in the 1950s, is the result of its environment and of culture. Many of its characteristics contribute to its environmental sustainability. Plant rich and frugal it exerts less pressure on scarce natural resources than diets richer in animal products. The importance of legumes, which directly fix nitrogen from the air, reduces the need for fertilizers. The diversity, in the diet and of the diets, ground the development and preservation of a particularly rich agrobiodiversity. These characteristics are now well known and valorized. Since the description of this model diets are quickly changing, in the Mediterranean area and worldwide. This raises two crucial questions. How are, and can be, preserved in contemporary Mediterranean diets the characteristics that made its environmen-

tal sustainability - and which to a great extent grounded its nutritional and health benefits? To what extent it can constitute a model for the preservation and improvement of the environmental sustainability of diets in other areas.

### **The progressive evolution of the Mediterranean diet towards sustainability.**

Berry E.M.

Hebrew University, Braun School of Public Health, Jerusalem, Israel

The position of the Mediterranean Diet (MD) has undergone a progressive evolution over the past 60 years. Historically, the health benefits of the diet in Crete (pre-1960) were recognized by Ancel Keys. These were confirmed in many studies leading to the formulation of the traditional MD pyramid in 1995. Thereafter, socio-cultural and further health impacts led, in 2009-10, to the formulation of a revised pyramid with greater emphasis on "a lifestyle for today". Since then two further advances have occurred: the recognition by UNESCO of the MD as an Intangible Heritage, and the increasing importance of ensuring Sustainability and its four dimensions. In order to monitor the progress in adherence to the MD it is necessary to measure all the determinants involved. Thus it will be necessary to identify the optimal valid indicators for each dimension - nutrition, environment, socio-cultural and economic. Indicators must be also generally available and inexpensive to collect to enable frequency of sampling. The relative weightings of the chosen indicators within each dimension is then calculated. Finally the weightings between the dimensions will have to be decided (not necessarily 25% each) in order to produce a composite index of Sustainability. This may be easily disaggregated to display the influence of each of the four dimensions to allow policy makers decide where improvements are needed and also to record progress over time. The presentation will consider examples from measuring Food Security and also problems of adherence to the MD.

Reference: Dernini S and Berry EM. Historical and Behavioral Perspectives on the Mediterranean Diet. In Mediterranean Diet: Impact on Health and Disease. Eds D F Romagnolo and O Selmi, Springer Science. In press, 2014

### **Towards a definition of economic and social sustainability of food supply chain.**

Adinolfi F.

University of Bologna. CIEAM. Italy.

The main aims of the paper is twofold. Firstly, to provide an overview of the methodology carried out in the literature for evaluating sustainability performance of a food regional food system. Successively, particular attention is devoted to measuring economic and social aspect of the concept of sustainability in broader sense meant. Since this specific field has been under-exploited until now (Defra, 2010), we are implementing a social and economic sustainability indicator for selected case in Apulia Region, by using the SCOR model. SCOR model describe the involved sub-system processes and the MAUT (Multi Attribute Utility Theory) MACBETH methodology to consistently compute the expected performances.

### **Sustainable diets in the context of sustainable food systems. Socio-cultural dimensions on Mediterranean diet.**

Medina F.X.

Universitat Oberta de Catalunya (UOC) / ICAF-Europe, Barcelona, Spain.

In the developed countries, the large number of industrial processes and transformations of all kinds which food goes through before reaching the consumer, generates in the latter a blind mistrust towards it. More and more often, people pursue going back to the origins that give them credibility and calmness when it comes to eating, and concepts like "traditional", "home-made" or "Bio" succeed.

Until the present, Mediterranean Diet has been observed as a healthy model of medical behaviour. After their declaration as a Cultural Heritage of the Humanity at UNESCO, Mediterranean Diet is actually being observed as a part of Mediterranean Culture and opening their concept as an equivalent of Mediterranean Cultural Food System or Mediterranean Culinary System. A new point of view that will be capital in the future discussions about the Mediterranean Diet, their challenges and their future perspectives.

From a local Mediterranean point of view and as proximity model consumption, Mediterranean food and diet can be a sustainable resource for the Mediterranean Area. In this context (and as every food system in their own bio-social context), the Mediterranean Diet is an outstanding resource -locally produced in cultural coherent contexts- for the Mediterranean area.

### **Food consumption pattern in Southern Mediterranean population.**

Belahsen R.

Lab. of Biotechnology, Biochemistry and Nutrition. Training and Research Unit on Nutrition & Food Sciences. Chouaib Doukkali University, El Jadida, Morocco

Mediterranean diet is a characteristic of the countries populations around the Mediterranean basin. However, the dietary pattern is not homogenous among these countries and even in the same country. This resulted in a wide variation of the dietary patterns within the Mediterranean region. On the other hand the diversity and nature of the foods that composes the diet have been reported to be nutritionally healthy with lower nutritional disorders and associated mortality than western diet. A change in the trend of food consumption in all these countries has been noted over the past decades in the region including in southern Mediterranean countries. This is characterized by a regression of the traditional dietary pattern that is based on diversity and preservation of local products; and a trend towards a homogenous and standardized dietary model with a decreased adherence to Mediterranean diet. In parallel to the similarity of trends characterizing the food consumption pattern, there is also a gradual Nutrition transition associated with increased obesity and non-communicable diseases. This paper examines the trends of food consumption across the southern Mediterranean area. The data are discussed considering the accompanying changes in health profile.

### **Meeting half way - PPP engagement for Nutrition Outcomes.**

Monterrosa E.

Sight and Life.

It is generally agreed that significant reductions in malnutrition will not be achieved by the public sector alone, and that this requires a broad group of stakeholders working across sectors towards a common goal. The private sector has a largely underestimated ability to reduce malnutrition. One way to leverage the private sector capabilities towards malnutrition is through public-private partnership (PPP). For the public sector, improved nutrition is both an objective and a value, but this is rarely the case for the private sector. It is important to define the terms of engagement by first considering 4 key elements in regards to shared interests.

Most partnership in nutrition often will define a common goal (or a shared interest) but to reach that goal several other factors should be considered including shared values, shared objectives, shared approaches, and shared outcomes. This talk will discuss the implications of convergence and divergence for each and how this may affect the direction of the partnership and likelihood for achieving an impact on nutrition outcomes. Often it is through these considerations where both parties will meet half way, establishing rules for engagement. The talk proposes a framework for transparent engagement among private and public sector parties.

Shared interests encompass declarations of interest and conflicts of interests (perceived and actual). All stakeholders must be clear about why the partnership is needed. Partnering is desirable to leverage the capabilities, and PPP often require significant exchanges in technical expertise along the value chain between partners. If perceived or actual conflict of interest cannot be solved in the partnership, then other arrangements, such as purchasing of the services, could be considered.

### **Opportunities within Boundaries - Rules of Engagement to leverage the private sector for scaling up nutrition.**

Germann S.

World Vision International.

One Goal - (A child nutrition campaign powered by the Asian Football Confederation / World Vision International and partners).

Extreme positions polarize and create often heated but needed debate. However, it is in the 'middle ground' where most progress for human and social development is taking place. The extreme view on one end says that 'the business of business is business', business is only responsible to its shareholders and to stay within the law and nothing else. The other end states that 'Capitalism only globalizes poverty, it only globalizes hunger and social injustice'. These extremes show us the range of viewpoints that businesses and civil society organisations need to consider when working in the area of improving global public health and nutrition. The last decade has seen an increase in Public Private Partnerships, often led by UN, civil society, and businesses who operate in the 'middle ground' of that debate.

Whilst the current evidence base on the impact of such PPP's in the field of nutrition is weak or absent, some are making significant advances to

reach the world's most vulnerable people with improved nutrition. At the same time, in light of rapid increases of obesity, there is rising concern that some food and beverage companies promote 'leanwashing' where a firm's public relations and marketing efforts promote the perception that they help solve the obesity problem that deflects from the fact that they directly contribute to the problem. Similar practices are found in the area of infant formula and WHO marketing code violations.

How to navigate those challenges? The most direct solution would be no engagement, promoted by some. However, this easy route fails us today and increasingly will make it impossible to ensure food and nutrition security for the potential 11 billion people by 2100. Hence moving from a combative to a co-creative mode of engagement is imperative. A co-creative mode leverages opportunities for positive impact at scale, but operates within clear boundaries that protect the public health interests, especially of the most vulnerable people in society. Recently developed guidance notes on preventing and managing conflict of interest led by SUN, the FTSE4Good Index, or Access to Nutrition Index are all nascent efforts to provide organisations working within the 'middle ground' with the needed guidance to leverage the private sector for improved nutrition at scale, whilst safeguarding public health interest. This will become even more important in our collective effort to achieve the new nutrition targets in the post 2015 sustainable development goals.

### **Public-Private Partnerships to ensure availability and access to safe and nutritious foods for preventing undernutrition among 6-23 mo old children.**

De Pee S.

World Food Programme

Background: Meeting nutrient needs is a prerequisite for the prevention of undernutrition (stunting, micronutrient deficiencies, wasting), together with prevention and treatment of illness. Meeting nutrient requirements of children aged 6-23 months requires consumption of a certain amount of animal source and fortified foods, but access to these foods is constrained by affordability and availability. With increasing urbanization and access to markets for smallholder farmers, the proportion of households that purchases a substantial part of their diet increases. Purchased foods can be fresh or processed. Processing serves several purposes, including extending shelf-life, pre-cooking and adding value (nutrition, flavor etc).

Issue identification: In order to ensure adequate nutrition for young children, foods need to be made available for this age group that are safe and nutritious, affordable, and appropriately marketed.

Potential solutions: Public-private partnerships are required that have as common goal increasing access to safe and nutritious foods for young children. The public sector sets requirements for nutritional value, safety, and marketing, monitors compliance, and commits to purchase a specific quantity for distribution to the poorest of the population. The private sector establishes a production facility, ensures production of safe and nutritious foods according to agreed specifications, and sells to middle- and high-income consumers. Dialogue and coordination between public and private sector partners is essential in order to a) set achievable goals for product composition (nutritional value, palatability, shelf-life and cost); b) model distribution options, including 'market size' of for free distribution, and subsidized and commercial sales, including their marketing; and c) develop a realistic business model for the required investment.

Conclusions and way forward: Due to lack of shared goals, distrust, and limited demand, there are few of such public-private partnerships. However, this is changing and promising models will be described.

### **Promoting nutrition as a sustainable business case for local food processors- a case from Ghana.**

Reinhard I.

Department for Agriculture and Food, German Development Cooperation (GIZ), Germany.

This presentation will describe the pilot project 'Affordable Nutritious Foods for Women' (ANF4W), implemented by GIZ. ANF4W is a testing ground for innovative approaches within the food fortification framework which aims to promote (nutrition) development goals while engaging with the private sector. The presentation will showcase ANF4W's strategy in Ghana to increase the supply of affordable nutritious foods (through product development) and demand of these foods (by raising awareness), while involving local stakeholders such as food producers and/or processors. This is aimed at increasing access, availability, and consumption of new and affordable fortified food products designed to bridge the gap between the nutritional needs and current intake of women of reproductive age (WRA).

ANF4W in Ghana identifies two main challenges in its approach. First is the promotion of 'nutrition' as a sustainable business case for local food

producers and processors. The project recognizes that this stems from weak infrastructural and technical capacities and limited access to financial services; as well as creating a sustainable private market for the product, where such a market has not yet been established. Secondly, with scarce data on dietary intake and nutritional status of WRA, an impact analysis of the project is difficult.

To address these challenges, the project will conduct studies on different local conditions/elements that play a role in a local stakeholder's ability to create and supply an affordable nutritious product. Studies will assess: women's eating habits and beliefs around foods, locally available and affordable food commodities, capacities of local food industry, and possible distribution channels. Increased awareness on the importance of nutrition for WRA will enhance the private market demand for these products.

The on-going studies and results will be used to determine various food prototype options. ANF4W together with selected local food processors will develop the food prototypes and subject them to an acceptability trial, and adjust them to a marketable product. The project will raise funds to conduct dietary intake and nutritional status assessment of WRAs, in order to access the success of this innovative approach.

### **A Review of a Public-Private Partnership in Nutrition: the DSM-WFP experience. Results for Development Institute.**

Jayaram S.

Results for Development Institute (R4D), Washington, USA.

Public-Private Partnerships (PPPs) in nutrition are still evolving, and there is a lack of evidence on how such PPPs contribute to nutrition. Given this context, Results for Development Institute (R4D) developed an evidence-based case study that reviews the activities and outcomes of the DSM-WFP partnership over the past seven years. Through a combination of literature research and in-depth interviews with key stakeholders, we explore the partnership's activities and how each organization has grown as a result of the collaboration. We study two product classes (Super Cereal (SC) and Micronutrient Powders (MNP)) in detail, and discuss achievements and lessons learned from the partnership's work.

Our emerging findings indicate that alignment on goals and vision is crucial for a PPP's success, and that the DSM-WFP partnership benefitted from the deep involvement of senior management from both sides. Both organizations have also individually grown over the past few years: WFP has become increasingly focused on nutrition quality, and DSM now has greater influence in the nutrition arena. The joint work of collaboration has led to packaging and product innovations: MNP packets and boxes have been redesigned to take account of the local context and end users, while product improvements led to SC/SC+ reformulations. In-country advocacy efforts are also being strengthened via both top-down and bottom-up approaches, and the partnership has recognized that regional forums on specific topics are effective in mobilizing capacity and interest.

Going forward, there is an opportunity to further improve systems to institutionalize and share knowledge: this will enable staff to better communicate with each other and to share experiences for greater impact. Lastly, there is a need for increased investment in defining metrics which will allow the partnership to better measure its impact and influence. There is scope to further disaggregate beneficiaries and track whether they are receiving the right nutrition; in addition, formal program evaluations to assess beneficiary reach, program delivery, replicability, and scalability could be conducted, and indirect outcomes (such as education attainment) could be tracked. By doing so, the DSM-WFP collaboration and other nutrition-focused PPPs can indicate their broader outcome and impact, and showcase how such partnerships can play an important role in meeting nutrient needs.

### **Public private partnership – a broad based reality approach to tackling maternal, infant and young child malnutrition in Ghana.**

Kwame Ntin Adu S.

Yedent Agro Group of Companies Limited.

The World Bank defines Public Private Partnerships (PPPs) broadly, as arrangements, typically medium to long term, between the public and private sectors whereby part of the services or works that fall under the responsibilities of the public sector are provided by the private sector, with clear agreement on shared objectives for delivery of public infrastructure and/or public services. These arrangements usually help create added value through synergies between public sector authorities and private sector companies, in particular, through the integration and cross transfer of public and private sector skills, knowledge and expertise. The quest for applying PPP as an effective broad based approach/strategy in tackling developmental and public health problems such as maternal, infant and young child malnutrition is increasingly becoming a growing

phenomenon among developmental and governmental stakeholders. Maternal, infant and young child malnutrition has become a bane and a developmental issue in developing countries such as Ghana. The impact of maternal, infant and young child malnutrition has diverse negative consequences to a country's economy and its citizenry. The brunt of malnutrition among mothers make them susceptible to pre and post natal deaths. Malnutrition among children also makes them susceptible to early childhood illnesses (morbidity) and death (mortality). Malnutrition also causes devastating mental and physical effects such as stunting, which affected children carry into adulthood. There are also attendant long term effects on the health of the population, human capital and sustainability on the development agenda of the country.

In Ghana, the statistics of maternal deaths of 350/100,000 live births renders it among the least safe countries for maternal and infant survival (ranked 150 out of 178 countries). This is a serious public health issue. The status of Ghana as one of the 30 most dangerous countries for childbirth in the world is very alarming.

With regard to infant and young child malnutrition, statistics show that 32% of children in Ghana between the ages 0-59 months in rural and periurban areas suffer from chronic malnutrition, 28% of children under 5 years are stunted, 14% are underweight while 9% are wasted. Additionally, 78% of children aged 6-59 months have some level of anemia. These statistics are very alarming as far as public health is concerned and need a broad based approach to tackle.

Factors that contribute to these alarming rates of malnutrition among others are; the high cost of nutritious and convenient foods for mothers and children which are way beyond the reach of the population at risk, lack of private sectors' active participation in the fight against malnutrition and the non sustainability of developmental and governmental agencies' free food rations program.

The need for an effective resolution with a public health approach that takes into effect malnutrition's contributory factors above, within a public private partnership frame work is a clarion call today. This is so because of the ample evidences of successful PPPs and the results that are there to show.

In tapping into PPPs evidence as a result-oriented approach in tackling developmental issues, Yedent, an SME private sector player in the food processing industry in Ghana, has collaborated with the Global Alliance for Improved Nutrition (GAIN) to tackle infant and young child malnutrition in Ghana. Yedent's strength in local capacity, understanding of the local value chain, human skills and infrastructure have been leveraged with GAIN's technological know-how and capital to develop, produce and market a convenient, affordable and nutritious cereal based complementary food for infants and young children between the ages of 6-24 months. Aside the collaboration with GAIN, Yedent has also collaborated with Ajinomoto and their partners (such as JICA, USAID, CARE, University of Ghana-Nutrition Department, etc) to develop a food supplement for malnourished children in Ghana.

In conclusion, PPP is a realistic broad based approach to dealing with striking developmental challenges that confront the world and must be embraced for scale ups especially in the fight against maternal, infant and young child malnutrition in our world today.

### The impact of hydration on health.

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**Background:** Maintenance of fluid and electrolyte balance is essential to healthy living as dehydration, overhydration and fluid overload are associated with morbidity and mortality. The aim of this review is to present the current evidence for the impact of hydration status on health.

**Methods:** The Web of Science, MEDLINE, PubMed and Google™ Scholar databases were searched using relevant terms. Randomised controlled trials and large cohort studies published over the 20 years preceding August 2014 were selected. Older papers were included if the topic was not covered by more recent work.

**Results:** Studies show an association between hydration status and disease, however, in many cases there is insufficient or inconsistent evidence to draw a firm conclusion. Dehydration has been linked with many conditions including; urological, gastrointestinal, circulatory and neurological disorders. Overhydration and fluid overload have also been linked with cardiopulmonary disorders, hyponatraemia, generalised oedema, gastrointestinal dysfunction as well as deep vein thrombosis.

**Conclusion:** There is a growing body of evidence supporting the link between state of fluid imbalance and disease. However, in some cases the evidence is largely associative and lacks consistency with limited number of randomised trials.

### Hydration, functional capacity and the promotion of physical activity.

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Hypohydration, if sufficiently severe, will adversely affect physiological function and there is good evidence that both cognitive and physical performance can be impaired by moderate levels of hypohydration. It is also well recognised that hydration status is one of the many factors that affect the subjective perception of effort during exercise. This is important in the promotion of active lifestyles: if the exercise feels too hard, adherence will be poor. In prolonged exercise, the rating of perceived exertion (RPE), which is usually measured using either the 10 point or 15 point rating scales of Borg, tends to increase over time. It also tends to be greater under conditions of environmental (high heat, humidity) stress. Many investigations into the responses to manipulation of hydration status during exercise also report the effects on the RPE. A systematic review of the literature has established that, regardless of whether hypohydration was invoked prior to or during exercise, 15 trials (54%) reported the overall mean RPE to be significantly higher when exercising in a hypohydrated state compared to when euhydrated. A meta-analysis of the data from 23 trials revealed overall mean RPE to be significantly higher when hypohydrated compared to when euhydrated (MD= 1.01; 95% CI = 0.72, 1.31;  $p < 0.001$ ). The results demonstrate a graded response in RPE to the degree of dehydration and suggest that those who exercise for enjoyment or health benefits should ensure good hydration before exercise and should limit the degree of hypohydration incurred during exercise.

### Water and total fluid intake in the European Union.

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Water is among the most essential diet components and a sufficient supply is crucial for health and wellbeing. While in Europe there is generally no shortage in drinking water of good quality, the actual fluid consumption patterns differ between countries and population groups. Although preformed water contributes the most to total fluid intake, the EFSA Concise Food Consumption Database 2008 shows a higher consumption of tap water in the northern participating countries (Finland, Denmark) as well as Austria, as opposed to a preference of bottled water in other regions and especially in Germany that was also leading in fruit and vegetable juices and soft drinks.

The average total fluid intake in Europe as reported in nutrition surveys considered in the European Nutrition and Health Report generally lies within the recommended range of 1500-2000 ml/d and is increasing with a higher frequency of intake. There are, however, differences between population groups. Elderly persons, for instance, tend to drink less putting them at risk of dehydration in light of the age-related increase in urinary fluid losses.

On the other hand, physically active individuals as well as those on a health-conscious diet have a higher fluid consumption.

Identifying differences in drinking patterns and quantities across countries and population groups in Europe together with the influencing factors is important to optimise the hydration status.

### Barriers to good hydration practices.

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Euhydration, defined as the state of being in water balance, is linked with optimal physical and cognitive performance, while dehydration or hyperhydration, i.e. deviations from water balance, have important health implications<sup>1</sup>. Therefore maintaining good hydration ie water balance of individuals or of population groups is of public health interest.

To achieve water balance, the adequate water intake for adult men and women is estimated at 2 and 2.5 L/day, respectively<sup>2</sup>. However when water needs are higher, eg at sickness or hot temperature conditions or high physical activity levels, water intake must be higher than the adequate level<sup>2</sup>. Water, in the context of adequate level estimation, is considered a nutrient; thus adequate water intake may be achieved from consuming a variety of water sources, including drinking water, beverages and solid and fluid foods<sup>2</sup>.

Quenching thirst and adopting a daily hydration scheme are the physiological and conscious mechanisms that trigger water intake; however several barriers may block at least partially water intake.

Thirst may be altered by various physiological conditions, including age. However, at an individual basis, the main barrier to good hydration practices is the limited ability to access, purchase, prepare and consume a variety of hydration sources. An integral vision is required when observing barriers, here are a few examples extracted from the literature and from our research work: physical disabilities may constitute the con-

sumption of foods and beverages difficult or undesirable<sup>2</sup>; restrictions in the work environment may limit beverage intake; family budget issues may limit purchasing of hydration sources, particularly of beverages; lack of social support may affect the ability to purchase while limited social interaction may discourage consumption of various hydration sources<sup>3</sup>; cognitive or mental problems may limit communication of the desire to drink or eat. Models that allow the systematic observation of various barriers to good hydration, such as an assets-based approach<sup>4</sup>, are helpful in organizing solutions that lead to better hydration. Moreover, educational efforts that increase awareness on the benefits of hydration (and on the risks of dehydration) and on the availability of a variety of hydration sources is expected to accelerate lifting of barriers to hydration.

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### **Vitamin D and mortality: meta-analysis of individual participant data from a large consortium of cohort studies from Europe and the United States.**

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**Objectives:** Low serum 25-hydroxyvitamin D concentrations (25(OH)D) have been linked to mortality in several studies but age, sex, season and country specific results from a large consortium of cohort studies have not yet been reported.

**Design:** Individual data meta-analysis of eight prospective cohort studies from Europe and the USA

**Setting:** General population

**Participants:** 26,018 men and women, aged 50-79 years

**Main outcome measure(s):** All-cause, cardiovascular and cancer mortality.

**Results:** 25(OH)D concentrations varied strongly by season (higher in summer), country (higher in USA and Northern Europe) and sex (higher in men) whereas no consistent trend with age was observed. During follow up, 6,695 study participants died, among whom 2,624 died of cardiovascular diseases and 2,227 died of cancer. For each cohort and analysis 25(OH)D quintiles were defined with cohort and sub-group specific cut-off values. Comparing bottom vs. top quintiles resulted in a pooled risk ratio [95%CI] of 1.57 [1.36-1.81] for all-cause mortality. Risk ratios for cardiovascular mortality were similar in magnitude to that of all-cause mortality in subjects both with and without a history of cardiovascular disease at baseline. With respect to cancer mortality, an association was only observed among subjects with a history of cancer (risk ratio, 1.70 [1.00; 2.88]). Analyses using all quintiles suggest curvilinear inverse dose-response curves for the aforementioned relationships. No strong age-, sex-, season- or country- specific differences were detected. Heterogeneity was low in most meta-analyses.

**Conclusions:** Despite strongly varying 25(OH)D levels by country, sex and season of blood collection, the association between 25(OH)D level and all-cause and cause-specific mortality was remarkably consistent. Targeted long-term randomized controlled trials are needed to explore whether vitamin D supplementation in those individuals with the relatively lowest 25(OH)D concentrations of a population can reduce their mortality from cardiovascular diseases, cancer and other causes.

**Reference:** Vitamin D and mortality: meta-analysis of individual participant data from a large consortium of cohort studies from Europe and the United States. Schöttker B et al. *BMJ*. 2014 Jun 17;348:g3656. doi: 10.1136/bmj.g3656.

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### **Folate and vitamin B12 in relation to total and cardiovascular mortality in older persons in Central and Eastern Europe.**

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**Purpose:** Despite plausible biological mechanisms, epidemiological evidence on the link between folate and vitamin B12 and cardiovascular risk remains inconsistent. We investigate the relationship between plasma concentration of folate and vitamin B12 and the risk of fatal and non-fatal cardiovascular disease (CVD).

**Methods:** The data come from the Health, Alcohol and Psychosocial factors In Eastern Europe (HAPIEE) prospective cohorts based in Krakow (Poland), Kaunas (Lithuania) and 6 Czech towns that followed up random population samples of men and women aged 45-69 since baseline in 2002-06. After median follow up of 6.5 years, all 495 incident cases of CVD (including 198 deaths) and 4,884 controls sampled from disease free subjects were included in a nested case-control study. Plasma concentrations of folate and vitamin B12 were analysed in a central laboratory. Odds ratios (OR) of fatal and non-fatal CVD by cohort-specific quartiles of plasma concentrations were estimated by logistic regression models controlling for potential confounders (age, sex, cohort, smoking, education and material deprivation). Since results were consistent across study centres, results of pooled analyses are presented.

**Results:** After adjustment for covariates, folate concentrations were inversely associated with mortality from all causes (OR for highest vs. lowest quartile 0.78, 95% CI 0.65-0.93 (p-value for trend by quartile 0.009). For CVD, the association was similar for non-fatal (OR for highest vs. lowest quartile 0.69, 95% CI 0.53-0.90, p for trend 0.005) and fatal CVD (OR 0.72, 95%CI 0.55-0.94, p-for trend 0.022). For the combined fatal and non-fatal CVD, the ORs quartiles 2, 3 4 vs. quartile 1 were 0.79 (0.65-0.95), 0.76 (0.62-0.92) and 0.70 (0.57-0.86), respectively, p for trend <0.001. Adjustment for further covariates did not change the results. We found no association of vitamin B12 with total mortality or with fatal or non-fatal CVD. Results were similar after excluding events in first 2 years of follow up.

**Conclusions:** In this large population based study, we found consistent and significant inverse associations of total and CVD mortality and non-fatal CVD with plasma folate but not with vitamin B12. The association with folate may be due redox and methylation status, although previous studies have not confirmed the role of homocysteine; alternatively, our finding of an apparently protective effect of folate may at least partly reflect higher intakes of foods associated with plasma folate, such as fruit, vegetables or cereals.

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no. HEALTH – F3-2010-242244.

### **Repeated measures of body mass index and C-reactive protein in relation to all-cause mortality and cardiovascular disease: results from the Consortium on Health and Ageing Network of Cohorts in Europe and the United States (CHANCES).**

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Obesity has been linked with elevated levels of C-reactive protein (CRP), and both have been associated with increased risk of mortality and cardiovascular disease (CVD). Previous studies have used a single 'baseline' measurement and such analyses cannot account for possible changes in these which may lead to a biased estimation of risk. Using four cohorts from CHANCES which had repeated measures in participants 50 years and older, multivariate time-dependent Cox proportional hazards was used to estimate hazard ratios (HR) and 95% confidence intervals (CI) to examine the relationship between body mass index (BMI) and CRP with all-cause mortality and CVD. Being overweight ( $\geq 25$ - $<30$  kg/m<sup>2</sup>) or moderately obese ( $\geq 30$ - $<35$ ) tended to be associated with a lower risk of mortality compared to normal ( $\geq 18.5$ - $<25$ ): ESTHER, HR (95%CI) 0.69 (0.58-0.82) and 0.78 (0.63-0.97); Rotterdam, 0.86 (0.79-0.94) and 0.80 (0.72-0.89). A similar relationship was found, but only for overweight in Glostrup, HR (95%CI) 0.88 (0.76-1.02); and moderately obese in Tromsø, HR (95%CI) 0.79 (0.62-1.01). Associations were not evident between repeated measures of BMI and CVD. Conversely, increasing CRP concentrations, measured on more than one occasion, were associated with an increasing risk of mortality and CVD. Being overweight or moderately obese is associated with a lower risk of mortality, while CRP, independent of BMI, is positively associated with mortality and CVD risk. If inflammation links CRP and BMI, they may participate in distinct/independent pathways. Although the inclusion of repeated measures did not materially change the associations reported when using baseline only measurements, it may still prove important to account for changes in risk factors over time so as to fully unveil their potential independent effects on mortality and disease morbidity.

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no. HEALTH – F3-2010-242244.

**Self perceived health and its relation to all cause and cause specific mortality among the elderly: Preliminary results from the Consortium on Health and Ageing Network of Cohorts in Europe and the United States (CHANCES).**

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A common item in questionnaires assessing population health is that referring to Self Perceived Health (SPH). Usually, this is a simple question of the type. "In general, how would you rate your health?" and participants' answers are ordered from "poor" to "excellent". Many studies in Europe, US and Japan have examined the usefulness of this simple question in assessing overall health by evaluating its association with overall or cause specific mortality. As documented by three meta-analyses, in the majority of these studies SPH being "poor" as compared to "excellent" was associated with increased mortality by 2-fold. Previous studies however differed with respect to the potential confounders used in the analyses. Moreover there was no attempt to simultaneously identify specific patterns of characteristics that are common among those who perceive their health as good/excellent as opposed to those who perceive their health as not good/poor.

Using so far seven cohorts from CHANCES with available information regarding SPH we assessed for participants >65 years at recruitment the association of SPH with all-cause mortality by estimating adjusted hazard ratios (HR) and their 95% confidence intervals (CI) using Cox proportional hazard regression. The estimated HRs from each cohort were then combined through meta-analysis. We also used logistic regression to evaluate in each cohort characteristics of people who perceived their health as "generally good" (good/very good/excellent) rather than "generally bad" (moderate/poor). Statistically significant odds ratios (OR) were then combined through meta-analysis.

There was a consistent trend of increased mortality for those with SPH "moderate" (combined HR: 1.38; 95% CI: 1.10 to 1.73) or "bad" (combined HR: 2.15; 95% CI: 1.45 – 3.20) as compared to those with SPH "good/very good/excellent", adjusting for age, sex, smoking status, body mass index, drinking status, education, marital status and morbid conditions such as CVD, cancer and diabetes. Results were consistent in sensitivity analyses including subgroup analyses by morbidity status i.e. within those with none of the indicated morbid conditions and within those with at least one of the indicated morbid conditions.

Combined ORs, indicated that being male (as opposed to female), having normal BMI (as opposed to being overweight/obese), not having CVD, diabetes or cancer at enrolment (as opposed to having at least one of those), consuming on average ethanol within the 2nd/3rd cohort specific tertiles (as opposed to being an ethanol consumer of the 1st tertile), having a higher education level (as opposed to having at maximum primary education), and performing vigorous physical activity (as opposed to not performing such physical activity) are factors associated statistically significantly with the odds of self perceiving one's health as "generally good" rather than "generally bad".

The above indicate results support a consistent finding of increased mortality associated with moderate or bad SPH (as compared to generally good) among the elderly which follows a monotonic pattern in all analyses and persists after adjustment of a number of established factors which affect mortality including morbidity at baseline. The pattern of characteristics of elders who rate their health as generally good highlights a profile of these people which is more or less common across cohorts participating in this analysis.

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no. HEALTH – F3-2010-242244.

**Biomarkers of aging and disease.**

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The project CHANCES (Consortium on Health and Ageing: Network of Cohorts in Europe and the United States) is a collaborative large-scale integrating project funded by the European Commission (FP7) which aims to produce evidence on ageing-related health characteristics and determinants in Europe. CHANCES focuses on four groups of chronic diseases, cancer, cardiovascular diseases and diabetes, osteoporosis and fractures, cognitive function and psychiatric disorders, that are major contributors to the burden of disease in the elderly.

In the work-package on Biomarkers (WP9) an inventory was made of the biomarkers that have been measured in the various cohorts. In addition, a set of biomarkers have been selected, related to aging and diseases to complete the existing data set of biomarkers. Emphasis was on cohorts

from Central and East-European origin (HAPIEE cohorts from Krakow, Prague and Kaunas) and the ESTHER cohort (Germany). In these cohorts biomarkers of oxidative stress, antioxidant and redox status have been measured, in addition to biomarkers of nutrition (folate, vitamin B12 and vitamin D) and disease (kidney and liver function and inflammation). In this presentation biomarker data will be given from the measurements within CHANCES supplemented with data from other studies. The focus will be put on the distinction between biomarkers for aging, nutrition and disease.

The research leading to these results has received funding from the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement no. HEALTH – F3-2010-242244.

**The number of people with overweight and obesity continue to grow worldwide. This coincides with an increase of cardiovascular diseases, type II diabetes, certain types of cancer and other noncommunicable diseases.**

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To tackle this growing problem of obesity and other diet-related health issues, the World Health Organisation (WHO) called upon the food industry to:

- limit levels of saturated fat, trans fat, added sugars and salt in existing products;
- issue simple, clear and consistent food labels
- help consumers to make informed and healthy food choices.

A successful approach to fight obesity, calls for a joint effort between scientists, governments and the food industry.

The Choices Programme is a good example of such a cooperation. This positive front-of-pack labelling programme helps consumers to make healthy choices. At the same time, the programme stimulates the food industry to develop healthier food products<sup>1</sup>.

This programme builds upon a cooperation between governments, scientists and food industry. Public authorities can support the initiative by endorsement or approval of the programme in (inter)national policies. Scientists, independently from industry, develop the product criteria based on international dietary guidelines from the WHO. These criteria are periodically reviewed by the scientific committee. Adaptations of regional criteria can be set by a national scientific committee, taking into account local food habits, dietary guidelines and product composition.

The food industry uses the criteria to reformulate their products to healthier options. Studies demonstrate an important impact of the programme on the healthiness of products. Amounts of sodium, sugar and saturated fat have been greatly reduced, whereas fibre content increased<sup>2</sup>. Data from a modelling study by Roodenburg et. al.<sup>2</sup>, in a Dutch young adult population, show potential beneficial effects of Choices on energy and nutrient intakes, but also unintended effects on fat soluble vitamins. Calculated intake distributions showed that median energy intake was reduced by 16% by replacing normally consumed foods with Choices compliant foods. Intakes of nutrients with a maximal intake limit were also reduced (ranging from -23% for sodium and -62% for TFA). Effects on intakes of beneficial nutrients varied from an increase of 28% for fibre and 17% calcium to an unintentional reduction in fat soluble vitamin intakes (-15 to -28%).

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**UK experiences and data on product improvements (salt reduction) and influencing consumers' choices.**

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The United Kingdom initiated a national level salt reduction programme over 10 years ago. The initiative comprised of elements including the formation of an action group; monitoring of salt intake and salt levels in food, setting a population target salt intake, development of a salt reduction strategy, progressive lowering of salt targets for different categories of food, collaboration with industry to reformulate food; consideration of regulation, nutrition labelling; a consumer awareness campaign; and media activity. This presentation will reflect on the available data regarding the responses to this initiative and also on the lessons learned from this initiative for programmes focussing on saturated fat and sugar.

## **The Israeli Health Ministry dilemma over FOP labeling and salt reduction.**

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Background: In December, 2011, Israel launched the National Program for Active & Healthy Living, to address obesity and non-communicable diseases such as diabetes, high blood pressure and heart disease. The Ministries of Health, Education and Culture and Sport share leadership; additional ministries, local government, Israel's four health funds, the private sector and civil society are partners, as well. The program is called Efscharibari, loosely translated as "It's possible to be healthy," but signifying the government's responsibility to enable citizens to maintain a healthy lifestyle.

Policy goals include removing junk foods from schools; tax breaks on workplace purchases of healthy refreshments; calorie-labeling at restaurants and on vending machines; front-of-package food labeling; limiting junk food ads during children's TV; reducing sodium content in processed foods; and promoting healthy lifestyle via Israel's four health funds, public hospitals and well-baby clinics. The Ministry of Health and the Ministry of Finance are exploring economic interventions, like a "soda tax" and regulating the price of whole grain bread.

Methods: The three ministries manage the program through a joint committee. While the Health Ministry originally financed efforts for all ministries, each ministry now manages and finances changes in their own policymaking arenas. For example:

The Health Ministry initiated a national program to reduce salt intake, including voluntary collaboration with the industry to reduce salt in prepared and kosher food, as well as a national survey of salt consumption of the population (24 hours urinary collection). The Ministry subsidized group treatment for diabetes empowerment and overweight reduction in all 4 health funds.

The Ministry of Education declared the first year of the National Program "The year of active, healthy lifestyle," to catalyze the transition to schools as health-promoting environments for students, teachers and surrounding communities. The Ministry of Culture and Sport shifted its focus toward facilitating opportunities for all citizens to engage in physical activity.

The program included a pilot in 15 municipalities, and strengthened staff of Israel's Healthy Cities Network. It also included Israel's largest ever social marketing program, leading research-based campaigns to promote physical activity, salt reduction, tap-water consumption/reduction of sweetened beverages and healthier birthday parties in nursery schools.

Results: The Ministry of Health and Israel's leading food companies have agreed on salt reduction targets in 11 food categories. In several food groups, such as packaged salads and breads, companies have already begun to reduce salt content. Efscharibari's "food label" for low calorie, low sodium whole grain bread currently appears on breads from all of Israel's leading bakeries.

In the Health System, all public hospitals now provide more healthful food to both patients and visitors. The four health funds tripled the number of diabetes and weight reduction groups for children and adults. In 2015, the Ministry of Health will launch a "healthy parenting" initiative, to be implemented in well-baby clinics.

Since 2011-12, over 300 schools have achieved accreditation as "health-promoting schools". The Ministries of Agriculture, Education and Health successfully piloted a school fruit and vegetable distribution program, added health promotion as an educational objective, and made it a basic component of teachers' training. It is now illegal to sell or serve unhealthy foods in schools.

Additional initiatives included a game-based website for children, health-related content for children's TV, health promotion in the military and the police and the production of a tool kit for workplace health promotion. Municipalities and local NGOs have initiated hundreds of programs in community centers and public spaces, including community and nursery-school edible gardens, "walking school buses" and bicycling groups for at-risk youth.

The program is not without challenges: front-of-packaging food labeling has encountered strong opposition both in and beyond government, as has reducing junk food marketing to children. In 2015, the Ministry of Health will be launching roundtables with relevant parties on both fronts, in order to achieve realistic and sustainable solutions.

Conclusions: It is possible to make national public health and health promotion programs to reduce the incidence of NCDs, if sufficient resources are recruited and attention is focused. Challenges, though, remain, and must be addressed, in order to achieve the National Program's goals and equitably foster healthy behaviors on a population level.

## **Experience from Friesland Campina with Multi-Stakeholder initiatives on healthy diets.**

*Dekker P.  
FrieslandCampina, The Netherlands.*

FrieslandCampina is one of the world's five largest dairy companies. Its products like dairy-based beverages, cheese, desserts, infant nutrition, ingredients and products for professional consumers find their way in more than 100 countries mainly in Asia, Africa, EU and Middle East. The company is fully owned by Zuivel Coöperatie FrieslandCampina U.A., with more than 19.000 member dairy farmers from the Netherlands, Germany and Belgium.

By 2050 the world's population is expected to have risen to between 9 and 10 billion people. Feeding this increasingly global population is an enormous challenge. From a nutritional perspective we are confronted with malnutrition and overweight/obesity at the same time. FrieslandCampina wants to help combat malnutrition and help reduce the growing number of people with overweight. FrieslandCampina does this by improving the composition of its products, by disseminating information about healthy eating and lifestyle, and by making the healthier selection of food easier for the consumer.

Preventing and combating overweight and obesity is a shared responsibility of consumers, NGO's, governments as well as food producers and food suppliers. FrieslandCampina is committed in working together with other stakeholders addressing this challenge. As such FrieslandCampina is one of the founding fathers of the Choices Foundation in the Netherlands and the International Choices Foundation in Brussels. Why does FrieslandCampina participate in Multi-Stakeholder initiatives? What are our conditions to participate? What is the impact of participation in these initiatives such as the Choices system, on the company and its brands? One of the results: every year 2 million kilo's less sugar is nowadays added in dairy and fruit based drinks on the Dutch market.

During a short presentation eight years of experience with the Choices Foundation will be shared by Petra Dekker, one of the leading nutritionists of FrieslandCampina.

## **Activities and results of the Global Food Monitoring Group.**

*Dunford E.  
The George Institute for Global Health, Australia.*

Non-communicable diseases now account for more than 60% of total deaths globally. Alongside the United Nations, regional governments all around the world are calling for population-wide preventive measures based upon an improved food supply. For example, in Latin America alone it's been estimated that a reduction of 10% in sodium intake yearly 10 years could result in >500,000 fewer coronary heart disease and stroke events annually. This will only be achieved if there are definitive data describing the food supply and how it can be improved.

The Global Food Monitoring Group (FMG) aims to collate data on the nutritional composition of processed foods in multiple countries using comprehensive large scale product label surveys with the aim of objectively and transparently monitoring changes in the nutritional composition of processed foods globally. Currently, the FMG has representation from 31 countries, with over 200,000 products (both packaged and processed at the barcode level and food service items) included. LMICs represent two-thirds of the FMG, and most of these are from Central and South America and the Asia Pacific region. The FMG has high-level input and support from the FAO, the World Health Organization, and the Pan-American Health Organization, as well as industry groups and governments from a range of countries.

To date, training seminars have been held in several countries to increase the capacity for data collection in LMICs in the Asia Pacific region and Latin America. Advanced technologies to improve data collection have been developed and distributed to eight countries. Data have already been used by public health researchers to demonstrate to both industry and government bodies the often wide variation in sodium levels in foods, the lack of consistency in how nutrients are displayed on packaged food labels and menu labels both nationally and globally, and the variations in locally made vs. imported products in lower and middle-income countries as opposed to developed countries.

Data from Australia, New Zealand and the UK have been used to develop a smartphone application called FoodSwitch which was launched as a public-private partnership with leading health insurance company, Bupa. By scanning the barcode of a packaged food product using a smartphone's camera, the FoodSwitch application presents a nutritional profile of the food with easy-to-interpret, colour-coded traffic light ratings for total fat, saturated fat, sugar and salt content. The application also suggests healthier alternative products (at the brand level) in the same category of the scanned food. FoodSwitch has been an important outcome of the work of the FMG to date and is a good example of how a multi-stakeholder project can be used to directly help consumers make healthier food choices. A particular innovation in the app was the incorporation of a crowdsourcing function whereby users are able to contribute information on missing products. If a barcode is scanned but the corresponding UPC is not identified in the database, then the user is asked to photograph of missing items and the information is then added to the database. More than 500,000 photos of missing items have been sent in

by FoodSwitch users since launch, and this huge volume of crowd-sourced data has provided a novel means for low-cost, real-time tracking of the nutritional composition of foods. This information has been shared with both government and industry to try to encourage manufacturers to reformulate their products towards healthier formulations. There appears to be significant opportunity for this approach in many other countries and it is hoped that this will provide for scalability and offer a practical means for industry, public health and government to work together to improve the food supply in multiple countries around the world and combat the growing problem of diet-related NCDs.

### Labelling developments in Latin America.

Uauy R.

Institute of Nutrition INTA, University of Chile.

Considering the rapid rise in the prevalence of obesity and related NCDs in virtually all Latin American countries and the direct association of these diseases with diet and patterns of food consumption, there is a strong need to align food intake of the population with recommended patterns of consumption and physical activity in support of good health and nutrition. These measures have to be simple, easy to understand and applicable on large scale.

Front-of pack labelling systems (FOPL), based on "food group" specific criteria for sugar, salt, saturated and trans fat and dietary fibre, have been developed to provide an answer to this demand. A positive logo as has been developed by INSP in Mexico and by the University of La Plata in Argentina, in order to guide consumers in selecting the "healthiest" options within each food category. This approach not only provides the best choice from what is available but also serves to guide the food industry towards health-nutrition driven innovation. The implementation of the choices approach requires cooperation of science, industry and government in each country where it is implemented, as demonstrated in the case of e.g. the Netherlands. Where the choices system has had an important impact on the sugar, salt, fat and fibre content of processed foods as well as has influenced population intake. FOPL should also help food industry to generate changes in processing that will promote healthier food consumption, with less sugar, salt, saturated fats and energy and increase fibre and micronutrient intake. Considering that presently processed foods in most markets are loaded with excess sugar, salt and saturated fat; this approach depending on the setting can generate a virtuous cycle where both health demands and business interest are compatible. Unprocessed foods too should preferably be cooked with minimal or no addition of salt, sugar and saturated fats during preparation. These actions should ultimately lead to a healthier food supply/consumption patterns and lower NCD diet related risks and thus lower health costs.

Thus processing per se should not be a criterion to define health consequences; the challenge for all is to promote a healthy diet in which healthy foods can be consumed in their natural form or processed in a manner that does not compromise human health. The goal today and in the future is to change processing in support of good health and nutrition.

### Estudios de Balance Energético; metodología y resultados en la población española.

Varela Moreiras G.

Nutrición y Bromatología. Universidad CEU San Pablo (Madrid), España. Fundación Española de la Nutrición (FEN).

El balance energético (BE) o equilibrio energético se refiere "simplemente" a que debemos comer la misma cantidad de energía que gastamos. Conocer el concepto de BE y aplicarlo a nuestras vidas es quizá el factor más importante para mantener una buena salud y tratar de prevenir la obesidad. Sin embargo, la teoría no es sencilla aplicarla ya que, por un lado, en este ya avanzado siglo XXI desconocemos todavía en gran medida lo que comemos, en definitiva, nuestra alimentación. Y ésta es cada vez más compleja, lo que dificulta sin duda controlar adecuadamente este lado de la "balanza", la ingesta. Pero además, en el otro lado, el correspondiente al gasto energético, aún es peor conocido y hay muy escasa información en la cuantificación adecuada del mismo. Debe recordarse, además, que no debemos estudiar aisladamente los componentes del BE, sino de manera integrada, y como interaccionan. Problemas como la infravaloración de la ingesta de energía, y la sobrevaloración del gasto, son frecuentes en la mayoría de las encuestas alimentarias, impactando más en aquellos grupos de población en los que el control del balance energético resulta aún más necesario. El empleo de las nuevas tecnologías abre innovadoras posibilidades para las encuestas de balance energético. Precisamente, la innovadora metodología (empleo de "tablet" para cuantificación de la ingesta, y de acelerómetros para el nivel de actividad física) en el reciente Estudio ANIBES ("Antropometría, Ingesta, y Balance Energético en España"), representativo de la población española, y que hemos desarrollado, proporciona una herramienta útil y actualizada para un mejor conocimiento del balance energético de la población española, como se pondrá de manifiesto en la ponencia.

### Contribución calórica de los macronutrientes en épocas de debate.

Socolovsky S.

Universidad de Buenos Aires, Argentina.

La valoración de la contribución calórica de los alimentos de la dieta es un tema en constante debate. Dado que la utilización de Bases de Datos de la más diversa procedencia se emplean para acreditar el contenido calórico de los alimentos reportados en las encuestas alimentarias es imprescindible tomar en consideración los errores que surgen en las valoraciones a consecuencia de la inexactitud de estos datos.

Se discutirá extensamente la contribución calórica de los macronutrientes en las dietas modernas, con presencia de los sustitutos del volumen (bulk replacers) de azúcares, que incluyen polioles, polidextrosa, inulina, FOS, GOS, IMOs y otros. Asimismo se presentarán los avances en edulcorantes intensivos y se hará referencia a los sustitutos de grasa presentes en múltiples alimentos de nueva tecnología.

La innovación tecnológica actual induce la constante reformulación de alimentos para hacer efectiva la reducción calórica de los alimentos envasados y el tema es fundamental dentro del debate actual sobre balance energético.

### Herramientas para planificar y medir consumo en intervenciones nutricionales: fortificación de alimentos.

García-Casal M.N.

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Para la justificación, planificación y medición de consumo en intervenciones nutricionales, por ejemplo un programa de fortificación de alimentos, se requiere conocer la magnitud del problema nutricional, la necesidad de una determinada intervención (fortificación, suplementación, universal o dirigido), si se requiere incluir uno o más nutrientes y cual alimento es el más indicado. Para reunir esta información, que además será utilizada como línea de base para medir el impacto de la intervención una vez implementada, es ideal obtener evidencias clínicas o subclínicas de deficiencia, estimaciones que indiquen bajos niveles de ingesta de nutrientes o las probabilidades de desarrollo de algunas deficiencias debidas a cambios en hábitos de consumo, condiciones sociales y/o económicas que estén ocurriendo en un determinado momento. En un escenario ideal, esta información debe ser obtenida de encuestas nacionales de salud y nutrición que se planifiquen especialmente para un determinado programa. Si esta clase de estudios no está disponible, se pueden usar datos nacionales recientes de consumo de alimentos, encuestas de ingresos y gastos del hogar (HIES por sus siglas en inglés), encuestas de panel, la herramienta de valoración rápida de fortificación (FRAT por sus siglas en inglés), las hojas de balance de alimentos de FAO, encuestas demográficas de salud y/o información proveniente de las industrias sobre producción, ventas y consumo. Otras fuentes de información, aunque indirectas, son los documentos de política nacional, reportes de industrias o de inversionistas, evaluaciones finales de proyectos o publicaciones de estudios de eficacia. Se presentaran detalles de la FRAT y de las HIES. FRAT combina un recordatorio de consumo de 24 horas simplificado y un cuestionario de frecuencia de consumo de alimentos. Esta herramienta puede implementarse por sí sola o incluirse como parte de una encuesta existente. FRAT recoge datos cuantitativos representativos a nivel de hogares, indicando el consumo de vehículos potencialmente fortificables además de datos sobre uso y disponibilidad de alimentos. Las HIES han sido recientemente validadas como herramientas para la estimación del impacto de programas masivos de fortificación de alimentos.

### El cuestionario como instrumento de valoración de la actividad física.

Román Viñas B.

Fundación para la investigación Nutricional, Barcelona. CIBER OBN, Instituto Carlos III, Madrid. EUSES, Universidad de Girona. Spain.

El sedentarismo y una práctica de actividad física inferior a las recomendaciones suponen un mayor riesgo de desarrollar enfermedades crónicas y disminuir la esperanza de vida. Para llevar a cabo políticas de promoción de estilos de vida saludables y medir sus eventuales resultados es necesario disponer de instrumentos que midan la actividad física de una manera válida y fiable y que sean sensibles al cambio. En estudios poblacionales los cuestionarios de actividad física son la herramienta de elección, debido principalmente a su bajo coste y fácil implementación. A pesar que existen numerosos cuestionarios validados en distintas poblaciones, la elección del instrumento a utilizar depende del tipo de estudio que se plantea (estudios de prevalencia, de intervención, longitudinales), objetivos del mismo (realizar comparaciones entre poblaciones, evaluar la relación entre actividad física/sedentarismo y salud, evaluar tendencias, etc.), recursos de que se dispone (presupuesto, recursos humanos),

qué componente de la actividad física se quiere medir (en el tiempo libre, en el trabajo, tiempo dedicado a caminar o a estar sentado) y cómo se quiere medir (variable cuantitativa o cualitativa, medición de la actividad física como variable principal, etc.), la población objeto de estudio (tamaño de la muestra, sexo, edad, estudios, nivel socioeconómico, nivel de actividad física), etc. A continuación, el cuestionario seleccionado debe pasar un proceso de validación en la población objeto de estudio. Posteriormente, es necesario ser riguroso en todo el proceso de aplicación del mismo, desde la formación de los entrevistadores (si es administrado), hasta la recogida de los datos y verificación de los mismos, así como el análisis e interpretación de los datos. Cuando se tienen en cuenta todos estos aspectos, se minimiza el error de medición asociado al cuestionario. Sin embargo, la actividad física es un comportamiento humano y como tal su medición por métodos subjetivos no está exenta de errores asociados a la percepción, cultura o educación del individuo.

### **Yogurt as part of healthy diet and weight management.**

Kok F.J.

*Division of Human Nutrition, Wageningen University, The Netherlands*

Yogurt is rich in many nutrients, including protein, vitamins B-2, B-6, B-12, calcium, potassium, zinc, and magnesium and the acidity of yogurt increases the bioavailability of specific nutrients such as calcium.

Yogurt consumers are more likely to have a better overall diet quality compared to non-users. Yogurt also has more lactic acid and galactose but less lactose than milk. Moreover, probiotics in yogurt have possible health benefits.

Limited findings suggest that yogurt may have a beneficial effect on weight and body fat, but further randomized controlled trials are needed to confirm this. Mechanisms for these findings are yet unclear, but calcium and other nutrients (eg, whey and casein proteins) may facilitate loss of weight and fat mass related to satiety and preservation of lean body mass. Moreover, recent evidence suggests that changes in the gut microbiota by probiotic bacteria in yogurt may influence weight gain.

Further evidence for or against a benefit of yogurt consumption on weight management is needed, but this should not advise against recommendations for including yogurt as part of a healthy diet, because it is a nutrient-dense, lower-calorie food that can help to meet guidelines.

### **Yogurt consumption and impact on cardiometabolic risk factors.**

Marette A.

*Institute for Nutrition and Functional Foods, Heart and Lung Institute of Laval Hospital, Faculty of Medicine, Laval University*

Growing evidence indicates that consumption of dairy, and particularly fermented dairy products, is linked with better diet quality and is negatively associated with long-term weight gain. Recent meta-analyses and epidemiological studies further suggest that there is a significant inverse association between the intake of fermented dairy products and the risk of type 2 diabetes (T2D) and cardiovascular diseases (CVD), even when adjusted for several confounding factors. This presentation will summarize and highlight both the epidemiological and experimental studies that have investigated the impact of dairy products, and notably yogurt, on cardiometabolic risk factors and whether this may help prevent T2D and CVD in specific populations. I will also discuss the potential factors in fermented dairy products that may underlie their impact on obesity, T2D and CVD. Finally I will discuss some key issues and current gaps that need to be considered when investigating the impact of yogurt consumption on the incidence of these complex societal diseases.

### **Yogurt consumption and metabolic diseases in children and adolescents (including latest results of HELENA study).**

Moreno L.A.

*GENUD research group, University of Zaragoza, Spain*

Although there is no clear evidence of the role of dairy consumption on cardiovascular diseases (CVD) risk development in adults, several studies have suggested dairy consumption to have a protective effect. There is limited information on the relationship between milk and dairy products consumption and CVD risk factors among adolescents. To identify those food groups best discriminating individuals at high/low CVD risk and to investigate the relationship between dairy consumption and CVD risk factors we studied a sample of adolescents (12.5–17.5 years) from eight European cities participating in the cross-sectional (2006–2007) HELENA (Healthy Lifestyle in Europe by Nutrition in Adolescence) study. Diet, waist circumference, skin-fold thickness, systolic blood pressure, insulin resistance, triglycerides, total cholesterol/high-density lipoprotein ratio

and cardiorespiratory fitness (CRF) were assessed. Individual z-scores of CVD risk factors were summed to compute sex-specific clustered CVD risk scores. Dairy emerged as the food group best discriminating adolescents at low/high CVD risk. In both boys and girls, waist circumference and sum of skin-folds were inversely associated with consumption of milk and milk- and yogurt-based beverages. Moreover, CVD risk score was also inversely associated with overall dairy consumption, but only in girls. This study adds further evidence to the scarce literature on the influence of milk and dairy products on adolescents' cardiovascular health.

### **Yogurt and fermented milks in daily nutrition: from science to the guidelines and recommendations.**

Salminen S.

*Functional Foods Forum, University of Turku, Finland*

Beneficial microbes, such as many lactic acid bacteria, enter the food supply primarily through fermented milks and addition of probiotics. Yoghurt among fermented milks is a significant component of the diet of many geographical regions. The fermentation process serves to preserve safety, nutritional quality and palatability of milk providing health benefits.

Yoghurt is fermented with symbiotic cultures of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *bulgaricus*. Yoghurt itself has been a nutritious food for centuries. It has provided us with live lactic acid bacteria with proposed benefits to health.

The scientific basis for health benefits starts from the symbiotic strains with high lactase activity. It is well recognized that yoghurt consumption improves lactose digestion and diminishes or eliminates symptoms of lactose intolerance. The physiological effects have been clearly demonstrated in a large number of human studies in which consumption of yoghurt with live cultures has been compared with consumption of a pasteurized product (with heat-killed bacteria). Most studies have shown better lactose digestion in subjects who consumed yoghurt with live cultures, as well as reduction of gastrointestinal symptoms. All studies highlight the essentiality of live bacteria for the beneficial effect on lactose digestion. In the European Union, only one permitted health claim for yoghurt with live yoghurt cultures has been approved: a cause and effect relationship has been established between the consumption of live yoghurt cultures in yoghurt and improved lactose digestion in individuals with lactose maldigestion. We assessed health messages, which include probiotics or fermented milks or yoghurt in food based nutrition guidelines and recommendations in fourteen countries of the European Union and several countries outside European Union recommend yoghurt. Five European Union member states had national nutrition guidelines or recommendations that include either fermented milks with live bacteria or probiotic cultures. Thus, some EU member states recognize health benefits associated with consumption of live microbes and yoghurt, even if marketing claims are not authorized. Similar concepts were found outside Europe. Several studies have confirmed viability and metabolic activity of yoghurt bacteria in the human intestine, as well as in *in vivo* animal models. Yoghurt bacteria can also be detected in feces of human subjects consuming yoghurt suggesting that they may interact with the microbiota. Yoghurt has been traditionally used in the management of acute diarrheal disorders. This recommendation is based on the traditional approach in many countries all over the world, as well as on evidence gained in human intervention studies. Yoghurt feeding in children with acute watery diarrhoea decreased stool frequency and shortened the duration of diarrheal episodes and similar reports have been later published with yoghurt supplemented by specific probiotic bacteria.

Taken together, yoghurt with live cultures has a role in both nutrition recommendations and other health messages. Further studies may be required to include yoghurt in to general nutrition recommendations.

### **Nut consumption and metabolic syndrome.**

Salas-Salvadó J.

*INC World Forum for Nutrition Research Dissemination.*

It is well established that nut consumption is associated with several health benefits on cardiovascular risk factors and cardiovascular disease. These benefits are mainly attributed to its high content in many bioactive compounds. Scientific evidence supports that nut consumption is inversely related with the prevalence and incidence of the metabolic syndrome (MetS) and some of its components. Nuts reduce the postprandial glycemic response; however, long-term trials of nuts on insulin resistance and glycemic control in diabetic individuals are inconsistent. Epidemiologic studies have shown that nuts may lower the risk of diabetes incidence in women. An inverse association with body mass index and general obesity has been also suggested. Nuts could have a protective effect on blood pressure and endothelial function but further studies should confirm these results. It has been shown that nuts have a cholesterol-lowering effect, but the relation between nuts and hypertriglyceridemia and high-density lipoprotein cholesterol is unclear. An inverse association was found between the frequency of nut consumption and the

prevalence and the incidence of MetS in epidemiologic studies. Several trials have evaluated the effect of nuts on subjects with MetS and found that they may have benefits in some components. The results of the PREDIMED Study, a multicenter randomized nutrition trial for the primary prevention of cardiovascular disease in 7,447 participants at high cardiovascular risk, have demonstrated that nut consumption could be beneficial for MetS management. Compared with those participants randomized to a low-fat control diet, those in a Mediterranean diet enriched with nuts had a higher reversion of MetS and hyperglycemia component of the MetS after a median of 5.0 years of follow-up. Diabetic participants were more likely to reverse MetS. The protective effects on metabolism could be explained by the modulation of inflammation and oxidation. Further trials are required to clarify the role of nuts in MetS prevention and treatment.

### The potential role of nuts in cognitive functions.

Sabaté J.

Loma Linda University, California, USA

Dr. Joan Sabaté will explore the potential role of nuts in cognitive function. Evidence for the potential role of nuts in the prevention of cognitive degeneration will be reviewed. The nutritional factors related to cognition will be discussed, and a currently conducted large, dual-center, clinical trial on walnuts and cognition will be presented.

### Nuts and Diabetes Control.

Kendall C.

University of Toronto, Canada.

Dr. Cyril Kendall will point out how nuts may exert a protective effect on insulin resistance and type 2 diabetes, including the largest study to date on nuts and diabetes (Jenkins, D.J.A., et al. Nuts as a replacement for carbohydrates in the diabetic diet. *Diabetes Care*, 2011) and according to which two ounces (57 g) of nuts a day can improve glycemic control and blood lipids in those with type 2 diabetes.

### Nuts and mortality.

Bao Y.

Brigham and Women's Hospital and Harvard Medical School, USA.

Dr. Ying Bao will provide insight into the study "Association of nut consumption with total and cause-specific mortality", published in the *New England Journal of Medicine*. "We observed significant inverse associations of nut consumption with total mortality and most major causes of death in two large, independent U.S. cohort studies." The results were similar for peanuts and tree nuts, and the inverse association persisted across all subgroup analyses.

### Nutritional epigenetics: the search for mechanisms underlying DOHaD in Sub-Saharan Africa.

Silver M.

MRC International Nutrition Group, London School of Hygiene and Tropical Medicine, United Kingdom.

The MRC International Nutrition Group has been exploring links between early life exposures and long-term health outcomes in a rural community in The Gambia, West Africa for many decades. In doing so we are able to exploit an 'experiment of nature' in which fluctuations in energy balance and maternal nutritional exposures show a distinct bimodal seasonal pattern. One striking observation is that children born in the rainy season are six times more likely to die between 15-65y than those born in the dry season – a finding that sits squarely within the DOHaD paradigm.

Epigenetics is the study of modifications to the genome that can affect gene expression, without altering the underlying DNA sequence. One class of epigenetic modification, DNA methylation, is preserved during cell divisions, and has been shown in animal models to be influenced by nutritional exposures in early life with consequent life-long effects on phenotype. Human studies looking at babies born around the time of the Second World War Dutch 'Hunger Winter' point to similar effects in humans, suggesting changes in DNA methylation as a plausible mechanism by which early nutritional influences can affect health throughout the life course.

We have recently shown that season of conception and blood levels of key maternal nutritional biomarkers relating to one-carbon metabolism (B2, B6, cysteine and homocysteine) predict DNA methylation in infants at a number of metastable epialleles (MEs)<sup>2</sup>. MEs are genomic regions where methylation is established stochastically in the early embryo, leading to systemic (cross-tissue) inter-individual variation. Our continuing work in this area is highlighting further interesting candidates, some with known phenotypic consequences in humans.

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### Nutrition aspect of the Birth-to-Twenty cohort in South Africa.

Norris S.A.

MRC Developmental Pathways for Health Research Unit, Department of Paediatrics, University of the Witwatersrand, Johannesburg, South Africa

The relevance of nutrition pre- and during pregnancy and early infancy and childhood defines both short-term health and survival but also long-term health. This is now large body of literature that shows how early maternal and child nutrition has significant consequences on later health and human capital. The Developmental Origins of Health and Disease paradigm is particularly appropriate in understanding the health and nutrition transition in countries that face the double burden of nutrition-related diseases (acute malnutrition coexisting with obesity and other chronic diseases). The aim is to present African regional prevalence of child stunting and later obesity and discuss the need to prioritise maternal and infant nutrition not only in health and nutrition intervention programs but also in the emerging African research agenda so as to better orient policy decisions.

### Sugars and health. Is evidence behind policy?

Gómez Candela C.

Clinical Nutrition Department. University Hospital La Paz. Nutrition and Functional Food Research Group. IdiPAZ. University Autónoma of Madrid. Spain.

A healthy diet should meet individual nutritional needs and also incorporate cultural and gastronomic values that make it enjoyable. However, various studies show that nutritional imbalances are the main cause of the premature development of most chronic or degenerative disease that currently affect today's society. Changes that have taken place in the population's lifestyle have caused an increase in the prevalence of many chronic illnesses such as obesity, diabetes and metabolic syndrome which have ultimately led to a rise in cardiovascular morbidity and mortality. Evolving demographic and lifestyle trends, particularly when it comes to the incorporation of unhealthy diets and the absence of physical activity, are behind all this. Fortunately, despite all this, it is preventable.

The prevalence of NCDs, and more specifically obesity and overweight, are certainly an area of public health concern whose prevention should be managed effectively taking into consideration all its possible causes and the potential consequences of intervention measures.

Obesity and Sugar

The role of carbohydrates and, more specifically, the role of sucrose in developing obesity is more controversial. In spite of the publication of numerous studies on this subject in recent years, there are still many uncertainties about the role that high sugar diets play in the rising incidence of obesity. There is no reliable evidence that sugars affect obesity any more than any other macronutrient. Changes in body weight occur with any change in macronutrient intake that led to an overall excess or deficit of energy compared with requirement for weight stability. For the treatment of obesity the key objective is to reduce energy intake, whereas macronutrient distribution is less important. Once the desired weight has been reached, diets that limit fats and that are high in carbohydrates are the preferred method to maintain the weight lost. Although low carbohydrate diets may have a pathophysiological mechanism in short term weight loss, it is important to point out that the long term effects of continuing to follow these diets are not known.

Sugar and Diabetes

In relation to the nutritional recommendations, based on the evidence for treating and preventing diabetes, the total amount of carbohydrates consumed is more important than the type. Nowadays diabetics can consume sucrose (sugar) and foods that contain sugar as long as they are eaten as part of a healthy diet and there is an appropriate medical supervision. Sugar consumption does not cause the onset of diabetes, however, becoming obese, an unbalanced diet and a lack of exercise can do it. The relationship between sucrose consumption and Cancer

There is only possible evidence of a positive relation between the intake of monosaccharides (fructose and glucose) and pancreatic cancer. There is possible evidence of a positive association between glycemic index (GI) and colorectal cancer and that there is no association between GI and risk of endometrial cancer, breast cancer and pancreas cancer. More research is needed.

Sugar and Cardiovascular diseases

In this context the nutritional goal is focused on lowering fat and salt intake in order to reduce the incidence of cardiovascular diseases. Even

though the intake of sugar has dropped in recent years in the majority of developed countries (Australia, United States), the possible excessive consumption of sugar has been related only to possible excessive consumption of sugary drinks, mainly in the United States in children and adolescents.

#### Dental health

In developed countries tooth decay has ceased to be a problem due to the widespread use of adequate oral hygiene, exposure to fluoride and regular visits to the dentist. The overall existing key factors impacting dental caries includes the amount of sugars and starches consumption, frequency of intake, oral hygiene, exposure to fluoride and others. Most developed countries have lower caries prevalence than others with low sugars intake. No randomized controlled intervention studies have been reviewed on the effect of reducing the amount of "free sugars" on dental caries incidence or prevalence. Changes in sugar supply do not reliably predict the magnitude or the direction of change in caries prevalence. Sweet foods should be consumed with main meals (meals, snacks.) and after that the teeth should be brushed.

The importance of sucrose for cognitive functions: knowledge and behavior Carbohydrates are important for our bodies to function properly and particularly for the brain, as brain cells need a constant supply of glucose from the blood in order to maintain their integrity and functionality (140 g of glucose per day). The consumption of a food or drink containing sucrose is associated with an improvement in mental agility, memory, reaction time, attention and the ability to solve mathematical problems, as well as a reduction in the feeling of tiredness, in young and elderly healthy people, and also in Alzheimer patients.

#### Final considerations

The prevalence of NCDs, and more specifically obesity and overweight and dental health, are certainly an area of public health concern whose prevention should be managed effectively taking into consideration all its possible causes and the potential consequences of intervention measures. Any recommendation on public health policies has to take into consideration a thorough review of the latest scientific evidence.

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### Do genes modify the response to sugar and CHO intake?

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There is currently much controversy over what is the best recommendation to make on carbohydrate (CHO) intake, both for the general population as well as the sub-groups of people suffering from different pathologies such as diabetes, obesity, cardiovascular disease, etc. From the personalized nutrition point of view, the response is simple as, rather than trying to come up with a general recommendation, this approach seeks to make specific and particular recommendations for different groups of people based on their genotypes. However, what evidence do we currently have on the importance of genetics in modifying the response to CHO in general and sugar in particular in the different phenotypes?

We shall analyze the most important genes for which significant interactions have been found between their genetic variants and CHO or sugar intake in phenotypes of obesity, glycaemia, plasma lipids, diabetes, cardiovascular disease and other diseases. Among these genes we shall concentrate on the following: the Perilipin1 (PLIN1) gene, Transcription factor 7-like 2 (TCF7L2) gene and the Carbohydrate-responsive element-binding protein (ChREBP) also known as MLX-interacting protein-like (MLXIPL) gene, for which our group has found relevant gene-diet interactions. We shall also provide variability data on sweet taste perception in the population depending on age, as well as the influence of that sweet taste perception on preferences for the consumption of different kinds of food and its association with BMI, fasting glucose, plasma lipids and other cardiovascular risk phenotypes.

Tasting profile, such as sweet liking or supertasting, may also be influenced by genetics, and therefore, may subsequently influence dietary intake. The genes that have an influence on the perception of sweet taste are less well known than those that influence bitter taste. The sweet taste receptor is a heterodimer of 2 protein subunits, T1R2 (taste receptor, type 1, member 2) and T1R3 (taste receptor, type 1, member 3) that are encoded by the TAS1R2 and TAS1R3 genes located on human chromosome 1. T1R2 is the component specific to sweet taste perception. We have found that the polymorphism rs35874116 (Ile191Val) in gene TAS1R2 is associated with different food intakes and differences in the anthropometric measurements in a Mediterranean population. Taken together all of this suggests that genetic polymorphisms can indeed be relevant in modulating the effects of CHO intake and sugars, so that, in the future, they would have to be taken into account when drawing up specific recommendations on intake for specific population groups.

### Rationale for cutting down.

Jewell J.

WHO Regional Office for Europe

The presentation will focus on the context for WHO's work on sugar. It will provide context on the burden of overweight, obesity and noncommunicable diseases at the global and European levels, followed by an overview of WHO's role in setting nutrition and dietary guidelines. The recent draft guidelines and recommendations on free sugars intake will be described, followed by a discussion of the implications for policy development in countries.

### Rationale for not cutting down sugar goals.

Sievenpiper J.L.

Li Ka Shing Knowledge Institute, Division of Endocrinology, and the Toronto 3D Knowledge Synthesis and Clinical Trials Unit, St. Michael's Hospital, University of Toronto, Toronto, ON, Canada

Sugars are emerging as important public health targets for their role in the epidemics of obesity and cardiometabolic disease. Like the earlier controversy around the role of dietary fat in obesity, strong positions are being taken on limited data. Parallels are being drawn between fructose-containing sugars and tobacco with the suggestion that fructose-containing sugars are to cardiometabolic disease as tobacco smoke is to lung and cardiovascular disease. Although experimental models offer plausible biochemical mechanisms to support these positions, whether these mechanisms operate in free living people requires careful inspection. Prospective cohort studies have shown a consistent relation of sugary beverages with cardiometabolic outcomes. These associations, however, are small, subject to important collinearity effects from other aspects of a Western lifestyle, and do not hold true at moderate levels of intake or when modeling total sugars. Systematic reviews and meta-analyses of controlled feeding trials have shown that fructose-containing sugars in isocaloric exchange for other carbohydrates (even under positive energy balance or in fluid form) do not show evidence of harm. Nevertheless, fructose-containing sugars supplementing diets with excess energy compared with the same diets alone (without the excess energy) increase body weight, fasting and postprandial triglycerides, blood pressure, uric acid, glucose, and markers of non-alcoholic fatty liver disease (NAFLD), effects more attributable to the excess energy than the sugar. Taken together, the evidence suggests that sugary foods and beverages are one of many pathways to overconsumption and cardiometabolic disease. Setting lower sugar targets is not likely to be of benefit alone, without

targeting other refined carbohydrates along with the other aspects of a Western dietary pattern likely to replace sugars in the diet. Attention needs to remain focused on reducing overconsumption of all caloric foods associated with obesity and cardiometabolic disease, including sugary foods and beverages, and promoting greater physical activity.

### **Introduction to Community based actions in public health nutrition.**

Yngve A.  
Orebro Universtiy, Sweden.

Access to good food and possibilities to physical activity in the local community is essential to population health. Efforts exist to influence city planning and change obesogenic environments in residential areas. Inequity in health is very visible in most countries in relation to residential areas and local community setup. This presentation briefly introduces the symposium and tracks the roots and origins of community based environmental monitoring and interventions including the Change approach to community based assessment of health environments.

### **Community engagement and social marketing - The FAN project.**

Suggs L.S.  
Università della Svizzera italiana (aka: University of Lugano), Lugano, Switzerland. The FAN (Family, Physical Activity and Nutrition)

Program is a community based social marketing intervention promoting eating and activity behaviors of elementary and middle school children and their parents. It is offered to all families in this target who live in Ticino; the Italian speaking canton of Switzerland. The program was co-created with parents, children, teachers, nutrition experts, cantonal and national authorities, and the research team in Lugano. FAN provides families with tailored communication for eight weeks. Parents get thematic tailored content each week through a website, emails and text messages. Children receive tailored letters by post every week. Outcome measures are taken from three points in time: pre, post and 3 months post intervention, including two, week-long logs of eating behaviors (pre and post). The intervention was a large success in terms of participation and retention and community engagement and behavioral outcomes. This paper presents both formative and summative outcomes of the project, including eating behaviors and the process for achieving community engagement to design, implement and evaluate a technology-based social marketing initiative that was different than typical programs in that community.

### **Governance of healthy living in a local community - the SoL-Bornholm protocol and first results.**

Mikkelsen B.E.  
Aalborg University, Denmark.

The SoL intervention is a multilevel intervention targeting food and nutrition behaviour as well as sedentary lifestyle among children aged 3-8 years and their families being implemented in the three neighborhoods of the isle of Bornholm. The approach through is an integrated one where intervention components are delivered in a coordinated manner across supermarket, media, school & kindergarten settings using a supersetting approach. SoL is building conceptually on a partnership between representatives from civil society, community-based associations, businesses and the public administration. A broad range of outcome measures are measured baseline and follow up. This paper present baseline results from the interventions. The paper will discuss perspectives and limitations in engaging citizens, media, front workers and politicians in participatory approaches as well on using a combined action and intervention research approach.

### **The health promoting community and schools.**

Gísladóttir E.  
Directorate of Health, Iceland

This contribution reports on the Health Promoting (HP) Community that The Directorate of Health is undertaking. The HP Community project started with a pilot municipality, Mosfellsbaer, located near Reykjavik. The HP Community project will first and foremost act as an "umbrella" for various other projects, including HP Schools and HP Workplaces projects that are already being run by the Directorate of Health. The pilot community has established a steering group that supervises the project, formulates policy and establishes where special emphases are required. The Directorate of Health supports the community by developing checklists that can be used to evaluate their status, mapping what is being done well and where special emphases are required, and provides the foundation for measuring and evaluating outcomes. The Directorate of

Health will provide assistance throughout, via the HP Projects mentioned earlier, as well as by providing a framework of recommendations, based on best practice. Furthermore Reykjavik City and the Directorate of health have signed an agreement that focuses on health promotion and reducing health inequalities. The agreement contributes to effective public health work in the interest of people of all ages within the municipality.

### **Active phytases consumed with food offer a new solution to overcoming phytic acid inhibition of mineral absorption.**

Hurrell R.  
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Phytic acid is the major inhibitor of iron and zinc absorption in human diets. It is universally present in cereal grains and legume seeds and is therefore present in all home produced or industrially manufactured complementary foods based on these ingredients. In the developing world, low absorption of iron and zinc from cereal based porridges is a major factor in the etiology of the widespread iron and zinc deficiencies in infants and young children.

In industrially manufactured complementary foods, there are several options to ensure adequate iron absorption. Ascorbic acid is commonly used to protect iron from phytic acid. Ascorbic acid converts ferric to ferrous iron and chelates it in an absorbable form. The disadvantage of ascorbic acid is that it is readily degraded on cooking and storage and the complementary food requires expensive packaging. NaFeEDTA can also be used to protect iron from phytic acid, or phytases can be used to degrade phytic acid during processing. Phytic acid degradation can also be used to improve zinc absorption. This procedure however is more expensive than the addition of ascorbic acid as it involves holding the aqueous cereal mixture for around 1h at the pH and temperature optima of the phytase and then drying.

Ascorbic acid and NaEDTA included in micronutrient powders or lipid based nutrient supplements added to home-produced porridges can also increase iron absorption, however a new simple approach was introduced recently that was demonstrated to increase both iron and zinc absorption. This is the addition of a phytase enzyme active at gastric pH to the food at the time of consumption. In this approach, phytic acid is degraded during digestion releasing iron and zinc for absorption. This presentation will review the beneficial effects of phytic acid degradation during complementary food manufacture on iron and zinc absorption and then present the recent studies showing enhanced iron and zinc absorption in young children when phytases are included in lipid based nutrient supplements and micronutrient mixtures added to cereal porridges at the time of consumption.

### **Application of phytase in foods and supplements.**

Koenders D.  
DSM Nutritional Products, The Netherlands.

Phytate is a known antinutrient for several essential minerals, especially iron, zinc, calcium. It also stores the majority of phosphorus in plant seeds in a form poorly available for humans. Codex alimentarius recommends lowering antinutrients such as phytate in complementary foods for small children and older infants and mentions phytase as a suitable means.

Traditional preparation methods such as fermentation improve bioavailability somewhat by activating endogenous phytases. Not all cereals and legumes contain sufficiently active enzymes and if they do, the preparation process often allows only insufficient phytate degradation. Added phytase has been shown to improve mineral nutrition in numerous trials across various consumer groups. Phytase can be used as food ingredient to degrade phytate in the stomach, or as processing aid to degrade phytate during food manufacturing. In both cases, phytate-bound minerals will become more available for uptake by consumers.

We report here that phytase (Tolerase™ P) originating from *Aspergillus Niger* can be safely, as assessed by JECFA, and effectively used in various food categories and supplements. Phytase is cost efficient to achieve balanced mineral nutrition in humans for minerals whose bioavailability is impaired by phytate. The presentation will also show examples of applications and stability.

### **Could phytase help reduce stunting in young children? Evidence for improved phosphate bioavailability and growth in pigs and poultry.**

Adeola, O.<sup>1</sup> & Cowieson, A.J.<sup>2</sup>  
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The main source of organic phosphate in the diets of pigs and poultry is phytin phosphorus. Phytin is a mixed salt of phytic acid, usually com-

plexed with Mg, K and Ca and is the primary storage form of phosphorus (P) in plant material. At pH above 1.1, phytic acid is negatively charged, becoming increasingly so as pH rises above 5 (for example in the small intestine). Due to the substantial negative charge on phytic acid at intestinal pH, phytic acid is chelated by various divalent cations such as Zn, Fe, Cu and Ca. Therefore, if these cations are ingested simultaneously with phytic acid, both the phytic acid (and associated phosphate) and the chelated cation precipitate and are largely unavailable for absorption. In pigs and poultry, the use of exogenous phytase is common for hydrolysis of phytic acid in the gastric phase of digestion in order to liberate phosphate and reduce the various antinutritive effects of phytic acid in the intestine. In both pigs and poultry, the use of exogenous phytase enhances the retention of phytin P from approximately 25 to 80%, which reduces the need for supplemental inorganic phosphate (a finite global resource). These improvements in phytin P retention are associated with dramatic improvements in growth rate, which are partially due to P retention and the improved solubility of cations, amino acids and other nutrients in the small intestine. Recent research has also implicated myo-inositol in these growth promoting effects of phytase (myo-inositol being generated on complete dephosphorylation of phytic acid), perhaps via insulin-mimicking mechanisms. These effects may also be evident when phytin is consumed in a low cation diets that promote solubility of phytic acid in the small intestine and allows endogenous phosphatase engagement. It can be concluded that supplementation of phytin-rich foods with exogenous phytase and/or separate consumption of P from inorganic sources are effective strategies in pigs and poultry to improve the retention of phytin P and reduce the antinutritive effects of phytic acid more generally. These effects are consistent and substantial and suggest that similar benefits of phytase may be apparent in young children with low phosphate intake.

### **Evidence on the potential benefit of adding phytase to complementary food supplements for prevention of childhood stunting.**

Christian P.

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Childhood stunting is a public health problem of global proportions that requires urgent attention. The recent Lancet Nutrition series estimates that 165 million children may have stunting in low and middle income countries (LMIC). Although childhood undernutrition has prenatal origins, nutritional interventions in the postnatal period that are shown to be effective in improving linear growth include appropriate infant and young child feeding practices and complementary food supplements (CFSs), increasingly with high-energy and micronutrient dense lipid-based formulations. Among micronutrients known to promote linear growth, evidence for zinc is the strongest; in a pooled analysis of randomized trials, improvement in mean height by 0.37 cm is observed in children supplemented with zinc for 24 weeks. It is estimated that 17.6% of the world's population has zinc deficiency, and children in LMICs under age 5 years bear the greatest risk. Proxy indicators of zinc deficiency in the population include not only prevalence of stunting, but overall zinc supply and phytate:zinc ratio in the national food supply or typical diet. Although routine zinc supplementation is not commonly done in programs, zinc is added with other micronutrients in ready-to-use CFSs, in fortified food blends (such as Corn Soy Blend), and also in micronutrient powders for home-fortification of traditional complementary foods. Zinc bioavailability is important to consider as iron, calcium and high-phytate diets will inhibit zinc absorption. A few studies have examined adding exogenous phytase to micronutrient powders and found improvements in iron and zinc absorption, reduction in deficiencies, and one study also recorded improvements in weight-for-age z scores (WAZ) in children, although no effect was observed on height. There is potential for adding phytase either to lipid-based supplements which include zinc, or to micronutrient powders to improve bioavailability of zinc from the traditional complementary foods but further research on both safety and efficacy is needed to show impact on growth beyond that on status.

### **Evolución de la compra de alimentos de la agricultura familiar para el programa nacional de alimentación escolar de Brasil: resultados nacionales.**

Slater B.<sup>1</sup>, Schwartzman F.<sup>1</sup>, Rodrigues Mora C.<sup>1</sup>, Sicoli J.<sup>1</sup>, Wenzel D.<sup>2</sup>, Bicalho D.<sup>1</sup>, Fischer E.<sup>2</sup>

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El Programa Nacional de Alimentación Escolar (PNAE) es una de las más importantes y antiguas políticas públicas de Brasil. En este programa, la alimentación escolar es considerada como un derecho de los estudiantes y una de las estrategias de seguridad alimentaria y nutricional (SAN) del país. Inicialmente será presentado una breve evolución histórica del pro-

grama, su base legal, objetivos, directrices y algunos datos de la magnitud y extensión de la atención a sus beneficiarios. Posteriormente, se analizará el porcentual de compras de alimentos procedentes de la agricultura familiar (AF), según establecido en la Ley 11.947 de 2009, con base en banco de datos oficiales de Fondo Nacional de Desarrollo de la educación del Ministerio de Educación (FNDE-MEC) referente a los periodos 2010 a 2013.

Cabe resaltar que 2010 fue el primer año obligatorio de compra de alimentos de la AF para el PNAE. A cada año, nuevos avances vienen siendo construidos y se espera volúmenes mayores de compra de la AF y que la compra sea realizada en 30% del volumen en todos los municipios del país. Dado el carácter reciente de la legislación, otros aspectos deberán ser profundizados y estudiados.

Por otro lado y el municipio de São Paulo, el Departamento de Alimentación Escolar (DAE) de la Secretaría Municipal de Educación de São Paulo es el órgano responsable por la gestión técnica, administrativo y financiero del Programa de Alimentación de la Ciudad de São Paulo. Actualmente atiende aproximadamente 900.000 (novecientos mil) alumnos con alimentación diaria, obedeciendo los parámetros específicos para cada segmento y respetando sus características individuales. A partir de la Ley 11.947 de 2009, y con los compromisos sociales adquiridos, el DAE viene comprando alimentos de Agricultura Familiar desde 2012, con destaque para el arroz orgánico, jugo de naranja y de uva integrales ambos sin adición de azúcar.

Atender las exigencia de calidad de la alimentación escolar nortea la compra de los alimentos, también en el sector de la industria alimenticia, buscando en todo momento adecuarse a las recomendaciones Brasileñas.

Con ejemplo de PAE sostenible iremos presentar un pequeño video. "Educaro mas allá del Plato" que tiene como objetivo premiar las acciones de que promueven buenos hábitos alimenticios en los alumnos, a partir de tres directrices:

Valoración de las merenderas; Promoción de la discusión sobre alimentación en la comunidad educativa; Participación de los diversos actores de la alimentación en el ámbito territorial de la escuela y de esta forma se espera que la alimentación escolar ultrapase la frontera de la cocina e del comedor, entre la sala de aula y llegue a la casa del alumno!

### **Vinculación de la agricultura familiar con el programa nacional de alimentación escolar de Brasil.**

Rodríguez CAM1, Schwartzman F1, Sicoli JL1, Slater B1

<sup>1</sup>Departamento de Nutrición, Facultad de Salud Pública, Universidad de São Paulo, Brasil

En el 2009, el gobierno de Brasil aprobó la ley 11.974, la cual define los lineamientos del Programa Nacional de Alimentación Escolar (PNAE) y consolida su vinculación con la agricultura familiar (AF). Esta legislación establece que del total de los recursos financieros transferidos por el gobierno federal a los estados y municipios para la alimentación escolar, mínimo 30% deberán ser utilizados en la compra de productos directamente de la AF y que esta adquisición podrá ser realizada dispensando el proceso licitatorio. La puesta en marcha de esta iniciativa es un proceso complejo, ya que involucra diferentes sectores del gobierno y de la sociedad, además de factores territoriales, los cuales juntos pueden facilitar o dificultar el éxito de esta vinculación.

Objetivo: Describir la implementación de las compras directas de la AF en el estado de São Paulo, Brasil, en el año de 2012.

Metodología: Se trata de un estudio descriptivo de corte transversal donde fueron analizados 25 municipios que compraron alimentos directamente da la AF para el PNAE.

Resultados: 40% de los municipios utilizaron 30% o más de los recursos del gobierno federal; 100% de los municipios compro dispensando el proceso licitatorio; 80% compraron de agricultores del mismo municipio; en 36% de los municipios, todas las escuelas tenían infraestructura adecuada para recibir, almacenar, conservar y preparar alimentos de la AF; en 92% de los municipios, la totalidad de las escuelas recibieron alimentos de la AF; 64% de los municipios apoyaban a los agricultores en la logística de la entrega de los alimentos; en 96% de los municipios todos los manipuladores estaban aptos para preparar los alimentos de la AF.

Conclusión: los resultados de la investigación muestran que la implantación de las compras directas de la AF en los municipios del estado de São Paulo está avanzando. Sin embargo todavía es necesario fortalecer las acciones para que los municipios alcancen por lo menos la meta del 30% establecida en la legislación y puedan mejorar la infraestructura de las escuelas.

### **Elementos de sostenibilidad para programas de alimentación escolar.**

Schwartzman F.<sup>1</sup>, Sampaio Barbosa N.V.S.<sup>2</sup>, Rodríguez C.A.M.<sup>1</sup>, Sicoli J.<sup>1</sup>, Slater B.<sup>1</sup>

<sup>1</sup>Facultad de Salud Pública – Universidad de Sao Paulo. <sup>2</sup>Organización de las Naciones Unidas para la Agricultura y Alimentación (FAO).

Programas de Alimentación Escolar (PAEs) representan una intervención importante para la protección social, la garantía de la seguridad alimentaria y nutricional (SAN) y el cumplimiento del derecho humano a la alimentación. Estos programas han sido recomendados como una de las principales estrategias de desarrollo sostenible a largo plazo. Asimismo, un buen PAE tiene el potencial de promover la educación, contribuir al desarrollo y al aprendizaje escolar, mejorar la participación escolar y combatir el absentismo. Los PAEs también pueden constituirse en potentes instrumentos de desarrollo local, cuando compran alimentos de los agricultores familiares, al mismo tiempo en que suministran productos frescos, diversificados y de acuerdo a los hábitos alimentarios locales a los estudiantes. Teniendo en cuenta todos estos beneficios, los gobiernos deben planificar la sostenibilidad de sus PAEs. Serán presentados los elementos de sostenibilidad para los PAEs, los cuales fueron establecidos en un Foro de Expertos sobre Programas de Alimentación Sostenibles en América Latina coordinado por la Organización de las Naciones Unidas para la Agricultura y Alimentación (FAO), y que deberían ser considerados por los gobiernos en la planificación del fortalecimiento y sostenibilidad de sus PAEs a corto, mediano y largo plazo: amplio compromiso de todos los actores involucrados en los PAE; capacidad financiera del gobierno; sostenibilidad económica, social y ambiental; marcos legales y normativos claros; articulación intersectorial e interinstitucional y con políticas públicas de educación, salud, desarrollo social y económico, agricultura; principios, directrices y objetivos claros y adecuados a la realidad y necesidad de cada país; cumplimiento de recomendaciones nutricionales y de calidad alimentaria claramente definidas; adecuación de la oferta de alimentos a la cultura local, a las necesidades especiales alimentarias, a los grupos etarios, necesidades nutricionales y sanitarias; amplio respeto por la cultura y la diversidad; fortalecimiento de la escuela como espacio saludable y educativo; promoción de la educación para la SAN y la formación de hábitos; infraestructura y equipamiento adecuados; vinculación con mercados locales, especialmente con la agricultura familiar; sistemas de diagnóstico, monitoreo, evaluación; desarrollo y fortalecimiento de las capacidades de los actores sociales involucrados en la alimentación escolar; participación y control social, que incluyan mecanismos de transparencia.

### Plant foods as modulators of oxidative stress: the pre-eminence of human evidences.

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A large body of evidences has shown that oxidative stress (OS) plays a significant role in the development of degenerative diseases and chronic inflammatory status. Human body developed a sophisticated and co-operative array of antioxidant defenses to protect cellular district from OS. Despite the high grade of complexity and efficiency of endogenous defenses, the mechanism is not infallible and there is a need to optimize redox machinery with diet. Plant foods have been accredited of an antioxidant action in vivo. However, the extent to which they are able to tune oxidative stress and the identification of the dietary molecules involved is unclear as well as the association with the endogenous redox system. The role of antioxidant might be somehow of limited impact due to the non-physiological concentrations utilized, to the low degree of absorption of flavonoids and to their extensive metabolism within the body. Moreover, the mechanism of homeostatic control of antioxidant defenses under stress condition is not clarified and a clear detrimental effect of galenic antioxidant overloading has been shown in humans. All these unclear and somehow contrasting evidences raise concerns about the role of antioxidant for human health. The first systematic review evaluating the impact of plant foods on biomarker of antioxidant status and oxidative stress in more than 230 dietary intervention trials in humans will be presented and critically discussed attempting to unravel the Red-Ox Dilemma.

### The immune response as determinant of micronutrient requirement?

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At the cellular and molecular levels, many micronutrients act as enzyme cofactors, components of the antioxidative potential and regulators of gene expression. In these functions, vitamins and minerals play an important role for the integrity and optimal function of the immune defence against pathogens. This is particularly true for micronutrients involved in cell proliferation as this latter is increased in activated immune cells. Deficiency states of Zn, Fe and Se impair the proliferation and maturation of T lymphocytes and neutrophil granulocytes and reduce the natural cytotoxicity and the ability to kill phagocytized bacteria. The proliferation of T cells is also reduced under folate and pyridoxine deficiency, while a lack of vitamin C and E particularly affects cellular immu-

nity through impaired phagocytosis and inhibited lymphocyte proliferation. Furthermore, vitamin C and E as well as other antioxidants are needed to protect the immune cells from the harmful effects of the free radicals they use in the fight against pathogens. In light of the synergism between many antioxidants, a balanced supply is of particular importance.

Vitamin D is another important player with both active forms 25-OH-D3 and 1,25-(OH)<sub>2</sub>-D3 regulating innate and adaptive immune reactions and gene expression.

These examples show that adequate micronutrient supply is mandatory for optimal disease prevention. Not surprisingly, the strongest effect of micronutrient on the immune system is seen in individuals with suboptimal status or in whom the immune function is disturbed and they are also more likely to benefit from micronutrient supplementation than those with adequate body stores.

However, high micronutrient intake in amounts beyond the physiological requirements has generally not shown additional benefits in healthy persons and may even be harmful in this group.

### Hydration, inflammation and the immune system.

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Hydration together with physical activity and exercise, as part of a healthy lifestyle, is a key factor involved in enhancing human health. However, either a little dose of them or an excess can be harmful for health maintenance at any age<sup>1</sup>.

Water is an essential nutrient for human body and a major key to survival has been to prevent dehydration<sup>2,3</sup>. Water is the medium where biochemical reactions, transport of substrates across membranes, temperature regulation, circulatory function and other physiological processes occur<sup>1</sup>. Nowadays there is still a general controversy regarding the necessary amount to drink water or other beverages to properly get an adequate level of hydration and also the best way of measuring hydration in humans in order to know to what extent a person can be at risk of dehydration and how to prevent any situation of dehydration at any age range<sup>1</sup>. In general, provision of water is beneficial in those with a water deficit, but little research supports the notion that additional water in adequately hydrated individuals confers any benefit. Subjects who are more prone to develop dehydration in normal conditions include children, both amateur and professional people who practise regularly physical activity and exercise, as well as elderly people. Water, or its lack (dehydration), can influence several systems and organic functions including physical and cognitive performance, gastrointestinal function, kidney function, heart function and hemodynamic response, and skin status. Furthermore, there is strong evidence showing that good hydration reduces the risk of urolithiasis and bronchopulmonary disorders<sup>3</sup>.

Hydration status might affect the immune system, while the involved mechanisms are not fully understood. One mechanism has proposed that intestinal hydration regulates bacterial-epithelial interactions that could have an effect on the immune system.

In humans, studies which evaluate this connection between cytokines and the hydration status are scarce. Indeed, dehydrated adults show high concentrations of some proinflammatory cytokines in serum, such as IL-6. The possible hypothesis is that proinflammatory cytokines such as IL-6, IL-1 and TNF- $\alpha$  regulate the hydration status, since they can transmit information to the hypothalamus, place where the vasopressin (VP) is synthesized<sup>4</sup>. This hormone plays a key role on water homeostasis throughout their function in osmoregulation. In a dehydration and hyperosmolality state, renal excretion of water is reduced along with a massive release of VP, which induces the decrease of water lost in urine<sup>5</sup>.

There is evidence that some bacterial strains interact with the host systemic immune system, leading to changes in cytokine production, immunoglobulin titers and lymphocyte counts, which works throughout the body<sup>6</sup>. These systemic responses could be due to dendritic cells (DCs) action, as they can transport luminal antigens to local lymph nodes, present antigens to naive immune cells and activate effector responses from B, T helper and Treg cells, which will activate the release of a different profile of cytokines<sup>7</sup>.

In conclusion, since intestinal microbiota could have a role in mucosal hydration and systemic immunity, a good balance of bacterial groups in the colon could function as an important factor in the hydration state and immunity of individuals.

This is the reason why the evaluation of this effect under euhydration and dehydration states, may be of a great interest to detect possible changes in dehydration biomarkers with changes in microbiota community and the immune response.

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### Personalized nutrition, obesity and inflammation.

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Individual differences in body weight/composition and adipose metabolism depend on nutrient intake and physical activity, being regulated by the genetic make-up and through gene-by-environment interactions. More than 50 putatively implicated genes in obesity phenotypes and adiposity traits have been evidenced from studies in animal models or within families with adoptees and twins as well as by means of candidate gene or linkage and GWAS investigations, which open the door for personalized nutrition accounting the genetic variety and the phenotypical accompanying complications such as diabetes hypertension, inflammation, etc. The number of entries under the heading Obesity in the online Mendelian inheritance in man (OMIM AT (<http://omim.org/>)) is 516 as accessed on 2nd January 2014. Indeed, inflammation as an associated manifestation of obesity involves the modulation of a number of genes related with this process such as TNF $\alpha$ , IL-6, PAI-1, PON, etc. In this context, the Nutrigenetics science consider "the effect of genetic variation on the dietary response", whose advances are based on the understanding that the genetic make-up determine unique nutritional requirements and rely on the sequencing of the human genome and the subsequent analyses of human genetic variation as well as on studies that associate gene variants with diseases. The factors that underpin nutrigenetics are the diversity on the inherited genome and the myriad of interactions with specific foods/nutrients, whose knowledge is contributing to tailorize nutrition. Thus, it is not only important the influence of the genetic background in the onset of obesity, but also the mode that the dietary advice can be individualized and prescribed depending of the genetic background.

International consortia such a Food4Me are describing genetic variants that contribute to obesity in order to characterize nutrient x gene interactions and to implement dietary counselling for obesity prevention and management in a customized manner. Indeed, additional nutrigenetics/nutrigenomics studies are needed concerning personalized nutrition to be clinically prescribed since genotyping and gene expression appraisal on nutrient-sensitive candidate genes contribute to diagnosis, prognosis and therapy purposes in the obese. In this context, weight loss is associated with a reduction in diabetes and cardiovascular risks that may specifically benefit from a focus on inflammatory pathways and related genes. Interestingly, a number of direct-to-consumer genetic tests are being already used and commercialized in diverse countries to implement individualized treatments based on the genotype, but ethical issues, as well as a correct interpretation for health professional and economic aspects need to be developed and standardized in the near future for a scientific and systematic application of nutrigenetics on personalized nutrition and understand the role on inflammatory pathways.

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### Nutrition at the IAEA.

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The IAEA's activities in nutrition arise from its mandate to accelerate and enlarge the contribution of atomic energy to health, peace, and prosperity throughout the world. The overall aim of IAEA's nutrition activities is to assist Member States in enhancing their capabilities to combat all forms of malnutrition by providing technical expertise and encouraging the use of nuclear techniques, particularly stable isotope techniques, through its delivery mechanisms (Technical Cooperation Programme and Coordinated Research Projects). The IAEA contributes to global efforts to com-

bat malnutrition, in particular during the first 1000 days of life, and to prevent the debilitating health and social consequences of nutrition related noncommunicable diseases. Stable isotope techniques can be effectively used in a range of applications, including assessment of breastfeeding practices, body composition, and changes in energy expenditure and physical activity. Through its Technical Cooperation Programme, the IAEA has helped to establish stable isotope laboratories in 20 African Countries, 17 countries in Latin America and the Caribbean, and 11 countries in Asia and Pacific, including the Middle East. The work of the IAEA complements the work of other UN agencies, NGOs and other major players in nutrition and health, and actively contributes to improving health globally

### Assessment of body composition for better understanding of infant, child and adolescent malnutrition.

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Malnutrition, which includes both under-nutrition and obesity, across the life-course is a global public health concern. Growth references/standards for weight, height and body mass index (BMI) have provided the basis for assessment of children's nutritional status. However, these are unable to provide information on the proportions of fat, lean and bone mass. Some charts for children's body composition by techniques such as skinfold thicknesses, body circumferences, bioelectrical impedance analysis (BIA), nuclear techniques, and dual-energy X-ray absorptiometry (DXA) have recently been produced mainly using high-income country data. For public health or clinical research these different techniques offer both advantages and disadvantages. To measure and interpret body composition across the life-course is critical to improve our understanding of the association between growth and development, body composition, health, and disease risk. But also to better develop and evaluate intervention studies.

### Lean mass accrual among Kenyan infants aged 6-15 months: effect of insect-based complementary food and associated factors.

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Background: The efficacy on lean mass gain in Kenyan infants receiving a daily portion of either two versions of a locally produced complementary foods based on maize and germinated amaranth grains with (Winfood Classic [WC]) or without termites (Winfood Lite [WL]) was assessed and compared to a standard food aid product ('Corn-Soy-Blend plus [CSB+]).

Methodology: In a randomized controlled design, 428 infants received Winfoods for 9 months from 6-15 months of age. Change in FFM was assessed using a stable isotope methodology (deuterium oxide dose-to-the-infant).

Results: There were no significant differences in lean mass accrual between the infants receiving WC, WL and CSB+. FFM was 6.0 $\pm$ 0.8, 5.9 $\pm$ 0.8 and 5.9 $\pm$ 1.3 kg, respectively; p=0.7 at 6 months of age and 8.2 $\pm$ 1.1, 8.3 $\pm$ 1.2 and 8.2 $\pm$ 1.0 kg, respectively; p=0.7 at 15 months of age. Being a boy, weight for length (WHL) of >0 z score at 6 months and breastfeeding at both 6 and 15 months were associated with greater FFM accrual.

Conclusions: No significant impact on FFM was detected from feeding a locally produced complementary food with or without termites compared to CSB+. Early WLZ and breastfeeding status strongly predict FFM. These results highlight importance of timely interventions to improve child health.

### Assessing body composition and its association with cardiometabolic risk: A 12-country study using isotopic dilution.

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Background: Measuring body composition is critical to assess the adverse health effects of obesity in children, its prevalence and its variability across countries and population groups.

**Objectives:** To assess body adiposity in 6-12 year old children, to correlate body fat with traditional measures of body size, to evaluate the association of these results with indices of cardiometabolic risk, and to compare these indices of risk between stunted (S) and non-stunted (NS) children.

**Materials and methods:** The present analysis includes data from 1,205 children aged 6-12 years old from 12 Latin American countries (Argentina, Brazil, Chile, Costa Rica, Cuba, El Salvador, Ecuador, Jamaica, Mexico, Peru, Uruguay, and Venezuela). Percent body fat was estimated by deuterium oxide dilution method (%BF-D2O). Anthropometric measurements (skinfolds, waist circumference) and cardiometabolic indices were collected. Multiple linear regressions were used to model the relationship between cardiometabolic risk indices and adiposity-D2O. Spearman's correlations estimated the association between %BF-D2O with adiposity by skinfolds equations and BMI. ANOVA and student's t-tests were used to compare mean differences of body composition and cardiometabolic indices of risk between stunted (S) and non-stunted (NS) children, as well as comparing normal weight non-stunted (NWNs), normal weight stunted (NWS), overweight non-stunted (ONS) and overweight stunted (OS) children.

**Key findings:** Measurement using %BF-D2O demonstrated a wide range of adiposity, with significant differences between countries, age and sex. Multiple linear regressions showed that %BF-D2O was positively associated with TC, LDL-C, TG, Insulin, HOMA-IR, CRP, IL-6, HCT, LDL-HDL ratio, SBP and DBP, and inversely associated with HDL-C ( $p < 0.05$ ). BF by D2O correlated similarly well with the skinfold equations of Deurenberg ( $\rho = 0.88$ ) and Dezenberg ( $\rho = 0.82$ ), and less so with BMI ( $\rho = 0.69$ ). Stunted (S) children displayed lower adiposity by %BF-D2O measurement and lower waist circumference (WC) than NS children, yet higher LDL-C ( $p < 0.05$ ) and no difference in waist-to-height ratio (WHtR). Overweight-stunted (OS) children displayed lower %BF-D2O ( $p < 0.5$ ), and higher TC and LDL-C compared with ONS children, but this was not statistically significant.

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### **Differences in growth and body fatness in children and adolescents from seven low-to-middle income countries: results from a Coordinated Research Project (CRP) of the International Agency of Atomic Energy (IAEA).**

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**Introduction:** Patterns of growth and the accumulation of body fat during childhood and adolescence can have profound effects on future health and wellbeing. However, little is known about the variation and diversity of children's growth and body fatness in low-to-middle income countries.

**Objectives:** To describe body fat percentage (BF%) by age, sex, and nutritional status in 6-16 y old children from 7 countries from Latin America, Asia, and Africa using a harmonized reference field method of deuterium oxide dilution.

**Methods:** In 909 children aged 6-16 years (54.5% girls) from 7 countries (Brazil (n=32, mean age 13.0 y), Cuba (n=97, 14.2 y), Guatemala (n=191, 13.6 y), India (n=283, 10.9 y), Malaysia (n=102, 11.2 y), Mauritius (n=95, 13.9 y), Uruguay (n=109, 8.2 y)) participants of an IAEA CRP, we collected information on age, gender, weight, height, and total body fat derived from assessment of total body water by deuterium dilution. We estimated body-mass-index-for-age (BA) Z-scores based on WHO 2007 reference and body fat percentage (BF%) as total fat mass/total weight. Obesity was defined as BAZ >2 and overweight BAZ 1-2.

**Results:** BF% was significantly higher for girls than boys (43.6% vs 28.0%). BF% was also directly related to BAZ category, reaching 34.3% in obese children (girls: normal 31.4±7.7%, overweight 37.0±7.5%, obese 43.1±6.6%; boys: normal 24.4±8.7%, overweight 30.4±6.5%, obese: 39.2±8.7%). Associations between BMI and BF% were similar in most countries except for India and Malaysia where at the same BMI category 6-9 y old participants had significantly higher BF% than those from other countries (i.e. boys India: normal 24.5±6.8, overweight 26.3±6.0, obese 35.5±11.1 vs Uruguay: normal 17.9±6.8, overweight 26.4±8.9, obese 26.9±2.3; in girls Malaysia: normal 43.0±5.4, overweight 50.8±2.2, obese 51.5±4.2 vs. Guatemala: normal 17.9±6.8, overweight 26.4±8.9, obese 26.9±2.3).

**Key Findings:** Using a standardized and objective measurements impor-

tant variations in BF% for BMI in children and adolescents from low-to-middle income countries have been demonstrated. This diversity has to be taken into account when defining normal growth during this developmental period, especially considering potential short and long-term impact on health.

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### **Sustainable global food security: achieving the potential.**

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Following a period of dramatic fluctuations in food production and food prices caused in part by extreme weather events and government policy, the world has entered a period of falling food prices with little price volatility and large global food surpluses. As climate change proceeds, there is little doubt that extreme weather events will once again cause large production and price fluctuations. Therefore, now is the time for the public and private sectors as well as international institutions to take preparatory action. Such action should be based on the lessons learned during the period 2007-2012 when most governments were unprepared for the large food price fluctuations. As a result, governments scrambled to put in place short-term Band-Aid policies and programs to protect the politically powerful from negative effects. Since then, few governments appear to have put in place longer-term policies that would mitigate the negative effects from future food price fluctuations. Policies to strengthen low-income population groups' ability to protect themselves from transitory food insecurity and malnutrition, when food prices increase, are particularly important. The specific policy measures will vary among countries but the following measures are likely to be relevant for many low-income countries: Improved rural infrastructure, markets and institutions; agricultural research to increase productivity and mitigate effects of climate change and extreme weather events; access to credit, fertilizers and other inputs; risk and uncertainty management, particularly for smallholder farmers, and a framework for social safety net programs for low-income urban and rural households that can be activated or expanded as needed. The potential for assuring sustainable food security for all exists but will only be achieved if all actors pursue action that prepares for future food price and income volatility and takes into account the health and nutrition impact. Such action must be evidence-based and the role of the High Level Panel of Experts on Food Security (HLPE) and the World Committee on Food Security (CFS) in providing and disseminating such evidence is critically important.

### **Feeding the megacities and urban-rural linkages.**

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Urbanization is one of the key drivers of change in the world today and feeding of the humanity, the majority of which now lives in the cities, involves a complex system of ecological, social and economic relationships.

The world's urban population currently stands at around 3.5 billion and will almost double to more than 6 billion by 2050. This is a challenge not only for urban areas but also for rural areas, because many people, especially the young, are migrating from rural areas to urban areas continuously. When addressing urbanization challenges, we are also addressing, directly or indirectly, rural and territorial development.

Food and nutrition security in the cities cannot be taken for granted. It is part of a complex system and supporting the most vulnerable groups in an urbanizing world demands discussions on food, agriculture and cities in the context of rural-urban linkages. The world community has acknowledged that the human right to food must be progressively realized despite the enormous challenges and inequities that exist in the food systems of both rich and poor countries.

The diverse array of present "food systems" is changing rapidly on a global scale and will be transformed even more rapidly as a result of powerful forces. This transformation has become a major issue for debate amongst traditional and non-traditional actors and institutions engaged. This includes national governments, research institutions, mayors, planners, producers, private sector, social movements, United Nations (UN) agencies, and civil society organizations in high, medium and low-income countries. All parties to the debate are increasingly concerned with the impacts of food price volatility and climate change on food systems. Amidst calls for "sustainable intensification" of production, or

producing more food with fewer non-renewable inputs and less arable land relative to growing populations, a new paradigm is emerging for ecosystem-based, territorial food system planning. This new paradigm seeks to build diverse supplies of food geographically close to population centers, not to constrain the global food supply chains that contribute to food security for many countries, but to improve the local management of food systems that are both local and global.

What do we have to do to ensure people's access to healthy and nutritious food in cities? What do we have to do to produce enough food for urban dwellers? What infrastructures are needed and what kind of food production is possible in cities? How can cities preserve the services of the surrounding ecosystems?

Urban actors have often not considered the food system an important issue when designing, planning and managing cities. The perception has been that the food is there and one can easily buy it in the supermarkets or along the streets and that food will always be there. This perception was altered for many in 2008, when the food prices peaked. More than 20 countries around the world experienced food riots in urban areas. Hunger, now in both rural and urban areas, has become vocal, and this is changing the political scene.

As a result of new multi-sector, multi-stakeholder collaborations, urban and rural authorities and their citizens can come to better understand their food and ecosystem resources to adapt to multiple challenges and manage more resilient food systems.

### Towards Sustainable food Systems

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The High Level Panel of Experts for food security and nutrition has recently coined an integrated definition, whereby "a sustainable food system (SFS) is a food system that delivers food security and nutrition for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised". By this definition the global food system is clearly not sustainable. There are more than 2 billion malnourished, 805 million undernourished, 1.4 billion obese; while enough food is produced worldwide. A third of the food produced is lost or wasted. The majority of the hungry and poor are food producers. At the same time food production and consumption are already exerting a considerable pressure on natural resources and the environment. And demand is projected to increase, by 60% towards 2050 according to FAO, driven even more by changing consumption patterns than by population growth. In other words the global food system does not feed properly a third of the population while using resources in an unsustainable way. Increased urbanization will also profoundly change the very organization of food systems, in an increasingly globalized world. Food systems and diets are of course conditioned by various cultural, social and economic factors. Food systems and diets are interdependent. Diets are shaped by the food made available by a food system. The food system in turn is driven by the sum of the individual diets that constitute the demand. This is why food systems have to be considered in their entirety, acknowledging the interdependency of sustainable consumption and production. A sustainable diets approach aims to address at the same time nutrition requirements, both in terms of energy and nutrients and resources used for food production, including local biodiversity, used to produce traditional and local foods with their many nutritionally rich species. Sustainable diets are not only an objective but an essential mean to achieve the transformation of food systems which is needed to achieve this objective. It is important to recognize that the state of the food system reversely conditions the diets, and the possibility to have a sustainable diet, given the available spectrum of consumption choices and incentives. The capacity for populations to be able to choose a sustainable diet, leading to "Healthy life for present and future generations", or "low environmental impact", is the result of the action of many, through a system.

### Toxicology of low and non calorie sweeteners: from lab to law.

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Low and non-calorie sweeteners (LNCS) are ingredients used in a number of foods and drinks which are extremely popular in over the world. The dietary options that such products provide may be especially helpful in the management of obesity or diabetes mellitus. The LNCS are substances with a very intense sweet taste that are used in small amount to replace the sweetness of a much larger amount of sugar. The LNCS currently used include acesulfame-K (E950), advantame (E969), aspartame (E951), cyclamate (E952), saccharin (E954), sucralose (E955), and stevia/steviol glycosides (E960) among others. In some instances, blend of sweeteners are used (eg, cyclamate/saccharin, aspartame/saccharin, aspartame/acesulfame-K).

European Legislation on Food Additive Sweeteners. The Regulation (EC) No 1333/2008 of the European Parliament and of the Council of 16 December 2008 on food additives (OJ L 354/16; 31.12.2008) requires that food additives are subject to a safety evaluation by the European Food Safety Authority (EFSA) before they are permitted for use in the European Union (EU). In addition, it is foreseen that food additives must be kept under continuous observation and must be re-evaluated by EFSA. For this purpose, a programme for the re-evaluation of food additives that were already permitted in the EU before 20 January 2009 has been set up under Council Regulation (EU) No 257/2010 of 25 March 2010 (OJ L 80/19; 26.3.2010). The re-evaluation of all sweeteners is foreseen to be completed by the end of 2020. The levels of use of LNCS are set in such a way as to ensure that actual daily intakes do not exceed the acceptable daily intake (ADI). The ADI is defined as the estimated substance that people can consume on a daily basis during their whole life without any appreciable risk to health. ADI is expressed in milligrams or micrograms per kg of body weight (bw) per day. The ADI is usually set at 1/100 of the maximum level at which no adverse effect was observed in animal experiments. When re-evaluating previously authorized food additives, EFSA may confirm, amend or even withdraw an existing ADI following a review of all available scientific data. The current ADIs for these sweeteners are considered to be safe for the general population and consumer exposures to additives are below the ADI.

EFSA has already re-evaluated aspartame, advantame and steviol glycosides. The experts examined all uncertainties related to the evaluation of aspartame. Aspartame does not cause DNA damage and cancer, brain damage and behavioral effects, or reproductive and developmental effects. The breakdown products of aspartame (phenylalanine, methanol and aspartic acid) are also naturally present in other foods (eg, methanol is found in fruit and vegetables); an ADI of 40 mg/kg bw/day is protective for the general population. Advantame is an artificial sweetener derived by chemical synthesis from isovanillin and aspartame, although its chemical properties are different than those of aspartame; this sweetener and its metabolites are neither genotoxic nor carcinogenic and pose no safety concerns for consumers at the proposed uses and use levels. An ADI of 5 mg/kg bw/day was established for advantame. Steviol glycosides are mixtures of steviol glycosides extracted from leaves of stevia plant; steviol glycosides are neither genotoxic nor carcinogenic and an ADI of 4 mg/kg bw/day was established. The adults and childrens who are high consumers of foods containing steviol glycosides could exceed the ADI established if the sweetener is used at the maximum levels proposed. Overall, the revised exposure estimates for all age groups (toddlers, children, adolescents, adults and the elderly) remain below the ADI.

Risk assessment. All LNCS are subject to comprehensive safety evaluation by regulatory authorities, prior to approval. Scientists evaluate these sweeteners for many attributes including sensory qualities (eg, clean sweet taste, no bitterness, odorless), safety, compatibility with other food ingredients, and stability in different food environments.

A risk assessment comprises hazard identification, hazard characterization, exposure assessment and risk characterization. The risk characterization advice given to risk managers needs to provide information on a number of issues (eg., identification of potentially risk groups, duration of exposure relevant to hazard(s), description of uncertainties inherent in both hazard characterization and exposure assessment). The advice to risk managers should take the form of a descriptive narrative covering all relevant areas, including uncertainties, and should give sufficient information to answer questions addressed in risk characterization. As part of its safety evaluations of food additives EFSA established, when possible (i.e. when sufficient information is available) an ADI for each food additive or group of additives with similar properties. The scientists are working to better explain and outline their risk assessment approaches in their scientific outputs. The scientific committee has opted to use what is known as a "mode of action" (MOA), or "human relevance" approach in its risk assessment of the safety of aspartame. The MOA relating blood levels of phenylalanine, PKU and human risk of aspartame represents a valuable clarification of the reproductive effects reported in animals given large amounts of either phenylalanine or aspartame. With this approach, by using the weight of evidence from experimental observations and scientific criteria, scientists identify "key events" or "biological steps" which are a sequence of reactions triggered by a chemical in a living organism (e.g. toxicity, effects on the hormonal system, increased/decreased cell growth). Observations of these key events in human and animal studies are compared to determine the relevance for human health. The scientific opinion clearly describes the risk assessment approach to facilitate understanding by risk managers, stakeholders and other interested parties and to inform the risk management decisions. The EFSA role is to provide independent scientific advice to risk managers related to food safety and to communicate its advice to the public at large. The EFSA neither authorizes nor bans the use of substances in foods. It is the responsibility of risk managers (European Commission, European Parliament and EU Member States) to define and to agree measures, as and where required, taking into account scientific advice and other considerations.

## Epidemiologic perspective: low and no-calorie sweeteners, cancer, and pregnancy outcome.

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The role of low-calorie sweeteners on cancer risk has been widely debated since the 70s, when animal studies found an excess bladder cancer risk in more than one generation of rodents treated with extremely high doses of saccharin, and a few earlier epidemiological studies found inconsistent associations with bladder cancer risk in humans. This was however not confirmed in subsequent studies, and mechanistic data showed different saccharin metabolism in rodents and humans<sup>1</sup>. To provide information on the role of low calorie sweeteners on the risk of cancer at several sites, we considered data from an integrated network of case-control studies conducted in Italy between 1991 and 2008<sup>2</sup>. Cases were 598 incident, histologically confirmed cancers of the oral cavity and pharynx, 304 of the oesophagus, 1953 of the colorectum, 460 of the larynx, 2569 of the breast, 1031 of the ovary, 1294 of the prostate, and 767 of the kidney (RCC). Controls were 7028 patients (3301 men and 3727 women) admitted to the same network of general and teaching hospitals, for acute non-neoplastic diseases. We also considered 230 patients with cancers of the stomach and 547 controls, 326 of the pancreas and 652 controls, and 454 of the endometrium and 908 controls<sup>3</sup>. We obtained odds ratios (OR) from multiple logistic regression analyses, including allowance for total energy, besides major recognized risk factors for each neoplasm. The ORs for an increase of one sachet-day of low calorie sweeteners were 0.81 for cancers of the oral cavity and pharynx, 1.09 for oesophagus, 0.96 for colon, 0.94 for rectum, 1.16 for larynx, 0.94 for breast, 0.87 for ovary, 1.03 for prostate, and 0.99 for kidney cancer. There was no material difference in risk for saccharin vs other low calorie sweeteners. After allowance for various confounding factors, the ORs for ever users of sweeteners versus nonusers were 0.80 (95% CI, 0.45-1.43) for gastric cancer, 0.62 (95% CI, 0.37-1.04) for pancreatic cancer, and 0.96 (95% CI, 0.67-1.40) for endometrial cancer. Corresponding ORs for saccharin were 0.65, 0.19, and 0.71, and for other sweeteners were 0.86, 1.16, and 1.07, respectively. Other data on breast, brain and haematopoietic neoplasms also showed no association<sup>4,5</sup>. Data of the Nurses' Health Study (NHS) and of the Health Professional Follow-up Study (HPFS) found some excess of non-Hodgkin lymphoma (NHL, relative risk, RR=1.31 for  $\geq 1$  diet soda drink/day) and multiple myeloma (RR 2.02) in men, in the absence of any association in women, nor in both sexes combined. There was a borderline association for leukemia in both sexes combined (RR= 1.42)<sup>6</sup>. Thus, there is now convincing epidemiologic evidence of the absence of relevant association between saccharin, aspartame and other sweeteners, and the risk of several common neoplasms.

With reference to pregnancy outcome and specifically to preterm delivery, two cohort studies from Denmark<sup>7</sup> and Norway<sup>8</sup> reported some associations between "artificially" sweeteners beverages and low birth weight, which however were different in strata of carbonated and non carbonated beverages, and not heterogeneous from those of sugar-sweetened beverages. When the results of these two studies were pooled<sup>9</sup>, the RR was 1.25 (95% CI 1.09-1.43) for  $\geq 4$  servings/day of low-calorie beverages. However, for lower levels of consumption RR estimates were close to unity and, most important, similar risk estimates were found for sugar-sweetened beverages (RR=1.23, 95% CI 1.06-1.42 for  $\geq 4$  servings/day). Thus, those two studies provide no convincing evidence that low-calorie beverages have a specific impact on preterm delivery at any variance from that of sugar sweetened ones.

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## Low and non-calorie sweeteners in weight regulation.

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Sugar sweetened beverages are a major source of added sugars in the typical US diet. Low and non-caloric sweeteners (LCS) can help reduce this amount to zero, providing opportunities for weight control. Laboratory studies have consistently shown that LCS do not over-stimulate taste receptors, provoke hunger, or cause overeating. Diet beverages suppress hunger in the short term, largely due to volume effect, but do not affect food consumption at the next meal.

Larger scale clinical interventions and population-based observational studies have pointed to the effectiveness of LCS in weight control. Even though cross-sectional studies such as the National Health and Nutrition Examination Survey (NHANES) cannot establish causality, data analyses have identified sharp socioeconomic trends in LCS beverage consumption. The consumers of LCS beverages, tabletop LCS and LCS foods were older, richer, and better educated than non-consumers. Women were more likely to use LCS foods and beverages than were men. LCS users had higher-quality diets, as measured using the Healthy Eating Index 2005, and engaged in other positive health behaviors. Although LCS beverage consumers were more likely to be overweight, LCS use was a component of active weight control.

## Global burden of neural tube defects and folate status: understanding the magnitude and distribution of the problem.

De-Regil L.M.

Micronutrient Initiative.

Inadequate folate status in women of reproductive age is known to cause adverse health effects in both women and their babies. These include megaloblastic anemia, neuropathy, and higher risk of incomplete neural tube closure during the periconceptional period, when a woman gets pregnant. This presentation will provide an overview of the current knowledge of surveillance systems aimed at monitoring birth defects and folate status among women of reproductive age as well as the methodological and technical challenges that need to be addressed for their improvement, so that they can better serve their purpose and inform the implementation of evidence informed nutrition actions.

## Genetic variation in folate metabolism and congenital anomalies.

Tejero E.

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The genetic variation in enzymes involved in folate metabolism has been widely investigated. Some of these polymorphisms seem to modify the enzymatic activity of the encoded protein. The association between these variants and the risk for hyperhomocystenemia, some types of cancer, and congenital anomalies has been studied, with inconsistent results. The frequency of the risk polymorphisms varies significantly across different geographic regions and populations, suggesting that certain human groups may have higher requirements of folate and other related vitamins. Recent investigations support that maternal methylenetetrahydrofolate reductase (MTHFR) C677T, A1298C and methionine synthase reductase (MTRR) A66G polymorphisms may contribute to the risk of neural tube defects (NTDs) in the offspring. The strength of the association between these genetic variants and the risk for NTD seems to vary across geographic regions. These findings suggest that genetic variation may have a significant contribution to the variability in the metabolism of a given nutrient, and with the risk for anomalies related to the affected metabolic pathway.

## WHO guideline: blood folate concentrations in women of reproductive age for the prevention of neural tube defects.

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The World Health Organization (WHO) core functions include setting norms and standards and promoting and monitoring their implementa-

tion; as well as monitoring the health situation and assessing health trends. The systematic approach to update WHO recommendations requires a rigorous process to assure that guidelines are informed by the best quality evidence. These recommendations involve not only interventions but also the use of valid biomarkers for determining the magnitude and distribution of a public health problem, and for monitoring and evaluating the impact of public health interventions. Folate-preventable congenital anomalies require effective actions to reduce this burden. In collaboration with the National Center of Birth Defects and Developmental Disabilities at the Centers for Disease Control and Prevention (CDC), guidance on optimal blood folate concentrations in women of reproductive age that are associated with a reduced risk of neural tube defects has been developed following the rigorous WHO process of evidence-informed guideline development. This process has been finalized with updated recommendations on optimal blood folate levels for women of reproductive age, identifying cut-off values and raising new challenges in their implementation in public health programmes.

### Guidelines for improving folate status and health outcomes in populations.

Rogers L.

World Health Organization, Geneva, Switzerland.

In 2012, an estimated 270,358 deaths globally were attributable to congenital anomalies during the first 28 days of life (3.3 deaths per 1000 live births among children under 5) and neural tube defects were one of the most serious and most common. Determinants of neural tube defects and other birth defects are complex and multifactorial. Folate insufficiency has been identified as one of the determinants and improving the folate status of women of reproductive age is one of the strategies recommended for reducing folate-preventable neural tube defects. Nutrition interventions typically fall into the categories of dietary change/education, supplementation and fortification. In 2007, WHO recommended folic acid supplementation (400 µg/d) for all women from the moment they being trying to conceive until 12 weeks gestation, to prevent neural tube defects and other congenital malformations in the fetus. Furthermore, WHO recommends weekly iron and folic acid supplementation (2800 µg/week) for menstruating women. The fortification of staple foods is recommended by WHO to improve the micronutrient status of populations over time. In 2009, WHO recommended fortifying wheat and maize flour with folic acid. Fortification increases the intake of folate by women and can reduce the risk of neural tube and other birth defects. There are a variety of interventions that may be used to improve the folate status of women of reproductive age, thereby reducing the risk of neural tube defects and other birth defects. Choosing the most effective intervention for a particular population requires knowledge of that population's values and preferences, costs of the intervention, and the infrastructure in place for delivery of the intervention.

### Current capacity for academic nutrition training in West Africa.

Sodjinou, R.

UNICEF, Regional Office for West and Central Africa / WAHO.

Background: There is a dearth of information on existing nutrition training programs in West Africa. A preliminary step in the process of developing a comprehensive framework to strengthen human capacity for nutrition is to conduct an inventory of existing training programs.

Objective: This study was conducted to provide baseline data on university-level nutrition training programs that exist in the 16 countries in West Africa. It also aimed to identify existing gaps in nutrition training and propose solutions to address them.

Design: Participating institutions were identified based on information provided by in-country key informants, UNICEF offices or through internet searches. Data were collected through semi-structured interviews during on-site visits or through self-administered questionnaires. Simple descriptive and bivariate analyses were performed.

Results: In total, 83 nutrition degree programs comprising 32 B.Sc. programs, 34 M.Sc. programs, and 17

Ph.D. programs were identified in the region. More than half of these programs were in Nigeria. Six countries (Cape Verde, Guinea-Bissau, Liberia, Mali, The Gambia, and Togo) offered no nutrition degree program. The programs in francophone countries were generally established more recently than those in anglophone countries (age: 3.5 years vs. 21.4 years). Programs were predominantly (78%) run by government-supported institutions. They did not provide a comprehensive coverage of all essential aspects of human nutrition. They were heavily oriented to food science (46%), with little emphasis on public health nutrition (24%) or overnutrition (2%). Annual student intakes per program in 2013 ranged from 3 to 262; 7 to 40; and 3 to 10, respectively, for bachelor's, master's, and doctoral programs while the number of graduates produced annu-

ally per country ranged from 6 to 271; 3 to 64; and 1 to 18, respectively. External collaboration only existed in 15% of the programs. In-service training programs on nutrition existed in less than half of the countries. The most important needs for improving the quality of existing training programs reported were teaching materials, equipment and infrastructures, funding, libraries and access to advanced technology resources.

Conclusions: There are critical gaps in nutrition training in the West Africa region. The results of the present study underscore the urgent need to invest in nutrition training in West Africa. An expanded set of knowledge, skills, and competencies must be integrated into existing nutrition training curricula. Our study provides a basis for the development of a regional strategy to strengthen human capacity for nutrition across the region.

### Vers une formation qualifiante en nutrition au Mali.

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Au Mali, la situation nutritionnelle se complexifie car la malnutrition protéino-calorique sous toutes ses formes coexiste désormais avec les maladies chroniques de surcharge (obésité, diabète et maladies cardio-vasculaires). Ces maladies chroniques non transmissibles liées à la nutrition sont en nette progression. Entre 11,2% et 3,7% des femmes en âge de procréer sont respectivement en surpoids et obèses en 2001 contre 12,4% et 5,2% en 2006.

Au plan institutionnel, des évolutions sectorielles ont été enregistrées au cours des 15 dernières années en créant au sein du ministère de la santé, une division nutrition dotée aujourd'hui de plus de dix agents et des points focaux affectés dans les directions régionales de la santé, les Centres de Santé de Référence, les hôpitaux régionaux et l'Hôpital Gabriel Touré. Les CSREF et les CSCOM mettent en œuvre les interventions de nutrition du secteur santé. Il existe cependant un véritable déséquilibre de prise en compte de la nutrition dans les différents secteurs concernés (santé, développement rural, Education, Industrie, Promotion de la Femme, Communication et Protection Sociale). Le secteur de la santé qui a le leadership semble plus avancé que les autres secteurs dans la mise en œuvre des programmes de nutrition.

Des améliorations ont été observées dans le domaine de la recherche et de l'enseignement intégré de la nutrition dans les institutions de formation de la santé et du développement rural. Cependant dans le domaine de la formation des spécialistes (licences, masters et doctorat) en nutrition, les efforts sont minimes par rapport aux besoins. En effet, 17 nutritionnistes (15 licences et masters et 2 du niveau doctorat) sont recensés dans le pays contre un besoin de base exprimé par l'OOAS compris entre 240 et 1200 licences, 24 et 120 masters et entre 12 et 60 doctorats (Global Public Health, supplements novembre 2010). Ces estimations de base doivent être soutenues par une croissance annuelle de 10% pour chacun des niveaux. La politique nationale de développement des ressources humaines pour la santé adoptée en décembre 2009 ne prend pas en compte ces besoins.

La création au sein du DER de Santé Publique de la Faculté de Médecine d'un Master en Santé Publique depuis 2012 va s'enrichir d'une nouvelle mention consacrée à la nutrition qui vise à réduire le déficit en ressources humaines qualifiées dans le domaine. Cette formation vise à permettre aux futures spécialistes en nutrition de comprendre et analyser les problèmes de santé et nutrition dans les pays en développement et plus spécifiquement du Mali.

En plus des cours de nutrition administrés dans certaines grandes écoles nationales et facultés, l'ouverture du Master Santé Publique – nutrition au sein de la FMOS avec l'appui de certains partenaires comme l'UNICEF vise à combler la carence en ressources humaines qualifiées dans ce domaine en vue d'amorcer un véritable développement socio-économique du pays, qui ne saurait ce faire sans amélioration de l'état nutritionnel des populations.

### Integrated program for professional training in nutrition in Mali

Julien G.

Project Coordinator, Institut Bioforce Développement.

Building capacities of regional, national and local actors is a key factor to ensure a timely and appropriate response to nutritional emergencies or to address the challenges of improving access to water in the Sahel. However, the current training offer doesn't totally match the needs in terms of qualified and rapidly operational experts in the region (both quantitatively and qualitatively).

In September 2014, the Institut Bioforce has launched two French-language trainings in Mali in partnership with UNICEF, Fondation Mérieux, and Action Against Hunger, and in consultation with the West African Health Organization: "Nutrition Project Manager (Nutrition PM)" and "Water, Sanitation and Hygiene Promotion Project Manager" (WASH PM).

This integrated vocational training program aims at enhancing capacity and capability among local, national and international nutrition and WASH professionals in French-speaking Africa, therefore building the resilience of local communities.

The competency-based training program is designed for professionals working both in the public and private sectors. It is also addressing both "emergency response" and "sustainable access to services" and is adapted to the regional context.

This new initiative also aims at breaking the common sectorial approach in encouraging links between the Nutrition and WASH sectors (through joint sessions, and Wash In Nut module).

### **New academic training programs in nutrition and health in Benin.**

*Delisle H.*

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**Background:** Non-communicable diseases (NCD) are now a major health issue in low- and middle-income countries. Diabetes and cardiovascular diseases are among the four NCDs now recognized as a priority. Nutrition is central to NCD management and prevention, as well as for adequate policy, program delivery and research. In sub-Saharan Africa and particularly in French-speaking countries, academic training in nutrition has tended to focus on undernutrition and other deficiency diseases, as well as on food. In order to also address nutrition-related NCDs and to promote good nutrition, a public health and a clinical nutrition focus are required.

**Purpose:** In the framework of a university partnership project on the double burden of malnutrition funded by Canada (2008-2014) and involving academic partners of Benin, Burkina Faso and Mali, two new training programs in nutrition were developed at the Abomey-Calavi University in Benin: a regional Master's program and an undergraduate professional program. The purpose was to strengthen the professional workforce in nutrition in order to address the whole spectrum of nutrition disorders from a public health perspective, thereby contributing to nutritional health of the population.

**Methods:** Following needs assessments, the Master's and Bachelor's programs were developed according to the LMD reform (licence, master, doctorat), based on competencies to develop and keeping in mind the complementary nature of these professional levels. The new regional Master's program in nutrition and population health offered at the Regional Public Health Institute (IRSP) of Benin is a two-year program open to university graduates preferably with a few years of relevant practical experience. Following a common training core of a few months with other public health disciplines, the nutrition program is primarily based on problem solving and the required knowledge and attitudes: community-based food security and nutrition diagnosis, intervention and evaluation, along with advocacy for policies and programs, and social marketing. The undergraduate professional program in nutrition and dietetics for college (or paramedical) graduates is the first of its kind in French-speaking Africa. The students are trained during three years as professional generalists in nutrition, in order for them to perform adequately in clinical and public health settings, whether in public or private institutions. Their competencies encompass the management of all forms of malnutrition, the nutrition management of clinical conditions, the promotion of healthy eating and lifestyle, and the administration of food and nutrition programs. Several months of internship in hospitals, communities and food catering facilities are integrated in the program. Intensive training of trainers took place on-site through mentoring and at University of Montreal.

**Results and conclusion:** The Master's and the Bachelor's programs are now in full operation. Two cohorts of Master's students from 5 different countries (n=20) have now graduated and are involved in nutrition work. The bachelor's program has produced a first cohort of 17 graduates and a second one of roughly the same size is soon to complete the program. Challenges are for Master's students to obtain a scholarship and for the Bachelor's program to meet the high demand from candidate students whereas their number has to be limited to 25 per cohort in view of space and internship placement requirements. It is too soon to tell whether the graduates will find appropriate employment.

### **Early nutrition programming of cognition and behaviour.**

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There is evidence that early nutrition can influence later mental performance, cognitive development and behaviour. The idea that the diet of mothers, infants and children could have an influence on long-term mental performance, has major implications for public health practice and

policy development, and for our understanding of human biology, as well as for food product development, economic progress, and future wealth creation. Current evidence on the effect of diet on mental performance (MP) is largely based on animal, retrospective studies, & short-term nutritional intervention studies in humans. NUTRIMENTHE EU Project ([www.nutrimenthe.eu](http://www.nutrimenthe.eu)) has significantly improved this knowledge by studying the role, mechanisms, risks & benefits of specific nutrients & food components to respond to specific needs and influencing positively on the MP of children. The research has included quantification of the nutrient effects of early programming on later cognitive and mental disorders, effects of food on mental state and MP such as mood, activation, attention, motivation, effort, perception, memory & intelligence and the effects of food on mental illness. Extensive data from human and animal studies indicate that early diet and specific nutrients (e.g. iron, zinc, B-vitamins, folate, LC-PUFA) have a long-term impact on the function and structure of the brain. NUTRIMENTHE's Generation R study has proved that poor maternal thyroid function during pregnancy is an important risk factor for children's brain development. The results have also shown that children born to mothers who did not use folic acid supplements during the first trimester of their pregnancy had a higher risk of total problem behaviour at 18 and 36 months. Furthermore, structural imaging showed that low folate during pregnancy can have long-term effects on brain growth and development. In addition, the NUHEAL Follow-up study also proved that folate supplementation during pregnancy improves children's ability to solve response conflicts, giving better attention abilities. On the other side, The polymorphisms of the genes FADS1 and FADS2 were analyzed in "mother-baby pairs" in the ALSPAC and NUHEAL studies, demonstrating that FADS gene variants are an important factor determining maternal n-6 and n-3 fatty acid levels and fetal supply with during pregnancy, and so having a long-lasting effects. The ALSPAC study also confirmed that adequate iodine intake during pregnancy is important for child cognitive development at 8 years old; this study also demonstrated that eating fish regularly during pregnancy is important for the neurocognitive development of the offspring, supporting the recommendation that pregnant women should consume at least two fish meals a week, one of them being of oily/fatty fish. The re-analysis of the ALSPAC data from WISC-III obtained in children aged 8, has shown that seafood intake during pregnancy  $\geq 340$  g/week and maternal education determine higher mean scores on Verbal Comprehension, Working Memory and Speed Processing in the offspring at 8 years. The CHOP study has demonstrated the safety of lower protein content in infant formulas according to long-term mental performance. Within NUTRIMENTHE Project, evidence from ALSPAC, CHOP and NUHEAL has been confirmed that postnatal head size is a marker for brain development in healthy, term, children. In the NUHEAL children that head circumference (HC) at 4 years predicts long-term (at 9.5y) grey and white matter volumes, total brain volume, total inner surface area and grey matter distribution in the brain. ALSPAC data also showed a positive effect of being breastfed on achieving a higher educational outcome at age 16, which remained significant, even after adjusting for possible confounders. The resulting economic benefit of breastfeeding (< 6 months) would be £ 4,208 (~ 5,000 ) per child and even more than doubled with £ 8,799 (~ 10,500 ) for 6+ months of breastfeeding. So, successful promotion activities for better early nutrition will therefore be highly cost-effective. In conclusion, the understanding of the mechanisms associating early nutrition and later health of the brain developmental outcomes may have an enormous preventive potential, given the major public health implications, including opportunities for an improvement of cognition and an effective primary prevention of childhood and adult behaviour and mental diseases.

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### **Effect on the child of maternal iron deficiency.**

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There is an increased susceptibility to iron deficiency during the periods of tissue growth and differentiation. Thus, the pregnant women and children are the most vulnerable to this deficiency. Iron is essential for normal development of the baby, and especially for the brain development, because it is required for DNA synthesis, neuronal oxidative metabolism, and both myelin and neurotransmitter synthesis. However, despite that during pregnancy, the prevalence of ID can reach the 40% in developed countries<sup>1</sup>, such as in Spain<sup>2</sup>, there is a shortage of studies examining the association between ID and early brain development. The prevalence of IDA in Spanish children<sup>3</sup> aged 9–30 months old is similar to those of USA and range between the 8 and 11%. Infants with IDA show lower motor and cognitive test scores than infants without anaemia<sup>4,5,6</sup>. Follow-up studies suggest that effects of chronic, severe ID in infancy on cognitive function persist later in life despite iron treatment<sup>7,8</sup>.

We investigated in a Spanish sample of well-nourished pregnant with low psychosocial risk, the relations between maternal iron status at different stages of pregnancy and the development of the baby and of the neonatal behaviour<sup>9,10</sup>. Likewise, we followed this sample during the first year and at the third year of life and we assessed mental and behavioural development. We found relationship between ID during pregnancy and the birthweight and the neonatal behaviour. These associations were different depending on the time of gestation: ID in the first and second trimesters was related with low birthweight, prematurity and lower general autonomous response of the neonate and ID in the third trimester predicted the motor performance and self regulation capabilities of the newborn.

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### Maternal intakes of seafood types and child neurodevelopment: A longitudinal study based on a population with high consumption levels.

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Seafood consumption during pregnancy is thought to be beneficial for child neurodevelopment, but is also a source of neurotoxic contaminants. Guidelines suggest pregnant women balance these risks and benefits by limiting overall consumption or avoiding large fatty fish subtypes, but recommendations have not been assessed using empirical intake data. The authors examined associations between maternal seafood consumption and two time points of child neurodevelopment, at age of 14 months and 4-5 years among 1,892 and 1,589 mother-child pairs, respectively, in a prospective Spanish cohort. Bayley (14 months) and McCarthy scales (4-5 years) were used for cognitive and motor assessments. A rating scale was used for assessing autistic spectrum symptoms (CAST = Childhood Asperger Syndrome Test). Multivariate linear regression was used to assess associations between neurodevelopment scores and seafood intakes, adjusting for covariates and further analyses adjusting for cord mercury or long chain polyunsaturated fatty acid (LCPUFA) concentrations. Overall, intakes exceeding recommended limits of 340 g/week were associated with increases in scores, particularly at child age of 4 years. Large fatty fish, consuming 238 g/week (last Quantile) was associated with adjusted increases of +2.29 points of McCarthy general scale (95% confidence interval [CI] 0.42, 4.16) and decreases of -0.57 points of CAST (-1.01, -0.13). While most species, including small fatty fish and lean fish were positively associated with test scores, coefficients diminished about 15-30 % after adjusting for mercury or LCPUFA. Results do not support avoiding large fatty fish, but suggest benefits. Such associations embrace a wide range of cognitive functions and protective associations with autistic spectrum symptoms..

### The new ANIBES (“Anthropometry, Intake, and Energy Balance in Spain”) study: a model to approach energy balance.

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Different studies have previously assessed the global quality of the Spanish diet, identifying food patterns and nutritional status. However, no studies have evaluated energy balance and its determinants. New technologies reveal as potential and useful tools to solve some of the common problems derived from methodology to evaluate dietary intake and physical activity.

Therefore, we have carried out the innovative ANIBES study by the use of new emerging tools (i.e. tablet devices for food and beverages recording, and accelerometers for physical activity level quantification, among others) in order to obtain an accurate updating of energy intake, food/dietary habits/behaviour and anthropometric data of the Spanish population (aged 9-75 yr), as well as the energy expenditure and physical activity patterns, in order to approach the energy balance concept. The specific aims of the ANIBES Study were: to provide quantitative data on the food and nutrient intakes, sources of nutrients, physical activity level and anthropometric measurements; to provide information on trends in food consumption, nutrient intake in different age groups and gender; to describe the individuals with intakes of energy and nutrients above or below the national average; to provide height, weight and other anthropometric measurements and examine their relationship to socio-demographic, dietary, and health data; to monitor the diet of the population and the extent to which the diets of population sub-groups vary from recommendations. The design, protocol, methodology, and main results are presented and discussed.

### Energy balance and gene interactions

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Increasing importance is being placed on the study of all the factors that contribute to energy balance instead of focusing only on diet. We may define “Energy balance” as the relationship between “energy in” (food calories taken into the body through food and drink) and “energy out” (calories being used in the body for our daily energy requirements). Depending on the result of this relationship, we will observe whether weight is lost, gained, or remains the same. However, besides changes in weight, alterations to energy balance give rise to other health problems that can contribute to the development of type 2 diabetes, metabolic syndrome, an increase in cardiovascular disease risk and cancer.

Many factors contribute to energy balance, both genetic and environmental. Among the most important environmental factors are diet and exercise, but hours of sleep, stress, environmental temperature, etc. may also contribute to this balance. All these environmental factors are, in turn, subject to the genetic factors modulating them. We shall here review the main relevant genes in human energy balance, as well as their main gene-gene and gene-environmental interactions with different components of diet and physical activity. We shall present the results both of individual gene analyses and genetic risk scores (GRS) analyses that combine several of these genes. The phenotypes analyzed will mainly be those of obesity, although the findings may be extrapolated to include various related pathologies. In addition to genetic analyses, great importance has been placed in recent years on the epigenetics involved in energy balance. We shall comment on several examples of epigenetic regulation of energy balance through methylations and microRNAs.

### The importance of energy balance in obesity management.

Hand G.A

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A fundamental principal of sustainable weight management is that maintaining body weight requires equivalent energy consumption and expenditure over time. However, there is little understanding of the determinants of energy consumption and expenditure, and even less understanding of the relationship among energy intake, expenditure and changes in body composition. It is established that these three primary components of energy balance are not discrete variables, but are dynamic and interrelated. The purpose of this session is to gain a better understanding of energy balance as a framework for weight management. This goal will be achieved by discussing the results from the Energy Balance Study – an ongoing observational study of energy intake, expenditure and anthropomorphic changes in a group of young adults. Findings suggest that there is a significant misclassification of weight change on an individual basis even while group estimates of weight change are valid. The results also indicate that the amount of energy flux, the energy that is metabolized from intake to expenditure/storage over time, may be critical for understanding the relationship among the primary components of energy balance. And further, these components play a critical role in the composition of body mass that is gained or lost, which can

have a significant effect on weight management. Outcomes of this data-based presentation will include a better understanding of the energy balance framework for weight management and an appreciation for the importance of the level of energy flux at which energy balance is maintained.

### **Determinantes de la obesidad en etapas tempranas de la vida: estudios en México.**

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Antecedentes: La eficacia del tratamiento de la obesidad infantil y del adulto es moderada a baja y diversos estudios epidemiológicos y revisiones sistemáticas sugieren que la pérdida de peso mayor del 8% puede aumentar la mortalidad. Por lo que diversos expertos sugieren que la prevención de la obesidad debe iniciar durante las etapas más tempranas de la vida. México es uno de los países con mayor obesidad infantil en el mundo, que la ha convertido en el problema número uno de salud pública. El objetivo de esta presentación es analizar a partir de las evidencias de revisiones sistemáticas y de estudios originales realizados en el norte, noroeste y sureste de México los determinantes de la obesidad infantil durante el período pregestacional, gestacional y durante los primeros cinco años de vida.

Metodología: Se analizarán revisiones sistemáticas sobre la desnutrición durante y después del embarazo, en la diabetes gestacional, sobre el aumento de peso durante el embarazo. Se analizarán los resultados con estudios realizados en México, enfocados a la edad reproductiva, la diabetes gestacional y la adherencia a los protocolos de diagnóstico y tratamiento de la diabetes gestacional, el peso al nacer, la lactancia exclusiva, la introducción de alimentos antes de los seis meses, la introducción de alimentos chatarra antes de los dos años, las preferencias, rechazo de alimentos antes de los seis años y el nivel socioeconómico asociado a la obesidad. Además, se analizarán las implicaciones que estos resultados tienen de acuerdo al modelo ecológico de conducta y sus implicaciones para el establecimiento de prioridades de prevención e intervención en las políticas de salud. Asimismo se describirán estudios relacionados con la estigmatización de los niños y adultos mexicanos con exceso de peso por parte de los padres, los maestros, los estudiantes de medicina y los médicos. Se analizará las implicaciones de estos resultados para el establecimiento de una política de salud pública que integre la prevención de la obesidad con la prevención de la estigmatización hacia las personas con obesidad.

Resultados: En México, son determinantes de la obesidad, la obesidad pregestacional, el aumento excesivo de peso durante el embarazo, la desnutrición pre y postgestacional, la inadecuada atención prenatal, la falta de la aplicación de la norma para el diagnóstico y tratamiento de la diabetes gestacional, el bajo porcentaje de alimentación materna exclusiva, la ablactación temprana, la ingesta de comida chatarra antes de los dos años y la pobreza. Además, los niños con sobrepeso sufren de estigmatización por parte de los padres, los maestros, los médicos y los estudiantes de medicina.

Conclusión: Un amplio número de determinantes de la obesidad infantil y del adulto se presentan durante etapas tempranas de la vida en México, lo que requiere de una política integral para la prevención de la obesidad, enfocada principalmente a reducir los determinantes de la obesidad en etapas tempranas de la vida, acompañada de medidas que prevengan la estigmatización de los niños y adultos con obesidad.

### **Exposición a la televisión y a los anuncios de alimentos en la televisión en Latinoamérica.**

Bacardí Gascón M.

Facultad de Medicina y Psicología de la Universidad Autónoma de Baja California, México

La obesidad infantil y las horas que los niños pasan frente a un televisor se ha incrementado en las últimas cuatro décadas en la mayor parte del mundo. La revisión de la literatura indica que no tan solo el pasar varias horas frente a un televisor disminuye el tiempo que se puede dedicar a actividades físicas más vigorosas, si no que, la exposición a los anuncios de alimentos influye sobre la demanda, la compra y el consumo de los mismos en diferentes edades. Particularmente en los niños, que están expuestos a un importante número de estímulos que pueden afectar su desarrollo psicológico y hábitos alimentarios. La publicidad de alimentos en la TV se ha ido sofisticando producto de las investigaciones de mercado, ha utilizado diferentes técnicas orientadas a crear en los niños la necesidad de consumir productos de baja calidad nutricional y a hacer creer a los padres que al comprarlos contribuyen a la felicidad y a la salud de sus hijos.

El objetivo de esta exposición es analizar la literatura sobre la publicidad de alimentos en la tv en diferentes países de Latinoamérica y como puede contribuir al ambiente obesogénico en los niños y explorar las accio-

nes legislativas y gubernamentales para prevenir estas prácticas y sus implicaciones.

### **Abordaje integral de la malnutrición.**

Albino A.

Fundación CONIN, Mendoza, Argentina.

El hambre y la desnutrición infantil representan una realidad invisible e injusta en un mundo que podría proveer suficiente y sana alimentación y servicios de nutrición para cada persona en el planeta. El hambre viola la dignidad humana. Las deficiencias en nutrición reducen severamente las capacidades cognitivas. En consecuencia, los pobres no sólo padecen hambre diariamente sino que también está comprometido su potencial humano en el futuro. Un acceso típicamente deficiente o inexistente a la educación por parte de los pobres sólo contribuye a su exclusión social. Este ciclo de hambre, desnutrición, capacidades intelectuales comprometidas y carencia de oportunidades educativas y económicas se extiende por todo el mundo y es más evidente en las áreas rurales empobrecidas y en las periferias urbanas miserables. Más de mil millones de personas viven en circunstancias muy adversas que impiden el sueño y la nutrición y amplifican los problemas relacionados con la salud y la educación.

### **Vitamin E status: an assessment.**

Eggersdorfer M.

University Medical Center Groningen. Nutrition Science & Advocacy DSM Nutritional Products, Kaiseraugst, Switzerland

Vitamin E is essential for human health and achieving an optimal status is associated with beneficial health outcomes. Dietary recommendations are established in many countries around the world and refer to the important role of vitamin E in preserving the integrity of the cell membrane. The intake of vitamin E is in general low and very similar over all regions worldwide. Based on a search in the Pubmed/Medline database focused on population based studies published between January 1st 2000 and July 30th 2012 for a major part of the population intakes for  $\alpha$ -tocopherol and vitamin E are below 15 mg /d, which is the Recommended Daily Allowance (RDA) for men and women in the US. Given the fact that people in many countries are not meeting vitamin E intake recommendations we assessed serum  $\alpha$ -tocopherol. We used 12  $\mu$ mol/L vitamin E serum levels needed to avoid deficiencies in the human body (F.a.N. Board 2000). Results from a number of observational, prospective studies suggest a serum tocopherol concentration of 30  $\mu$ mol/L and above to have beneficial effects on human health in the field of cardiovascular disease and some cancers.

The data from the 2003-2006 National Health and Nutrition Examination Survey (NHANES) show mean  $\alpha$ -tocopherol concentrations below the optimal concentration for the total population and non-supplements users. In addition to differences in  $\alpha$ -tocopherol concentration between supplement and non-supplement users subpopulations by gender and race/ethnicity, a higher proportion of younger than older adults had suboptimal  $\alpha$ -tocopherol concentrations. As a consequence, despite low incidence of overt vitamin E deficiency many American adults have suboptimal  $\alpha$ -tocopherol status even when supplementing their diet. Data on vitamin E status worldwide will be discussed.

The issue of low vitamin E intake and serum level has to be widely addressed because of its potential subclinical and clinical consequences.

### **A dual role for vitamin E - essentiality and beyond.**

Weber P.

Corporate Scientist Human Nutrition, DSM Nutritional Products, Kaiseraugst, Switzerland

Dietary intake recommendations for vitamin E are established in many countries around the globe and refer to its important role in preserving the integrity of the cell membrane as a powerful chain-breaking antioxidant. In the US the Recommended Daily Allowance (RDA) for vitamin E is 15 mg  $\alpha$ -tocopherol in adults for both men and women, a value derived from the amount needed to prevent peroxide-induced hemolysis in vitamin E deficient subjects. So, the essentiality of vitamin E is well established and the intake needed to meet the RDAs can be achieved by a prudent diet. On the other hand, emerging data suggest that in diabetics carrying the haptoglobin genotype Hp 2-2 a daily intake of 400 mg vitamin E reduced a composite cardiovascular endpoint (cardiovascular death, myocardial infarction or stroke) significantly. In addition, there is several studies reporting an improvement in fatty liver disease (NASH) by daily intakes of 400-800 mg vitamin E in both, children and adults. A recent study found a reduction of functional decline in Alzheimer Disease at an intake of 2000 mg of vitamin E per day confirming earlier findings. Currently, available evidence is limited for a possible function of vitamin E in human health beyond its role as an essential micronutrient. However, there is encouraging data for it which point to specific condi-

tions and diseases at intakes which are likely not to be achieved by regular diet and which may be applicable for selected individuals and groups rather than for the general population.

### **Vitamin E in risk reduction for fatty liver disease.**

Péter, S.

DSM Nutritional Products Ltd., R&D Human Nutrition and Health, Kaiseraugst, Switzerland

Vitamin E is an essential micronutrient, which is a powerful peroxy radical scavenger particularly in the lipid bilayer of the cell membrane. The spectrum of non-alcoholic fatty liver disease (NAFLD) associated with metabolic determinants extends from hepatic steatosis through non-alcoholic steatohepatitis (NASH) to cirrhosis. NAFLD is frequently associated with obesity, dyslipidaemia, insulin resistance and type 2 diabetes mellitus (its prevalence can reach 76% in obese persons), but it also can be observed in 16% to 20% of normal weight individuals. Recent studies reported that vitamin E improves pathophysiological and histological status in NAFLD and NASH patients. As oxidative stress acts as a trigger to initiate cellular injury, leading to a chronic inflammatory response, vitamin E might act in NAFLD in different ways: As a chain-breaking, lipid-soluble antioxidant, quenching peroxy radicals or as an anti-inflammatory compound, antagonizing the production of inflammatory mediators. There are also measurable differences in the profile of chemical processes involving metabolites (metabolomics) of subjects who are likely (vs. unlikely) to respond to vitamin E treatment for NASH and in those experiencing histologic improvement (vs. no improvement) on treatment. At present, there is no approved drug for the treatment of NASH. It has been shown that vitamin E administered at daily dose of 800 IU/day improves liver histology in non-diabetic adults with biopsy-proven NASH. Besides this therapeutic effect, there may be options in a preventative setting as well, which has to be further evaluated.

### **Vitamin E in reduction of progression of Alzheimer Disease.**

Dysken M.W.

Minneapolis VA Health Care System, Minneapolis, Minnesota

Alpha-tocopherol (vitamin E) has been studied in three large clinical trials to determine its benefit in patients with Alzheimer's disease (AD) (Sano et al. 1997; Dysken et al. 2014) and in subjects with mild cognitive impairment (MCI) (Petersen et al. 2005). Sano et al. reported that 2000 IU/d of vitamin E delayed clinical progression by approximately seven months over a two year period in patients (N=341) with moderately severe AD. Dysken et al. reported that 2000 IU/d of vitamin E delayed clinical progression by approximately six months over two years in patients (N=613) with mild-to-moderate AD. Petersen et al. reported no benefit in delaying the progression of MCI to AD in subjects (N=769) with MCI. These three studies will be reviewed and discussed with emphasis on clinical trial methodology, mechanism of action, and implications for future research.

### **Frontiers in assessing vitamin E deficiency and its public health consequence in South Asia.**

West K.P.\*

George G. Graham Professor of Infant and Child Health Center for Human Nutrition and Sight and Life Global Nutrition Research Institute, Department of International Health, Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA.

The prevalence of vitamin E deficiency and its public health importance remain poorly characterized aspects of Hidden Hunger in low income countries, arising from assumed low prevalence, difficulty and of measurement, lack of evidence on consequence and uncertainty about roles of vitamin E isomers in health. More research is needed to discern prevalence and health effects of vitamin E deficiency. We report here findings from two population studies in South Asia: a case-cohort study of 1st trimester vitamin E ( $\alpha$ - and  $\gamma$ -tocopherol) status and risk of miscarriage in rural Bangladesh and a study among young school-aged children in Nepal to discover a plasma proteome associated with circulating concentrations of  $\alpha$ - and  $\gamma$ -tocopherol that could stimulate use of protein biomarkers to assess vitamin E status using lower cost assays in the future. In the first study, among 1605 1st trimester gravaida enrolled in a larger placebo-controlled, maternal vitamin A or  $\beta$ -carotene supplementation trial Bangladesh (JiVitA-1), 72% were vitamin E-deficient, with plasma  $\alpha$ -tocopherol <12  $\mu$ mol/L. The odds ratio (adjusted for cholesterol,  $\gamma$ -tocopherol, maternal age, gravidity and gestational age at blood draw) of miscarriage among these women was 1.83 (95% CI: 1.04, 3.20) compared to women whose vitamin E status was above this cutoff. A lower plasma  $\gamma$ -tocopherol was associated with lower risk of miscarriage. Interactions were evident with respect to maternal body mass index and iron status. We conclude that vitamin E deficiency may be common and asso-

ciated with early pregnancy loss in rural South Asia.

In Nepal, we measured 982 plasma proteins in >10% of plasma samples of 500 6-8 year old children: 121 proteins were associated with plasma  $\alpha$ -tocopherol ( $q < 0.10$ ; defining a plasma  $\alpha$ -tocopherome), comprising many proteins involved in lipid transport, cell adhesion, coagulation, intracellular trafficking and transcription. Following multiple imputation of missing values and linear mixed effects regression, we found 7 proteins (gene symbols: APOC3, APOB, PKM, FOXO4, UNC5C, RGS8 and ITGA5) that explain 73% of the variability in plasma  $\alpha$ -tocopherol concentration. Plasma proteomics may provide a new approach for assessing population vitamin E status in the future.

\* Presented on behalf of the JiVitA/Johns Hopkins Project, Gaibandha, Bangladesh (AA Shamim, K Schulze, RD Merrill, A Kabir, P Christian, S Shaikh, L Wu, H Ali, AB Labrique, S Mehra, R Klemm, M Rashid, P Sungpuag, E and Udomkesmalee) and the Johns Hopkins Plasma Nutriproteomics Team (R Cole, K Schulze, P Christian, L Wu, SU Lee, S Shrestha, J Groopman and J Yager). These studies were supported by the Bill and Melinda Gates Foundation (Grants GH614 and OPP5241, respectively), Seattle, WA.

### **Addressing micronutrient malnutrition in public health and development: from global guidelines to implementation tools.**

Peña-Rosas J.P.

World Health Organization, Geneva, Switzerland.

Dr. Peña-Rosas will provide a summary of the current scope of the program of micronutrient malnutrition globally and the efforts of the World Health Organization to develop evidence-informed guidance to address these issues.

### **Zinc supplementation for diarrhea management: increasing demand and coverage.**

De-Regil L.M.

Micronutrient Initiative

Dr. De-Regil will then present the experience of the Micronutrient Initiative in zinc supplementation programs for diarrhea treatment in a number of countries around the world, with particular emphasis on the challenges related to demand creation.

### **Addressing the challenges of assessing performance of large-scale populations based programs.**

Neufeld L.M.

Global Alliance for Improved Nutrition (GAIN), Switzerland

Food fortification, as a population based approach presents many challenges to assessing progress and potential for impact. Dr. Neufeld will present GAINs work to generate a body of evidence about the coverage and potential impact of food fortification programs, using an innovative, simple coverage assessment tool.

### **Challenges for the monitoring of micronutrient programs and evidence needed to adjust policies.**

Hotz C.

Independent consultant, The Global Alliances for Vitamin A (GAVA).

This presentation will focus on the challenge of adapting within countries, the policies and programs related to micronutrient interventions as the epidemiology of the problem shifts. The presenter will draw on the example of vitamin A supplementation in countries where regular dietary intake of vitamin A may now be adequate and the prevalence of deficiency low.

### **Integrating efforts to reduce sodium while maintaining progress on iodine deficiency disorder reduction: Experiences from the MENA region.**

Hussein I.

ICCIDD, MENA IEMRO Region. Institute of Brain Chemistry and Human Nutrition, OMAN & UK

Dr. Izzeldin will then address another important challenge related to micronutrients. In many countries, salt iodization remains a critical intervention to prevent iodine deficiency disorders given that alternative sources of dietary iodine have not been identified. But at the same time, countries are seeking to reduce salt intake for the prevention of chronic disease. Dr. Alsharif will focus on the integration of salt reduction with salt iodization and challenges of this, with focus on MENA region.

## An economic model for optimizing effective coverage and cost-effectiveness of micronutrient interventions.

Engle-Stone R.  
University of California, Davis, USA.

Many countries have multiple interventions for the prevention and control of micronutrient deficiency, but as yet, little attention has been paid to the need for coordination among these interventions. Coordination is critical to ensure efficiency in use of scarce resources but also as a means to ensure that all risks are minimized, both insufficient and excess intake. In collaboration with the Bill and Melinda Gates Foundation, Dr. Engle-Stone and the team at UC Davis have been developing an evidence based model to optimize combinations of interventions for micronutrient deficiency control programs.

## Formación en nutrición.

Martin Salinas C.  
Grado de Enfermería, Facultad de Medicina, Universidad Autónoma de Madrid.

En los nuevos Grados de Enfermería, la asignatura de Nutrición con una asignación de 6 ECTS, facilita al estudiante el desarrollo de competencias profesionales relacionadas con la nutrición. En este sentido, la formación de Grado afronta con esta asignatura los conceptos y fundamentos necesarios para el manejo de uno de los requisitos de cuidado universal, la alimentación, tanto desde el punto de vista de la promoción de la salud, como de la prevención de la enfermedad y de la atención y cuidados a las personas con problemas de salud. Pero a su vez, la formación de Grado inicia a los estudiantes de Enfermería en la metodología de la investigación y en la planificación de programas, proporcionándoles destrezas para diseñar y desarrollar acciones formativas a distintos niveles y, prácticas en relaciones interpersonales y para el trabajo en equipo. Todo ello necesario para situar al estudiante de enfermería en el uso del proceso enfermero aplicado a la alimentación y nutrición.

Pero es suficiente con la formación de Grado para proporcionar cuidados nutricionales de calidad?

El Aprendizaje de la Nutrición en el Grado en Enfermería, junto con las demás materias de la disciplina, permite desarrollar competencias para prestar cuidados relacionados con la ALIMENTACIÓN Y LA NUTRICIÓN. Sin embargo, la experiencia nos dice que la formación BÁSICA no siempre es suficiente a la hora de diseñar o planificar cuidados nutricionales. ¿Qué podemos hacer?

El profesional de Enfermería del siglo XXI tiene la necesidad de ampliar los conocimientos científicos y técnicos, con el fin de mejorar la calidad de la atención de salud al proporcionar unos cuidados enfermeros individualizados y correctamente planificados. Con la nueva titulación de Grado se abre la posibilidad de continuar la formación académica. Esto permite, además de una futura integración en un equipo multidisciplinar de Nutrición Clínica, desarrollar en profundidad las competencias específicas de esta área de conocimientos.

Pero, ¿qué tipo de formación es más adecuada. Podemos elegir entre un Máster Oficial o un Título Propio, en sus diferentes modalidades.

El MÁSTER OFICIAL es el segundo ciclo de las enseñanzas universitarias. Tiene como finalidad que el estudiante adquiera una formación avanzada, de carácter especializado o multidisciplinar, y orientada a la especialización académica y profesional, o bien a promover la iniciación en tareas investigadoras. Tiene validez en todo el territorio nacional y en el espacio europeo de educación superior (EEES). Los Másteres Oficiales surten efectos académicos plenos y habilitan, en su caso, para la realización de actividades de carácter profesional reguladas además de permitir el acceso a la realización de la Tesis Doctoral y obtención del título de Doctor.

Los TÍTULOS PROPIOS o no Oficiales (también llamados Experto Universitario y anteriormente máster) son programas aprobados por la propia Universidad en uso de su autonomía y están orientados a la formación avanzada y especialización profesional, ofreciendo un tipo de formación más flexible y diversificada, acorde a las demandas de la sociedad. Por sus características, esta formación no da acceso a los estudios de Doctorado. Su duración es inferior a la de un Máster Oficial y no tienen rango académico por lo que en el mundo laboral privado el valor que se les dé depende exclusivamente de la empresa o institución que contrata.

La elección va a depender de muchos factores, pero fundamentalmente hay que tener en cuenta dos aspectos:

1. La orientación hacia un Título Propio, tiene que ver con la Formación Continua y la especialización profesional.
2. La elección de un Máster Oficial, debe ir precedida de la intención de continuar con la formación académica para alcanzar el doctorado.

En el momento actual, la investigación es una función ineludible del profesional de enfermería, también en el área de Nutrición, y constituye una demanda para el desarrollo profesional, que nos va a permitir pasar a ser productores de conocimientos y no meros consumidores, así como, formar parte de los equipos multidisciplinarios de pleno derecho.

En conclusión, las competencias adquiridas con la realización de un Posgrado permitirán a los profesionales de enfermería tener un conocimiento experto para realizar juicios clínicos avanzados, desarrollar habilidades para la toma de decisiones, para el desempeño de funciones de consultor y para trabajar con equipos interdisciplinarios en proyectos de innovación y mejora.

## Líneas de investigación en cuidados de nutrición.

Domínguez Maeso A.  
Unidad de Gestión Clínica de Endocrinología y Nutrición. Hospital Complejo Universitario de Jaén.

Cuando Florence Nightingale realizó los valiosísimos trabajos de investigación enfermera que les valieron a los ingleses ganar una guerra, tenía clarísimo qué buscaba demostrar. Pienso que el principal problema con el que nos topamos las enfermeras especialistas o generalistas (en nuestro caso en nutrición) es no tener esa claridad de ideas, ya que nos hemos introducido en un mundo profesional demasiado técnico y centrado en la ayuda o colaboración a las actividades médicas. Una mala formación universitaria en investigación, hasta hace tres o cuatro años, completan esta situación que debemos que solucionar cuanto antes.

Uno de los temas fundamentales a tratar es la definición de las líneas de investigación propias de los cuidados enfermeros. Las líneas de investigación, en general, son las que hacen referencia al eje temático mono o interdisciplinario en el que confluyen actividades de investigación realizadas por uno o más grupos de investigación, que tengan resultados visibles en su producción académica y en la formación de recursos humanos mediante el desarrollo de trabajos de investigación, tesis y la divulgación de su trabajo, es decir con productividad académica.

Para conocer las líneas de investigación en enfermería la Organización Mundial de la Salud (OMS), la Organización Panamericana de la Salud (OPS) y el Comité Europeo de Salud (CES) emiten un acuerdo en materia de cooperación internacional para realizar investigación multinacional para introducir cambios que mejoren la práctica de la Enfermería en el mundo, generando líneas de investigación que basan el cuidado en la evidencia científica (Consejo Internacional de Enfermería, 2010) entre ellas la alimentación, la nutrición, la dietética y la educación para la salud como líneas prioritarias.

He de decir que el volumen de artículos publicados por enfermeras en el ámbito de la nutrición es ciertamente elevado. Al buscar en la base de datos "Cuiden" artículos sobre nutrición o alimentación, aparecen alrededor de 2190 registros (una vez suprimidos los que no son propiamente del tema). Sin embargo, la proporción de trabajos de investigación es relativamente bajo (32,6% de las publicaciones) Por otro lado es muy difícil comprobar cuantas enfermeras colaboran en trabajos multidisciplinarios liderados por otros profesionales, sobre todo médicos, con los que es frecuente la colaboración. Aún es más difícil determinar si estos trabajos se circunscriben a investigar sobre cuidados enfermeros y no a temas clínicos o socio-sanitarios en general ¿a qué podría ser debido? En principio los datos sobre la interrelación nutrición-enfermedad son poco concluyentes y casi siempre se circunscriben exclusivamente a las alteraciones por defecto o por exceso. En los estudios sobre el ser humano las evidencias son difíciles de hallar dado el importante número de variables en el área de influencia del tema. Estas premisas hacen que la investigación nutricional sea uno de los campos más complejos de la biomedicina. También hay que reconocer que nos falta formación en metodología de la investigación. Esto es de gran importancia, ya que es necesario que exista un pensamiento crítico, capacidad para evaluar críticamente la investigación y tomar conciencia del valor que tiene la investigación en la calidad global y la eficacia de los cuidados enfermeros. Ninguno de estos problemas es insalvable y realmente lo peor de esta situación es que las generaciones que estamos en este momento con trabajo estable y posibilidades de realizar investigación en cuidados no hemos adquirido el hábito de hacerlo ni se contempla como una actividad más del trabajo diario.

El consejo internacional de enfermería -CIE- comentaba en 2009 que "La perspectiva de la investigación en enfermería y el llamado de las líderes de asociaciones en el mundo, es al trabajo en grupos y redes temáticas, como estrategia para que las enfermeras con alto nivel de formación académica, apoyen a las de menor formación y más experiencia clínica, para basar los cuidados en la evidencia científica a través de la investigación cotidiana".

Desde las asociaciones de enfermeras se marcan líneas de investigación y se crean grupos de trabajo, sirva de ejemplo la actual línea de investigación que se está desarrollando desde el Grupo de Investigación de ASANEC (Asociación de Enfermería Comunitaria de Andalucía) en donde se prioriza la investigación sobre el nuevo modelo de gestión de cuidados implantado en la atención primaria andaluza, aunque emergen más líneas referidas a la promoción de salud y prevención de problemas de salud en la población en general, niños, jóvenes y población más vulnerable.

Dentro de las asociaciones y grupos de nutrición a nivel nacional ADENYD tiene definidas sus líneas de interés entre las que destacan la nutri-

ción artificial y la educación nutricional. En Andalucía contamos con el grupo NURSE trabajando en tres líneas principales: a) Prevención y tratamiento de la disfagia, b) Materiales y técnicas de nutrición artificial y c) Educación nutricional.

Es importante destacar que en este momento la universidad ha dado un cambio, apostando claramente por la preparación en investigación de los graduados en enfermería. En sus trabajos de fin de grado los alumnos escogen con frecuencia temas relacionados, directa o indirectamente, con la nutrición con lo que tenemos la seguridad de que la cantidad de trabajos de investigación está aumentando exponencialmente, si bien es cierto que estos alumnos y profesionales jóvenes e inexpertos necesitan del apoyo sus profesores expertos en investigación de cuidados enfermeros y de sus compañeros conocedores de la clínica y sus dificultades.

Por tanto, el compromiso de las enfermeras especialistas y/o expertas en nutrición debe ser firme, con la voluntad única de transmitir a las siguientes generaciones de profesionales las herramientas para construir una profesión prestigiosa y prestigiada, que aporte nuevos y mejores métodos de aumentar y proteger la salud de la población. Y en ese compromiso, estamos inmersas las integrantes de este Simposio.

### **Estrategias para la promoción de la alimentación equilibrada, desde las consultas de enfermería de Atención Primaria.**

Francés Pinilla M.

Dirección Enfermería Atención Primaria. Sector Zaragoza II. AECA.

Dentro de las consultas de enfermería de atención Primaria, la alimentación es un factor fundamental, ya que la base de una buena salud parte de una alimentación saludable, es decir una alimentación equilibrada.

Por ello a los usuarios se les debe de informar de los diferentes grupos de alimentos y los nutrientes que comportan para que conozcan cómo afectan al organismo según su edad o su problema de salud.

El objetivo es incorporar a su estilo de vida una alimentación saludable, variada y sabrosa, basada en la cocina mediterránea.

Tanto en el Ministerio de sanidad, como en las diferentes CCAA, se han publicado, planes o guías bien específicas de alimentación o bien guías en las que la alimentación es una parte importante en la educación para la Salud, del usuario o pacientes en atención primaria.

En la exposición del Simposio se hace un recorrido por los Planes y Estrategias puestas en marcha en las CCAA, incluida la "Estrategia para la Promoción de Alimentación y Actividad Física Saludables" en Aragón 2011-2016.

### **Influencia de la disfagia en el desarrollo de la malnutrición.**

De Torres Aured M.L.

Unidad de Dietética y Nutrición. Hospital Universitario Miguel Servet. Observatorio de la Nutrición y el Estudio de la Obesidad de AECOSAN.

La disfagia es la alteración o dificultad en el proceso de la deglución. No es en sí misma una patología propiamente dicha, sino un síntoma que acarrea tantas complicaciones, que en ocasiones debe abordarse como una patología. El abordaje de este síntoma requiere actuaciones que abarcan un correcto diagnóstico e intervención terapéutica adecuada y completa, incluida sobre todo la nutrición.

Las personas que padecen disfagia, suelen tener alterado el proceso de la deglución y con ello la capacidad para alimentarse e hidratarse de manera correcta, lo que pudiera acarrear cuadros de desnutrición y deshidratación.

La detección del problema puede pasar desapercibido y enmascarado entre otros signos más llamativos y/o urgentes, por lo que un diagnóstico correcto y a tiempo, evita la aparición de complicaciones como la desnutrición, porque permite la instauración de terapias nutricionales adecuadas y personalizadas.

Dentro de las complicaciones de la disfagia, las hay que alteran la eficacia porque ocasionan una merma en la capacidad de alimentarse, con un nivel adecuado de nutrición e hidratación. Otras alteran la seguridad produciendo obstrucción brusca, atragantamiento, aspiración y neumonía. Cuidados nutricionales en la disfagia.

Uno de los Cuidados enfermeros más importante en la prevención de estados de malnutrición en pacientes con disfagia, es adaptar la alimentación a la capacidad deglutoria del paciente, probando las diferentes texturas de alimentos y viscosidades en los líquidos.

Para preservar lo más posible las costumbres, hábitos y cultura alimentaria del paciente, debe de adaptarse el tipo de alimentos -que habitualmente ingiere- a una consistencia acorde a las posibilidades deglutorias individuales y formar sobre los beneficios de seguir esta dieta adaptada, al paciente (si no tiene deterioro cognitivo) y a familia o cuidadores.

¿Qué es el MECV-V?

El método de exploración clínica volumen-viscosidad es un método sencillo y seguro que consiste en utilizar bolos alimenticios de 3 viscosidades

diferentes (néctar, líquido y pudín) en 3 volúmenes crecientes cada uno de ellos (5ml, 10ml y 20ml) y así se puede evaluar los signos de disfagia en cada deglución, que será de dificultad progresiva. Obligatoria, esta prueba se realiza mientras el paciente tiene conectado un pulsioxímetro, para comprobar la saturación de O<sub>2</sub> y detectar alguna bronco-aspiración silente.

Con este método se pretende detectar cómo son de seguras las degluciones y si hay signos de aspiración del bolo a la vía aérea. Sobre todo indica cuál es el volumen y la viscosidad del alimento adaptado que el paciente deglute con seguridad y riesgos minimizados.

Intervenciones enfermeras en el adiestramiento nutricional.

La enfermera tiene una función asistencial con una actividad formativa para usuarios y pacientes. Sus objetivos:

- Destacar la importancia de la dieta equilibrada.
- Animar al paciente, familiares y cuidadores a participar en la intervención.
- Informar al paciente y/o cuidadores de las dificultades de deglución que presenta.
- Deben estar encaminadas a cubrir las necesidades nutricionales del paciente.

Malnutrición / Desnutrición

Todos los objetivos, cuidados e intervenciones hasta aquí reflejados, sólo busca que los pacientes con disfagia no entren en un estado de malnutrición, llegando incluso a la desnutrición.

La desnutrición relacionada con la enfermedad, constituye un problema sanitario de altos costes por su elevada prevalencia del 20 al 50%.

La evidencia científica muestra en la literatura publicada, todos los beneficios de salud que suponen una adecuada nutrición en cualquier enfermedad, ya que los pacientes desnutridos tienen un consumo mayor de recursos, porque tienen el doble de necesidades que los no desnutridos. Metaanálisis como los de Cadwood (2010) y Russell (2007) demuestra que el diseño de buenas estrategias para conseguir una adecuada nutrición por vía oral modificada, enteral o parenteral, proporcionan beneficios de salud en los pacientes desnutridos o en riesgo, lo que proporciona un coste-beneficio muy favorable para el SNS.

Protocolos y Guías de procedimiento.

Las enfermeras de nutrición desarrollan las intervenciones en disfagia en pro de erradicar la desnutrición, mediante Guías y Protocolos basados en la evidencia científica y la evidencia asistencial.

### **Conceptual considerations on equity in access to interventions addressing the double burden of malnutrition from a social determinants of health approach.**

Zamora G.

World Health Organization, Geneva, Switzerland.

Equity in health refers to the need of addressing inequalities or differences in health that are judged to be unnecessary and unfair, and which are avoidable by proper action. Malnutrition, one of the most widespread health inequities across and within countries, affects more often those population groups with less power, economic resources and opportunities. Nutrition-specific and nutrition-sensitive interventions are usually designed to target these populations groups; however, those who most need it sometimes face barriers to effectively and timely access interventions. Inequities in access to interventions can be framed as an implementation outcome and thus equity-based implementation research can contribute to identify and overcome those barriers. This presentation will put forward the WHO conceptual and operational approach used in nutrition to this matter.

### **Equity and implementation issues concerning the six global targets 2025 to improve maternal, infant and young child nutrition.**

Peña-Rosas J.P.

World Health Organization, Geneva, Switzerland.

Understanding equity in access to interventions as an implementation outcome allows us to examine concrete operational issues that are sometimes less considered in conceptual frameworks addressing equity and the double burden of malnutrition. The six global targets 2025 to improve maternal, infant and young child nutrition, endorsed by the World Health Assembly, require complex interventions and a multisectoral approach informed by the guidelines recommended by the World Health Organization. The implementation of these interventions faces difficulties across health systems and contexts. Implementation science and research can contribute to assess and overcome these difficulties. This presentation will examine examples of implementation difficulties using an equity lens and offer entry points to enhance access to interventions, especially for the most vulnerable population groups.

### **A health systems strengthening approach to improve nutrition of pregnant women and newborns in Ethiopia, Kenya and Senegal.**

Kung'u J.<sup>1</sup>, Ndiaye B.<sup>1</sup>, Ndedda C.<sup>1</sup>, Bogale G.<sup>1</sup>, Gold E.<sup>1</sup>, Neufeld L.<sup>2</sup>, De-Regil L.M.<sup>1</sup>

<sup>1</sup>Micronutrient Initiative, <sup>2</sup>Global Alliance for Improved Nutrition

Coverage of nutrition interventions for pregnant women is poor, but potential for improvement is limited where health systems are weak. Such is the case of several African countries. We used Knowledge, Attitudes and Practices surveys to identify key individuals and factors influencing antenatal care demand and use in Kenya, Senegal and Ethiopia. Women with children 0-11 months were randomly selected for the interviews and the results analyzed by using mixed methods. The qualitative and quantitative findings were used to assess areas of opportunity and overcome potential barriers. This presentation will outline these findings and how they informed the design of ad hoc country strategies to improve antenatal care seeking and coverage, supply chain management and quality of care.

### **Addressing the problem of equity impacts of nutrition interventions in India.**

Albrecht D.

World Health Organization Country Office for India.

With a population of 1,25 billion people, India is the second most populated country in the world. Almost 50% of Indian children and women in fertile age are affected by anemia. Stunting and wasting are chronic problems that affect most of infant population with irreversible developmental impacts. Evidence shows that inadequate nutrition is one of the most important causes of the lack of progress on key health indicators in the country. At the same time, India is going through an epidemiological transition. While communicable diseases constitute 30% of the burden of diseases in the country, around 65% of this burden is related to non communicable diseases. Half of deaths in India are related to heart and metabolic conditions (CVD and diabetes), India is the country with the largest number of diabetes patients in the world with around 70 million people affected. This number will increase 50% in the next 20 years. It can be stated that India is not a country but at a continent with different epidemiological realities that vary across its 29 states and union territories. Ambitious nutrition interventions were adopted since the early days of the Republic in 1947. The results of the Integrated Child Development Services (ICDS) scheme, consisting of several interventions for early childhood development including supplementary nutrition, immunization, health check-ups, and referral services to children below six years of age as well as expecting and nursing mothers have been disappointing. ICDS was initiated in 1975 and was expanded in 2005 to cover the entire country. Using the case of the ICDS we will explore some strategic questions to analyse what critical elements could be considered in the future to achieve better results. Are policymakers understanding the complexity of the nutrition problems India faces? Who is being benefited among the population? Is equity in access being mistreatment? Are decision makers adopting innovative systems approaches? Are single, very often vertical, interventions contributing to improve nutrition in India? Are international partners effectively contributing to Indian priorities? Who is setting the agenda? These questions can serve to better define in the future expected results and accountability mechanisms among Indian and international stakeholders working on nutrition in India.

### **Connecting Public-Private-Civil Society and Community to address the challenges in increasing access to iron fortified fish and soy sauces among rural communities in Cambodia.**

Theary C.

Reproductive and Child Health Alliance, RACHA – CAMBODIA.

High prevalence of iron deficiency anaemia among children and women is a major public health issue in Cambodia. Fish and soy sauce are widely consumed by the entire population, and their fortification with iron has been widely introduced and its reach is currently being expanded. With support from Global Alliance for Improved Nutrition (GAIN), this project implemented by Reproductive and Child Health Alliance (RACHA), in collaboration with the National Subcommittee for Food Fortification (NS-CFF) and the private sector, is being scaled up nationwide with the aim of preventing Iron deficiencies. Nationwide, 47 private producers involved in the project and production of iron fortified fish sauce and soy sauce has been increasing. Market share of the fortified products at local markets varies from 5% (at very remote) to 90% (at target provincial/district markets). To reach out the remote communities, RACHA engaged with existing community networks including village shop keepers as outlets of the products, build capacity of local comedians to perform and

not only to inform the communities about the advantage of iron fortified fish sauce and soy sauce but to disseminate other crucial maternal newborn and child health messages. Multi-sectoral collaboration is crucial to ensure institutional and social sustainability like joint advocacy for mandatory legislation and ensuring its enforcement, strengthens community's capacity to address important issues by weaving together the skills, resources, networks and knowledge of the government, business and voluntary sectors.

### **The role of choice architecture (nudging) in Public Health Nutrition.**

Perez-Cueto F.J.A.

Department of Development and Planning, Aalborg University-Copenhagen

Objective: Despite large investments performed by governments and societies to tackle the food-related chronic disease epidemiology, very little success has been achieved, particularly in terms of healthier lifestyles (eating, physical activity). Large population campaigns and education programs have been successful in increasing awareness, knowledge, in creating attitudes and values towards healthy eating and healthy lifestyles, but actual behavioural change has not been achieved. This paper aims at providing a theoretical framework for applying specific environmental changes through targeted choice architecture to facilitate healthy food choices, without limiting actual options and variety.

Methods: Critical review of the theoretical models that have been used to support previous interventions (e.g. Theory of Planned Behaviour, Health Belief Model, Stages of change), and contrast them with dual process theory, as an alternative paradigm in the study of public health nutrition.

Key findings: Majority of healthy eating campaigns have attempted to reach the rational and conscious mode of choosing with limited success if measured as healthier eating. Small changes can have positive effects on health, and are easier, cheaper and more practical to implement. Choice architectural (nudging) interventions, directed towards the automatic, unconscious choice have proven effective in laboratory settings, and are promising venues for population based actions.

### **An update: choice architecture as a means to change eating behaviour in self-service settings: a systematic review.**

Skov L.R.<sup>1,2</sup> & Perez-Cueto F.J.A.<sup>1,2</sup>

<sup>1</sup>Department of Health Science and Technology, Aalborg University-Copenhagen. <sup>2</sup>Department of Food Science, University of Copenhagen.

Objective: The primary objective of this review was to update the current evidence-base for the use of choice architecture as a means to change eating behaviour in self-service eating settings, hence potentially reducing energy intake.

Methodology: 12 databases were searched systematically for experimental studies with predefined choice architectural interventions in the period June 2011 – March 2012. The 12 included studies were grouped according to type of interventions and underwent a narrative synthesis. An update of the review was conducted during the summer of 2014.

Results: The evidence indicates that (i) health labelling at point-of-purchase is associated with healthier food choice, whilst (ii) manipulating the plate and cutlery size has an inconclusive effect on consumption volume. Finally, (iii) assortment manipulation and (iv) payment option manipulation was associated with healthier food choices. The majority of studies were of very weak quality and future research should emphasise a real life setting and compare their results with the effect of other more well-established interventions on food behaviour in self-service eating settings.

Key findings: An increasing interest in the topic of choice architecture and nudging has increased the scientific output since the last review. There is a clear limitation in the lack of a clear definitions and theoretical foundation.

### **Self-estimation vs. self-served vegetable and whole grain consumption.**

Nørnberg T<sup>1</sup>; Houlyby L<sup>1</sup>; Jørgensen L<sup>1</sup>; He C<sup>2</sup>; Perez-Cueto FJA<sup>2,3</sup>

<sup>1</sup>Integrated Food Studies, Aalborg University-Copenhagen. <sup>2</sup>Department of Development and Planning, Aalborg University-Copenhagen.

<sup>3</sup>Department of Food Science, University of Copenhagen

Methodology: To compare actual food selection measures with individual estimates of serving sizes an intelligent buffet was used in order to obtain precise measurements on a self-served meal among a convenience sample of 58 participants recruited at a university in Copenhagen, Denmark. The intelligent buffet is a novel device facilitating data collection in a non-intrusive manner. Self-estimated amounts were assessed

though a self-administered quantitative questionnaire.

Results: The study showed significant differences between self-estimated and actual portion sizes ( $P < 0.001$ ). The mean self-estimated weight of a vegetable serving was 218 ( $\pm 134$ ) g, of a whole grain serving it was 36 ( $\pm 34$ ) g, while the actual mean weights were 74 ( $\pm 44$ ) g and 10 ( $\pm 9$ ) g respectively. In addition the data analysis showed that there was no significant correlation between estimated and actual weights ( $P > 0.05$ ).

Key findings: The results indicate that the respondents' ability to accurately assess the serving size of vegetables and whole grain in a self-served meal based on the Danish Dietary Guidelines does not correspond with the actual amount. This may have implications for consumer interpretation of dietary recommendations for nutrition interventions in Denmark.

### **Choice architectural nudge interventions to promote vegetable consumption based on automatic processes decision-making.**

Skov L.R.<sup>1,3</sup>, Friis R.<sup>2</sup>, Andersen P.M.<sup>2</sup>, Olsen A.<sup>3</sup>, Perez-Cueto F.J.A.<sup>1,3</sup>

<sup>1</sup>Department of Health Science and Technology, Aalborg University-Copenhagen. <sup>2</sup>Human Nutrition Studies, University of Copenhagen.

<sup>3</sup>Department of Food Science, University of Copenhagen.

Objective: To test the effectiveness of three types of choice architectural nudges to promote vegetable consumption among Danish people. The experiment aims at providing evidence on the influence of automatic processing system in the food choice situation in an all you can eat buffet serving.

Methodology: Experimental cross-over design study in the FoodScape Lab, comparing control to exposure of three nudges: Nudge 1: Natural green – priming vegetable-choosing behaviour. Nudge 2: Having a pre-weighed (200g) fixed salad as default to the main course, and Nudge 3: presenting each component of the salad separately to increase choices compared to a pre-mixed salad.

Results: A total of 92 people (dropout rate=21%) partook in the study (60.2% female) with an average age of 26.5. Nudge 1 ( $N=27$ ) found a significant decrease in total energy consumption due to high decrease in meat consumption ( $p < 0.001$ ) but no significant change in vegetable intake ( $p=0.16$ ). Nudge 2 ( $N=33$ ) found a significant increase in vegetable consumption ( $p=0.018$ ) while Nudge 3 ( $N=32$ ) found no impact on vegetable intake ( $p=0.56$ ) but a decrease in total energy intake due to a decrease in meat intake ( $p < 0.001$ ).

Key Findings: Only the Nudge that had a default portion size of vegetable had the intended impact of increasing vegetable consumption. This emphasises the importance of portion sizes in out of home eating as well as underlines the effect of the one-unit bias. The remaining two nudges were not successful in increasing vegetable intake, but promoted health by decreasing total energy intake which suggests that visual variety of fruit and greens prompts a healthy-eater subconscious behaviour.

### **Attitudes towards choice architectural nudge interventions to promote vegetable intake among Danish adolescents.**

Houlby L.<sup>1</sup>, Nørnberg T.R.<sup>1</sup>, Skov L.R.<sup>2,3</sup>, Perez-Cueto F.J.A.<sup>2,3</sup>

<sup>1</sup>Integrated Food Studies, Aalborg University, Copenhagen. <sup>2</sup>Department of Health Science and Technology, Aalborg University, Copenhagen. <sup>3</sup>Department of Food Science, University of Copenhagen.

Objective: The objective of this study was to investigate the attitudes towards choice architectural nudge interventions aiming to increase vegetable intake among Danish teenagers in a school context, and which factors influence these attitudes.

Methodology: Cross-sectional data were collected through an online quantitative questionnaire, which was developed, validated and distributed to assess factors associated with attitude towards choice architectural nudge interventions. Data analysis included descriptive statistics, factor analysis and structural equation modelling. A total of 408 respondents (78% female) with a mean age of 18 ( $\pm 1.3$ ) spread throughout Denmark provided sufficient responses.

Results: The structural equation model revealed that healthy buffet habits and opinions of where the responsibility of healthy eating lies had the strongest positive association with attitude towards choice architectural nudge interventions. Also, social norms were positively associated with the outcome. Perceived vegetable intake and buffet habits attaching importance to animal welfare and organic food had a negative association.

The descriptive analysis found that the respondents were generally positive towards less intrusive nudges and displayed a more negative attitude towards those targeting their self-image. Further, the respondents considered it to be acceptable for the school to attempt to intervene with their health-related behaviour, but essentially they saw it as neither the school's obligation nor responsibility.

Key findings: Healthy buffet habits and opinions of where the responsibility of healthy eating lies were found to have the strongest positive as-

sociation with attitude towards choice architectural nudge interventions. In general, the respondents were predominantly positive towards the use of less intrusive choice architectural nudge interventions, while negative attitudes were expressed towards nudges targeting the respondents' self-image.

### **Nudging young Danish men to eat more vegetables – a food laboratory pilot experiment.**

Kongsbak I.G.<sup>1</sup>, Skov L.R.<sup>2,3</sup>, Nielsen B.K.<sup>1</sup>, Wichmann M.<sup>1</sup>, Schaldemose H.S.<sup>1</sup>, Atkinson L.<sup>1</sup>, Ahlmann F.K.<sup>1</sup>, Perez-Cueto F.J.A.<sup>2,3</sup>

<sup>1</sup>Integrated Food Studies, Aalborg University-Copenhagen. <sup>2</sup>Department of Health Science and Technology, Aalborg University-Copenhagen.

<sup>3</sup>Department of Food Science, University of Copenhagen.

Objective: This study assessed the combined effect of two choice architectural nudges as a means to increase fruit and vegetable consumption among male university students.

Methodology: This single one-day lunch meal study was conducted in a Food Scape Laboratory. A control group ( $n=32$ ) and an intervention group ( $n=33$ ) were recruited to attend an ad libitum self-serve buffet at two different timeslots. Two choice architectural nudges were applied in the intervention group; the fruit and vegetables were placed at the beginning of the buffet and separated in eight separate bowls to increase visual variety. The self-served amount (g) of food components was measured using high intelligence equipment.

Results: The amount (g) of self-served fruit and vegetables was significantly higher in the intervention group ( $p = .005$ ). The total energy consumed (kJ) was significantly lower in the intervention group ( $p = .01$ ), while there was no significant difference in the total amount (g) of self-served food between the two groups ( $p = .326$ ).

Key Findings: This study found convincing evidence for the combined effect of two choice architectural nudges as a means to increase the amount of self-served fruit and vegetables among male university students. Based on these findings it is suggested that choice architecture could be used as a supplement to already existing strategies in the promotion of public health nutrition.

### **Study on the normative state, and inter- and intra-individual variation on hydration status among Guatemalan preschool children with similar dietary intake. Hydration status throughout different measurement methods, equipment and storage systems.**

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Center for the Studies of Sensory Impairment, Aging, and Metabolism – CeSSIAM- Guatemala City, Guatemala. Department of Biochemistry and Molecular Biology II, Institute of Nutrition and Food Technology, Center of Biomedical Research, University of Granada, Granada, Spain.

Insofar as water is the most vital and essential of all nutrients and the greatest constituent of the human body, it is perplexing that the study of hydration has not received a greater emphasis in nutrition research. With financial assistance from the European Hydration Institute and other sources, and through a donation of an osmometer to measure urinary osmolality (Uosm) to CeSSIAM from the Fundacion Imeroamericana de Nutricion (FINUT) [Löser 815], as well as through access to a similar instrument at the University of Granada [Osmomat 030], and their application in relation to field studies in Guatemala, a series of insights on the process and results of hydration research can be reported.

Experience in the field setting: The osmometer is a stable and user-friendly instrument in the field, providing reproducibility with CVs of 0.9–2.3%. Urine collection is among the most non-invasive of procedures. We gained experience with application assessing Uosm in replicate quantitative 24-h collection samples among 87 preschool children attending three day-care centers offering a common dietary menu cycle. Using a creatinine-excretion-based criterion [Remer T, AJCN, 2003], one is able to obtain complete 24-h urine volume in 57% of the samples from these young subjects.

Research Findings with Application of urinary osmometry: Within subject CVs on three collections were high ranging, from 1% to 68% with a median of 22%, reflecting day-to-day variance in hydration state. The median Uosm from samples stored at 0°C from 16 to 25 weeks was 484 mOsm/kg compared to 486 mOsm/kg from samples stored at -80°C from 50 to 59 weeks, with an  $r$  value of 0.893 on the same osmometry equipment in Guatemala. A second aliquot of the -80°C sample was shipped to Spain and measured on the Osmomat 030 equipment (stored from 43 to 52 weeks) and the median Uosm was 430 mOsm/kg, with an  $r$  value of 0.828. With this same aliquot solvent analytes and urine oxidative biomarkers were measured. The selection of solvents included: Urea, Uric Acid, Ca, Mg, K, Na and Pp. Concentration of Urea, K and Na determined 84% of the Uosm variance. The oxidative biomarkers F2 t15

Isoprostane (F2-Iso), an index of lipid oxidation and 8-Hydroxydeoxyguanosine (8OHdG), product of nucleic acid damage, were inversely associated with Urine volume (Uvol) with *r* values of -0.603 and -0.433 (*p*0.001), respectively and directly with Uosm with *r* values of 0.541 and 0.782 (*p*0.001) respectively.

Interpretation of the initial experience with Uosm assessment: In comparison to average Uosm value reported for children across the literature, our highlands sample had relatively low median Uosm 484 mosm/kg [range: 158-1080 mosm/kg], i.e. representing a superior hydration state. Freezing and thawing of samples for Uosm is possible, but data cannot be pooled across different makes of instruments without cross-calibration.

Projection to the future: We need to look at children under less favorable dietary situations than the present sample and assess their hydration status. Hydration of lactating women would be another focus, with both urinary and breast milk samples used as tools. Occupational issues of the Guatemalan sugar-harvesting labor-forces represent additional future opportunities.

Funding sources: Hildegard Grunow Foundation, Munich; European Hydration Institute, Madrid and FINUT, Granada.

### The association between hydration status and cognitive function among the elderly.

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Objectives: The objective of the study was to investigate the relation between hydration status and cognitive function in apparently healthy older adults.

Material and methods: The cross-sectional study was conducted among 60 free-living volunteers, aged 60 years and older. Information about water consumption was gathered based on 3-d records. Daily water consumption was compared with reference values for adequate intake (AI = 2000 ml for women and 2500 ml for men). The hydration status was assessed in morning urine samples by evaluating urine specific gravity. Urine density measurement was made using urometer. The cognitive function was tested using the Mini Mental State Examination (MMSE), the Geriatric Depression Scale (GDS), the Babcock Story Recall Test and the Trail Making Test (TMT) questionnaires. The study protocol was approved by the ethical commission in the National Food and Nutrition Institute in Warsaw.

Results: The mean daily water intake from all source was 2441 ml, and as many as 70% of respondents met a reference values for adequate intake (AI). Results indicated that there was no statistically significant differences between the group with water consumption above AI level and below this level in socio-demographic and health-related factors, and cognitive assessment tests. Mean urinary specific gravity amounted 1.013 (range 1.004 – 1.025), which shows that study population was in a good hydration state. Participants were classified into two groups depending on their urine specific gravity: below or equal 1.012 (*n*=31) and above 1.012 (*n*=29). We do not detect any significant differences between these two groups, either in demographic and lifestyle factors or results of cognitive assessment tests. The average result of MMSE test was 27.8. The result of 35% of individuals was in the range of MCI (Mild Cognitive Impairment), and 5% in the range of dementia. Mean result of GDS test (3.5 points) was within "normal" range ( $\leq 5$  points), while the results of 25% of individuals were in the range of "suspicion of depression" ( $>5$  points) and 5% in the range of "depression" ( $>10$  points).

Key findings: Among elderly volunteers with good hydration status there were no significant differences in cognitive performance in relation to urine specific gravity.

### Hydration Amongst Nurses and Doctors On-call (The HANDS On Study).

El-Sharkawy A.M.<sup>1</sup>, Bragg D.<sup>1</sup>, Watson P.<sup>2</sup>, Maughan R.J.<sup>2</sup>, Sahota O.<sup>3</sup>, Lobo D.N.<sup>1</sup>

<sup>1</sup>Division of Gastrointestinal Surgery Nottingham Digestive Diseases Centre NIHR Biomedical Research Unit, University of Nottingham, Nottingham, <sup>2</sup>School of Sport, Exercise and Health Sciences, Loughborough University, Leicestershire, <sup>3</sup>Department of Orthogeriatric Medicine, Nottingham University Hospitals NHS Trust, Queen's Medical Centre, Nottingham, United Kingdom

Rationale: Dehydration of as little as 2% of total body weight may impact on physical and mental performance. We aimed to investigate the prevalence of dehydration in frontline medical and nursing staff over the course of a normal working shift and assess its impact on cognitive function.

Methods: This was a prospective cohort study on healthy nurses and doctors on-call working on medical and surgical wards at a large university teaching hospital. At the start of the shift and end of the shift, subjects were weighed and provided blood and urine samples before com-

pleting a series of computer-based cognitive function tests including the Stroop Colour Naming Interference Test (attention) and Sternberg Memory paradigm (working memory and basic sensorimotor speed).

Results: 88 doctors and nurses participated in the study, amounting to 130 shifts. 52% participated for one shift, and 48% for two shifts. 36% of subjects were dehydrated (urine osmolality  $>800$  mOsmol/kg) at the start of the shift and 45% at the end, *P*=0.026. Dehydration was associated with a trend towards an increase in the number of errors made, however, this was only statistically significant with the single-number and five-letter Sternberg short-term memory test.

Conclusion: Dehydration is common in nurses and doctors on-call and appears to be associated with impairment in cognitive function.

### Dehydration in the elderly: a review focused on economic burden.

Frangeskou M.

University of Bath, UK.

Background: Dehydration is the most common fluid and electrolyte problem among elderly patients. It is reported to be widely prevalent and costly to individuals and to the health care system. The purpose of this review is to summarize the literature on the economic burden of dehydration in the elderly.

Method: A comprehensive search of several databases from database inception to November 2013, only in English language, was conducted. The databases included Pubmed and ISI Web of Science. The search terms "dehydration" / "hyponatremia" / "hypernatremia" AND "Cost" AND "elderly" were used to search for comparative studies of the economic burden of dehydration. A total of 15 papers were identified.

Results: Dehydration in the elderly is an independent factor of higher health care expenditures. It is directly associated with an increase in hospital mortality, as well as with an increase in the utilization of ICU, short and long term care facilities, readmission rates and hospital resources, especially among those with moderate to severe hyponatremia.

Conclusions: Dehydration represents a potential target for intervention to reduce healthcare expenditures and improve patients' quality of life.

### The South East Asia-Nutrition Leadership Program (SEA-NLP).

Fahmida U.

SEAMEO TROPED Regional Center for Community Nutrition, University of Indonesian, Jakarta.

The South East Asia-Nutrition Leadership Program (SEA-NLP) is a one-week training designed to empower nutritionists working in government bodies, research institutes, and academic institutions in South East Asia by providing competencies in effective leadership skills. It also aims to provide a forum of networking among nutritionists in the region where information and ideas are exchanged and collaboration projects can be established. The SEA-NLP is part of the ENLP (European Nutrition Leadership Program) network and is organized by the South East Asian Ministry of Education Organization Regional Centre for Food and Nutrition (SEAMEO RECFON) at the University of Indonesia since 2002. Since the 1st SEA-NLP in October 2002, the program has been attended by 237 nutrition and nutrition-related professionals from Southeast Asian and neighboring countries. They came from universities and research institutes (57%), government and policy making institutions (40%) and NGOs/industry (3%). SEA-NLP has expanded its benefit by having the Re-echo of SEA-NLP which was initiated in the Philippines and will be expanded to other countries. In its 10th year, the SEA-NLP Alumni Award and Country Project Award have been initiated to acknowledge the outstanding achievements of SEA-NLP alumni as individual or as project within the country or across countries. The SEA-NLP alumni have also been involved in policy making, program implementation and capacity building in the health and nutrition program in their countries.

### How to increase leadership impact for a healthy world? The African Nutrition Leadership Programme, ANLP.

Badham J<sup>1</sup>, Jerling J.<sup>2</sup>

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An abundance of evidence exists with regards to the interventions that would be efficacious in alleviating various forms of under-nutrition. In order to scale up many of these interventions, over the last decades, dedicated attention has been given to building capacity with a focus on technical knowledge and skills. At the same time the nutrition community has come to the realisation that the solutions to many nutritional problems lie in a multi-sectoral (trans-disciplinary) approach. To succeed in scaling-up nutrition, it is necessary to convert well-constructed and costed plans into action, at the programme implementation level. To this

end, attention to building the necessary leadership capacity, required to successfully lead and manage implementation through effective multi-sectoral teams, has largely been neglected.

The African Nutrition Leadership Programme (ANLP) has been building individual leadership capacity since 2002 with over 300 individuals from some 33 countries now part of the continent wide network. More recently the ANLP has embarked on a series of initiatives to build transformational leadership capacity in organisations. The aim is to enable a higher degree of team effectiveness and grow the necessary skills and orientations, to successfully lead and manage the implementation of nutrition-specific and nutrition-sensitive interventions, in countries, at all levels, through functioning and effective multi-sectoral teams. These programmes have already contributed to the successful implementation of mandatory food fortification in Kenya and is now being used to build the needed managerial leadership capacity in the Zambian National Food and Nutrition Commission.

### **Public health challenges related to nutrition: the physical activity perspective.**

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Although during the past centuries the quality, amount and safety of foods were main concerns in Public Health, during the last 50 years the excess of food has become a major concern in most developed countries. The fight against obesity has focused mostly on the control of the diet keeping low the energy intake. Although this strategy is successful short term it fails in most people, if not accompanied by important changes in the life style. Moreover, dieting may be very challenging for children. An alternative that is based on the same principle, i.e. inducing a chronic energy deficit, is to combine diet with exercise adjusting the volume of exercise as much as required to keep the negative energy balance until the target body composition has been reached. Loss of free fat mass (FFM) is a common consequence of prolonged negative energy balance, observed in healthy human undergoing low calorie diet and patients with conditions causing hypercatabolism and/or reduced energy intake. Excessive loss of FFM may be detrimental, since lean tissues and, in particular skeletal muscle, account for most resting metabolism and is essential for the preservation of bone mass and exercise capacity. Moreover, loss of lean mass is negatively associated with survival in intensive care, cancer and other emaciating conditions. Exercising while following low-calorie diets attenuates the loss of FFM. The lean mass-saving effect of exercise can be achieved with strength training, but also with low-intensity exercise such as walking or arm cranking. In humans under very low calorie diets this effect depends on the amount of exercise. Although increasing the ratio of protein to carbohydrate and the total amount of protein ingested may reduce the loss of lean mass, the potential anti-catabolic effect of hyperproteic diets remains unclear. Exercise seems to attenuate protein breakdown. In addition, exercise may protect the skeleton from the negative effect of the increased cortisol levels while in negative energy balance. Energy expenditure could also be increased by uncoupling oxidative phosphorylation or by eliciting an increase thermogenesis by, for example, stimulating heat production in brown adipose tissue. Some forms of exercise can induce these two effects.

What characteristics must exercise have to prevent or treat obesity? An important premise is that exercise should be programmed under the same rules that apply to any medical treatment. Exercise should be scheduled (dosed) considering that there are various forms of exercise (therapeutic forms), the dose and mode depend on the characteristics of the patient and that if exercise is stopped the effect vanishes quite fast. Furthermore, as occurs with many drug therapies exercise may interact with nutrition and concomitant medical treatments. This lecture will explain some basic guidelines to follow to schedule exercise for the treatment and prevention of obesity and its co-morbidities.

### **Physical activity is more than calorie output: benefits of it on health.**

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Much of the evidence linking a sedentary way of life to morbidity and mortality has been derived from relatively healthy populations, but there are data on the effects of physical activity in individuals with health problems or with risk factors for chronic disease. Clinicians, and often the general public, frequently consider the primary value of physical activity as the contribution it makes to control of these other risk factors. This approach underestimates the value of physical activity in the prevention and treatment of numerous chronic health conditions. There is a steep inverse gradient of morbidity and mortality across categories of cardio-

respiratory fitness and physical activity in all subgroups—women and men who are middle-aged or older, obese or normal weight, or healthy or unhealthy. The overall death rates vary by these subgroups, older individuals obviously have higher death rates than younger persons, but the pattern of association of fitness or activity to mortality is comparable for the various population subgroups. In fact, fit individuals with another risk factor often have lower death rates than unfit individuals without the risk factor.

Regular physical activity and moderate to high levels of cardiorespiratory fitness provide protection against numerous health problems and inactivity should be given increased attention by physicians and other health care professionals. Recent research on how to use cognitive and behavioral strategies to help sedentary individuals become more physically active has shown promising results. Exercise Is Medicine is a global initiative to address how to implement physical activity into clinical practice and public health initiatives, and thereby help more individuals practice healthful lifestyles and improve their health.

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### **The dual burden of under- and overnutrition: from evidence to response.**

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The ongoing increase in obesity prevalence in the developing world, combined with the continuing problem of undernutrition has resulted in

many middle-income countries having both under- and overweight as public health problems. While the term 'dual burden' (DB) is used in public health in a variety of contexts, nutrition experts have applied it to the situation described above, namely, the coexistence of under- and over nutrition within the same household, community or country.

Within the household, the DB usually consists of a child with chronic undernutrition (stunting) and a mother or other adult with overweight or obesity. In the community or in a given region or country, the DB reflects the presence of subpopulations suffering from weight deficit or excess, either in the same or in separate geographic locations.

Another important type of DB is that that occurs sequentially within the same individual: early undernutrition that 'imprints' certain metabolic pathways and favors fat accumulation, insulin resistance, and other disorders, at a later age. Given that early undernutrition (particularly delay in longitudinal growth) is still prevalent in developing countries, the potential impact of this DB is significant.

In spite of the existence of the DB, in most countries there is no direct correlation between under- and overweight. On the contrary, chronic undernutrition is decreasing worldwide, while overweight and obesity are increasing. This indicates that the interrelationship between under- and overweight is complex, and modulated by a number of factors, including income, gender, level of education, and access to health care.

### **EPODE, a multi stakeholder approach to prevent childhood obesity at large scale.**

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**Introduction:** EPODE is a coordinated, capacity-building approach for communities to implement effective and sustainable strategies to prevent childhood obesity.

**Methods:** In each community based programme at central level, a coordination team, trains and coaches a local project manager nominated in each town or community by the local authorities by using social marketing and organisational techniques. The local project manager is provided with tools to mobilise local stakeholders through a local steering committee and local networks. The added value of the methodology is based on a strong scientific input, institutional endorsement, evidence-based and social marketing techniques, sustainable resources, public private partnership, brand dynamics and evaluation.

**Results:** The EPODE methodology is now implemented in nine countries (France, Belgium, Spain, Greece, the Netherlands, South Australia, Mexico, Romania, Canada). At child level the prevalence of overweight and obesity in children aged 5 to 12 is monitored. In the eight French pilot towns, the prevalence of children overweight including obesity decreased between 2005 and 2009 by 10% ( $p < 0.0001$ ). In the two Belgium pilot towns, the prevalence of children overweight significantly decreased by 22% between 2008 and 2010 ( $p < 0.04$ ). Following an European project, the EPODE European Network, a book of recommendations has been published to enrich the methodology and facilitate the implementation of similar initiatives in other countries. In 2014, the EPODE International Network brings together 44 community based programs from 29 countries around the globe for experience and best practices sharing.

**Conclusion:** Childhood obesity is a complex issue and needs a multi-stakeholder involvement at all levels to foster healthier lifestyles in a sustainable way as it has been demonstrated through community based programs. The EPODE methodology contributes to this approach.

### **Dietary Impact: Results of FITS in US and MING in China.**

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Most literature on the topic of the double burden of under and over nutrition focuses on under and overweight in low and middle income countries, and does not often examine, in detail, the dietary patterns which contribute to these issues and must be understood in order to be adequately addressed. The current study uses two unique data sets to demonstrate the different dietary patterns of young children in US and China. The Feeding Infants and Toddlers Study (FITS) was conducted in the US in 2008, and collected 24 hour recall data for a large sample of 3200 children ages 0-48 months, with a second day collected for 25% of the sample in order to adjust for usual nutrient intakes. The Maternal and Infant Nutrition and Growth (MING) Study was conducted in China in 2012, and collected one 24 hour recall for a large sample of 2485 children 0-36 months from 8 major cities in China. While nutrient intakes are generally adequate and the prevalence of frank under nutrition is relatively low in the US, poor diet quality and over nutrition are far more prevalent issues. Examination of dietary patterns and food sources of energy show dietary patterns leading to these issues include the inade-

quate consumption of fruits, vegetables and healthy oils and high consumption of sweetened beverages and sweet foods. In China, there are several nutrients under consumed as well as a few over consumed, including calories. Examination of dietary patterns and food sources of energy show that dietary variety is low and rice becomes a major source of energy in the first year and the number one source of energy by age 24 months. In both US and China, it seems that high consumption of low nutrient dense foods is creating the dietary imbalances. In China, foods such as rice and noodles seem to be displacing higher nutrient dense foods such as milk, creating key nutrient gaps as well as overconsumption of calories by some. In US, the high consumption of sweets appears to be consumed in addition to nutrient dense foods such as milks, but displacing fruits and vegetables. Such specific dietary patterns must be understood in each country so that effective approaches to amelioration can be developed.

### **Ensuring evidence based nutrition policies: The EVIDENT network.**

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Quite a lot of research is conducted in the field of nutrition. However an important source of research waste is inadequate use of research findings in policy and practice. An analysis of research in Africa shows that nutrition research is not meeting the needs of policy makers.

Many studies are descriptive; few provide solid evidence or are not addressing priority questions for decision makers. Priorities for research are not being articulated by decision makers.

Much research provides information on quick fix solutions whereas stakeholders would rather see solution to prevent malnutrition, address lifestyle and behaviour and studies that address nutritional issues in broader strategies. There is overall a great felt need for evidence based recommendations from the perspective of policy makers

A new framework for evidence based nutrition research is needed, building on transparent and systematic methods.

The EVIDENT network proposes to develop a platform of members that can develop policy briefs on questions identified by policy makers. These briefs are made available to all members of the platform and their development is equally open to all interested members. The platform provides training in making a synthesis of available evidence and the development of policy briefs. There is an active stimulation of communication between the scientific community and policy makers to develop questions that are the posted on the platform for all members to respond to. Over time a considerable encyclopaedia of policy briefs will be available with a clear indication of research gaps. Health technology tools can be used and adapted for this purpose. Moreover, the identified research gaps will, over time, create a basis for a research agenda that can move solution forward.

### **Adherence to healthy dietary guidelines and future depressive symptoms: Evidence from the Whitehall II Study.**

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**Background:** It has been suggested that dietary patterns are associated with the future risk of depressive symptoms. However, there is a paucity of prospective data examining the temporality of this relationship.

**Objective:** We sought to examine whether adherence to a healthy diet, defined by the Alternative Healthy Eating Index (AHEI), was prospectively associated with depressive symptoms assessed over a 5-year period.

**Design:** Data came from the Whitehall II Study, a large-scale, on-going, prospective cohort study of UK civil servants (government employees) aged 35 to 55 years at study induction (phase 1:1985-1988). Analyses are based on 4215 participants with complete information on AHEI, depressive symptoms and covariates. AHEI is a dietary index built on intake of 9 components: fruit, vegetable, ratio of white meat (seafood and poultry) to red meat, trans fat, ratio of polyunsaturated fat to saturated fat, total fiber, nuts and soy, alcohol consumption and long-term multivitamin use. AHEI score was computed in 1991-1993 and 2003-2004. Recurrent depressive symptoms were defined as having a Center for Epidemiologic Studies Depression Scale score  $\geq 16$  or self-reported use of antidepressants in 2003-2004 and in 2008-2009

**Results:** After adjustment for a large range of socio-demographic, health behaviors and health status factors, AHEI score was inversely associated with recurrent depressive symptoms in a dose-response fashion in women ( $p$  for trend  $< 0.001$ ; for 1SD in AHEI score, OR: 0.59; 95% CI: 0.47, 0.75) but not in men. Women who maintained high AHEI score or impro-

ved their score during the 10-year measurement period had a 65 % (OR: 0.35; 95%CI:0.19, 0.64) and 68 % (OR: 0.32; 95%CI:0.13, 0.78) lower odds of subsequent recurrent depressive symptoms compared to women who maintained low AHEI score. Amongst the AHEI components, vegetable, fruit, trans-fat and ratio of polyunsaturated fat vs. saturated fat components were associated with recurrent depressive symptoms in women.

Conclusion: In the present study, there was a suggestion that poor diet is a risk factor for future depression in women.

### **Alcohol intake and depression: the PREDIMED trial and the SUN cohort.**

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High alcohol intake has been widely associated with depression, however the role of moderate alcohol intake and specific types of beverages was unclear.

We aimed to prospectively evaluate the role of moderate alcohol intake and the role of wine consumption on the incidence of depression.

For this purpose we analyzed the participants of the PREDIMED trial and the participants of the SUN cohort initially free of depression. Then we compared the incidence of depression within different groups of alcohol consumption. Cox regression analyses were fitted over 23,655 and 82,926 person-years respectively.

Results of both studies agreed that alcohol intake in small amounts (5-15 g/d) and especially wine consumption (2-7 drinks/week) was associated with a lower incidence of depression compared to abstainers [adjusted-HR (95% CI) = 0.65 (0.49-0.86) in the PREDIMED trial, and 0.68 (0.47-0.98) in the SUN cohort].

### **Dietary patterns and health related quality of life.**

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The life expectancy of the population has increased notably in the last years. Population ageing has fostered the general concern for obtaining a better health-related quality of life, as people are living longer, policies and programmes that enact "active ageing" are a necessity. Quality of life is a broad concept that refers to the physical, psychological and social domains of health. Quality of life questionnaires have become an efficient way of gathering data about people functioning and well being. Also health status measures have been shown to be a powerful predictor for chronic diseases and mortality over the long term in clinical practice. Several factors are well-known determinants of HRQL, diet together with other aspects of daily life like physical activity, the relation with the environment etc., play a crucial role in our state of health and therefore in our mental and physical quality of life. To identify the determinants of quality of life is an important task from a Public Health perspective, especially those factors that are modifiable like dietary and lifestyle habits results from special interest. The Research Nutrition Group from the University of Las Palmas de Gran Canaria has been working in this research line since 2009 with the aim to establish the associations between nutrients, foods, food groups and/or dietary patterns and quality of life in general population. Result of this research several scientific papers have been published in which the most relevant findings obtained are the protective effect of the Mediterranean diet on mental and physical quality of life (Ruano C, et al. Plos One, 2013; 8(5):e61490. doi: 10.1371/journal.pone.0061490; Henriquez P, et al. Eur J Clin Nutr;2012;66:360-68), and on the contrary the harmful effect that the adherence to a Western dietary pattern has on quality of life, specially the intake of trans unsaturated fatty acids seems to play a detrimental role both in mental and physical quality of life (Ruano C, et al. Nutr J, 2011;10:121; Ruano C, et al. Food Nutr Sci 2014; 5,1291-1300).

### **Micronutrients and depression: Kuopio Ischaemic Heart Disease Risk Factor (KIHD) Study.**

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Introduction: Recently, it has been suggested that low intakes of several micronutrients are associated with elevated levels of depression. The aim of this presentation is to clarify the associations between micronutrients and depression in both cross-sectional and prospective analyses in Kuopio Ischaemic Heart Disease Risk Factor Study Population.

Methods: The Kuopio Ischaemic Heart Disease Risk Factor Study (KIHD) is a population-based prospective study of ageing men from eastern Finland. Study population included 2682 Finnish men aged 42-60 years at baseline and the follow-up period has exceeded 20 years now. Dietary

intakes of micronutrients were quantitatively assessed by 4-day food records and serum concentrations of nutrients were also determined at baseline. Depressive symptoms were assessed with the 18-item Human Population Laboratory Depression Scale. Those who scored five or more were considered to have elevated depressive symptoms at baseline. Data of severely depressed participants who received a discharge diagnosis of depressive disorder during the follow-up was obtained through a linkage to the national hospital discharge register. Associations between intakes or serum concentrations of micronutrients and depression were investigated.

Results: Low folate intake was associated with an increased risk of depression both in cross-sectional and prospective analyses. No statistically significant associations were detected between intake or serum concentrations zinc and depression in prospective analyses. We have also preliminary results to show that higher magnesium/zinc (Mg/Zn) ratio may be associated with a decreased risk of depression in prospective analyses, and low serum 25-hydroxyvitamin D is associated with elevated depressive symptoms in cross-sectional analyses.

Conclusion: Low dietary intake of folate and low Mg/Zn ratio may increase the risk of depression, and low serum concentrations of 25-hydroxyvitamin D are associated with elevated depressive symptoms. However, no statistically significant associations were found with other group B vitamins, intake of zinc or serum zinc concentrations and depression.

### **In favour of taxes.**

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With the support of a systematic literature review I will argue to shed more light on the potentialities of unhealthy food taxation in changing eating patterns and life styles and hence combating the obesity epidemic. One remarkable point that emerges when assessing the set of selected papers is the existence of a wide diversity of objectives, methodologies, settings and datasets, policies implemented and results achieved by all these studies, which undoubtedly adds complexity to any attempt to draw a general conclusion on fast food taxation. Most of the examined studies predict a rather modest fiscal impact on unhealthy food and drinks consumption and/or nutrition intake and consequently a poor result on weight loss and obesity, by the interplay of several factors among them the effects of cross-price elasticities. However this may be clearly context dependent. I will try to identify from this those more favourable settings.

### **Observational Studies vs Experiments in Nutrition and Health Research: Observation.**

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In theory, diet and health hypotheses are best tested by randomized trials because this design avoids confounding and also allows the investigator to control the differences in exposure. However, in trials that require large numbers of individuals to change their diets, and to maintain these changes for many years, lack of adherence to the assigned diets has often made the results of major dietary trials uninformative or misleading. Also, changing one dietary factor in isolation is difficult, so confounding by other aspects of diet often remains possible. "Negative" trials are difficult to interpret, especially for cancer, because of uncertainty regarding critical periods of exposure and latency between exposure and clinical outcomes. Randomized trials using nutritional supplements and placebos may result in better adherence and larger contrasts in intake, but these are usually testing a different hypothesis than the relationships examined in observational studies; in typical trials, micronutrient supplements are usually added to existing diets, which may already be sufficient in the nutrient being evaluated. Thus negative results may not refute the epidemiologic observations. Some hypotheses are particularly difficult to evaluate in randomized trials, such as the effects of childhood diets on cancer risks later in life. When dietary trials have been successful, this has usually involved endpoints that respond quickly to dietary change, such as diabetes and cardiovascular disease. Due to ethical considerations that require stopping when statistical significance is achieved, the confidence intervals typically range from minimal to huge effects, precluding any precision in quantification of benefit.

Observational studies of diet and disease outcomes also face challenges in measuring dietary intakes, but experience has shown that important effects can be detected with sufficient sample sizes and adequate follow-up. No single methodological approach will be applicable to all hypotheses, but for many issues the best available evidence is likely to come from a combination of replicated findings from observational studies and controlled feeding studies with intermediate endpoints. Identification of trans fat as a serious public health risk provides a recent example.

## Beer versus wine: beer is better!

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Moderate consumption of alcoholic beverages, mainly red wine, has been associated with good health. However, over the last several decades most health benefits like lower risks for mortality, cardiovascular disease and diabetes type II, have been shown to be independent of beverage type.

Moreover, several characteristics of beer may make this beverage fitting a healthy life-style better than wine. This lecture will summarize these beneficial beer specific characteristics and explain how these may beneficially affect health. Recent scientific data on beer specific health aspects will be presented. These include beer's relative low alcohol percentage resulting in lower blood alcohol levels, its high water content providing better hydration and its abundance of important nutrients. Some of these nutrients relevant for health include polyphenols, minerals and vitamins.

It will be concluded that beer, when consumed responsibly and in moderation, contributes to a healthy life-style more than moderate wine consumption.

## Wine vs beer: which alcoholic beverage exerts higher cardioprotective effect?

Estruch R.

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Excessive alcohol consumption is associated with increased morbidity and mortality as well as with labor and traffic accidents. However, current evidence suggests beneficial effects of moderate drinking on cardiovascular events including coronary heart disease, ischemic stroke, peripheral arterial disease and congestive heart failure. The underlying mechanisms to explain these protective effects against coronary heart disease include an increase in high-density lipoprotein cholesterol and an increase in insulin sensitivity, and a decrease in platelet aggregation and circulating concentration of fibrinogen. However, there are discrepancies regarding the specific effects of different types of beverages on the cardiovascular system, and also whether the possible protective effects of alcoholic beverages are due to its alcohol component (ethanol) or non-alcoholic products containing, mainly polyphenols. Recent randomized clinical trials have shown that wine, a polyphenol-rich alcoholic beverage, provides higher antioxidant and anti-inflammatory effects than some spirits such as gin, a polyphenol-free alcoholic beverage. In addition, dealcoholized red wine decreases blood pressure through a nitric oxide mediated mechanism, suggesting a protective effect of polyphenols on vascular function. Other studies performed in women have observed that daily doses of 15–20 g of alcohol as red wine are sufficient to elicit protective effects similar to those observed in men who consumed higher doses of wine.

When comparing the effects of moderate intake wine, beer or spirits on cardiovascular system, the results of the meta-analysis have shown the wine exert higher cardioprotective effects than other alcoholic beverages.

In conclusion, moderate consumption of wine exerts a protective effect on biomarkers related to the progression and development of atherosclerosis due to its alcoholic (ethanol) and non-alcoholic (polyphenols) content. Since red wine have higher polyphenolic content than other alcoholic beverages such as beer or spirits, red wine seems to have a higher protective effect on cardiovascular system than other alcoholic beverages.

## From the alphabet to the bone.

Bulló M.

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The role of calcium and vitamin D in improving bone mineral density and reducing the risk of osteoporosis and fracture risk has been well established. However, increasing evidences have pointed out the potential role of other modifiable nutritional factors, including vitamins, for the maintenance of bone health. Despite a wide consensus in animals, data on vitamin A status in human showed inconsistent results, and only retinol intake seems to compromise bone health. Most, but not all studies, have found a positive relationship between vitamin B complex, vitamin C and E both with bone mineral density at different sites or with a reduced risk of fractures, mainly attributed to their role on homocysteine, hydroxylation of lysine and proline or antioxidant properties respectively. More recently, vitamin K, originally identified as a coagulator factor, has been suggested as a potential protective factor for their role on osteocalcin.

## Guidelines for the design, conduct and reporting of human studies in public health nutrition.

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A recent 5-paper series in the Lancet carries the title of "Research: increasing value, reducing waste". A key message of the series is that much research is poorly designed, conducted and reported, leading to incomplete or unusable biomedical research, a waste of resources, in other words. Studies do not always include methodologists or statisticians to assist in the design and analyses of data, resulting in weak designs and flawed and biased conclusions. While the registry of trials has improved, partly because better journals demand it, the registry or publication of protocols is uncommon and this makes the reproducibility of research, a cornerstone of science, difficult if not impossible. A common problem is that appropriate power analyses are not conducted. Underpowered studies tend to yield null results which are difficult to publish while small studies with positive or negative results are easier to publish. This creates a bias in the literature. Even when appropriately powered studies are conducted, journals have the unfortunate tendency to reject publishing articles with null results.

Many guidelines and checklists exist for reporting studies of varying designs. These include STROBE (Reporting of Observational Studies in Epidemiology) and the CONSORT 2010 checklist (Consolidated Standards of Reporting Trials). The best journals require that such guidelines be used and monitor compliance but despite this, many publications have some missing details.

An important aspect in science is to carefully review the literature when designing studies and when presenting and discussing the results. Lancet requires that a systematic review be conducted and that a section called "Research in Context" be included to highlight what the findings add to the literature. Lower tiered journals are less demanding and many authors do not cite the relevant key literature. It is also the case that citations are more likely to be made to articles appearing in prestigious journals or those written by well-known investigators.

The gold standard in research is the randomized controlled trial (RCT). Individuals or clusters are randomized but not all RCTs have placebos or are blinded, often because these aspects are unfeasible. Systematic studies sometimes include only RCTs but this can leave out important literature. GRADE (The Grading of Recommendations Assessment, Development and Evaluation) is a sensible and transparent approach to grading quality of evidence and strength of recommendations or conclusions. This permits the inclusion of studies with RCT or observational designs. Some questions are not easily or even possible to address with RCTs and require that well designed observational studies be conducted.

An important distinction is between efficacy and effectiveness research. RCTs are usually best for evaluating the impact or efficacy of clinical interventions; typically these studies are done under highly controlled conditions. Effectiveness refers to assessing impact of public health programs and take into account not only potential efficacy but also provision (whether the services are available, accessible and of adequate quality), utilization and coverage. A landmark publication by Victora, Habicht and Bryce (2004) in the American Journal of Public Health carries the title "Evidence-Based Public Health: Moving Beyond Randomized Trials". They make the point that causal chains in public health interventions are complex, making RCT findings subject to effect modification in different populations. They point out that observational studies with plausibility designs are often the only feasible option for evaluating large-scale public health interventions.

## Research Integrity & the Fallacy of the Ad Hominem

Binks M.

Nutritional Sciences College of Human Sciences, Texas Tech University, USA.

As we consider solutions to the burgeoning obesity epidemic worldwide it is essential to leverage resources from all possible constituencies who are interested in contributing to being part of the solution. Unfortunately, all too often, our passion for what we "believe" to be true, can override our willingness to engage in thoughtful scientific appraisal. Such has been the case in the conversations involving potentially valuable collaborations that can be built around industry-academic-public health partnerships in nutrition and obesity research. Increasingly both in the public and professional domains we have seen otherwise well-conducted research, involving fully transparent and appropriate funding, rejected out-of-hand based solely on the source of that funding. Beyond this, we have seen the intellectual contributions of individual researchers with impeccable records of substantial, meaningful and ethical research rejected solely on the basis that these fully transparent relationships

exist. In this presentation, we will address several fallacies related to the issue of perceived bias based on funding source alone; consider the unintended negative impact these attitudes can have on the process of objective scientific discovery and public health; and outline guidelines to promote ethical industry/academic partnerships that can expand our scientific knowledge and improve public health.

### **Metabolomics and nutritional applications.**

*Brennan L.*

*UCD Institute of Food and Health, University College Dublin, Ireland.*

Metabolomics is the study of metabolites present in biological samples such as biofluids, tissue/cellular extracts and culture media. Combining metabolomic data with multivariate data analysis tools allows us to study alterations in metabolic pathways following different perturbations. Examples of perturbations can be disease state, drug or nutritional interventions with successful applications in the fields of drug toxicology, biomarker development and nutrition research.

In recent years, metabolomics has been used to define the metabolic phenotype (metabotype) of individuals. There is an expectation that assigning individuals to a particular metabotype will provide a prediction for response to interventions such as drug and nutritional treatments thus providing a personalisation to treatment. Examples which have been successful include response to supplementation with vitamin D and treatment with acetaminophen and Fenofibrate therapy. However, further work is necessary to establish the true potential of metabolomics in personalised health. Metabolomics can also be applied to the discovery of biomarkers of food intake. To date successful examples include the development of biomarkers for foods such as red meat, fish, citrus fruit and wholegrains. The current approaches used to identify such potential biomarkers and developments in this field will be discussed.

### **New tools for the study of microbiota in nutrition research.**

*Gil A.*

*Department of Biochemistry and Molecular Biology II, Institute of Nutrition and Food Technology, Centre of Biomedical Research, University of Granada, Granada, Spain.*

Intestinal bacteria promote the early development of the host immune system and contribute to the appropriate balancing of immune responses later in life. Paralleled massive sequencing of intestinal microbiota DNA and other molecular techniques such as fluorescence in vitro hybridization (FISH) provide new tools to identify commensal and pathogenic bacteria in a more precise way. Over the course of evolution, lactobacilli, other lactic acid bacteria and bifidobacteria have been abundant colonisers of the human small intestinal mucosa and coexist in mutualistic relationships with the host. Some members of these groups exert additional probiotic properties that provide health benefits to the host via the regulation of immune system functions. Before testing the potential use of microorganisms as probiotics in humans, a sine qua non condition is to conduct studies in cell and animal models although human clinical trials are the definitive tool for establishing microorganisms functionality. Ideally, cell models should resemble the in vivo conditions; however, in most in vitro experimental models, epithelial and dendritic cells (DCs) are cultivated as monolayers in which the establishment of functional epithelial features is not achieved. Co-culture experiments with probiotics, dendritic cells and intestinal epithelial cells, as well as 3D cell models attempt to reconcile the complex and dynamic interactions that exist in vivo between the intestinal epithelium and bacteria on the luminal side and between the epithelium and the underlying immune system on the basolateral side. Additional models, include tissue explants, bioreactors and organoids. Animal studies may also provide valuable information, such as the mechanism through which probiotics can exert their action. Accumulating evidence demonstrates that commensal bacteria and probiotics communicate with the host by pattern recognition receptors, such as TLR and NOD-like receptors, to enhance or suppress activation and influence downstream pathways, leading to a better tolerance of the host against foreign antigens. Gaining insight into the mechanisms of intestinal microorganisms action may contribute to foster the development of novel strategies for the treatment or prevention of gastrointestinal and autoimmune diseases.

### **The role of food and nutrition in space exploration.**

*Baker E.*

*University of Texas MD Anderson Cancer Center, USA.*

Man has roamed the Earth since the beginning of time – seeking knowledge, satisfying curiosity, searching for new lands, exploring beyond the oceans and over the mountains. This curiosity – this quest for understanding – this exploration to claim territory for the motherland did not – and does not – come without risk. The basic human needs of food and shelter

have often been the most difficult challenges, coming at greatest cost. Five hundred years ago explorers set sail in great ships, often spending months to years at sea in horrific conditions, succumbing to dreaded diseases, the most feared of which, for centuries, was scurvy. An estimated 2,000,000 sailors died of scurvy in the two hundred years after Columbus' voyage.

One hundred years ago explorers turned to the top and bottom of the Earth, believed by many to be the last frontiers. Unimaginably harsh conditions, extreme temperatures, and grueling travel were complicated by the basic needs of food and shelter as well. Properly placed food supplies could, and sometimes did, mean the difference between life and death. Fifty years ago the reachable frontier moved off the planet and explorers today look to the stars. The unique environment of space travel, the constraints of living on orbit, in isolation, and the unique physiologic adaptations to this environment present challenges to maintaining health and high levels of crew performance, both physically and mentally. Nutrition involves not only food intake, but must consider the physiology associated with this environment, the countermeasures employed by crewmembers and the closed food system providing nutrients.

## SPEAKER CURRICULUMS

### Olayiwola Adeola



B. Agr. in Animal Science (with First Class Honors), 1982, University of Ife, Nigeria.  
M. Sc. in Animal Science, 1986, University of Guelph, Canada.  
Ph.D. in Animal Science (with Distinction), 1989, University of Guelph, Canada.

Professor Adeola is currently a professor in the Department of Animal Sciences at Purdue University. He served as non-ruminant nutrition section associate editor for the Journal of Animal Science, on the editorial board of Poultry Science, as associate editor for the Canadian Journal of Animal Science. He conducts research in energy, amino acids, and phosphorus utilization of non-ruminant animals for improving the efficiency of lean meat production and minimizing the flow of nutrients through animal waste into the environment. He has authored or co-authored 160 refereed papers, 160 abstracts and book chapters, and several other publications. Professor Adeola received the American Feed Industry Association (AFIA) Poultry Nutrition Research award in 2005, the Maple Leaf Duck Research Award in 2007, the AFIA Nonruminant Nutrition Research award in 2007, the Evonik-Degussa Poultry Research Award, Poultry Science Association in 2010, and the National Broiler Chicken Council Research Award, Poultry Science Association in 2012. He served on the National Academy of Sciences - National Research Council Committee that wrote the 11th Revised Edition of the Nutrient Requirements of Swine (NRC, 2012).

### Felice Adinolfi



Felice Adinolfi is Professor of Economics and Rural Appraisal at University of Bologna. Since 2014 he is member of the Steering Committee of the EU Scientific Programme for Expo 2015 at European Commission Joint Research Centre.

From January 2010 to January 2012 he held the position of Scientific expert assisting the European Parliament Committee on Agriculture and Rural Development. He has published more than 80 papers that have featured in international peer-reviewed journals, and scientific books on the field of agricultural economics and policy. He is reviewer for several agricultural economics journals. Since 1st of January 2013 is Member of the CIHEAM's Advisory Board. He has been Member of the Nomisma Scientific Board. Since 2011 he is Co-editor in Chief of the "International agricultural policy" journal on mayor journal.

### Tasnime Akbaraly



I am currently a permanent Researcher at INSERM, the French National Institute of Health and Medical Research localised in Montpellier (south of France). I am also honorary researcher at University College London and consultant for the Whitehall II team. Having originally studied biochemistry, I found my way to cognitive aging epidemiology. After obtaining a PhD on the impact of nutrients such as selenium and carotenoids on cognitive decline, I wished to learn more on nutritional epidemiology and had several post-doctoral experiences (MRC Human Nutrition Research, Cambridge, UK; Department of Epidemiology and Public Health, UCL, London, UK). I am interested in the determinants of heterogeneity in aging. My current research consisted of

- Examining the impact of diet on cognitive, physical functioning and mental health using expertise in nutritional epidemiology and neuropsychology
- Examining the association between type II diabetes biomarkers, cholesterol metabolism and cognitive decline and mental health.

### Abel Albino



Médico pediatra, doctor en medicina, Miembro de Número de la Academia Nacional de Educación, Miembro de Número de la Academia Española de Nutrición, Miembro Correspondiente Nacional de la Academia Nacional de Medicina, Fundador de CONIN en Argentina, ha replicado el modelo de Chile en recuperación de la desnutrición infantil y creado el de prevención que ha sido replicado en Argentina, Latinoamérica y África, superando los 60 centros. Desde hace más de 20 años se dedica a la lucha contra la desnutrición infantil, desde sus dos puntos de ataque: prevención y recuperación, para vencer este terrible flagelo; con una me-

todología innovadora, a través de un abordaje integral de la problemática social que da origen a la extrema pobreza.

Sostiene que el desarrollo del país depende de la unión: de los ciudadanos en forma particular, las empresas y el Estado, despreciando la lucha del hombre contra el hombre, al convertirla en una lucha del hombre contra el hambre.

Lucha por proteger el tesoro más preciado de la sociedad, los niños y así contribuir a enriquecer a nuestro querido país, por ser ellos, su principal riqueza.

### Daniel Albrecht



Mr Albrecht is an international expert with 18 years of professional experience in health policy and processes with emphasis in health systems and equity, nutrition and social protection. He has extensive expertise in international development with over 15 years of direct negotiations and implementation of multi-sectoral health and nutrition projects involving donors, governments, and civil society organizations. With a strong academic grounding in health and nutrition policy and social protection, Daniel Albrecht holds a bachelor's degree in law from the Pontifical Catholic University of Peru and a Master's in International Development with concentration in Health and Public Policy from The Norman Paterson School of International Affairs at Carleton University in Ottawa, Canada. He also holds a Diploma in project formulation and monitoring from United Nations Institute of Economic and Social Planning (ILPES) - UN ECLAC in Santiago, Chile. Daniel has led projects in public health programmes in Peru, Canada, Brazil, Chile, India, Bangladesh, and Switzerland, involving the planning, design, implementation and management of health and social protection projects with focus, among other areas, on nutrition and maternal and child health focusing on integrated policies and inter-sectoral action to improve equity impacts.

### Arturo Anadón



Full Professor and Head of Department of Pharmacology and Toxicology, University Complutense of Madrid. Master in Basic Pharmacology, Faculty of Medicine, University Complutense of Madrid (Spain). Visiting Scientist, Department of Animal Pathology, National Veterinary School, Toulouse, France. IRI Research Institute Fellowship, USA. Medical Research Council, London, U.K. Visiting Research Fellow. Departments of Applied Physiology and Surgical Science, and Pharmacology, Royal College of Surgeons of England, London, U.K. Fellow Real Colegio Complutense at Harvard University (USA). Member of the Expert Advisory Panel on Food Safety at the World Health Organization, Genève, Switzerland. Member of JECFA. Membership of the European Food Safety Authority's Panel on Food Contact Materials, Enzymes, Flavourings and Processing Aids. Parma (Italy). Expert of EMA, EFSA, Organization of American States, International Atomic Energy Agency. Member of the Royal Academy of Doctors of Spain. Corresponding Member of the Royal National Academy of Pharmacy. He is author or co-author of over 200 peer-reviewed research articles and 100 book chapters. Member of editorial board of several journals.

### Rhona S. Applebaum



Rhona S. Applebaum, Ph.D. is the Vice President and Chief Science & Health Officer at The Coca-Cola Company where she is responsible for the Company's global health and well-being strategy on a variety of issues and programs related to food safety, diet, health and an overall active, healthy lifestyle. Dr. Applebaum also serves as the Executive Director of the Company's Beverage Institute for Health and Wellness.

Dr. Applebaum joined the Company in 2004 as the Chief Scientific and Regulatory Officer, leading Global Scientific and Regulatory Affairs. In 2012, she was elected by The Coca-Cola Company's Board of Directors as a Vice President of the Company.

Dr. Applebaum serves on numerous committees, boards and advisory boards, including the Centers for Disease Control Foundation's Corporate/CDC Roundtable, the EPODE International Network, Health Connect South, the Harvard Medical School Global Health Advisory Council, and several industry trade groups and science organizations. She is also a member of many industry committees, councils and executive boards. In 2012 she was honored as one of the "100 Women Leaders in STEM," and in 2013 was named to the Executive Leadership Honor Roll of On-Board. In June, 2014 Dr. Applebaum received the Kosuna Distinguished Lecture in Nutrition.

In 2009-2010, she served on The Center for Strategic and International Studies Commission on Smart Global Health Policy, and from 2008-2011

as a member of the Science Board to the Food and Drug Administration (FDA). Dr. Applebaum has also been a member of FDA's Food Advisory Committee and USDA's Agricultural Policy Advisory Committee for Trade. Before joining The Coca-Cola Company, Dr. Applebaum was Executive Vice President and Chief Science Officer for the National Food Processors Association. She also held leadership roles with the Distilled Spirits Council of the United States, the Chocolate Manufacturers Association, the American Cocoa Research Institute and the National Confectioners Association.

Dr. Applebaum received her B.A. from Wilson College (history and biology), her M.S. from Drexel University (nutrition and food science) and her Ph.D. from the University of Wisconsin (food microbiology and food safety).

### Javier Aranceta Bartrina



Holds a doctorate in Medicine (MD) and Nutrition (PhD). Specialist in Preventive Medicine and Public Health. Head of Community Nutrition Unit of the Área Municipal de Salud y Consumo de Bilbao, Spain (1985-2013). Associate professor of the Department of Preventive Medicine and Public Health of the University of Navarra. Full Professor (ANECA). President of the Scientific Committee of the Sociedad Española de Nutrición Comunitaria (SENC). Coordinator of the Proyecto Perseo (AESAN). President of the Department of Food Science of the Academia de Ciencias Médicas de Bilbao. Member of the Royal Academy of Medicine of the Basque Country (RAMPV) and its Board of Directors. Member of the Real Sociedad Bascongada de los Amigos del País. Scientific Director of "Dieta Sana" magazine. Director of the Spanish journal of community nutrition (RENC). Member of the Steering Committee of the Fundación Española de Nutrición (FEN). Author or 25 technical books and editor or co-editor of other 39 books about Nutrition and Public Health in some of the most highly regarded medical publishing houses of the world. He has published 150 scientific articles related to his specialty (56 in international publications). Cumulative grade H=21. "Grande Covian" 2007 award. Award of the Academia Española de Nutrición 2009, for his career. Delikatuz Bizi 2008 award. Fundación Dieta Mediterránea 2006 award. Catedata 2005 award and first accésit at Princi 1989 National Award of the Ministry of Health care and Consumption.

### Victoria Arijá



Victoria Arijá, Professor of Preventive Medicine and Public Health in the Rovira i Virgili University (URV) from Tarragona, Spain. Associate Dean in the Medicine and Health Sciences Faculty in the URV. Coordinator of the Research Group on Nutrition and Mental Health in the URV. Coordinator of the Research Group Nutrition and Community Health in the Institute for Research in Primary Care, IDIAP Jordi Gol, of the Catalan Institute of Health. Member of the board of directors of the Spanish Society of Community Nutrition (SENC). Member of the board of the NGO "Nutrición sin fronteras". Member of the board of directors of the Spanish Federation of Nutrition, Food and Dietetics (FESNAD). Her research topics are the assessment of nutritional status in populations, the assessment of the relationship between nutritional status and mental health in infants, schoolchildren, pregnant women, adults and elders; and also the effect of iron status (deficiency / excess) and the presence of genetic alterations on the neurobehavioral development of children, and of the iron excess on the onset of chronic diseases.

### Montserrat Bacardí Gascón



Profesora investigadora de la Facultad de Medicina y Psicología de la Universidad Autónoma de Baja California en Tijuana, es reconocida en el nivel máximo en el Sistema Nacional de Investigadores. Se ha dedicado a la docencia e investigación en el área de nutrición, nutrición clínica y nutrición y salud pública desde que terminó la Maestría en Ciencias (Nutrición) en el Kings College de la Universidad de Londres en 1980. Miembro de la Academia Mexicana de Ciencias, ha publicado más de 150 artículos indizados en el JCR, que han sido citados más de 800 veces por otros autores. Ha presentado en congresos internacionales (España, Francia, Malasia, Inglaterra, Canadá, Turquía, Australia, Suecia y EEUU). Ha publicado 28 libros y capítulos de libro. Ha sido revisora de diferentes publicaciones del JCR y de diferentes programas y fondos de salud del CONACYT.

### Jane Badham



Jane is a registered dietitian and registered nutritionist and also has a Postgraduate diploma in Hospital Diets, a Masters degree in Nutrition and a Diploma in Marketing Management.

Jane's has been running her own health communication and strategy business, JB Consultancy, for 22 years that advises NGO's, CSOs and the food industry on nutrition issues and trends, food regulations, micronutrient malnutrition and maternal, infant and young child nutrition.

Jane has a passion for transformational leadership development and is actively involved with the African.

Nutrition Leadership Programme that aims to develop and network young leaders in the field of nutrition in Africa and grow organisational leadership capacity, towards the successful scaling up of nutrition interventions. Jane is well known in the media and regularly comments on nutrition matters. She has co-authored a number of peer reviewed articles, contributed to a number of books and received awards for her nutrition writing and contribution to the dietetics profession.

### Ellen Baker



Dr. Ellen Baker M.D., M.P.H., grew up in New York City and attended Cornell University Medical College. Her post-graduate training was in Internal Medicine and Public Health. Following a three year residency in Internal Medicine in San Antonio, Texas, Dr. Baker joined the National Aeronautics and Space Administration (NASA) in Houston Texas as a medical officer. In 1984 she was selected into the Astronaut Corps as a mission specialist and expert in aerospace medicine. Dr. Baker flew on three Space Shuttle missions – STS 34 in 1989 to launch the Galileo spacecraft to Jupiter, STS-50 in 1992, a material processing science mission, and STS-71 in 1995, the first Space Shuttle docking with the Russian Mir Space Station and has logged over 686 hours in space. Dr. Baker retired from NASA in 2011 and is currently a consultant at University of Texas - MD Anderson Cancer Center in Houston, Texas, working in the Cancer Prevention and Population Sciences Division.

### Christina Bamia



Christina Bamia has graduated from the National Metsovio Technical University of Athens. She has an MSc in "Statistics with Applications in Medicine" from the University of Southampton, a PhD in Medical Statistics from University of London (LSHTM) and a Diploma in Epidemiology & Population Health from University of London (LSHTM). Since 2011 she is Assistant Professor of Epidemiology and Medical Statistics, in the Athens Medical School. From 2000 –today she has participated as Research Associate and as co-investigator in several EC-funded programs with the EPIC study and CHANCES project. Her main working areas are cancer epidemiology, determinants of healthy aging, and methodology for epidemiological data analysis. To-date she has 93 peer-reviewed publications and 4443 citations.

### Ying Bao



Dr. Bao is Associate Epidemiologist at Brigham and Women's Hospital and Instructor in Harvard Medical School. Her research has focused on diet and lifestyle determinants in cancer and other chronic diseases. In the past 10 years, she has published important findings in high-profile journals, rapidly establishing her as a leading young investigator in chronic disease prevention and control. In a landmark paper published in the New England Journal of Medicine in 2013, Dr. Bao demonstrated that regular nut consumers, compared to non-nut eaters, had a 20% reduction in total mortality over a 30-year follow-up.

### Rekia Belahsen



Rekia Belahsen is PhD, Professor, Head of the Training and Research Unit on Nutrition & Food Sciences and Head of the Lab. of Biotechnology, Biochemistry and Nutrition at Chouaib Doukkali University in El Jadida (Morocco). Consultant in Nutrition. Obtained several grants, awards and numerous fellowships like the FAO Medal of Merit (Morocco) in 2007 and a grant from Islamic Development Bank in 1998. Fulbright Scholar in 2003. Author of many publications and involved in several journals' editorial like the Mediterranean Journal of Nutrition and Metabolism. Was/is executive mem-

ber of many national and international organizations and groups: Health and Environment Research Group, the Moroccan Society of Nutrition, FANUS, MENANA and IUNS. Participated to several organizations of meetings like the First Federation of African Nutrition Sciences (FANUS) meeting, in Ouarzazate (Morocco) in 2007, the first international meeting of Nutrition in Marrakech (Morocco) in 2011, The International Workshop on Nutrition Transition in El Jadida (Morocco). The main current research subjects concern: nutrition transition, community nutrition, Mediterranean diet, obesity, micronutrient deficiency and Food composition and food sustainability.

### Elliot M. Berry



Dr Elliot Berry graduated from the University of Cambridge, UK with distinction in medicine. In 1980 he won a Fogarty Research fellowship at the Rockefeller University to work on fat cell metabolism. His principal research interests are the bio-psycho-social problems of weight regulation from obesity to anorexia nervosa, and the benefits of the Mediterranean diet. His laboratory

work focuses on the effects of nutrition on cognitive function. In the medical school he teaches medicine, nutrition and public health, and has been voted many times as an outstanding lecturer. Berry has published over 240 articles and chapters in books. He has been a visiting scientist at the dept of Brain & Cognitive sciences at MIT, a distinguished visiting scholar at Christ's College, Cambridge and a visiting Professor at Yale University. Berry has chaired national committees for food supplementation and obesity and is an advisor to the Ministry of Health on nutrition. Dr Berry has been a consultant for the FAO, WHO, World Bank and the Serbian Government in Public Health. He was the Director of the Braun School of Public Health & Community Medicine (2003-6), and Head of the WHO Collaborating Center in Capacity Building in Public Health (2007-2013).

### Miriam Bertran Vilà



Profesora investigadora titular del Departamento de Atención a la Salud de la Universidad Autónoma Metropolitana Xochimilco, a cargo del Programa Alimentación y Cultura de la misma universidad. Es nutrióloga con maestría y doctorado en Antropología Social y Cultural. Es autora de "Antropología y nutrición", "Cambio alimentario e identidad de los indígenas mexicanos", "Alimentación e incertidumbre en la vida cotidiana en la ciudad de México: narrativas sobre la alimentación saludable" entre otras publicaciones. Además de su docencia en licenciatura y posgrado en la UAM, ha dado clases en diversas universidades de México, España, Francia, Brasil y Guatemala. Ha sido asesora de aspectos socioculturales de la alimentación en proyectos de investigación y desarrollo en la industria de alimentos, así como en instancias del gobierno de México y de la Encuesta Nacional de Nutrición en Colombia.

### Agata Bialecka



Agata Bialecka holds a M.Sc. in Dietetics from the Warsaw University of Life Sciences – WULS, Poland. She is currently a PhD student in the Department of Human Nutrition, Faculty of Human Nutrition and Consumer Sciences, WULS, Poland. The subject of her PhD study is "The assessment of the impact of diet, nutritional status and lifestyle on the cognitive function among the elderly". Her dissertation research focuses on evaluating the importance of nutrition for cognitive function of the elderly. The objective of research is to investigate the association between a healthy diet indicator and the prevalence of cognitive impairment in the elderly. In her research she also want to determine the impact of dehydration on mental performance. The research are supported by EHI Grant (European Hydration Institute). Her research interests involve nutritional behaviours of different population groups (such as children, pregnant women, the elderly) and eating disorders. Agata has been working in the of european project called NU-AGE. Agata is also an active member of the the Polish Society of Dietetics.

the elderly". Her dissertation research focuses on evaluating the importance of nutrition for cognitive function of the elderly. The objective of research is to investigate the association between a healthy diet indicator and the prevalence of cognitive impairment in the elderly. In her research she also want to determine the impact of dehydration on mental performance. The research are supported by EHI Grant (European Hydration Institute). Her research interests involve nutritional behaviours of different population groups (such as children, pregnant women, the elderly) and eating disorders. Agata has been working in the of european project called NU-AGE. Agata is also an active member of the the Polish Society of Dietetics.

### Hans Konrad Biesalski



Head of Department of Biological Chemistry and Nutrition, University of Hohenheim.

Lecture: Consequences of hidden hunger in Europe. The Professor Doctor Hans Konrad Biesalski is one of the most important voices in world nutrition and metabolism, especially in oncology, of the world. He will offer a magistral lecture on Monday November the

10th, at the III World Congress of Public Health Nutrition, speaking about

"Consequences of hidden hunger in Europe".

In addition to exercising nowadays as Head of the Department of Biological Chemistry and Nutrition at the University of Hohenheim, he has collaborated with several scientific societies, highlighting his participation as member of the High level panel of expert group of the global forum of food security and nutrition.

He is Member of the Executive Board of the German Society of Nutrition Medicine, Editor of the curriculum of nutritional medicine for physicians and consultant for Nutritional Medicine at the Federation of Physicians. As well he has been speaker and scientific co-ordinator of the research group of Functional Food, and of the Network of Molecular Nutrition (special interdisciplinary research group funded by Ministry of Science). Furthermore, he achieve several awards for his researches and works, as the Hermes Vitamin Award, the Wörwag Nutrition Award or his election as member of the Institute of Advanced Studies Berlin 2007.

Biesalski has not only worked as editor of various textbooks in the fields of Nutrition and Medicine, but in addition he has published more than thirty researches related to food security.

This broad curriculum and experience makes him one of the foremost authorities on nutrition and its current situation.

### Martin Binks



Martin Binks Ph.D. is Associate Professor, Nutritional Sciences, at Texas Tech University and leads the Behavioral Medicine & Translational Research Lab. He is a clinical psychologist specializing in behavioral medicine and obesity research. Dr. Binks received his Ph.D. in clinical psychology from Fairleigh Dickinson University, trained at the Bronx VA Medical Center and completed

pre and postdoctoral training in Behavioral Medicine at the Medical University of South Carolina. He is formerly an Assistant Professor at Duke University Medical Center, Division of Medical Psychology. He was Director of Behavioral Health, Research, and New Business and Strategic Alliances at the Duke Diet & Fitness Center.

Martin has authored many research publications and the book The Duke Diet. He is an outspoken public advocate for obesity research funding, treatment for people with obesity, and scientific integrity. His research interests include: behavioral, pharmacologic and surgical obesity treatment; barriers to treatment adherence (nutrition & physical activity); obesity and comorbidities; non-alcoholic fatty liver disease (NAFLD); pain and sleep in obesity; Sickle Cell Disease; mHealth and technology assisted intervention; health disparities; and neuroscience related to obesity (fMRI). He serves as a reviewer on several scientific journals and as an editorial board member for the International Journal of Obesity and Obesity Science and Practice. Dr. Binks has an ongoing multimedia presence as an internationally recognized obesity expert.

Dr. Binks is a Fellow of the North American scientific organization The Obesity Society (TOS) and is both Development Chair and a member of the Executive Council (Secretary Treasurer). He is a contributor to the Treat Obesity Seriously campaign and is on the Executive Board for Obesity Week™. Martin is a member of the World Obesity Federation (formerly IASO) and serves as a Fellow on their SCOPE Clinical Care educational group. He is also a member of the American Society for Bariatric and Metabolic Surgery (ASMBS). Additionally, Martin has been a contributor with the Army National Guard Decade of Health and Wounded Warriors programs and currently serves on several advisory boards including Spark America and the International Food Information Council Scientific Advisory Group.

### Steven N. Blair



Steven N. Blair is Professor in the Departments of Exercise Science and Epidemiology and Biostatistics at the Arnold School of Public Health, University of South Carolina. Dr. Blair is a Fellow in the American College of Epidemiology, Society for Behavioral Medicine, American College of Sports Medicine, American Heart Association, and American Kinesiology Academy; and was elected to membership in the American Epidemiological Society.

Dr. Blair is a past-president of the American College of Sports Medicine (ACSM), National Coalition for Promoting Physical Activity, and the American Kinesiology Academy. Dr. Blair is the recipient of three honorary doctoral degrees--Doctor Honoris Causa degree from the Free University of Brussels, Belgium; Doctor of Health Science degree from Lander University, U.S.; and Doctor of Science Honoris Causa, University of Bristol, UK. He has received awards from many professional associations, including a MERIT Award from the National Institutes of Health, ACSM Honor Award, Population Science Award from the American Heart Association, and is one of the few individuals outside the U.S. Public Health Service to be awarded the Surgeon General's Medallion. He has delivered lectures to medical, scientific, and lay groups in 48 states and 50 countries. His research focuses on the associations between lifestyle and health, with a

specific emphasis on exercise, physical fitness, body composition, and chronic disease. He has published over 550 papers and chapters in the scientific literature, and is one of the most highly cited exercise scientists with over 31,000 citations to his body of work. He was the Senior Scientific Editor for the U.S. Surgeon General's Report on Physical Activity and Health.

### Martin Bobak



Professor of Epidemiology, University College London, School of Life and Medical Sciences, UK. Martin Bobak is professor of epidemiology at University College London. His research focuses on determinants of health in Central and Eastern Europe and the former Soviet Union, with a broad interest in the effects on health of societal, socioeconomic, psychosocial, behavioural and environmental factors. At present, Prof Bobak conducts, with colleagues in Russia, Poland, Czech Republic and Lithuania, a large multi-centre longitudinal study (the HAPIEE project) on the influences of social, economic and psychosocial factors, nutrition and hazardous alcohol consumption on cardiovascular disease, other chronic conditions and healthy ageing indicators during societal transition.

### Lorraine Brennan



Dr Lorraine Brennan graduated from Trinity College Dublin in 1995 and received a Marie Curie Fellowship to carry out her PhD studies in the University of Southampton, UK. In 1998 she commenced a Marie Curie post-doc, in ITQB, Lisbon, Portugal. In 2000 she received a Conway Fellowship and returned to Ireland to initiate work in cellular metabolism in UCD. In 2005 she was appointed a lecturer in Biochemistry. In 2007 she joined the School of Agriculture and Food Science and is currently a PI in the Institute of Food and Health in UCD. She currently leads a group whose primary focus is the application of metabolomics in nutritional research.

### Benjamin Caballero



El Dr. Caballero es Profesor de Salud Internacional y de Salud-Materno-Infantil (Facultad de Salud Pública), y Profesor de Pediatría (Facultad de Medicina) en la Universidad de Johns Hopkins, en Baltimore, EEUU. Obtuvo su diploma de médico en la Universidad de Buenos Aires y su doctorado (Ph.D.) en el Massachusetts Institute of Technology (MIT) en Cambridge, EEUU. Comenzó su carrera académica como profesor asistente en la Escuela de Medicina de Harvard, y como Director de la Unidad de Nutrición del Boston Children's Hospital. Se incorporó al plantel de la Universidad de Johns Hopkins como director fundador del Centro de Nutrición Humana.

Es miembro del Consejo Directivo de la Nevin Scrimshaw International Nutrition Foundation (Boston), de la Nestle Foundation (Suiza), y del International Life Sciences Institute (Washington). Ha sido Presidente de la Society for International Nutrition Research, y de la Fundación Panamericana para la Salud y la Educación. Entre sus reconocimientos más recientes se incluyen su incorporación a la Academia Española de Ciencias en Nutrición y Alimentación, el Premio José Mataix de dicha Academia, el Premio Ancel Keys de la Asociación Mundial de Salud Pública y Nutrición, el Thompson-Beaudette Lectureship de la Universidad de Rutgers, y el Medearis Lectureship de la Universidad de Harvard.

El Dr Caballero ha participado activamente en comités científicos nacionales e internacionales, incluyendo el Food and Nutrition Board, el Dietary Reference Intakes (DRI) Committee, el Panel on Macronutrient Requirements, y el Obesity Task Force, todos del Institute of Medicine, National Academy of Sciences de EEUU. Ha integrado el panel de expertos que define las recomendaciones dietéticas para la población de EEUU (Dietary Guidelines for Americans), el Consejo Científico del Food and Drug Administration (FDA) y del Departamento de Agricultura (USDA), y diversos comités del National Institutes of Health.

Es autor de más de 200 publicaciones científicas. Es editor-en-jefe de la Encyclopedia of Food Sciences and Nutrition, una obra en 10 volúmenes sobre la producción, consumo y efectos biológicos de alimentos. También es editor-en-jefe de la Encyclopedia of Human Nutrition, que recibió el premio al mejor libro del año de la British Medical Association. Su Guide to Dietary Supplements resume los fundamentos científicos para el uso de suplementos vitamínicos y minerales. Su libro The Nutrition Transition: Diet and Disease in the Developing World explora el impacto del desarrollo económico en enfermedades crónicas asociadas con dieta y estilo de vida. En el libro Obesity in China el Dr. Caballero describe su extensa investigación de los factores que resultan en el aumento dramático en obesidad y enfermedades crónicas no transmisibles en áreas rurales y urbanas de China. EL Dr. Caballero es asimismo co-editor del reco-

nocido libro de texto sobre nutrición y enfermedad, Modern Nutrition in Health and Disease.

### Cristina Campoy



Full Prof. of Paediatrics at University of Granada (UGR). Director of the EURISTIKOS Excellence Centre for Paediatric Research (UGR). Member of the ESPGHAN Committee on Nutrition. Coordinator of the Research Group of "Infant Nutrition and Metabolism" (PAICTS187). Secretary of the Early Nutrition Academy (ENA).

Partner in the EU Platform for Diet, Physical Activity and Health. Full member of the Spanish Royal Academy of Nutrition and Food Sciences. Co-ordinator of the FP7 NUTRIMENTHE EU Project and of the PREOBE Excellence Research Project; UGR leader of the EarlyNutrition Project, MynewGut Project, EARNEST, NUHEAL and at different projects funded by the Spanish Ministries of Innovation and Sciences: EVASYON, CIBERESP in Epidemiology & Public Health. Co-ordinator of the Interuniversity Master & PhD Doctorate: "Genetic, Nutritional and Environmental Factors for Growth and Development".

More than 180 papers & chapters in National-International Journals and books, more than 560 abstracts and many Conferences in National and International Meetings. Expert reviewer of European Projects at 5th, 6th, and 7th Framework Programmes. Expert reviewer of 15 international journals. Member of different International Societies and Associations and of different expert groups.

### Roberto Capone



Roberto Capone is an agronomist, who graduated in 1986 from the University of Bologna (Italy). He has been Principal Administrator of CIHEAM Bari since 2008, where he is also the head and coordinator of the Sustainable Agriculture, Food and Rural Development division.

In the period December 2007-April 2008 he was a member of the Italian technical committee and served as a national coordinator for Italy of the Mediterranean Diet nomination for inclusion on UNESCO's Intangible Cultural Heritage representative list.

In the period February 2007-February 2009 as a General Secretary at Italian Ministry of Agriculture, Food and Forestry Policies (MiPAAF) he was in charge of coordination and management of the National Liaison Committee between the Italian Government and the Organizations of the United Nations for food and agriculture (FAO, IFAD, WFP).

From March 2007 to April 2008 he served as a Minister Adviser at MiPAAF dealing with international affairs in the Mediterranean area.

In the period May 2000-June 2007 he was a Principal Administrator of CIHEAM and acted as the Italian representative at the Secretariat General of CIHEAM in Paris.

His main fields of interest are: Mediterranean food systems sustainability, sustainable food production and consumption, the Mediterranean Diet, food safety and security, traditional and local agro-food products enhancement, and integrated development of Mediterranean rural areas.

### Mabel Alicia Brigida Carrera



Age: 67 years old. Argentina. Medical MD. Nutrition specialist. University of Buenos Aires (UBA). Public health specialist. UBA. Diabetes specialist. Argentine diabetes society master's degree in emergencies and disaster management- Isalud University public health and nutrition professor - specialization school in Argentina catholic University (UCA). Public health professor and nutrition professor- Muñiz training hospital of UBA (undergraduate medicine). Former president of the Argentine nutrition society, 2003-2004. President of XVII Argentina Nutrition Congress (2009). President of the IUNS - ICN 21st International Congress of Nutrition to be held in Buenos Aires, Argentina, in 2017.

### Parul Christian



Parul Christian, DrPH, MSc, is Professor in the Department of International Health and the Program in Human Nutrition, Johns Hopkins Bloomberg School of Public Health. Dr. Christian's research over the past 20 years has focused on examining the impact of micronutrient deficiency prevention across the life stages. She has carried out large RCTs in Nepal, and Bangladesh

testing the effect of micronutrient supplementation during pregnancy in enhancing fetal growth, pregnancy outcomes such as low birth weight, preterm birth and fetal loss, infant mortality, and maternal and reproductive health. Her research interests also expand into the area of the deve-

developmental origins of health specifically examining the effects of early life interventions on longer term outcomes of cognition and cardio-metabolic health in follow-up studies of intervention cohorts. Currently her research in childhood undernutrition, specifically stunting, involves leading a food supplementation trial in rural Bangladesh which aims to test the efficacy of four different complementary food supplements, two of which are locally formulated and produced, in improving child growth and reducing stunting in the first 2 years of life. Dr. Christian is also conducting an impact evaluation study of a WFP nutrition program in Malawi for reducing childhood stunting and maternal anemia.

### Saskia de Pee



Saskia de Pee has worked in international nutrition for nearly 20 years. Her areas of expertise are, amongst others, micronutrient deficiencies, fortification, including home-fortification, complementary feeding and treatment of moderate acute malnutrition, health and nutrition in the context of crises, and nutrition in relation to HIV/AIDS and Tuberculosis.

Her work at WFP focuses specifically on ensuring that programming is based on the latest scientific knowledge, and using scientific rigor to monitor and evaluate programs.

She works in the Nutrition Advisory Office of the World Food Programme and is adjunct assistant Professor at the Friedman School of Nutrition Science and Policy of Tufts University in Boston and at Wageningen University, the Netherlands.

### Luz María De Regil



Dr Luz María de Regil has 15 plus-year work experience in the public, private, non-for-profit and intergovernmental sectors in the areas of publishing, education, public health research and policy making. With hands-on experience in managing and leading multidisciplinary teams with diverse partners, Luz María is currently responsible for leading the Micronutrient Initiative's

strategies for innovation, nutrition surveillance, implementation research and knowledge dissemination, to improve the quality and effectiveness of programs where the Micronutrient Initiative is involved and influence policy and practice worldwide. Through her previous positions in Mexico, USA and Switzerland, Luz María frequently combined her knowledge in laboratory techniques, nutrition, food science, epidemiology and international negotiation for different research projects, improving nutritional surveillance and monitoring, and developing global guidelines, to elaborate solutions and support an equitable implementation and evaluation of maternal and infant public health programs addressing malnutrition in any of its forms. With multiple publications in English and Spanish, Dr De-Regil is currently member of the Cochrane Collaboration, GRADE working group, American Society for Nutrition, Latin American Society of Nutrition. Formerly, she was a vice-president of the Mexican Society of Nutrition and a member of the WHO Guidelines Review Committee and the WHO Research and Ethics Committee.

### María Lourdes de Torres Aured



Diplomada Universitaria en Enfermería por la Universidad de Zaragoza. Responsable de U. Dietética y Nutrición del H. U. Miguel Servet desde 1994 (creación y puesta en marcha). Representante del Consejo General de Enfermería en el Observatorio de la Nutrición de la AECOSAN del Ministerio de Sanidad. Diplomada en Puericultura y Pediatría por la Escuela Nacional de Sanidad (posteriormente Instituto de Salud Carlos III). 1979. Y en Medicina del Trabajo y Salud Laboral por el Instituto Nacional de Higiene y Seguridad en el Trabajo. 1978. 14 Expertos en temas de Nutrición, Dietética y Dietoterapia; Educación nutricional; Higiene y Seguridad Alimentaria. Posgrado en: Coaching de Salud (adaptado a nutrición). Máster en Dietética, Dietoterapia y Nutrición (Título propio sin homologar). Organizadora de 7 Jornadas Aragonesas de Nutrición (Anuales). Y presidenta o miembro de CO de cinco congresos relacionados con la nutrición y uno con la calidad. Y del I Congreso FESNAD. Ponente y participante en Congresos nacionales e internacionales y Jornadas de diversas Sociedades de Nutrición (con más de 60 ponencias/conferencias y unas 90 comunicaciones libres). Organizadora y profesora de más de 40 cursos, seminarios y/o talleres para profesionales sanitarios de Nutrición Artificial Domiciliaria; y Dietética y Dietoterapia, en diversos foros. Integrante del Proyecto NIPE del Consejo General de Enfermería-Ministerio de Sanidad, en cinco líneas de investigación y desarrollo. Autora de más de cuarenta artículos en revistas científicas de sociedades de nutrición e intensivos; y veinte capítulos en libros y guías de nutrición, y en la Enciclopedia S21 de Enfermería. Coordinadora y coautora de cinco libros relacionados con la nutri-

ción y la educación nutricional. Miembro de la Estrategia Promoción de Alimentación y Actividad Física Saludables, de la Dir. Gral de Salud Pública del Gobierno de Aragón. Estudio de Comedores Escolares en 2011. Gobierno de Aragón. Colaboradora habitual en los medios escritos y audiovisuales.

### Cheikh M.H. Dehah



Cheikh M.H. Dehah, PhD, enseigne la Nutrition au sein de la Faculté des Sciences et Technique de l'Université des Sciences de Technologie et de Médecine (USTM) de Nouakchott, Mauritanie, dont il dirige le Master de Nutrition et Santé. Il est de même chargé du cours de Nutrition au sein du Département de Santé Publique de la Faculté de Médecine de la même Université. Il a enseigné à l'Institut Régional de Santé Publique de Ouidah, Benin dans le cadre du Master de Nutrition et Santé et il est par ailleurs, membre du Comité de Rédaction de la revue « Universal Journal of Public Health ». En 2009, il a été chargé par l'Unicef (sur financement OFDA/USAID) de diriger le processus d'intégration de la Nutrition dans les curricula des Ecoles de Santé Publique et de l'Université (Faculté des Sciences et Faculté de Médecine), Mauritanie. Ce processus aboutira en 2011 par l'élaboration, de modules de formation en nutrition pour le compte des Ecoles de Santé Publique (parcours Infirmier d'Etat, Sage Femme et Infirmier Médico-social), de plans de modules de nutrition pour les cycles PCEM et DCEM de la Faculté de Médecine et pour la filière Nutrition et Santé de la Faculté des Sciences et Techniques de l'USTM (Licence et Master) en plus de la formation des formateurs.

Pr Dehah est, d'autre part, consultant indépendant spécialisé sur les questions de nutrition, dans une perspective multisectorielle en lien avec la Santé publique avec une expérience de 17 ans en la matière, travaillant pour l'OMS, l'UNICEF, la FAO, le PAM, la Banque mondiale, HKI et World Vision, autant dans son pays qu'en Afrique subsaharienne (Tchad, Niger en particulier). Il a été ainsi chargé, entre autre, en 2004 de rédiger le document de la Politique Nationale de Développement de la Nutrition (2006 – 2015) de son pays, la Mauritanie, et de son Plan d'action en 2006 et en 2014 et du document de Politique Nationale de Nutrition et d'Alimentation du Tchad (2014-2025) et de son Plan d'Action, en 2013. Il est l'auteur du premier Protocole National de Prise en Charge de la Malnutrition Aigue de la Mauritanie en 2000. Il fut le Coordinateur ou Facilitateur, pour son pays, de plusieurs initiatives ou études régionales, en particuliers : l'initiative « Repositioning children's right to adequate nutrition in the Sahel », en 2008 avec HKI et l'étude « The Cost of Hunger in Africa », en 2010-2011 avec l'Union Africaine et le PAM.

Il est actuellement membre de plusieurs comités techniques dans son pays dont principalement: le Comité National SUN et le Comité Technique Permanent du Conseil National de Développement de la Nutrition présidé par le Premier Ministre. Sur le plan international et régional, il fut pendant trois éditions (2008, 2009 et 2010) membre du Comité Scientifique International du Programme de Leadership Africain de Nutrition (PLAN) et du Comité Scientifique du Congrès Maghrébin de Sécurité Sanitaire des Aliments (édition 2013).

### Petra Dekker



Petra Dekker is one of the leading nutritionists of FrieslandCampina. She did a Bachelor in Nutrition & Diagnostics at the Hague University of Applied Sciences and a Master in Human Nutrition at the Wageningen University in The Netherlands. After former marketing and sales functions she started working for FrieslandCampina within Marketing, R&D and Public Affairs. In the function of Corporate Manager Diet & Health she is responsible for the CSR Health & Nutrition policy of FrieslandCampina.

### Hélène Delisle



Hélène Delisle is professor at the Department of Nutrition, Faculty of Medicine, University of Montreal, since 1985. She obtained a Master's degree in Nutrition at McGill University and a Ph.D. in Clinical Sciences at University of Montréal. She also trained in Law as well as in International Management.

Her current research work is primarily focused on the nutrition transition in developing countries and the double burden of 'undernutrition' and 'overnutrition'. She is head of TRANSNUT (for nutrition transition), a WHO Collaborating Centre since 2003 which is comprised of 10 researchers from the Department of Nutrition and other units of University of Montréal. She is currently in charge of a CIDA-funded university partnership project in West Africa on the double burden of malnutrition, with the aim of strengthening training, research and advocacy capacity to address the issue (2008-2014).

## Sandro Dernini



Sandro Dernini received his Doctor's degree in Biology from the University of Cagliari (Italy) and his Ph.D. from the School of Education of New York University. Experience: Coordinator of the Forum on Mediterranean Food Cultures, Rome (2002-present); FAO consultant on sustainable diets activities and sustainable food systems development, Rome (2010-present); International Expert for the Priority 5 "Mediterranean Food Consumption Patterns: Diet, Environment, Society, Economy and Health" of the EXPO Milan 2015 Feeding Knowledge Program, CIHEAM-Bari (2013-present); Coordinator of the CIISCAM-International Interuniversity Studies Centre on Mediterranean Food Cultures, University Sapienza of Rome, University de Gran Canaria, University of Tuscany, University of Calabria, University of Parma (2006-2011); Head of the President's scientific office of the Italian National Research Institute on Food and Nutrition, Rome (2007-2010); FAO consultant for the development of the FAO Network of Centres of Excellence on Food Quality, Safety and Nutrition, Rome (2000-2002); Coordinator of the Consortium for the Well Being in the XXI Century, Rome (1995-2000); Coordinator of the Interdepartmental Well Being Centre of the University of Cagliari (1994-1999); Coordinator of Plexus International, network of scientists and artists (1982-present).

## Patrick R. Detzel



Patrick R. Detzel is a Swiss, German and French national. At Nestlé research center, Dr. Detzel is leading the different health economic projects for the allergy prevention. He is also involved in the projects on weight management to reduce obesity and micronutrient fortification in emerging markets of infant cereals and milks to reduce micronutrient deficiencies. Previously at economic affairs, Dr. Detzel was handling different issues on measuring the economic and social impacts of the Nestlé companies in different parts of the world, relations with major economic organizations in Europe and globally such as the OECD, or the ERT, as well as producing different economic analysis on household incomes and future evolutions of the global food and beverages markets. With the Büro Bass, Dr. Detzel spent a number of years in working on economic impact assessments for different public actors such as the SECO, the federal statistical office. Previously he was head of the measurement science department of AC Nielsen Switzerland, the largest data provider on consumer behaviour for the fast-moving consumer goods. Dr. Detzel is a graduate of the University of St Gallen and Geneva, holds a post-graduate degree of statistics of the University of Neuchatel and a PhD in social and economic science from the University of Geneva. Prior to joining the AC Nielsen he was research associate at the Manchester School of Management in international labour economics. A native Swiss French speaker, he is fluent in English and German.

## Ana Domínguez Maeso



Diplomada universitaria de enfermería: Universidad de Granada, Licenciada en antropología, por la Universidad Católica de San Antonio (Murcia), Supervisora de dietética infantil desde febrero de 1984, compartiendo ésta, con las supervisiones de nutrición clínica y dietética desde Diciembre de 1986 y la supervisión de farmacia desde 1990. En la actualidad Supervisora de la UGC de Endocrinología y Nutrición del Complejo Hospitalario de Jaén y profesor asociado de salud en la escuela universitaria de enfermería de la universidad de Jaén, desde el curso 2001-2002. Continuando en la actualidad como coordinador de los practicum del grado de enfermería. Miembro fundador de la comisión de nutrientes del Hospital "Ciudad de Jaén". Miembro de la Comisión de continuidad de cuidados al alta hospitalaria en los Procesos asistenciales del Complejo Hospitalario de Jaén. Miembro de la comisión de redacción de la Revista de Enfermería del Complejo Hospitalario de Jaén. Miembro de la Comisión de Planes de Cuidados del Complejo Hospitalario de Jaén. Secretaria de ADENYD. Aportaciones a congresos nacionales 105; Aportaciones a congresos internacionales 3; Nº de artículos publicados en revistas nacionales 21; Nº de artículos publicados en revistas internacionales 2; Premios recibidos en concurrencia competitiva 8; Proyectos de investigación obtenidos en convocatorias públicas y competitivas y contratos con empresas o con la administración 2.

## Adam Drewnowski



Dr. Adam Drewnowski is the Director of the Center for Public Health Nutrition and Professor of Epidemiology at the School of Public Health, University of Washington. He is Adjunct Professor of Medicine and the Director of the UW Center for Obesity Research. Dr. Drewnowski received MA degree in biochemistry from Balliol College, Oxford and PhD in psychology from The Rockefeller University in New York. He has been on the faculties at the Rockefeller University and at the University of Michigan before joining the University of Washington. His studies deal with the socio-economic disparities in obesity and diabetes, and the price of healthy foods. Dr. Drewnowski has developed new GIS/GPS methods to map the geography of obesity and diabetes at the neighborhood scale. His current research focuses on developing value metrics to identify foods that are affordable, accessible, sustainable, and nutrient-rich. He is the author of the Nutrient Rich Foods nutrient profiling models to rank foods based on their nutritional quality. Dr. Drewnowski has served on the Institute of Medicine Standing Committee to Prevent Childhood Obesity and is currently working on nutrient density of the diet in relation to greenhouse gas emissions (GHGEs); ranking foods by their nutritional value and estimated carbon cost.

## Elizabeth Dunford



Elizabeth Dunford (Lizzy) is the Global Database Manager and Research Fellow for The George Institute for Global Health's Food Policy Division where her main responsibility is the day to day management of a global branded food composition database which tracks the nutritional content of processed foods around the world. She is also Project Coordinator for the Global Food Monitoring Group and for the FoodSwitch smartphone application globally. Lizzy has an undergraduate degree in Human Nutrition, a Masters degree in Public Health, and a PhD in Public Health from The University of Sydney. The work she has done through the Food Monitoring Group was instrumental in The George Institute's Food Policy Division achieving World Health Organization Collaborating Center status in 2013. Through the Food Monitoring Group Lizzy liaises closely with collaborators from 30 countries. She also works closely with the Pan American Health Organization undertaking work to build capacity in low and middle income countries in Latin America to monitor the nutritional composition of foods. Lizzy is a Registered Nutritionist with the Nutrition Society of Australia and in the past 5 years she has presented at 19 national and 17 international conferences, 22 times as an invited speaker. In her short research career she has published 25 academic papers, has authored 3 external documents for the World Health Organization and she is an invited reviewer for more than 20 nutrition and public health journals.

## Maurice Dysken



Maurice Dysken, MD, is the former Director of the Geriatric Research, Education, and Clinical Center at the Minneapolis VA Health Care System and is a Professor in the Department of Psychiatry at the University of Minnesota Medical School. Dr. Dysken received his A.B. from Oberlin College with a major in chemistry and his M.D. from Case Western Reserve University. He completed his residency in psychiatry at the University of Chicago following two years of military service in the Army Medical Corp. Since joining the Minneapolis VA HCS 31 years ago, he spent one summer as a Guest Scientist at the NIH Clinical Center in Bethesda, MD, and also served on the Neuroscience of Aging Review Committee for the National Institute of Aging. In addition, he is a Past President of the Minnesota Psychiatric Society and a Distinguished Fellow of the American Psychiatric Association. Dr. Dysken was the Chairman of a five year, 14 site clinical trial in Alzheimer's disease (CSP #546) that was sponsored by the VA Cooperative Studies Program and published in JAMA 1/1/2014. He is an author on 117 publications, 153 scientific presentations, 16 book chapters, and an editor of one book.

## Manfred Eggersdorfer



Senior Vice President at DSM Nutritional Products and Head for Nutrition & Science Advocacy. Professor for Healthy Ageing at the Groningen University. Dr. Manfred Eggersdorfer is Senior Vice President for Nutrition Science & Advocacy at DSM. DSM Nutritional Products is the world leader in vitamins, carotenoids and nutritional ingredients for Human Nutrition, Animal Nutrition and Personal Care.

Prior to DSM, Manfred Eggersdorfer was working for BASF, Ludwigshafen in different positions including Head of Research and Development Fine Chemicals.

Manfred Eggersdorfer studied chemistry at the Technical University Munich and did his PhD in organic chemistry in the field of synthesis and characterization of unusual amino acid. He was post-doc at the Stanford-University, California working with Carl Djerassi on the isolation and characterization of sterols from marine origin.

Further Manfred Eggersdorfer is active as honorary professor at the Faculty of Medical Sciences at the University of Groningen. He is member of the Advisory Board of the Johns Hopkins Bloomberg School of Public Health, of the Fraunhofer-Gesellschaft Curatorial for Innovation, and affiliate of various other organizations. He is author of numerous publications in the fields of vitamins, innovation in nutritional ingredients, and renewable resources, reviewer for a variety of journals and associate editor of the "International Journal of Vitamin and Nutrition Research".

### Ibrahim Elmadfa



Prof. Elmadfa was the director of the Department of Nutritional Sciences at the University of Vienna from 1990 to 2011. He is the President of the Austrian Nutrition Society and the Past-President of the International Union of Nutritional Sciences (IUNS). He has authored/co-authored several books in human nutrition, food chemistry and health monitoring (Austrian Nutrition Report 1998, 2003, 2008 and 2012; European Nutrition and Health Report 2004 and 2009); and more than 400 original publications in international scientific journals and numerous invited presentations at national / international scientific conferences.

He was the Editor of *Annals of Nutrition and Metabolism* and "Forum of Nutrition" (1999 - 2011). Trained in Human Nutrition and Food sciences, his research interests are focused on nutrient requirements in health and disease (member of the working group Dietary Reference Intake Values for Central European Countries), Monitoring of nutrition and health status, Bioavailability of nutrients, Nutrition and immune function, Food safety and quality.

He served as coordinator, partner and work package leader of ten EU-funded projects as well as scientific advisor (1995-2001) to the European Commission as member of the Scientific Committee on Food (vice president) and as member of working groups: Nutrition and dietetic foods, Novel food, Upper safe limits, Flavourings. Member of Codex Alimentarius Austria (Chair of sub-committee on Novel food / technologies) and member of the National nutrition commission. Member of scientific consulting groups of the WHO/FAO (Fat & fatty acid requirements; NUGAG-Diet & health, Global Non-Communicable Disease Network (NCD-net) and member of the WHO- International Advisory Council (IAC), Scientific leader and UNICEF- Consultant for the Palestinian Micronutrient Survey.

### Ahmed El-Sharkawy



Mr El-Sharkawy is a Specialist Registrar in gastrointestinal surgery with clinical interests in hepatopancreatobiliary surgery, surgical oncology and trauma surgery. He studied undergraduate medicine at the University of Newcastle, UK. He began his academic clinical career at the Leeds Teaching Hospitals NHS Trust as an academic foundation doctor and was subsequently awarded

a National Institute of Health Research (NIHR) Academic Clinical Fellowship in Nottingham, UK. Mr El-Sharkawy is now a Clinical Research Fellow at the Department of Gastrointestinal Surgery, part of the Nottingham Digestive Disease Centre, NIHR Biomedical Research Unit. He has a keen interest in human physiology, particularly fluid and electrolyte balance in hospitalised patients. He is currently completing his PhD investigating fluids, hydration and clinical outcome in hospitals with Professor Dileep Lobo's group who have recently been awarded the University of Nottingham's prestigious Knowledge and Innovation award in recognition of their work in this area.

### Ronit Endevelt



Undergraduate and Graduate Studies: 1980-1983, B. Sc. Hebrew University, School of Nutrition Rehovot. Nutrition science and dietetics B.Sc. 1984.

1986. Nutrition and physical activity M.Sc. Medical School and School of Public Health. Hebrew University. 1984-1986.

2002. Nutrition and health management Ph.D. Ben Gurion University. 1998-2002. 2004 Nutrition education, School of Medicine and Para-medicine Post Doctoral studies. Ben Gurion University. Prof. Drora Freizer and Dr. Danit Shahar. 2002-2004.

Post-Doctoral Studies: 2004. Nutrition education, School of Medicine and Para-medicine Post Doctoral studies. Ben Gurion University. Prof.

Drora Freizer and Dr. Danit Shahar. 2002-2004.

Academic Ranks and Tenure in Institutes of Higher Education: Lecturer. Tel Hai College school of Nutrition. 2001-2003.

Lecturer & Post-doctoral studies. Ben Gurion University medical school 2001-2004.

Senior Lecturer (specialist track). University of Haifa School of Public Health, Faculty of Welfare and Health Sciences. October 2004- present. Positions outside the University: 1987-2012. Director of the nutritional services and the Nutrition Supplement of Maccabi. Health Medical Services. 2012-2014. Director of health promotion of Maccabi Health Medical Services.

### Ramón Estruch



Professor Ramon Estruch is Senior Consultant at the Internal Medicine Department of the Hospital Clinic (Barcelona) since 2002. He is also Associate Professor in the School of Medicine at the Barcelona University since 1996, Member of the Board of Directors of the CIBER Obesity and Nutrition, Institute of Health "Carlos III", Government of Spain, since 2006 and Member of the Advisory Board of the ERAB (European Foundation for Alcohol Research) from European Union since 2010.

The main research lines developed are the following: 1) Cardiovascular effects of Mediterranean diet 2) Mechanisms of the effects of moderate wine and beer consumption: Effects on the expression and function of cellular and endothelial adhesion molecules related to development of atherosclerosis; 3) Effects of chronic alcohol consumption on heart, liver and brain; 4) Effects of different alcoholic beverages on immune system; 5) Effects of olive oil, nuts and cocoa in lipid profile and inflammatory biomarkers related to atherosclerosis.

In the last years, his group has received grants from the European Commission, National Institute of Health (NIH) from USA, CICYT, Instituto Nacional de Investigación Agroalimentaria (INIA) del Ministerio de Educación y Ciencia, Fondo de Investigación Sanitaria (FIS) and Instituto de Salud Carlos III del Ministerio de Sanidad (ISCIII). In addition, Prof. Estruch is the leader of the Thematic Network "Mediterranean Diet and Cardiovascular Disease" from the ISCIII (Spain).

Twenty years ago we started a research program on the toxic effect of alcohol on cardiovascular (N Engl J Med 1989, Ann Intern Med 1994; JAMA 1995, Arch Intern Med 1995) and central nervous systems (Arch Neurol.1995; Ann Neurol.1997). At 1994, a new research program on effects of key foods (alcoholic beverages) on atherosclerosis started. First, we analyzed the effects of alcoholic beverages on adhesion molecules related with the development of atherosclerosis (Alcohol Clin Exp Res 1998 and 1999; Thromb Haemost 2002). Moderate consumption of red wine reduces serum inflammatory markers related to atherosclerosis (Atherosclerosis 2004), ex-vivo adhesion of human monocytes on an endothelial line (Am J Clin Nutr 2004) and oxidative stress parameters (Nutr Metab Cardiovasc Dis. 2010). Finally, in 2003, we have started an ambitious study (PREDIMED) to evaluate the effects of a Mediterranean Diet and its main components on the primary prevention of cardiovascular disease in high-risk patients, which have enrolled near 7.500 patients. The study finished at the end of 2011 and their main results have been published in top journals, including New England Journal of Medicine (2013), JAMA (2014), Ann Intern Med (2006 and 2014), Arch Intern Med (2007 and 2008), Am J Clin Nutr (2009), J Nutr (2010), Diabetes Care (2011) and PloS One (2012 and 2014). He has published more than 250 manuscripts in peer-review Journals.

### Umi Fahmida



Umi Fahmida, PhD is academic staff at Southeast Asian Ministers of Education Organization Regional Center for Food and Nutrition (SEAMEO RECFON) at the Universitas Indonesia since 1997 and is currently Deputy Director of Program Division at SEAMEO RECFON under which the South East Asian Nutrition Leadership Program (SEA-NLP) is coordinated. She earned her Doctorate degree in Nutrition (2003) and MSc in Community Nutrition (1997) from SEAMEO-TROPED RCCN Faculty of Medicine, Universitas Indonesia and her bachelor's degree from Faculty of Agriculture Technology, Bogor Agriculture University (1995). She was awarded with GTZ Fellowship Awards for both her Master's and Doctorate studies. Her research interests are on the effect of nutrient and non-nutrient (psychosocial stimulation, gene) interaction on infant/child growth and development and on dietary methodologies/applications particularly on the use of linear/goal programming (LP) to develop/evaluate food-based recommendations. She received Post-doctorate Research Award from SPIN-KNAW Netherlands for nutrigenomics/nutrigenetics study on the role of LC-PUFA and iron on young child cognition. She has been working with studies and community-based trial on complementary feeding recommendations developed using LP and is currently expanding its implementation into

national/regional activity to empower local academe and program implementers to promote local specific food based dietary guideline.

### Laura Fernández Celemín



Director Nutrition and Food Safety, Deputy Director General – European Food Information Council (EUFIC). Dr Laura Fernández Celemín holds a degree in Dietetics & Human Nutrition and a PhD in Nutrition & Endocrinology from the Catholic University of Louvain, in Belgium. After joining EUFIC in 2002 she worked in several roles and is currently Deputy Director General and Director of

Nutrition & Food Safety. Throughout her career, she has published a number of peer-reviewed publications in scientific journals and magazines. She is also sitting in the Board of Directors of the European Nutrition Leadership Platform, aiming to enhance the impact of nutrition in Europe. EUFIC communicates science-based information on nutrition and health, food safety and quality, to help consumers to be better informed when choosing a well-balanced, safe and healthful diet.

More information on EUFIC's communication materials can be found at [www.eufic.org](http://www.eufic.org).

### Marina Francés Pinilla



Diplomada en enfermería por la UNIZAR. Enfermera de Atención Primaria y Comunitaria durante 24 años.

En la actualidad Directora de Enfermería de los Sectores de AP Zaragoza 1y 2. Servicio Aragón de Salud (SALUD). Máster en Liderazgo y Administración Pública por la USJ.

Miembro de la Estrategia para la Promoción de Alimentación y Actividad Física Saludables en Aragón. Participante en varias mesas redondas en congresos de Comunitaria o de sociedades de Nutrición.

Fundadora y Presidenta de Asociación de Enfermería Comunitaria Aragonesa (AECA). Junta Directiva de FAECAP (Federación de Asociaciones de Enfermería Comunitaria Atención Primaria).

### Marianna Frangeskou



I hold a Masters Degree in Health Economics and Policy from Barcelona Graduate School of Economics and a Bachelor in Science in Economics from the University of Cyprus. Before joining Bath Centre for Healthcare Innovation and Improvement, where I am currently doing my PhD on Healthcare Management and Improvement Science I was a trainee at the European Commission in

the Cabinet of Education, Culture, Multilingualism and Youth and in the Press Department, DG Communication.

The aim of my PhD research is to investigate the role of modelling and simulation in quality improvement studies in healthcare. My research will be conducted using a number of case studies in the collaborating hospital that will explore the causes of the apparently significant additional risks associated with admission to hospital on certain days of the week, known as the 'weekend effect'.

Publications: Marianna Frangeskou, Beatriz Gonzalez, Lluís Serra-Majem. Dehydration in the elderly: a Review focused on Economic Burden. *JNHA - The Journal of Nutrition, Health and Aging* (forthcoming).

### Simone K. Frey



Dr. Simone K. Frey is Coordinator of the European Nutrition Leadership Platform (ENLP). ENLP provides three unique tools to nutrition professionals to impact their careers in nutrition and health: 1. Basic leadership training (ENLP seminar) for young professionals in nutrition and health; 2. A powerful network to connect globally with peers; 3. Advanced leadership training (ENLP Advanced seminar) for mid-career professionals with 6-10 years of experience.

More info: <http://enlp.eu.com>. Simone has a background in nutritional science and economics and is currently managing director of Bioanalyt, a company developing test kits to measure vitamins on the spot.

### Rasmus Friis



Rasmus Friis is a M.Sc. student in human nutrition from the University of Copenhagen. Rasmus has been working on the OPUS project within two workpackages; the SHOPUS project which was conducted on adult and on children where they validated a web-based dietary assessment software. Latest he had been working with FoodScape Lab in Aalborg University

where he conducted data for his master thesis and looking at the food waste of the EAT project for the municipality of Copenhagen in a collaboration with the Danish National Food Institute.

Rasmus is also an active board member of the Danish Society of Nutrition.

### María Nieves García Casal



Dr. María Nieves García Casal, actual president of the Latin-American Nutrition Society (SLAN), is chief of the research team of the Nutrition Section of the Experimental Medicine Centre at the Venezuelan Institute for Scientific Research (IVIC). For more than 20 years when she initiated her biochemical training in human nutrition and later as a consolidated research, she has developed

important research lines related to iron, vitamin A and folates metabolisms and also with maize and wheat fortification programs. During her productive trajectory, evidenced by her publications in specialized peer reviewed, high impact journals, she has made important contributions of immediate applicability to nutrition-related public health problems. Recently, with her working group that include Master and PhD students, as well as scientific personal from IVIC and other collaborating institutions, they perform research on iron absorption from diets consumed by the Venezuelan population and on food fortification programs, especially those consumed by populations vulnerable to anemia and iron deficiency worldwide. The Nutrition Section under her supervision also develops projects related to the consumption of marine algae as iron sources, as well as the use of carotenoids and antioxidants in the prevention and treatment of non-communicable chronic diseases, with special emphasis in type 2 diabetes. During 2013 Dr. Garcia-Casal was on sabbatical license at the Evidence and Programme Guidance Unit, Department of Nutrition for Health and Development of the World Health Organization in Geneva, Switzerland.

### Alfredo Gea



Alfredo Gea PhD, is a young epidemiologist that work in the field of nutritional epidemiology. He works at the department of Preventive Medicine & Public Health (University of Navarra, Spain). He is involved in the PRE-DIMED trial and the SUN cohort as research investigator. Despite his young age, Dr. Gea has published more than 25 research articles in peer-reviewed international journals, and his investigation is mainly focus on alcohol consumption and chronic diseases.

### Angel Gil



Full Professor of Biochemistry and Molecular Biology at the University of Granada, Spain and Head of the Research Excellence Group CTS-461 on Nutritional Biochemistry.

President of the Spanish Society of Nutrition (SEÑ). President of the Iberamerican Nutrition Foundation (FINUT). Manager Director R&D Puleva SA and Abbott Lab from 1983 to 1994 and 1995 to 1996, respectively. Former Director of the Foundation University of Granada-Enterprise from 2001 to 2004. President and Chairman of the International Congress of Nutrition 2013. Member of the Spanish Academy of Nutrition and President of the Spanish Scientific Committee of Bread. Associate-Editor of *Annals of Nutrition and Metabolism* and member of the Advisory Board of a number of selected nutrition journals. More than 350 articles published in peer-review journals and more than 130 book chapters. Editor-in Chief of the "Tratado de Nutrición", a textbook written in Spanish with 4 volumes and a Web site. Supervisor of 46 PhD Thesis and 16 Master Degree Thesis. Field of research: Infant nutrition, childhood obesity, nutrigenomics, probiotics and its association with prepubertal hormonal and metabolic changes related to early onset of metabolic syndrome.

### Elva Gisladdottir



Elva Gisladdottir, Nutritionist, works at the Directorate of Health in Iceland (former The Public Health Institute of Iceland) in the division of Determinants of Health. Educational background: MSc in Nutrition and BSc in Biology and shorter courses in Public Health, e.g. Problem Solving in Public Health at the John Hopkins School of Public Health in Barcelona. Current work: Health promotion and primary prevention in various settings with the aim to promote healthy habits among Icelanders through various channels. Takes part in projects coordinated by The Directorate of Health; Health Promoting pre-, primary and secondary schools, Health Promoting Workplaces and Health Promoting Communities. Took part in con-

ducting the Icelandic National Dietary Survey of adults in 2010-2011. Nordic and European Projects: Taking part in the revision of criteria for the Nordic Key Hole. Has taken part in Nordic and EU funded projects and is currently taking part in the EU Joint Action on Chronic Diseases (CHRODIS) and the Nordic Project on reducing salt intake. Relevant memberships: World Public Health Nutrition Association (WPHA), Young Public Health Nutrition Network (Vermillion), Young Gastein Network and Scholarship (years 2007, 2009, 2012) on behalf of the European Health Forum Gastein, DG SANCO and DG Research. Icelandic networks within public health and nutrition.

### Carmen Gómez Candela



Degrees  
1981, Degree in Medicine and Surgery at the Autonomía University of Madrid.  
1985, Specialization MIR in Endocrinology and Nutrition.  
1991, Doctor in Medicine (cum Laudem) at the Complutense University in Madrid.

2013, Master in Hospital Direction and Clinical Management.

Work experience: From 1988 Head of the Clinical Nutrition and Dietetics Department at the University Hospital La Paz of Madrid.

Dr Carmen Gómez Candela is associated professor at the Autonomía University of Madrid (UAM), and professor at the National University of Education by Correspondence (UNED).

She was the president of Spanish Society of Basic and Applied Nutrition (SENBA) from 2001 till 2007 and coordinator fundator of the Spanish Federation of Societies of Nutrition, Food and Dietetics (FESNAD) created in July 2002.

Investigation: Head of Nutrition and Functional Foods Research Group at La Paz Health Research Institute (IdiPAZ).

### Marcela González Gross



Full Professor for Sports Nutrition and Exercise Physiology at the Department of Health and Human Performance of the Technical University of Madrid, Spain. She is the Head of the Nutrition, exercise and healthy lifestyle research group (ImFINE). For more than 20 years she has been analyzing the nutritional and fitness status and its impact on both physical and cognitive

function of healthy subjects with different levels of physical activity, especially adolescents and the elderly. Main research aspects include early diagnosis of subclinical vitamin deficiency, optimal hydration, improvement of life quality and health education. She has received several research awards and published over 170 articles in JCR journals.

### Beatriz González López-Valcárcel



Beatriz González López-Valcárcel is full professor at the department of Quantitative Methods for Economics and Management, University of Las Palmas de Gran Canaria. Former president of the Spanish Association of Health Economics (2004-2005) and Vice-President of the Spanish Society of Public Health (SESPAS) 2013-2015. Researcher in Health Economics, leader in projects funded by the National R&D Plan and EU funded projects (VI y VII Framework).

International consultant in Brazil, Costa Rica, Chile, Mexico, Mozambique, Panamá and Uruguay. Awarded with the Civil Cross of Health by the Ministry of Health of España. Named Adoptive Daughter of the city Las Palmas de Gran Canaria.

### Gregory A. Hand



Gregory A. Hand, PhD, MPH is Professor of Epidemiology and Founding Dean of the Robert C. Byrd Health Sciences Center School of Public Health at West Virginia University, USA. He previously served as Professor of Exercise Science and Associate Dean for Research and Practice of the Arnold School of Public Health at the University of South Carolina, USA. He received his

PhD degree from the University of Texas, Southwestern Medical Center at Dallas, his MPH degree from the University of South Carolina and a MS degree from the University of Arizona. He received postdoctoral training at the Moss Heart Center, UT Southwestern Medical Center at Dallas.

Dr. Hand began his research career examining the neurobiological basis for cardiovascular adjustments to muscular activity. His interest in physical activity and the physiological stress associated with movement led him to begin research on the effects of physical activity on physiological, metabolic and anthropomorphic issues related to infection and antiretroviral therapy in people living with HIV/AIDS. Currently, Dr. Hand's research is focused on energy balance, weight management and the health

outcomes associated with the amount of energy that an individual expends and consumes. He has published over 100 journal articles and book chapters on the role of physical activity and exercise on determinants of health and health outcomes.

His work has been funded by multiple federal agencies, private foundations and corporate entities. He has been honored by election to American Physiological Society, The Obesity Society, Delta Omega Public Health Honor Society and The American Association for Advancement of Science. He is a Fellow of the American College of Sports Medicine.

### Anthony Hehir



Director - Nutrition Improvement Program. DSM Nutritional Products. Anthony Hehir is a South African and Irish national and was born and raised in Zimbabwe and Botswana in Southern Africa. He holds higher degrees in Human Physiology, Nutrition and Dietetics and Business Administration as well as a masters degree in Acting and Musical Theatre. Having first trained in nutrition, Anthony worked as a clinical and public health Dietitian in rural South Africa, rolling out an integrated nutrition programme for at-risk groups as well as overseeing the nutritional support of patients on the national HIV care programme.

Anthony has been with DSM Nutritional Products since 2005, first based in South Africa where he was responsible for the countries in Sub-Saharan Africa, driving co-development of staple food fortification programmes. Since then Anthony has held several global and regional marketing, communications and business development roles within DSM, having the opportunity to work globally and across cultures.

Anthony is currently the director of DSM's Nutrition Improvement Program, a specialist team in DSM whose mission is to positively impact public health by developing and implementing effective nutrition solutions and leveraging their expertise and partnerships to reach and serve the 4 billion people at the base of the pyramid.

Anthony is currently the director of DSM's Nutrition Improvement Program, a specialist team in DSM whose mission is to positively impact public health by developing and implementing effective nutrition solutions and leveraging their expertise and partnerships to reach and serve the 4 billion people at the base of the pyramid.

### Louise Houlby



Louise Houlby has obtained a M.Sc. in Integrated Food Studies from Aalborg University in Copenhagen, Denmark, where her studies primarily has been focused on choice architecture and nudging used in health promotion as well as the effectiveness of National health recommendations. Her research interests lies within behavioural nutrition and consumer sciences.

### Richard Hurrell



Richard Hurrell graduated in Food Technology from the University of Reading (UK) in 1969 and made his Masters and PhD at the University of Cambridge UK specializing in the effect of food processing on nutritional quality of food proteins. He joined Nestlé Research Centre in Switzerland in 1978 and became head of the micronutrient group focusing on iron bioavailability

and fortification in relation to infant foods. He introduced human absorption studies with stable isotopes as a way to optimize iron and zinc absorption from infant foods. He joined the Institute of Food Science, ETH Zurich in 1994 as full Professor of Human Nutrition, introducing nutrition into the food science curriculum and setting up a research program based on micronutrient malnutrition in the developing world. This focused on iron and zinc absorption in women and children from fortified and biofortified foods, and long term feeding studies in women and children monitoring iron and zinc status so as to demonstrate efficacy of fortified foods. He has some 200 peer reviewed publications with recent interest in the influence of infections on iron bioavailability and the influence of added phytases on iron and zinc absorption in infants. He retired as Head of Human Nutrition at ETH in 2012.

### Isatou Jallow



Isatou Jallow is from the Gambia and trained as a nutritionist at the University of Oslo, Norway. She has 24 years of field and policy experience in nutrition, gender, women's issues and advocacy. She now serves as the Chief of Women, Children and Gender Policy for the UN World Food Programme (WFP) based in Rome. In her current position, she is responsible for the development and coordination of WFP's policy on Gender Equality and the Empowerment of Women. Prior to this, she served as the Executive Director of the National Nutrition Agency in the Gambia where she was responsible for placing nutrition on the development agenda and advocating the same at the global level. Her achievements include the adaptation of the global UNICEF/WHO Baby Friendly Hospital Initiative (BFHI)

into a community initiative – Baby Friendly Community Initiative (BFCl), and engaging men to support and share the responsibility for improved maternal and infant/young child nutrition.

### Eugène Jansen



Eugène Jansen has studied organic chemistry at the Technical University in Eindhoven. He did his thesis in biochemistry at the University of Utrecht. After a 2-y post-doc period in endocrinology at the Erasmus University in Rotterdam, he entered the National Institute for Public Health in Bilthoven. In this Institute he was employed in several disciplines, such as endocrinology, clinical chemistry, analytical biochemistry, toxicology, and aging research. He is currently working in the Centre for Health Protection on several projects on the nutritional status of vitamins and minerals in the Dutch population for the Dutch Ministry of Public Health. He is also involved in two projects on biomarkers of aging (MARK-AGE and CHANCES), funded by the EC (7th framework). In addition, he is project leader of strategic project on the effects of vitamins and minerals on aging. He runs a bio-analytical laboratory with a specialization on measurements of a broad spectrum of physiological and nutritional biomarkers in epidemiological samples, such as biomarkers of oxidative stress and redox status, lipid and fatty acid metabolism, vitamins, minerals, carotenoids, iron metabolism, inflammation, etc. He is (co)author of more than 180 scientific publications which have appeared in the international press.

### Shubha Jayaram



Shubha Jayaram is a Senior Program Officer at the Results for Development Institute (R4D). Shubha works on a mix of portfolios, and her work centers around multi-stakeholder partnerships and workforce development. She leads the Partnership to Strengthen Innovation and Practice in Secondary Education (PSIPSE) project and R4D's skills development initiative (including the Innovative Secondary Education for Skills Enhancement (ISESE) project). Her recent work also includes a review of public-private partnerships in nutrition, and the Think Tank Initiative's Policy Engagement and Communication project, which supports the capacity of think tanks in Anglophone Africa. Prior to R4D, Shubha worked in both the private and non-profit sectors. She worked as an analyst at IDEAglobal, a macroeconomic research firm, where she supported the fixed income and commodity teams and developed short and medium term outlooks for clients. Shubha has also worked with TechnoServe in sub-Saharan Africa, where she provided business advice and mentorship to entrepreneurs and SMEs in South Africa, Swaziland and Uganda. Shubha holds a Master in Public Policy degree from the Harvard Kennedy School and a Bachelor of Arts degree in Economics and International Relations from Tufts University.

### Jo Jewell



Jo Jewell is currently working as a Nutrition Policy Officer within the Division of Noncommunicable Diseases and the Lifecourse at the WHO Regional Office for Europe. His previous experience includes roles as Policy and Public Affairs Manager at World Cancer Research Fund International, based in London, and as Policy Coordinator at the European Public Health Alliance in Brussels. He has a background in European politics and has a Masters in Health Policy, Planning, and Financing. His experience and publications mainly relate to food and nutrition policy, including a focus on effective policy design and the role of European and global recommendations.

### Arturo Jiménez Cruz



Es profesor de la Facultad de Medicina y Psicología de la Universidad Autónoma de Baja California en Tijuana desde 1988 hasta la actualidad, fue profesor adjunto del Departamento de Salud Pública y de la División de Ciencias del Ejercicio y Nutrición en la Universidad Estatal de San Diego. Es miembro de la Academia Mexicana de Ciencias, es investigador nacional nivel 2, fue presidente de la Sección Latinoamericana de la Sociedad Americana de obesidad y miembro del comité científico del Congreso Mundial de Nutrición y Salud Pública (2014). Fue coordinador de la primera encuesta nacional de consumo de alimentos en Cataluña (1985-1988) en el Departamento de Salud de la Generalitat y autor de las tablas de composición de alimentos Wander-Sandoz. Ha publicado más de 200 trabajos, ha co-editado siete libros, es coautor de 26 capítulos de libro, ha dirigido más de 30 tesis de maestría y doctorado y cuenta con más de 1000 citas.

### Gaëlle Julien



Gaëlle Julien works for the Institut Bioforce, an NGO based in Lyon, France, where she is the coordinator of an integrated vocational training program in Bamako, Mali: "Nutrition Project Manager (Nutrition PM)" and "Water, Sanitation and Hygiene Promotion Project Manager (WASH PM)". This program implemented in partnership with UNICEF, Fondation Mérioux, Action Against Hunger, and designed in consultation with the West African Health Organization, aims at enhancing capacity and capability among local, national and international nutrition and WASH professionals in French-speaking Africa. Gaëlle also has further experiences in humanitarian/development field with the NGO Sidaction, as International Training Programs Manager from 2011 to 2014, and with Fondation Mérioux, as Coordinator of a public health project in Mali from 2005 to 2010 (public-private partnership between Fondation Mérioux, the Mali Ministry Of Health, and the European Commission).

### Jordi Julvez



Jordi Julvez is a research fellow that Works in CREAL since September 2011. His background is neuropsychology and epidemiology. He spent three years as a post-doc fellow at Harvard School of Public Health and learned about developmental neurotoxicity in population studies. He is now in charge of neurodevelopment assessment in CREAL.

### Rebecca Kanter



Rebecca Kanter, PhD, is a visiting research fellow in the Leverhulme Centre for Integrative Research on Agriculture and Health (LCIRAH) and with the Nutrition Group in the Department of Population Health at the London School of Hygiene & Tropical Medicine. Dr. Kanter's current research focuses on the linkages between public health nutrition and agriculture. She also conducts studies regarding nutrition-related non-communicable diseases and obesity with a great interest on related risk factors such as (obesogenic) food environments and gender disparities, particularly in Latin America. She has previously worked in Brazil, Mexico, and Guatemala and on many multi-Latin American country research studies. In 2012, she participated in the 6th Latin American Workshop in Leadership in Nutrition held by the Latin American Nutrition Society (SLAN). Dr. Kanter is also an International Atomic Energy Agency (IAEA) expert on data management for developing countries.

### Maria Kapsokefalou



Maria Kapsokefalou is an Associate Professor in Human Nutrition at the Agricultural University of Athens, Greece. Following a BSc in Chemistry at the University of Athens, Maria Kapsokefalou pursued her graduate studies in Food Science and in Nutrition at Cornell University as a Fulbright Scholar. She received her PhD in 1992 and continued her scientific development in Nutrition at Cornell University, as a recipient of the Nutricia Research Foundation International Training Fellowship, at ETH Zurich, and at the University of Crete, where she was a Researcher and Lecturer in Food Science and Nutrition until 2000. In 2001 she joined the Department of Food Science and Human Nutrition at the Agricultural University of Athens. Her scientific work is focusing on hydration and on micronutrient nutrition (bioavailability and bioactivity of iron and phytochemicals). Current interests and activities also include nutrition communication, consumer perception on nutritional issues and evaluation of nutrient intake in the population. Her research is supported by national, private and EU funding. She is the author of 45 research articles, of 70 conference abstracts, monographs and of various professional articles. She is involved in community based projects on elementary and high school student education. Dr Kapsokefalou is a member of several national, EU and international consortia, organizations and committees.

### Sarah Kehoe



I became interested in global health and nutrition issues while spending time in South America and Asia. I then completed my MSc in Public Health Nutrition in 2006 and was subsequently employed by the University of Southampton at the Medical Research Council Lifecourse Epidemiology Unit where I am currently a Research Nutritionist. My role there involves working on all nutritional aspects of studies investigating the developmental ori-

gins of chronic disease in India. I completed a PhD part time whilst working on these studies and graduated in April 2013. The title of my thesis was 'The effect of a micronutrient-rich food supplement on women's health and nutrient status'. Since then I have become interested in the development of interventions to increase consumption of healthy foods among low-income populations.

### Cyril Kendall



Dr. Kendall is a Research Associate in the Department of Nutritional Sciences, Faculty of Medicine, University of Toronto, and the Clinical Nutrition and Risk Factor Modification Center, St. Michael's Hospital. He was educated at the University of Toronto, has over 140 publications in medical journals and has been invited to present at numerous international conferences. His primary research interest is the role of diet in the prevention and treatment of chronic disease (cardiovascular disease, diabetes and obesity). His studies on combining cholesterol-lowering food components (dietary portfolio) have been recognized as creating an effective dietary alternative to drug therapy (statins).

### Damiet Koenders



My background is Food Science at Wageningen University with the specialization in Food Physics. I started working for DSM in 2005 at the Biotechnology Center in Delft, the Netherlands. In the past years, I've worked on the applications of functional ingredients and enzymes in a variety of foods. And since 2012, I'm involved in the application of phytase in cereal based foods to improve the nutritional quality of the (young child's) diet.

### Frans Kok



Frans Kok (1950) is professor in Nutrition & Health and director of the Division of Human Nutrition at Wageningen University, The Netherlands. Kok was trained in human nutrition (MSc, PhD) in Wageningen and epidemiology (MSc) at Harvard University, Boston USA. Kok's scientific research covers topics such as diet in disease prevention, dietary behaviour, and overweight. In emerging economies in Asia and Africa attention is on diet and deficiency disorders. He is author of some 300 international peer-reviewed scientific publications and editor of three nutrition textbooks. From 2006-2010 he acted as Dean Research of Wageningen University being responsible for the quality of academic research and postdoctoral training. He has been member of the Academic Board of Wageningen University for more than 10 years. Kok is member of several (inter)national scientific committees. He chaired the Dutch National Health Council committee responsible for the 2006 Dietary Guidelines for the Netherlands. Kok presents and lectures on nutrition and health topics at many (popular)scientific (inter)national symposia, master classes, and the media.

### Patrick Kolsteren



Patrick Kolsteren is a Medical Doctor with a specialisation in Tropical Paediatrics and a PhD in Nutrition. He is currently working as professor at the Institute of Tropical Medicine of Antwerp, Belgium where he is head of the child health and nutrition unit. Dr Kolsteren has worked in Asia as a clinician and paediatrician for nine years before joining the institute. His work focusses on maternal and child nutrition with a particular emphasis on epidemiological aspects and the development of the evidence base. Dr Kolsteren has also an assignment at the Ghent University in international nutrition.

### Parviz Koohafkan



Dr. Parviz Koohafkan, is the Founder of the World Agricultural Heritage Foundation and the UN Partnership Initiative on "Conservation and Adaptive Management of Globally Important Agricultural Heritage Systems (GIAHS)". He is presently Professor and Senior Research Fellow at Research Institute for Humanity and Nature, Kyoto, Japan. He was born in 11 March 1951 in Iran, obtained an engineering degree in Natural Resources Management from University of Teheran, Iran, he has a Ph.D. in Ecology and Master in General and Applied Ecology from the University of Sciences and Techniques of Montpellier, France. His fields of specializations are: Integrated Natural Resources Management; Biodiversity and Genetic Resources Conservation; Sustainable Livelihood and Climate Change Management; Land Use Planning, Sustain-

able Agriculture and Rural Development; Environmental Impact Assessment; Dr. Koohafkan, started his career in Iran as assistant professor in ecology and then as a professor of Forest Ecology in Ecole National du Génie Rural des Eaux et Forêts in Montpellier, France.

From 1985 until 2012, he worked in Food and Agricultural Organization of the United Nations, FAO in several countries and held several Senior positions in FAO headquarter in Rome including the positions of Director of Land and Water Division, Director of the Climate Change and Bio-energy Division, and the Director of Rural Development Division in Sustainable Development Department of FAO.

Fluent in English, Spanish, French and Italian, he is the author of several books and publications on sustainable agriculture and rural development, biodiversity, agro-ecology, natural resources management and climate change.

### Klaus Kraemer



Dr Kraemer is the Director of Sight and Life ([www.sightandlife.org](http://www.sightandlife.org)), the humanitarian nutrition think-tank of DSM, and Adjunct Associate Professor in the Department of International Health of Johns Hopkins Bloomberg School of Public Health. Inspired by a vision of a world that is free from malnutrition, Sight and Life helps to improve the lives of some of the world's most vulnerable populations. It does this by supporting innovations that aim to eradicate malnutrition. Sight and Life's three strategic areas are to advance research, share best practices, and mobilize support for the world's undernourished. As a nutrition scientist with over 25 years of experience in research, advocacy, communication, and strategic and organizational leadership in the fields of nutrition and public health, Dr Kraemer has expertise in research and product development, as well as program implementation and evaluation. His interests range from capacity and leadership development to enable the scaling-up of nutrition interventions, to food and nutrition security, nutrition communication, and advocacy, among others. As Director, Dr Kraemer provides the leadership, vision, and direction (at all levels), guides a small but efficient global team, interacts with funders and partners, and serves as its key spokesperson internally and externally.

Dr Kraemer is editor of Sight and Life magazine, one of the most widely read scientific magazines on micronutrients and health in the developing world. He serves on several professional societies dedicated to nutrition, vitamins, and antioxidants, is reviewer for a number of scientific journals, has published many scientific articles, and co-edited 10 books.

### Samuel Kwame Ntim Adu



Samuel Kwame Ntim Adu is the Chief Executive Officer of Yedent Agro Group of Companies Limited. He holds a degree in Economics and Geography from the Kwame Nkrumah University of Science and Technology (Ghana), a Graduate Diploma in Management from the Henley Management College (UK) and an Executive Masters in Business Administration from GIMPA (Ghana). Samuel began his career with Unilever Ghana Limited in 1994. He resigned in 2002 to start Yedent Agro, a company whose mission is to bring good nutrition, affordability and convenience in consumer products such as cereal and tuber staples through vitamin and mineral fortification and more efficient production and distribution systems. The products are targeted at the most nutritionally vulnerable populations in Ghana and sub Sahara Africa.

Today from the town of Sunyani, in the heart of the maize producing region of Ghana, Samuel has established the first indigenous micronutrient food fortification processing company. The established company, Yedent, has attracted the attention and collaboration of some of the world's leading nutrition organizations. Among them are Global Alliance for Improved Nutrition (GAIN) and Ajinomoto Group of Companies Limited.

Samuel's enduring passion is to champion the cause of delivering affordable nutrition to the most vulnerable. Kwame has championed this passion on many nutrition and health platforms across the globe; from Africa to Europe, to America and to Asia.

### Carlo La Vecchia



Dr. La Vecchia received his medical degree from the University of Milan and a master of science degree in clinical epidemiology from Oxford University. He is recognized worldwide as a leading authority in cancer aetiology and epidemiology. Presently, he is Professor of Epidemiology at the School of Medicine at the University of Milan. Dr. La Vecchia serves as an editor for numerous clinical and epidemiologic journals. He is among the most renowned and productive epidemiologists in the field with over 1,790 peer-reviewed papers in the literature and is among the most highly cited

medical researchers in the world, according to ISI Highly Cited.comsm, the developer and publisher of the Science Citation Index (h index, 119). Dr. La Vecchia is an Adjunct Professor of Medicine at Vanderbilt Medical Center and the Vanderbilt-Ingram Cancer Center and of Epidemiology at the University of Lausanne, CH.

Dr. La Vecchia is a temporary advisor at the World Health Organization in Geneva, and a registered journalist in Milan. He was Adjunct Associate Professor of Epidemiology at Harvard School of Public Health between 1996 and 2001, and was Senior Research Fellow at the International Agency for Research on Cancer IARC/WHO between 2006 and 2008.

Dr. La Vecchia's main fields of interest include cancer epidemiology and the risk related to diet, tobacco, oral contraceptive use and occupational or environmental exposure to toxic substances; and analysis of temporal trends and geographical distribution of mortality from cancer, cardiovascular diseases, perinatal and other selected conditions.

### Guillem López Casasnovas



Born in Ciutadella, Menorca, married and with three children. Bachelor of Economics (with Honours, 1978) and Law degree (1979) from the University of Barcelona, he earned his Ph.D. in Public Economics from the University of York (United Kingdom, Ph.D. 1984). He has taught at the University of Barcelona, and has been visiting scholar at the Institute of Social and Economic Research (UK), University of Sussex and the Graduate School of Business at Stanford University (USA).

Since June 1992 he is Professor of Economics at the Pompeu Fabra University of Barcelona. He has been deputy rector of Economics and International Relations and Dean of the Faculty of Economics and Business Administration of the same university between 2000 and 2004. In 1996 he co-founded, along with Vicente Ortún, the Centre for Research in Health and Economics (CRES -UPF), an institution that he run until 2006. He is currently Senior Research Fellow and member of the Governing Council of the same centre. He is co-director of the Master of Public Management (UPF -UAB - EAPC) and the Master of Health Economics & Policy of the Barcelona Graduate School of Economics (Barcelona GSE). His main research interests include the measurement of the efficiency of the public sector, the changing role of the public sector in general (and in the health sector in particular), fiscal balances, the financing of local government finances, health economics, dependency and intergenerational balances.

Since 2005 he is an independent adviser of the Governing Council of the Bank of Spain and member of the Advisory Council for Economic Recovery and Growth (CAREC). He is a member of the Advisory Board of the Ministry of Health (since 2000) and the Departments of Health of Catalonia and the Balearic Islands (from 2001). He was President of the International Health Economics Association (IHEA) between 2007 and 2011 and has also served as an expert adviser for the World Health Organization (WHO) on health inequalities in the European Union.

### Ascensión Marcos



Research Professor: Spanish National Research Council (CSIC): March 2006; Head of the Immunonutrition Research Group: Institute of Food Science and Technology and Nutrition (ICTAN)-CSIC: 1989; Head of the Institute of Nutrition and Food Technology (CSIC): 1998-2002; Guest Lecturer ad-honorem at the Buenos Aires University (Chair of Nutrition, Health, Nutrition, Food Technology and Toxicology Department. Pharmacy and Biochemistry School). 2004; International Forum on Immunonutrition for Education and Research (i-FINER): President (2008-2014); International Society for Immunonutrition (ISIN): President (2014-2018). Federation of European Nutrition Societies (FENS): President (2011-2015), Treasurer (2007-2011); Royal Catalan Academy of Pharmacy: Honorary member (2011); Royal Spanish Academy of Pharmacy: Honorary member (2015); Spanish Nutrition Society (SEÑ): Treasurer (2010-2015), Past-President (2007-2010), President (2003-2007), Board Member (1999-2003), Secretary (1997-1999) Spanish Federation of Nutrition, Food and Dietetics Societies (FESNAD): Board Member (2003-2005); Fellow of the International Union of Nutritional Sciences for outstanding research, development of nutritional sciences, national recognition and contribution to IUNS and other international organizations (2013); Spanish Agency of Food Safety, Consumption and Nutrition (AECOSAN): Member of the Scientific Committee (2013-2015).

473 publications: SCI Journals: 214 original articles, 29 reviews, 12 journal editions. Guest Editor in 9 supplements: AJCN (1997), EJCN (Aug-2002; Dec-2002), Nutrition (2003), NH (2003), IJO (2004), BJN (2007), PNS (2008, 2010, 2011, 2012), ANM (2013), NH (2013). No SCI journals: 89 original articles, 7 reviews, 1 edition. Books: 109 book chapters, 8 books, 8 editions.

### André Marette



Dr. André Marette graduated from Laval University in 1990 with a PhD in Physiology and Endocrinology. He is currently full professor in the department of Medicine and Scientific Director of the Institute of Nutrition and Functional Foods at Laval University, Québec, Canada.

Dr. Marette is an international expert on the pathogenesis of inflammation, type 2 diabetes and cardiovascular diseases in obesity. His research in the areas of insulin action and insulin resistance, and the mechanisms of inflammation, has advanced the understanding of the cellular/molecular defects leading to diabetes and opened new possibilities for nutritional and pharmacological therapeutic interventions. He has published over 150 papers in high-impact journals (Nature Medicine, PNAS, J Biol Chem., FASEB J, Cell Metabolism, Diabetes, etc...) and 15 reviews or book chapters.

Dr. Marette holds several national and international research grants and awards and a research Chair in the pathogenesis of insulin resistance and cardiovascular diseases. He is also leading international research collaborations with Norway, Finland, Brazil and France. Dr. Marette has received several awards including the prestigious Young Scientist Award of the Canadian Diabetes Association and the Charles Best Lectureship Award of the University of Toronto, both in recognition for his outstanding contribution to diabetes research.

Dr Marette has organized a number of national and international meetings and symposia and has been invited to speak at more than a 140 national and international meetings. He also serves as internal or external referee to a number of international and national funding agencies.

### Carmen Martín Salinas



Máster Oficial en Docencia Universitaria por la Universidad de Alcalá. Alcalá de Henares. Madrid. Diplomado Universitario en Enfermería. Universidad Nacional de Educación a Distancia Actividad docente.

Desde enero de 2011, en que se produjo la integración de la Escuela de Enfermería La Paz en la Universidad Autónoma de Madrid, ejerzo como profesora en el Grado en Enfermería, en las asignaturas Farmacología y Nutrición II (2º curso) y Estudio y Manejo del dolor (4º curso).

Anteriormente había ejercido como profesora de Nutrición y Dietética y de Enfermería Médicoquirúrgica I y II en la Diplomatura de Enfermería de la EUE La Paz desde 1988 hasta 2010. En relación con la actividad docente e investigadora, he participado en proyectos de innovación docente (propios y como colaborador), he tutelado trabajos de fin de Grado y dispongo de publicaciones científicas, tanto capítulos de libro como artículos en revistas nacionales, con índice de impacto, sin índice. Asimismo, he presentado más de 30 trabajos en congresos nacionales o internacionales con ponencias orientadas a la formación docente, y he participado en un proyectos de I+D+i financiado en convocatorias competitivas de Administraciones o entidades públicas y privadas. Y estoy pendiente de la resolución de un nuevo proyecto. También he sido coordinadora del volumen "Nutrición y Dietética" de la colección Enfermería S21 (1ª y 2ª edición) editorial DAE (Grupo PARADIGMA).

En cuanto a otro tipo de actividades, he formado parte del grupo de trabajo para la Normalización de las intervenciones para la práctica de la enfermería (proyecto NIPE). Instituto Superior de Investigación para la Calidad Sanitaria (ISICS) 2006. Cofundadora de ADENYD (asociación de enfermeras de nutrición y dietética) y Vicepresidenta de la misma durante tres legislaturas. Vicepresidenta de ADENYD en las elecciones de 2013. Socia SENC (Sociedad Española de Nutrición Comunitaria). Pertenencia al Consejo de Redacción de la Revista Cuidados Nutricionales (ADENYD). Pertenencia al Comité Consultivo Internacional de la Revista Aquichan.

### J. Alfredo Martínez



Professor of Nutrition, chairman of the Institute of Nutrition at the University of Navarra since 2002. Associate Director of I+D+i at INIA (Soria). Member of the Scientific Advisory Group for the 7th EU framework, ILSi, Académico Correspondiente Real Academia de Farmacia (Royal Academy of Pharmacy, Spain), Secretary of the Federation of European Nutrition Societies (FENS 2003-2007), Spanish Federation of Nutrition, Food and Dietetics (FESNAD president 2005-2010). Member of the IUNS Council (2005-), President-elect of International Union of Nutritional Sciences (2013-), President of ISNN (2014-).

The research fields in which I have been involved for the last years include: Nutritional control of metabolism, Nutritional utilization of functional foods, Evaluation of nutritional status in different populations Nutrition and immunity, Obesity: cell, animal and human intervention and epidemiological studies, Consumer surveys, Long-distance learning.

Nutrigenomics number of publications with ISBN > Over 500. Books and chapters > Over 50, invited speaker > Over 100 lectures at international and national level (selected forum).

### Miguel Ángel Martínez Gonzalez



Prof. Martínez-Gonzalez, MD, PhD, MPH is Professor and Chair of the Department of Preventive Medicine and Public Health at the University of Navarra. He is the principal investigator of the SUN cohort, which was initiated in 1999 and has already recruited over 22000 participants with >120 scientific publications. He has been the coordinator of the PREDIMED Network (RD 06/0045) funded by Instituto de Salud Carlos III from 2006 to 2013. He was awarded in 2013 with a 2.1 million euro Advanced Research Grant by the European Research Council PREDIMED-PLUS n° 340918 (2014-2019). He has been visiting scholar at Harvard School of Public Health, concretely at the Department of Nutrition lead by Prof. Willett, in 1998, 2001 and 2004. He is associated editor of the British Journal of Nutrition. He has co-authored over 450 peer-reviewed articles and has an h-index of 63 according to google scholar and of 49 according to the web of science. His articles have been cited >8200 times (average number of cites/article: 17.5). He has been the director and supervisor of 30 doctoral theses. He has been the editor or director of >20 books, two of which are the textbook "Bioestadística amigable" [Friendly biostatistics] (Diaz de Santos, 2006, 2ª ed; Elsevier 2014, 3ª ed) and the textbook "Conceptos de salud pública y estrategias preventivas" [Concepts of Public Health and preventive strategies] (Elsevier, 2013).

### Reynaldo Martorell



Dr. Reynaldo Martorell is the Robert W. Woodruff Professor of International Nutrition at the Rollins School of Public Health of Emory University, Atlanta, GA (USA). He was chair of the Department of Global Health from 1977-2009. He obtained a PhD in biological anthropology from the University of Washington, Seattle, in 1973. His research interests include maternal and child nutrition, child growth and development, micronutrient malnutrition, and the emergence of obesity and chronic diseases in developing countries. Previously, he was a scientist at the Institute of Nutrition of Central America and Panama (INCAP; 1972-77), Associate Professor and then Professor of Nutrition, Food Research Institute, Stanford University (1977-91) and Leading Professor, Division of Nutritional Sciences, Cornell University (1991-93). He serves on the Board of Directors, Nevin Scrimshaw International Nutrition Foundation; the Executive Management Team, Food Fortification Initiative; and the Board of Trustees, Helen Keller International, among other appointments. His awards include election to the Institute of Medicine of the USA National Academy of Sciences, the Kellogg's International Nutrition Prize from the American Society for Nutrition, the Gopalan Oration and Gold Medal Award from the Nutrition Society of India and the Carlos Slim Award for Lifetime Achievements in Research on Health.

### Massimo Massi-Benedetti



Professor Massimo Massi-Benedetti, MD, former Associate Professor of Endocrinology and Metabolic Diseases, Chair of the School of Podology, of the School of Nursing Sciences and member of the Academic Senate at the University of Perugia (Italy), Chair of the Coordination Office of the Umbria Reference Centre for Diabetes; Co-director of the WHO Collaborating Centre for Improvement of Diabetes Care. Chair of the IDF European Region from 1997 to 2003 and IDF Vice-president from 2003 to 2009, Chairman of the IDF Science Task Force 2009-2012, Director of Research and Education at the Dasman Institute for Diabetes Research in Kuwait. At present he is President and Scientific Director of the HUB for International health ReSearch-HIRS ([www.HIRS-research.eu](http://www.HIRS-research.eu)) and Senior IDF Programme Advisor.

Professor Massi-Benedetti's areas of interest in the field of diabetes include: pathophysiology; evaluation of new drugs; advanced systems for insulin delivery; complications; pregnancy; metabolic monitoring; and epidemiology. He was a member of the European Union research projects EURODIABETA; DIABCARD 1-4; DIABCARE 1-3; MFIT; DIABSTYLE 1-2; ADICOL, IMMIDIAB and coordinator of the B.I.R.O. Consortium Project leader of the EUBIROD EU Project ([www.eubirod.eu](http://www.eubirod.eu)).

Professor Massi-Benedetti is a member of numerous national and international diabetes societies, has organised, chaired and spoken at more than 300 national and international meetings. He was also founder and member of various EASD study groups. He is the author of approximately 350 publications (full papers, abstracts and book chapters) and has sat on the editorial boards of numerous peer-reviewed journals.

### Ron Maughan



Ron Maughan is currently Emeritus Professor of Sport and Exercise nutrition at Loughborough University, England. He obtained his BSc (Physiology) and PhD from the University of Aberdeen, and held a lecturing position in Liverpool before returning to Aberdeen where he was based in the Medical School for 25 years. His research interests are in the physiology, biochemistry and nutrition of exercise performance, with an interest in both the basic science of exercise and the applied aspects that relate to health and to performance in sport. For 10 years, he chaired the Human Physiology Group of the Physiological Society and he has chaired the Nutrition Working Group of the International Olympic Committee since 2001.

### Xavier Medina



Ph D in Social Anthropology (University of Barcelona). MA in Applied Anthropology (UNED, Madrid). Current Positions: Academic and Programmes Director, Department of Food Systems, Culture and Society, College of Health Sciences, Universitat Oberta de Catalunya (UOC), Barcelona (Spain) (from 2009). General Coordinator of postgraduate studies, College of Health Sciences, UOC (from 2011). Director of the UNESCO Chair on Food, Culture and Development. Universitat Oberta de Catalunya (UOC), Barcelona. Associate professor (Humanities and Methodology), Ramon Llull University. Barcelona.

Former Positions: Senior researcher and head of projects at the European Institute of the Mediterranean (IEMed), Barcelona (1991-2009). He's author of more than a dozen books and more than a seventy articles in journals, mainly on food issues.

### Bent Egberg Mikkelsen



Bent Egberg Mikkelsen holds a M.Sc. of Food Science from the Royal Agricultural University, Copenhagen and a PhD in Social Science, from Roskilde University. He is the author of a large number of publications on public health nutrition and sustainable public food systems. Bent is principal investigator on several research projects and work include several assignments on nutrition at schools and hospitals for the Council of Europe, food and nutrition at work for the Nordic Council of Ministers, healthy eating at school for the European WHO regional office and the EU platform for Health, Diet and Physical activity. He is a Professor of Nutrition and Public Food Systems at the MENU research group at Aalborg University. Chair of EU expert committee for the school fruit scheme (SFS). Member of advisory boards of ProMeal, Glamur and VeggieEat projects. Member of scientific panel in the Sapere Taste Education network and the EU FoodLinks project. He is the Member of the Management committee COST action IS1210 and the vicepresident in the Food & Nutrition section of EUPHA.

### Luis A. Moreno



Luis A. Moreno is Professor of Public Health at the University of Zaragoza (Spain). He is also Visiting Professor of Excellence at the University of Sao Paulo (Brazil) and affiliated member at the Johns Hopkins Global Center on Childhood Obesity. He did his training as Medical Doctor and his PhD thesis at the University of Zaragoza. He studied Human Nutrition and Public and Community Health at the University of Nancy (France). He has participated in several research projects supported by the Spanish Ministry of Health, and the European commission (HELENA, IDEFICS, EURRECCA, ENERGY, Toy-Box and iFamily). He has published more than 350 papers in peer reviewed journals. He is the coordinator of the GENUD (Growth, Exercise, Nutrition and Development) research group, at the University of Zaragoza. He is a former member of the ESPGHAN Committee of Nutrition, current Vice-President of the Spanish Nutrition Society and President of the Danone Institut of Spain.

### Maria Neira



Director for the Department of Public Health, Environmental and Social Determinants of Health. Dr Maria P. Neira was appointed Director of the Department of Public Health, Environmental and Social Determinants of Health at the World Health Organization, Geneva, Switzerland in September 2005. Prior to that, she was Vice-Minister of Health and President of the Spanish Food Safety Agency. She had previously held several senior positions in WHO. Dr Neira began her career as a medical coordinator

working with refugees in the Salvador and Honduras for Médecins Sans Frontières (Doctors Without Borders).

Dr Neira is a Spanish national, and a medical doctor by training. She specialized in Endocrinology and Metabolic Diseases; and Public Health. Dr Neira has been awarded the Médaille de l'Ordre national du Mérite by the Government of France and is a member of the Academy of Medicine, Asturias, Spain.

### Lynnette M. Neufeld



Lynnette M. Neufeld is Director of Monitoring, Learning and Research at the Global Alliance for Improved Nutrition (GAIN) where she leads a team dedicated to the strategic collection, translation, and use of evidence to guide the design and improvement of nutrition programs globally. Dr. Neufeld is Chair of the Steering Committee of the Micronutrient Forum and is a council Member of the International Union of Nutritional Sciences (IUNS). Dr. Neufeld has extensive international experience, including 10 years at the National Institute of Public Health (INSP) in Mexico where her research focused on improving the effectiveness of interventions to promote the health, growth and development of children from disadvantaged populations. She continues an active research agenda, including lead researcher on the nutrition impact evaluation of the Oportunidades (Mexico). She continues an active role in research, teaching and student advising through on-going collaborations with Emory and Cornell Universities and INSP in Mexico and has over 80 publications in peer reviewed journals and book chapters. Dr. Neufeld has a Doctoral and Master's Degrees in International Nutrition from Cornell University and a Bachelor of Applied Human Nutrition from Guelph University in Guelph, Canada.

### Mariela Nissensohn



Mariela Nissensohn was born in Buenos Aires, Argentina. She obtained a degree in Nutrition at the University of Buenos Aires, Argentina in 1998. She studied a Master in Clinical Nutrition at the Universidad Autónoma de Madrid, and obtained her PhD. in Public Health (Epidemiology, Planning and Nutrition) at the University of Las Palmas de Gran Canaria in 2012.

After worked as a Clinical Nutrition consultant in diverse institutions, she has been Associate Professor of Nutrition at the Universidad Autónoma del Carmen, México during 2007 - 2008. Since 2009 she is working in the Nutrition Research Group, at the University of Las Palmas de Gran Canaria, under the direction of Prof. Dr. Serra-Majem, where she has participated in national and international projects. Recently she is member of the Biomedical Research Centre in Physiopathology of Obesity and Nutrition (CIBERObn). She is author and co-author of many nutrition articles.

### Trine Nørnberg



Trine R. Nørnberg has obtained a B.Sc. in Food Science and Nutrition from Copenhagen University and a M.Sc. in Integrated Food Studies from Aalborg University in Copenhagen, Denmark, where her studies primarily have been focused on choice architecture (nudging) used in health promotion, human nutrition and public health as well as the effectiveness and development of National health recommendations. Her research interests lies within behavioural nutrition, sustainable eating and consumer sciences.

### Shane Norris



Shane Norris is a Research Professor in the Department of Paediatrics at the University of the Witwatersrand, Johannesburg, South Africa. Shane Directs the MRC/Wits Developmental Pathways for Health Research Unit. He has extensive research experience in longitudinal cohort studies and epidemiology and his research expertise and interest includes: (i) maternal and child health, (ii) child nutrition, growth, body composition, and development; and (ii) intergenerational transmission and developmental origins of obesity and metabolic disease risk.

### Mark O'Doherty



I am currently a postdoctoral research fellow at the UK-CRC Centre of Excellence for Public Health, Queen's University Belfast. My postdoctoral training to date has been in the field of cardiovascular and cancer epidemiology, and healthy ageing. I am currently core to the strategic organisation of the cardiovascular disease and diabetes Work Package within the EU 7th framework

CHANCES Project: Consortium on Health and Ageing: Network of Cohorts in Europe and the United States. In this present post, I have recently been awarded a three year CARDI Leadership Programme in Ageing Research Fellowship to explore differences in trends in work related disability, and of the differences in the way people report disability between nations and across different national health and welfare service contexts. This will be achieved through the use of the Northern Ireland Cohort for the Longitudinal Study of Aging (NICOLA). With the support of this Fellowship I will build upon my current ageing research interests, and lay the foundation for a career as a research leader within the NICOLA study.

### Victor O. Owino



Dr Victor O. Owino is currently a Senior Lecturer and Chairman, Department of Human Nutrition & Dietetics, Technical University of Kenya. His research focuses on development and testing of efficacy of nutritious foods on infant and young child growth. Dr Owino has experience in application of stable isotopes for determination of breast milk intake and body composition. Additionally, he is currently leading work on the impact of maternal HIV-seropositivity on breast milk output among Kenyan mothers. He has previously worked at Valid Nutrition and University of California Davis.

### Luis Peña Quintana



Profesor Titular de Pediatría de la Universidad de Las Palmas de Gran Canaria. Jefe Sección de Gastroenterología, Hepatología y Nutrición Pediátrica del Hospital Universitario Materno-Infantil de Canarias (Las Palmas de Gran Canaria). Médico Especialista (MIR) en Pediatría. Diplomado en Gastroenterología, Hepatología y Nutrición Pediátrica y en Errores Innatos del Metabolismo. Diplomado en Sanidad y Medicina de Empresa. Gestor de los Sistemas de Calidad en el Sector Sanitario de la European Organization for Quality (EOQ) (EOQ Quality Systems Manager in Healthcare). Presidente de la Sociedad Española de Gastroenterología, Hepatología y Nutrición Pediátrica (2008-2012). Académico Fundador y Secretario de la Academia Española de Nutrición y Ciencias de la Alimentación. Miembro de ESPGHAN, LASPGHAN, de ONGs (Nutrición sin fronteras-Barcelona, España-, Cooperación para la Nutrición Infantil-CONIN-Argentina) y de varias Asociaciones, Comités y Sociedades nacionales e internacionales. Autor o coautor de numerosas comunicaciones, monografías, capítulos de libros y publicaciones nacionales e internacionales. Ha dirigido y dirige varias tesis doctorales y trabajos de investigación. Investigador principal o miembro de varios proyectos de investigación, becas y ensayos clínicos subvencionados por organismos públicos y privados. Ha impartido numerosos cursos, conferencias, cursos del doctorado y ponencias relacionados con su especialidad.

### Juan Pablo Peña Rosas



Dr Juan Pablo Peña-Rosas currently coordinates the Evidence and Programme Guidance, Department of Nutrition for Health and Development at the World Health Organization (WHO) in Geneva, Switzerland. He oversees the development of evidence-informed guidelines for interventions addressing the double burden of malnutrition for neonates, infants, children and women in stable and emergency settings, under the WHO Research Strategy umbrella. He has been an Adjunct Assistant Professor at Emory University Rollins School of Public Health in Atlanta, United States since 2011. He received his Medical Degree from Universidad Central de Venezuela in his native country and a Master's Degree in Public Health Nutrition from University of Puerto Rico in San Juan. He holds a PhD in Human Nutrition and Epidemiology from Cornell University, Ithaca, NY. Dr Peña-Rosas is a member of the American Society for Nutrition, Latin American Society of Nutrition, the American Evaluation Association, the Cochrane Collaboration, Grading of Recommendations Assessment, Development and Evaluation (GRADE) working group and the WHO Guidelines Review Committee 2010-2012.

### José Luis Peñalvo



José has been a postdoctoral fellow at the University of Helsinki School of Medicine (Finland) and the Johns Hopkins School of Public Health (Baltimore, MD) before joining the Spanish National Center for Cardiovascular Research (CNIC) in 2008. While at CNIC, José has been coordinating the area of lifestyle epidemiology. Currently holding a Joint appointment at CNIC, José is a co-investigator in two large cohorts aimed at identifying determinants

of early subclinical atherosclerosis: The PESA (Early Detection and Progression of Early Subclinical Atherosclerosis) study and the Aragon Workers' Health Study (AWHS). He has a strong background in clinical research and epidemiology methods, including the design, implementation and evaluation of community-based interventions. He is particularly interested in the study of lifestyle determinants of cardiovascular health. He has worked on this topic from different perspectives, starting from basic biomedical research to currently working at applying epidemiological methods and advanced biostatistics to large datasets.

### Carmen Pérez Rodrigo



Dr. Carmen Pérez-Rodrigo is President of the Spanish Society of Community Nutrition –Sociedad Española de Nutrición Comunitaria (SENC). MD, Specialist in Preventive Medicine and Public Health, postgraduate diploma in Nutrition, specialized postgraduate training in public health nutrition, nutrition epidemiology, community nutrition and nutrition education. Advanced degree in Communication sciences – journalism. For more than 25 years has coordinated nutrition surveys at the local, regional and national level and has been involved in the design, implementation and evaluation of community nutrition programs at local, national and international level, particularly school based programs. Has been involved in European research projects such as Eurreca, Eurobase (Ethics and the obesity and overweight epidemic: image, culture, technologies and interventions), Pro Children (Promoting and sustaining health through increased vegetable and fruit consumption among European schoolchildren) or Eurodiet, among other. Contributed to the development of a framework for WHO DPAS implementation, monitoring and evaluation; Advisor to the Council of Europe task force on School–Meals and contributor to the development of the European Network of Health Promoting Schools 'Healthy Eating for Young People In Europe. A school-based nutrition education guide'. Vice-president of the European Academy of Nutritional Sciences (EANS) (2004-2009); Member of the Executive Committee of the International Society for Behavioral Nutrition and Physical Activity (ISBNA) (2007-2013) and board member for Public Health Nutrition at Sociedad Española de Nutrición Básica y Aplicada (SENBA) (2003-2007). Editor of Revista Española de Nutrición Comunitaria-Spanish Journal of Community Nutrition (RENC) (2006-2012). Member of the Editorial Board of Public Health Nutrition (2002-2014) and Health Education.

### F.J. Armando Pérez-Cueto



F.J. Armando Pérez-Cueto is Associate Professor of Public Health Nutrition at Aalborg Universitet's Campus in Copenhagen, Denmark. He has been visiting lecturer at the Faculty of Food and Nutrition Sciences (FCNAUP) of Porto University yearly since 2011. During his career he was part of several EU Funded projects, namely, DAFNE (Data Food Networking), EATWELL, Q-PorkChains, ProSafeBeef. Currently, he is Work Package leader of the VeggieEAT Project (IAPP-Marie Curie/EU grant agreement # 612326), member of the Sino-Nordic Network Food4Growth (Nordic Council of Ministers), and principal investigator of the Danish-Brazilian Network ELIGEBIEN (Danish Ministry of Education and Innovation Funds). Originally a Food Engineer from UNIVALLE, Bolivia, he received his postgraduate qualifications from Ghent University, namely a PhD in Applied Biological Sciences, a MSc in Rural Development Economics, and a Diploma in Food Science & Nutrition. He has consolidated a multi-disciplinary research approach around different aspects of food and health, including postdoctoral work combining nutrition and consumer research. Presently, the focus of his research is on the role that choice architecture (nudging) could play in Public Health Nutrition. He is author of 46 original articles, co-editor of 1 book, and member of the Editorial Boards of Nutricion Hospitalaria (Comité Editorial Iberoamericano), Revista Chilena de Nutrición and Perspectives in Public Health. He enjoys sharing conversations and interchange of ideas with young researchers and students.

### Szabolcs Péter



Dr. Szabolcs Péter is a scientist at R&D Human Nutrition and Health of DSM Nutritional Products Ltd. in Switzerland. He obtained his M.D. (general medicine) and Ph.D. (health sciences) degrees at Semmelweis University, Budapest. His doctoral thesis focused on the role of lifestyle in obesity prevention. Simultaneously he was working on childhood obesity at the Department of Nutritional Physiology of National Institute for Food and Nutrition Science. After completing a postdoctoral fellowship on metabolic syndrome at the School for Physiology and Nutrition of North West University in South Africa, he was engaged at Gedeon Richter Plc. in anti-obesity drug development.

### Per Pinstrup-Andersen



Per Pinstrup-Andersen is Professor Emeritus and Graduate School Professor at Cornell University and Adjunct Professor at Copenhagen University. He is past Chairman of the Science Council of the Consultative Group on International Agricultural Research (CGIAR) and Past President of the American Agricultural Economics Association (AAEA). He has a B.S. from Copenhagen University, a M.S. and Ph.D. from Oklahoma State University and honorary doctoral degrees from universities in the United States, the United Kingdom, Netherlands, Switzerland, and India. He is a fellow of the American Association for the Advancement of Science (AAAS) and the American Agricultural Economics Association. In addition to his 15 years as professor at Cornell University, he served 10 years as the International Food Policy Research Institute's Director General and seven years as department head; seven years as an economist at the International Center for Tropical Agriculture, Colombia; and six years as a distinguished professor at Wageningen University. He is the 2001 World Food Prize Laureate and the recipient of several awards for his research and communication of research results.

### Andrew Prentice



Professor of International Nutrition. Director, MRC International Nutrition Group. Andrew Prentice will be one of the lecturers that will be at the III World Congress of Public Health Nutrition. His speech will take place at Sunday November the 9th.

Prentice was dedicated almost his whole life to the work and research about the nutrition. After five years working at the MRC Dunn Nutrition Unit's rural field station in Keneba, The Gambia, he traveled to Cambridge, where he focused on the study of the regulation of energy balance with a particular focus on obesity, being Head of Human Energy Metabolism at the MRC Dunn Clinical Nutrition Centre of the English city. Nowadays, he collaborates with The Gambia, Chile, Bangladesh, Kenya and Tanzania in researches focused on the four areas of ING, with special interest in the early life programming of immune function, nutrient-gene interactions and reproductive nutrition.

He has also been member of several international advisory committees and achieve important awards in his investigation fields, as the EV McCollum International Lecturer Award from the American Society of Nutrition 2010/11, and the 5th George G Graham Lectureship 2011 from Johns Hopkins University.

All this large experience of the situation and needs of the international nutrition will provide this Congress a really global and accurate point of view of the world situation of this field.

gh-impact journals (Nature Medicine, PNAS, J Biol Chem., FASEB J, Cell Metabolism, Diabetes, etc...) and 15 reviews or book chapters.

Dr. Marette holds several national and international research grants and awards and a researchChair in the pathogenesis of insulin resistance and cardiovascular diseases. He is also leading international research collaborations with Norway, Finland, Brazil and France. Dr. Marette has received several awards including the prestigious Young Scientist Award of the Canadian Diabetes Association and the Charles Best Lectureship Award of the University of Toronto, both in recognition for his outstanding contribution to diabetes research.

Dr Marette has organized a number of national and international meetings and symposia and has been invited to speak at more than a 140 national and international meetings. He also serves as internal or external referee to a number of international and national funding agencies.

### Monique Raats



Professor Monique Raats is Director of the University of Surrey 's Food, Consumer Behaviour and Health Research Centre. She previously worked at the Institute of Food Research, Health Education Authority and University of Oxford. Her portfolio of research is wide ranging in terms of topics being addressed (e.g. food choice, policy development, food labelling), and methodologies used (e.g. qualitative, quantitative, stakeholder consultation). Since her arrival at the University of Surrey in 2000, she has played a central role in securing research funding for both national and European research projects. She has published over 95 peer-reviewed papers, 19 book chapters, and co-edited two books (The Psychology of Food Choice; Food for the Ageing Population). She is a founding member of the International Society of Behavioral Nutrition and Physical Activity. In 2011 Monique joined the UK's Scientific Advisory Committee on Nutrition and is a member of its Subgroup on Maternal and Child Nutrition.

### Ines Reinhard



Dr. Ines Reinhard holds a MSc in Home Economics and Nutritional Science and obtained her PhD in Nutrition from University of Giessen, Germany. Her research looked at the impact of food-for-work measures on improving the nutritional status of rural populations in Indonesia. Since 1997 she has been working for the German Development Cooperation (GIZ) in various positions, including long-term assignments in Indonesia, Cambodia, Ethiopia, Vietnam and Sri Lanka. In her current position as senior planning officer in the Department for Agriculture and Food in GIZ Headquarters in Germany, she guides and supervises projects aimed at ensuring food and nutrition security. She has a regional focus in West Africa, the Greater Lakes Region, as well as South and Southeast Asia. Her responsibilities include the development of innovative concepts and approaches to improve nutrition, as well as advisory services for the German Ministry of Economic Cooperation and Development (BMZ).

### Pilar Riobó Serván



Pilar Riobó Serván, Born in San Antonio, Texas USA. MD, Universidad Complutense de Madrid, 1983. (A with honors). PhD Universidad Complutense de Madrid, 1992. (A with honors).

Specialist in Endocrinology and Nutrition, in Hospital Ramon y Cajal Madrid, where worked until 1990. Fellowship in Jackson Memorial Hospital, University of Miami (Florida), 1993. Supervisor of Radiological Facilities. Current Academic and Professional Appointment: Associate Head of Nutrition and Endocrinology Department, Fundación Jiménez Díaz-IdC Hospital, Universidad Autónoma, Madrid.

Lectureships, Seminar Invitations, and Presentations at Meetings and Conferences national and international meetings: Has written 5 books, and more than 80 Peer Reviewed Publications in Spanish and foreign journals. Collaboration with media: TV, Radio, magazines and Journals, weekly for nutrition subjects, since 1990.

Memberships and Appointments: Member of Spanish Society of Endocrinology y Nutrition. Vicepresident of Society of Endocrinology, Nutrition and Diabetes of Madrid Community (Sendimad). Member of European Enteral and parenteral Nutrition Society (ESPEN). Member of Spanish Society of Parenteral and Enteral Nutrition (SENPE): President of the 2012 SENPE meeting in Madrid.

Honors and Awards: Award of the Spanish Society of the fight against Hypertension. Award of the Danone Institute. Extraordinary Award End of Medical Studies.

### Claudia Andrea Rodriguez Mora



Graduada en nutrición y dietética en la Universidad Industrial de Santander, Colombia. Actualmente cursa la maestría de Nutrición en Salud Pública en la Universidad de São Paulo, Brasil y realiza intercambio académico en el Observatorio de la Alimentación de la Universidad de Barcelona, España. Becaria de la "Fundação de Amparo à Pesquisa do Estado de São Paulo FAPESP"

y del programa de movilidad internacional Santander. Trabajo en Colombia como nutricionista en la Secretaría Departamental de Salud de Santander y en el programa de alimentación escolar de Nariño. Tiene experiencia en el área de salud pública, actuando principalmente en la asesoría de programas y políticas de alimentación y nutrición, alimentación escolar y seguridad alimentaria y nutricional.

Graduated in nutrition and dietetics at the Industrial University of Santander, Colombia. Currently pursuing a Master's degree in Public Health Nutrition at the University of São Paulo, Brazil and takes academic exchange at "Observatorio de la Alimentación" at the University of Barcelona, Spain. Fellow of the "Fundação de Amparo à Pesquisa do Estado de São Paulo FAPESP" and the program of international mobility Santander. Works in Colombia as a nutritionist in the Health Government Department of Santander and for the school feeding program of Nariño. He has experience in the area of public health, acting in the following subjects: advice of programs and policies on food and nutrition, school feeding and food and nutrition security.

### Blanca Román Viñas



Doctora en Medicina, médico especialista en Medicina del Deporte y Master en Nutrición. Trabaja como investigadora en la Fundación para la Investigación Nutricional y es profesora lectora de la Escuela Universitaria de la Salud y del Deporte de la Universidad de Girona y también de la Universidad Ramon Llull. Ha participado como investigadora en varios proyectos europeos con

la temática de la armonización de las recomendaciones nutricionales en toda Europa (EURRECA, EUROpean RECommendations Aligned. Harmonising nutrient recommendations across Europe with special focus on vulnerable groups and consumer understanding) o el desarrollo de plataformas basadas en las TIC para promover la actividad física y la alimentación saludables (C4H-Credits for Health; PIPS - Personalised Information Platform for Life and Health Services). Es miembro de la CIBERobn (Ciber de Fisiopatología de la Obesidad y Nutrición) del Instituto de Salud Carlos III. Sus áreas de investigación se centran en el estudio de los métodos de medición de la actividad física, la evaluación de la misma en la población, la evaluación de los hábitos alimentarios y de ingestas inadecuadas de nutrientes en la población.

### Cristina Ruano Rodríguez



Cristina Ruano holds a degree in Pharmacy from the Complutense University of Madrid specialising in Biochemistry and a Ph.D. in Public Health (Epidemiology, Planning and Nutrition) from the University of Las Palmas de Gran Canaria. She is a University Expert in Community Nutrition and holds a post-graduated diploma in Mediterranean diet from the University of Barcelona. Since 2009 she is working in the Nutrition Research Group, at the University of Las Palmas de Gran Canaria, under the direction of Prof. Dr. Serra-Majem, where she has participated in national and international projects. She is member of the Biomedical Research Centre in Physiopathology of Obesity and Nutrition (CIBERobn). She has taken part in several research lines in the field of Nutritional Epidemiology and she is author and co-author of many articles on the relationship between nutrition and diseases.

### Anu Ruusunen



Anu Ruusunen is working as a post-doctoral researcher and clinical nutritionist in the Department of Psychiatry, Kuopio University Hospital, Kuopio, Finland. She finished her Ph.D. studies on the field of nutritional epidemiology in 2013 with Ph.D. thesis "Diet and depression - an epidemiological study". She has expanded her education during the last years in epidemiology, psychiatry, public health, behavioral sciences and biostatistics. Now she is continuing post-doctoral research in the field of diet and depression especially concentrating on the clinical dietary interventions. Next year she is going to have a post-doctoral visit in the SMILES trial in Deakin University, Australia. She is a writer of several scientific and popular articles of nutritional topics and is a writer of textbook of nutrition for nursing practices. Her clinical specialties include nutritional counselling especially in psychiatric disorders, including affective disorders, anxiety disorders, psychotic disorders and eating disorders.

### Joan Sabaté



Dr. Joan Sabaté is Professor of Nutrition and Epidemiology in the School of Public Health, at Loma Linda University in the USA. In 1992, he was investigator and co-author of the landmark population study first relating frequency of nut consumption to lower risk of heart disease among California Adventists. He subsequently served as principal investigator in a nutrition research study that directly linked the consumption of walnuts to significant reductions in serum cholesterol. His findings were published in the New England Journal of Medicine in 1993 and received the attention of more than 400 international media sources. Dr Sabaté continues to research the relationship of tree nuts to heart disease risk factors.

### Jordi Salas Salvadó



Prof. Salas-Salvadó has occupied teaching and research posts at the Faculty of Medicine in Reus (UB) since 1984. At present, he is professor of Nutrition and director of the Human Nutrition Unit of the Faculty of Medicine and Health Sciences of the Rovira i Virgili University (URV), and President of the Federation of Spanish Scientific Societies on Nutrition and Dietetics (FES-NAD). Since 1989, he has occupied a variety of medical posts at Sant Joan University Hospital in Reus, and since 1991, is Head of Nutrition of the Internal Medicine Service. He has directed 15 research projects financed by public bodies and 28 projects in conjunction with the pharmaceutical or food industries. He is one of the leaders of the PREDIMED study and has published more than 250 original articles.

## Seppo Salminen



Professor, Degree Program on Health Biosciences and Director, Functional Foods Forum, Faculty of Medicine, University of Turku, Turku, Finland.

Studies in Food Science and Nutrition at Washington State University, USA with MS Degree, Food Chemistry and Microbiology at University of Helsinki, Finland with MSc degree, and PhD in Nutritional Toxicology at the University of Surrey, United Kingdom; Visiting Professor (Food Safety) BOKU University, Vienna, Austria; Visiting Professor, Nutritional Toxicology, RMIT University, Melbourne, Australia; Registered toxicologist (Finland and Eurotox), Fellow of the ANZFA; Professor of the Joint Program of the Life Sciences Faculty and Medical Faculty of University Turku.

Research interests: intestinal microbiota and health, probiotics, prebiotics, functional foods, novel foods.

Member of the editorial board of British Journal of Nutrition, Journal of Food Protection, Bioscience and Microflora, Marcel Dekker Series in Food Science and Nutrition, Journal of Nutrition Science, Food and Nutrition Research; Member of following specialized societies: ASM, IFT, SOMED, FSNR; Expert member in several regulatory committees on food and health (Finland and EU) including the European Food Safety Authority NDA Scientific Panel, Fellow of the ANZFA.

Receiver of several international prizes such as Grand Prix du Yoplait, International Award for Modern Nutrition, Metchnikoff Prize.

Over 300 refereed publications in food and health, microbiology, probiotics, food safety and functional foods, several book chapters and text books in probiotics, food additives and functional foods.

## Almudena Sánchez-Villegas



PhD in Pharmacy (University of Navarra, 2001). Associate Professor of Preventive Medicine and Public Health at University of Las Palmas de Gran Canaria since 2003. Full Professor accreditation from ANECA (the Spanish National Agency for the quality and accreditation of the civil-servant academic staff bodies) in 2013. Research Fellow in the Department of Nutrition of Harvard School of Public Health (Boston) during the academic year 2005-2006.

She is author of more than 40 book chapters and co-editor of several text books of Public Health (Elsevier 2013) and Biostatistics (Elsevier 2014). She has authored more than 80 scientific articles, editorials or letters in international peer-reviewed journals such as Archives of General Psychiatry, American Journal of Clinical Nutrition, Diabetes Care or British Journal of Nutrition (h factor in web of Science=24). Coordinator and principal investigator of two Spanish Projects sponsored by the Spanish Ministry of Health (FIS PI042241 and FIS PI080819) to assess the role of diet and physical activity on mental disorders and quality of life, she also participated in other Spanish or European projects related to nutritional epidemiology such as the PREDIMED clinical trial analysing the effect of Mediterranean diet on cardiovascular risk or the EURRECA project (European RECommendations Aligned Harmonising nutrient recommendations across Europe with special focus on vulnerable groups and consumer understanding) sponsored by the European Union (FP6-0361196-2). Now part of CIBERobn (Spanish Biomedical Research Centre in Obesity Physiopathology and Nutrition network) collaborating within the PREDIMED-PLUS trial.

## Ben Schöttker



Ben Schöttker was born in 1982 in Celle, Germany. He studied Pharmacy in Marburg (Germany) and Public Health in Dresden (Germany) and obtained a Ph.D. in Human Biology from the Medical Faculty of the University of Lübeck (Germany). Since 2009, he is working as a postdoctoral scientist at the Division of Clinical Epidemiology and Aging Research, German Cancer Research Center, Heidelberg (Germany).

## Flavia Schwartzman



Nutritionist, Master in Nutrition and currently pursuing a Ph.D. in Public Health Nutrition at the University of São Paulo, Brazil. Experience in the areas of Public Health and Nutrition Education, working in the following areas: school feeding and nutrition, food and nutrition security, maternal and child nutrition. From 2006 to 2009, has been involved with the Brazilian National School Feeding Programme (PNAE), conducting research and/or working as a consultant of the program.

She has worked as an international consultant for the World Food Programme (WFP) in 2009 and 2010, and the Food and Agriculture Organization of the United Nations (FAO) since 2011, supporting the strengthening

of School Feeding Programmes in Latin America and the Caribbean region. She was a member of the Intersectoral School Feeding Committee (CEIA) to support the implementation of local procurement from family farming for PNAE in the state of São Paulo, Brazil.

## Jaap Seidell



Prof. Jaap Seidell was appointed as full professor (2002-present) and head of the Institute for Health Sciences (2003-2013) at the VU University in Amsterdam. Since 2013 he is appointed as one of the two distinguished 'university professors' at the VU University. He obtained his MSc (1983) and PhD (1986) at the Department of Human Nutrition at the University of Wageningen, The Netherlands. He was awarded a senior research fellowship by the Royal Academy of Arts and Sciences (KNAW) for the period 1988-1992. From 1992-2002 he was head of the Department for Chronic Diseases Epidemiology at the National Institute for Public Health and the Environment in Bilthoven, The Netherlands.

His main research interest is in the role of life-style factors in the prevention of chronic diseases but in particular the study of causes and consequences of obesity and body fat distribution. He (co)-authored well over 500 scientific papers and chapters in books on these topics (390 of these covered in ISI Web of Science; h-index: 77; h-index in Google-Scholar: 99). He has served as president-elect and as president (1992-2000) of the European Association for the Study of Obesity and was editor-in-chief of the "European Journal of Clinical Nutrition" (1996-2006) and is currently editor of "Public Health Nutrition". He is a member of the Royal Academy of Arts and Sciences (KNAW) and the Health Council of the Netherlands. He is a member of the scientific board of the International Obesity Task Force and the International Epode Network.

## Mauro Serafini



Prof. Mauro Serafini is the Head of the Functional Foods and Metabolic Stress Prevention Laboratory at Agricultural Research Council (CRA-NUT) in Rome. He is visiting Professor at the faculty of Food Technology and Biotechnology of Zagreb University. He teaches at the: Master of Phytotherapy, Siena University; Master in Obesity prevention, Faculty of Medicine, University La Sapienza on topics related to functional food and health. He got his degree in Nutrition in 1992 and received his PhD in Experimental Physiopathology, from the University of Pavia. He spent two years as postdoc at the Nutritional Immunology Lab at HNRC at Tufts University working on the role of vitamin E in immune function during ageing. He was Tenuere of a grant of the Japan Society for Promotional of Sciences at Kyoto medical University, department of inflammation. Prof. Serafini has been included by Thomson Reuters in the list of international researchers displaying the greatest numbers of reports designated by Essential Science Indicators as Highly Cited Papers, ranking among the top 1% most cited for their subject field and year of publication (2002-2013). Serafini's research mission is unraveling the link between sustainable dietary behavior and metabolic health with focus on understanding the role of plant foods in modulating antioxidant, anti-inflammatory and cell-mediated immune response in humans.

## Lluís Serra-Majem



Lluís Serra Majem is a medical doctor with a Ph.D. specialising in Preventive Medicine and Public Health Nutrition. In 1988 he became Associate Professor of Preventive Medicine and Public Health at the School of Medicine of the University of Barcelona, where he founded and is the Director of the Community Nutrition Research Centre of the University of Barcelona Science Park. In 1995 he became Full Professor of Preventive Medicine and Public Health at the University of Las Palmas de Gran Canaria, where he also holds the UNESCO Chair for Research, Planning and Development of Local Health Systems (from 1998) as well as serves as Director of the Biomedical and Health Research Institute (from 2013).

During the recent years he served on the Steering Committee, among others, of the following European Union Projects: PLANT food supplements: Levels of Intake, Benefit and Risk Assessment; Credits4Health; EURRECA: EUROpean RECommendations Aligned; BENERIS: Benefit-Risk assessment for food; PIPS: Personalised Information Platform for Life and Health Services and ENHR II: European Nutrition Health Report II. He is also colligated with the Spanish Ministry of Health's Thematic Centre of Obesity and Nutrition Research (CIBER OBN) and participates in the PREDIMED Study and Network. He has published 61 books and 340 peer reviewed scientific papers with an impact factor over 1100 and an H-index of 41, receiving more than 7000 citations.

In 1989 he founded the Spanish Society of Community Nutrition, of which he served as President from 2000 to 2006, and also created in 1994 the Spanish Journal of Community Nutrition. He is President and founder of the NGO Nutrition without Borders (2005), as well as of the Nutrition Research Foundation (since 1997); he also served as President of the Mediterranean Diet Foundation (from 1996 to 2012) where he was leading the candidacy of the Mediterranean Diet as a Intangible Cultural Heritage by the UNESCO, and currently is President of the International Foundation of Mediterranean Diet (IFMED). He has been honoured with the presidency of the Spanish Academy of Nutrition and Food Sciences (since 2009), and he has been appointed Scientific Director of the CIIS-CAM at Sapienza University in Rome. He has received numerous awards and recognitions and serves as visiting professor in several European and Latin-American Universities. He was the Promoter and the President of the I World Congress of Public Health Nutrition held in Barcelona in 2006.

### John L Sievenpiper



Dr. Sievenpiper completed his MSc, PhD and Postdoctoral Fellowship training in the Department of Nutritional Sciences, Faculty of Medicine, University of Toronto. He completed his MD at St. Matthew's University, School of Medicine followed by Residency training in Medical Biochemistry at McMaster University, leading to his certification as a Fellow in the Royal College of Physicians of Canada (FRCPC). Dr. Sievenpiper is currently a Consultant Physician in the Division of Endocrinology, St. Michael's Hospital. He also maintains an active research program both as a Scientist in the Li Ka Shing Knowledge Institute and as the Knowledge Synthesis Lead of the Toronto 3D Knowledge Synthesis and Clinical Trials unit, St. Michael's Hospital, University of Toronto. His research interests are focused on using meta-analytical techniques and randomized trials to investigate the role of diet in cardiometabolic risk. He is an investigator on several large grants including 4 Canadian Institutes of Health Research (CIHR) grants. Dr. Sievenpiper has been appointed to various international nutrition guidelines committees including those of the Canadian Diabetes Association (CDA), European Association for the study of Diabetes (EASD) and American Society for Nutrition (ASN). Dr. Sievenpiper has authored 100 scientific papers and 12 book chapters.

### Matt Silver



Matt Silver (PhD) is a bioinformatician and statistical geneticist with the MRC International Nutrition Group, based at the London School of Hygiene and Tropical Medicine and MRC Keneba, The Gambia, West Africa.

### Laurits Rohden Skov



Laurits Rohden Skov holds a M.Sc. in public health nutrition from the London School of Hygiene & Tropical Medicine, now a Ph.D. student at the Faculty of Medicine at Aalborg University, Copenhagen campus. Previous academic output has been within: best practice in obesity governance in Europe and setting-based health promotion. Laurits' current research is within behavioural nutrition employing 'Nudging' and choice architecture to promote vegetable consumption. He is also an active member of The European Nudge Network with special responsibilities in the health pillar.

### Christine Slater



I joined the International Atomic Energy Agency as a Nutrition Specialist in the Division of Human Health in 2009, after working as a consultant for several years preparing handbooks and e-learning modules on stable isotope techniques in nutrition - in particular assessment of body composition, total daily energy expenditure and infant feeding practices. These publications are now available on the IAEA Human Health Campus (<http://nucleus.iaea.org/HHW/Nutrition/index.html>). Prior to joining the IAEA, I was a research fellow at the University of Glasgow, UK and manager of the stable isotope facility at the University of Glasgow Department of Child Health, Royal Hospital for Sick Children, Glasgow. My formative experience in using stable isotope techniques in nutrition was gained while in the Stable Isotope Biochemistry Laboratory at the Scottish Universities Environmental Research Centre, where the focus was on developing new techniques to answer clinically important questions. I have always enjoyed the privilege of working as part of a multidisciplinary team and have

over 50 peer reviewed publications related to the use of stable isotope techniques to assess important questions related to both public health and clinical nutrition.

### Betzabeth Slater



Posee graduación en Nutrición por la Universidad Nacional Mayor de San Marcos (1986), maestría en Nutrición Humana Aplicada por la Universidad de São Paulo (1996) e doctorado en Salud Pública por la Universidad de São Paulo (2001). Actualmente es profesor doctor da Universidad de São Paulo. Tiene experiencia en la área de Nutrición con énfasis en Epidemiología Nutricional, actuando principalmente en los siguientes temas: Política Pública en alimentación escolar- Agricultura Familiar y Métodos cuantitativos y cualitativos para evaluación do consumo alimentar de adolescentes y adultos. És Editora asociada da Revista Brasileira de Epidemiologia e actúa como revisora de la Revista de Salud Pública y Europ. Journal of Clinical Nutrition. También é miembro titular do conselho do Departamento de Nutricion de la Facultad de Salud Pública/USP.

### Susana Socolovsky



Susana Socolovsky, PhD, CFS is a Doctor in Chemistry and Food Science from the University of Buenos Aires; she devoted 20 years to scientific research and teaching Organic Chemistry at the undergraduate, graduate and doctoral level at the Exact and Natural Sciences School of the University of Buenos Aires.

Dr. Socolovsky has widespread knowledge and expertise in food innovation and regulatory matters in Latin America. For the past 25 years Dr. Socolovsky has done extensive regulatory work for several multinational food ingredient companies throughout South America, Europe, United States, Japan, Canada. In its Food Development and Innovation role and in partnership with food companies throughout Latin America Dr. Socolovsky is responsible for having developed more 140 innovative, cutting edge food products in the light segment category.

Dr. Socolovsky has lectured on nutrition, food technology, nutrition and regulatory topics in more than 80 international conferences and has taught numerous food regulatory and innovation courses in universities in the USA, Canada, UK, México, Perú, Chile, Brazil, Uruguay, Paraguay, Ecuador and Argentina.

Dr. Socolovsky is an active member of the Technology and Regulatory Committees of various trade associations; acts as a non-governmental representative at Mercosur regulatory meetings as well as adviser to the local Codex Chapter. Dr. Socolovsky is also a consultant for the United States Pharmacopeial Convention, USA. As an expert in Public Policies she has worked in the design of the Law on Obesity and Eating Disorders in Paraguay and in several related projects in other LATAM countries.

Dr. Socolovsky is the Vice President of the Argentinean Association of Food Technologists - AATA, a Professional Member of the Institute of Food Technologists USA, and a full member of Argentine Nutrition Society, among others.

### Roger Sodjinou



Roger Sodjinou works for UNICEF Regional Office for West and Central Africa as Coordinator for the West African Nutrition Capacity Development Initiative (WANCDI) after having served as UNICEF Chad's Chief of Nutrition for three years. Prior to joining UNICEF, Roger worked for the Millennium Development Goals (MDGs) Centre as Regional Nutrition and for several international NGOs, including Concern Worldwide and Christian Aid. Roger received a BSc in nutrition from the University of Abomey-Calavi (Benin), an MSc in nutrition and health from Wageningen University (The Netherlands) and a PhD in human nutrition from the University of Montreal (Canada). Roger has extensive research experience in the field of international nutrition and has published many scientific papers in refereed journals.

### Noel Solomons



Noel W. Solomons was born in Boston, Massachusetts. He has worked on the clinical, metabolic and public health issues of nutrition in relation to health in Guatemala since 1975. He has been co-founder and Scientific Director of the Center for Studies of Sensory Impairment, Aging and Metabolism (CeSIAM) in Guatemala for the past 25 years. He received his undergraduate and medical training at Harvard University and his clinical and specialty training at the University of Pennsylvania and the University of Chicago. He has held faculty or visiting professor appointments over his career at

The University of Chicago and Massachusetts Institute of Technology in the USA, Universidad "Francisco Marroquín" in Guatemala, Universidade Federal de Rio de Janeiro in Brazil, University of Jakarta in Indonesia, Universidad Agraria "La Molina" in Peru, and University of Manitoba in Canada. Noel has served as chairman of the Committees on Nutrition and Urbanization and Diet, Nutrition and Long-term Health of the International Union of Nutritional Sciences. He is Director for Central America of the Nevin Scrimshaw International Nutrition Foundation in Boston, Board Member of the Hildegard Grunow Foundation in Munich, Advisory Board Member of the Nestlé Nutrition Institute, and a Fellow of the American Society for Nutrition. He is a member of the Guatemalan National Academy of Medical, Physical and Natural Sciences and the Spanish Academy of Nutrition and Food Science. He has over 600 publications including original papers, review articles, books and chapters in books. The current research interests of CeSSIAM include: the safety and efficacy of micronutrient fortification and supplementation: growth body composition and health; and the relation of dietary intake patterns to the resistance to infectious disease and the maintenance of long-term health and function.

### María José Soto



After studying nutrition at the School of Nutrition, Faculty of Health Sciences at the Universidad Rafael Landívar, Guatemala, María José Soto started her career at CeSSIAM, Guatemala, as a research fellow in 2007. Because of her scientific performance the Hildegard Grunow Foundation (HGF) accepted to promote her future education. In 2009 she participated successfully in the V Taller Latinoamericano de Liderazgo en Nutrición, a one-week leadership workshop in Chile. She completed her MSc in Nutrición Humana at the University of Granada, Spain, and started her doctorate, her dissertation fieldwork was carried out in Quetzaltenango, Guatemala. In November 2012 she presented Information on Guatemalan food intake at the Latin American Society Congress in La Habana, Cuba. In July 2013 she went again to Granada in order to finish the laboratory analyses proposed in her dissertation. She presented preliminary results of her dissertation at the Experimental Biology Congress in Boston, Massachusetts, the International Congress of Nutrition in Granada, Spain and the International Hydration Congress held in Madrid, Spain. In Madrid María José was awarded for the best poster and best oral presentation. She is presently finishing the statistical analyses of her data and writes her thesis papers.

### Jörg Spieldenner



Jörg Spieldenner joined the Nestlé Research Center, in Lausanne, as Head of the Public Health Nutrition Department in 2012 and is also responsible for the sustainable nutrition research programme.

Before that, he had been working at the Nestlé Nutrition Institute as Global Head of Health Economics. Jörg joined Nestlé in 2009 after a long career in Public Health having held positions as Head of the Directorate of the National Prevention Programmes in Switzerland, Professor at the University of Applied Sciences of Western Switzerland and as Executive Director of a global NGO. He was delegate and adviser to the Minister of Health in a German land and in the Directorate of external relations at the European Commission.

Jörg holds a Doctorate in Medicine, a Master in Health Economics and a Master in Sports Science and has contributed to a number of peer-reviewed publications. He is lecturing at the University of Applied Sciences in Zurich and Lausanne.

### L. Suzanne Suggs



L. Suzanne Suggs is an Assistant Professor of Social Marketing and Head of the BeCHANGE Research Group in the Institute for Public Communication, Faculty of Communication Sciences, at the Università della Svizzera italiana in Lugano Switzerland. She is also Director of the USI Sustainability Incubator (USI-SINC). She received a BBA in Marketing at University of North

Texas (USA), a MSc and PhD in Health Studies at Texas Woman's University (USA), and a Post-doctoral fellowship focused on healthy ageing and clinical decision-making at McMaster University (Canada). Suzanne's research focuses on social and behavior change and information and communication technologies (ICTs). She examines the determinants of behavior, develops and tests the effects of communication strategies, delivered through ICT, on such behaviors. She is a Co-Founder and on the Executive Board of the European Social Marketing Association, on the Steering Committee of the Geneva Health Forum (2014), is a member of EUPHA, and is on the Editorial Board for the Journal of Health Communication. She is the principal investigator on several eating and

physical activity behavior projects and consults on various projects around the world focused on health behaviors and ICT. She is Chair of a policy report about communicating complexity in health for the upcoming World Innovation Summit for Health in Qatar.

### Nathan Tefft



Dr. Tefft's research focuses on the economics of risky health behaviors and health policy. Using applied microeconomics and econometrics research methods, Dr. Tefft is primarily interested in how individuals make decisions regarding health-related behaviors in economic and policy contexts.

Dr. Tefft has ongoing research and interests in health and health-related behaviors including obesity, smoking, mental health, alcohol consumption, fatal automobile accidents, and asthma; preventive medical services and physician prescribing behavior; health in the context of labor markets, macroeconomic fluctuations, taxation, and safety net programs.

He has also been involved in interdisciplinary projects that intersect with public health and public policy. Past and current research topics in these areas include early childhood intervention programs related to child health, soft drink tax policies, SNAP participation at farmer's markets, and appetite suppressants and eating disorders.

Dr. Tefft has been an Assistant Professor of Economics at Bates College, in Lewiston, Maine, USA, since 2008. He also spent two years in the Department of Health Services at the University of Washington-Seattle between 2012 and 2014. He received a B.A. in Mathematics from Williams College (MA) in 2000 and a Ph.D. in Economics from the University of Wisconsin-Madison in 2008.

### Elizabeth Tejero



Dr. Tejero holds a Bachelor's degree in Nutrition and Food Science, and a Master's degree by Universidad Iberoamericana, in Mexico City. She was awarded a Ph.D in Nutritional Sciences by The University of Texas at Austin. She was a postdoctoral scientist at The Texas Biomedical Institute, in San Antonio Texas working on the effect of genetic and environmental factors influencing complex diseases in human populations and animal models.

Dr. Tejero is currently working as a scientist at the Laboratory of Nutrigenetics and Nutrigenomics at Instituto Nacional de Medicina Genómica in Mexico City. Her research interests include nutrigenomics and nutrigenetics, genetics of obesity and related disorders. Her focus is to investigate the effect of genetic variation in the risk for chronic diseases, and the mechanisms involved in the gene-nutrient interactions.

### Chan Theory



Theory has been Executive Director of the Reproductive and Child Health Alliance (RACHA) for more than 10 years. She graduated in Midwifery and Nursing and obtained her Master's Degree in Public Health from the Royal Tropical Institute in Amsterdam, the Netherlands. She has more than 20 years of work experience in Cambodia and internationally, including nine years of

management and advisory experience in maternal newborn and child health (MNCH) with HealthNet International and two years working as the visiting resident midwife at Hospital General in Paris and Romans, France. She completed an Advisory Skills Course by the Management for Development Foundation in Ede, the Netherlands, and has attended various international trainings and workshops. Her enthusiasm to promote whole health for MNCH has been sustained as she leads RACHA in implementing broad-based health programmes aiming to help curb maternal and child mortality rates in the country. She has written many research papers in the field of MNCH. She is actively involved in the conceptualization, incubation and the subsequent implementation of the Iron Fortified Fish Sauce and Soy Sauce project in Cambodia, which has been funded by GAIN since 2010. As a speaker to national, regional and international conferences and symposiums she addresses MNCH and the iron-fortified fish sauce project, its progress, development and challenges.

### Antonia Trichopoulos



MD, PhD, is Executive Vice President of the Hellenic Health Foundation and Professor Emeritus, School of Medicine, University of Athens. She has served as president of the Federation of the European Nutrition Societies (FENS) and as chairperson or key member of numerous Greek, European Commission and World Health Organization Committees. She has received nu-

merous honors and awards and was decorated by the President of the Greek Republic with the Golden Cross of Honor for her work in nutrition and public health. In 2011, she received the Federation of European Nutrition Societies (FENS) Award for her "outstanding nutritionist career". Her scientific work has focused on public health nutrition and nutrition epidemiology, with emphasis on the health effects of the Mediterranean diet and traditional foods.

### Barbara Troesch



June '14- now: Senior Scientist at DSM Nutritional Products, R&D, responsible for human studies with focus on iron and zinc deficiency, improving mineral bioavailability with phytase.

April '11 – May '14: Scientist at DSM Nutritional Products, R&D, responsible for human studies with focus on iron and zinc deficiency, improving mineral bioavailability with phytase.

October '07 – Dec. '10: Dissertation at the Laboratory for Human Nutrition, ETHZ, Zurich on "Correcting iron deficiency with a low iron micro-nutrient powder- A promising approach for malarial areas and beyond"

July '07 – Aug. '07: Specialist Nutrition & Economic security, International Committee of the Red Cross, Geneva.

March '06 – Feb. '07: Specialist Quality Assurance, Cilag AG, Schaffhausen.

Jan. '02 – Sept. '05: Specialist Nutrition & Economic security, International Committee of the Red Cross, Geneva.

Sept. '00 – Sept. '01: MSc Public Health Nutrition, London School of Hygiene & Tropical Medicine, London.

Sept '95 – Aug '00: MSc Food Science & Nutrition, ETHZ, Zurich.

### Ricardo Uauy



Prof. Ricardo Uauy is a renowned Chilean professor of nutrition and pediatrics at INTA (Institute of Nutrition University of Chile) and at the London School of Hygiene and Tropical Medicine. He has served as President of the Chilean Nutrition Society, and is former President of the International Union of Nutritional Sciences IUNS. He has participated as an expert in various WHO/FAO

Expert Consultations, and chaired the WHO/FAO consultation on Diet Nutrition and Physical Activity Prevention of Chronic Diseases (TRS 916). Prof. Uauy has served on the board and task forces of various health and nutrition organisations and has contributed to over 400 peer-reviewed scientific publications on various aspects of human nutritional needs in health and disease, and has co-edited five books. His present research interests include: obesity and other nutrition related NCDs, international health and nutrition.

### Gregorio Varela Moreiras



Full Professor in Nutrition & Food Science at the San Pablo CEU University (Madrid, Spain) where he leads the Department of Pharmaceutical and Health Sciences, and the competitive research group on "Nutrition and Food Sciences". At present, he is also President of the Spanish Nutrition Foundation (FEN) and past-President of the Spanish Nutrition Society (SEN). Member of

the Board of the Spanish Society of Community Nutrition (SENC). He is also member of the Scientific Committee Board of ILSI Europe and EPO-DE International Network. He is funding Member of the Spanish Academy of Nutrition and Food Sciences (AEN) and Member of the Board of Directors of the Royal Academy of Gastronomy (SPAIN). He has been involved in more than 30 Research Competitive Grants either international (USA, EU) or national (Ministry of Education and Research of Spain; Ministry of Health and Consumer Issues of Spain; Regional Governments of Castilla-León, Galicia and Madrid), as well as over 30 industry contracts as PI. He has published over 180 scientific articles and has published 15 books as editor and over 70 chapters in books.

### Florencia Vasta



Florencia Vasta obtained her undergraduate degree in Neurobiology and Physiology at the University of Maryland. She later received a MSPH, with a concentration in Human Nutrition in the department of International Health at Johns Hopkins Bloomberg School of Public Health (JHSPH). Her thesis focused on adolescent health and chronic disease risk, related to the nutrition transition in Jakarta, Indonesia. While at Hopkins, she also worked with researchers at the Institute of Nutrition of Central America and Panama (INCAP) on projects involving the double burden of obesity and stunting in children residing in urban poor areas of Guatemala. As a consultant, Ms. Vasta worked with the IAEA on a study measuring body

composition and association with cardiometabolic risk in Latin American children. She is currently a technical specialist at the Global Alliance for Improved Nutrition (GAIN) in Washington, DC, with an emphasis on maternal, infant and young child nutrition, developmental origins of health and disease, and the double burden of malnutrition. She continues her research studies in collaboration with Dr. Caballero at the JHSPH.

### M.G. Venkatesh Mannar



M.G. Venkatesh Mannar is a champion and technology leader in global nutrition with 35 years experience in pioneering effective international nutrition, technology and development initiatives focused on the world's most vulnerable citizens.

A chemical engineer and food technologist by training (IIT Madras, Northwestern University), Mannar served

as President of the Micronutrient Initiative (MI) in Ottawa for nearly 20 years until February 2014. In that role Mannar directed the organisation's mission to develop, implement and monitor cost-effective and sustainable solutions for micronutrient deficiencies. Under his leadership, MI has grown to play a major role in the expansion of supplementation and food fortification programmes to address hidden hunger in Africa, Asia, Latin America and the Middle East.

In 2013, Mannar was appointed an Officer of the Order of Canada, one of the country's greatest civilian honours, for his leadership in the global fight against malnutrition and micronutrient deficiency.

Through his recent appointment as Adjunct Professor in the Department of Chemical Engineering & Applied Chemistry, University of Toronto, Mannar is pursuing his research and teaching interests in the application of engineering principles to improve nutrition status through nutrient stability enhancement in fortified foods and rapid diagnostic methods for field assessment of nutrient status.

### Roos Verstraeten



Roos Verstraeten (°10 October 1981, Belgium) graduated as Industrial Engineer in Biochemistry in 2004. A year later, she obtained a master's degree in Food Science and Nutrition from Ghent University. She has worked as a junior consultant in nutrition in Vietnam and Burundi. Following her pre-doctoral degree, she began working as a doctoral researcher in the Food

Safety and Food Quality department of Ghent University, and within the Child Health and Nutrition unit at the Institute of Tropical Medicine, Antwerp. During this period, she developed a school-based health promotion intervention in Ecuadorian adolescents, performed several long study stays in Ecuador, participated in teaching, and supervised 10 (international) thesis students and 5 interns. She completed her doctoral training and obtained her PhD in Bioscience Engineering in 2014. Since 2013, she is a scientific officer at ITM and is currently working on the development of an evidence-based international knowledge network (EVIDENT). Roos is (co-)author of several peer-reviewed articles and has actively participated at multiple (international) conferences and symposia. She is Conference Director of the European Nutrition and Leadership Platform and has received the 'Young Investigators Award for outstanding oral communication.'

### Peter Weber



Professor Peter Weber received his Ph.D. in Nutritional Sciences from the University of Bonn, Germany and his M.D. from the University of Münster, Germany. After working for two years at the 'Research Institute of Child Nutrition', Dortmund, Germany he trained in Internal Medicine with a subspecialty in endocrinology at the University of Mainz, Germany. He is a Professor

of Nutrition at the University of Stuttgart-Hohenheim, Germany and gives lectures in Human Nutrition and Health. He has more than 70 peer-reviewed publications in the field of iodine deficiency and goiter, thyroid diseases, metabolic syndrome, postprandial lipid metabolism, vitamin K, vitamin status of populations, the role of vitamins and polyunsaturated fatty acids in human health and he is a co-editor of a book on vitamins. His scientific interests include the role of micronutrients in the prevention of diseases, nutritional status in risk groups such as elderly and in the emerging topic of Nutrition Security. In 1993 he joined Hoffmann-La Roche in New Jersey, USA and in July 2004 he was appointed Corporate Scientist for Human Nutrition & Health in DSM Nutritional Products in Kaiseraugst, Switzerland which includes the responsibility for the DSM Corporate Research Program for Nutrition.

### Keith P. West



Keith P. West, Jr., Dr.P.H., R.D. is the George G. Graham Professor of Infant and Child Nutrition and Director of the Center for Human Nutrition and Sight and Life Global Nutrition Research Institute within the Department of International Health at The Johns Hopkins Bloomberg School of Public Health in Baltimore, Maryland. He is a Registered Dietitian and earned his Master's and

Doctoral Degrees in Public Health at the Johns Hopkins University. Early in his career, Dr. West served as a Registered Dietitian in the US Army, reaching the rank of Major. Dr. West has worked in international nutrition for 35 years, conducting nutrition intervention trials and epidemiological studies to prevent vitamin A and other micronutrient deficiencies and their health consequences in children and women. He has worked extensively in Bangladesh, Nepal, and Indonesia. Professor West has over 180 scientific publications and was the 2007 recipient of the American Society of Nutrition's International Nutrition Prize.

### Simon Wieser



Simon Wieser is Professor for Health Economics at the Zurich University of Applied Sciences (Switzerland) and head of health economic research at the Winterthur Institute of Health Economics ([www.wig.zhaw.ch](http://www.wig.zhaw.ch)). He holds a Master degree in economics from the University La Sapienza in Rome and a PhD in economics from University of Zurich. He previously worked for over ten

years as a researcher and lecturer at the Swiss Institute for Business Cycle Research of the Swiss Federal Institute of Technology Zurich (ETH) in Zurich. His current main research interests are in health economic evaluations, with a particular focus on public health and nutrition in developing countries, in the assessment of the overall social costs of diseases and in the development prospective payments systems for inpatient care in Switzerland.

### Walter Willett



Dr. Walter Willett is Professor of Epidemiology and Nutrition and Chairman of the Department of Nutrition at Harvard School of Public Health and Professor of Medicine at Harvard Medical School. Dr. Willett, an American, was born in Hart, Michigan and grew up in Madison, Wisconsin, studied food science at Michigan State University, and graduated from the University of Michigan

Medical School before obtaining a Doctorate in Public Health from Harvard School of Public Health. Dr. Willett has focused much of his work over the last 35 years on the development of methods, using both questionnaire and biochemical approaches, to study the effects of diet on the occurrence of major diseases. He has applied these methods starting in 1980 in the Nurses' Health Studies I and II and the Health Professionals Follow-up Study. Together, these cohorts that include nearly 300,000 men and women with repeated dietary assessments are providing the most detailed information on the long-term health consequences of food choices.

Dr. Willett has published over 1,500 articles, primarily on lifestyle risk factors for heart disease and cancer, and has written the textbook, *Nutritional Epidemiology*, published by Oxford University Press. He also has four books for the general public, *Eat, Drink and Be Healthy: The Harvard Medical School Guide to Healthy Eating*, which has appeared on most major bestseller lists, *Eat, Drink, and Weigh Less*, co-authored with Mollie Katzen, *The Fertility Diet*, co-authored with Jorge Chavarro and Pat Skerrett and most recently *Thinfluence*, co-authored with Malissa Wood and Dan Childs. Dr. Willett is the most cited nutritionist internationally, and is among the five most cited persons in all fields of clinical science. He is a member of the Institute of Medicine of the National Academy of Sciences and the recipient of many national and international awards for his research.

### Agneta Yngve



Professor Agneta Yngve, PhD, MSc, MPH, is a public health nutritionist currently working in the area of culinary arts and meal sciences. She has authored more than 150 papers, whereof 70 original papers, several reviews and editorials. She was the Editor-in-chief for the journal *Public Health Nutrition* from 2007-2012. During her career she has focused on research on childhood nutrition, and published in the area of breastfeeding, breastmilk composition, fruit and vegetable intake among children and their mothers, overweight and obesity research, professional development and physical activity promotion. She is currently Faculty Professor at the

School of Hospitality, Culinary Arts and Meal Science at Örebro University, Sweden. She has previously spent 26 years at Karolinska Institutet, Stockholm, Sweden.

### Gerardo Zamora



Gerardo Zamora has joined the Evidence and Programme Guidance (EPG) Unit, Department of Nutrition for Health and Development (NHD), as Consultant. He is working on health equity and implementation research related to the WHO Global Targets 2025 and on developing policy-oriented tools to achieve them. Mr Zamora is a sociologist specialised in public health with over ten years' experience in development and health-related research at the international level. His main areas of expertise are in social determinants of health, as well as social and health care coordination/integration. Before joining the EPG Unit as consultant, he was Head of Projects of the Etorbizi Programme at the Basque Foundation for Health Innovation and Research (BIOEF), in Spain. Previously, he was Researcher and Deputy Director of Research at Ingema, a research institute on ageing in San Sebastian, Spain. Mr Zamora has been a consultant to United Nations Educational Scientific and Cultural Organization (UNESCO) and International Labour Organization (ILO) in Europe and Latin America. He holds a Bachelor of Sciences in Sociology from the University of Costa Rica, a Master of Arts in Human Rights and Needs from the Universidad Autónoma de Madrid, and a Master of Science in Health Research from the Universidad Pública de Navarra, where he is also finalising his doctoral dissertation in the Public Health Programme. He is a member of several scientific associations, including the International Sociological Association.

## ORAL COMMUNICATIONS

OT-001

Oral communication

### Body fat and inflammation in Cuban school children.

Hernández-Triana M, Ruiz-Álvarez V, Díaz-Sánchez ME, Viera-Cosíñol C, Hernández-Hernández H, Pita-Rodríguez G  
Department of Biochemistry and Physiology, Institute of Nutrition, Havana, Cuba.

Body fat excess is associated with insulin resistance and inflammation. Main objective was to identify this association in school children. Methods: Case-control study in 2012 with 51 overweight (OW) (mean age 107 months) and 51 normal children, paired by age, sex, and socioeconomic status, and submitted to measurements of body fat by deuterium dilution, inflammatory citoquines, insulin, ferritin, transferrin receptors, glucose, serum lipids, haemoglobin, energy expenditure, blood pressure, and dietary intake. Comparisons were carried out means Odd ratios, Mann Whitney tests, main component and multivariate analysis and logistic binary regression. Results: OW children with 1,7 times more body fat showed higher levels of C-Reactive Protein (CRP), insulin, triglycerides, blood pressure, physical activity, and higher intake of refined cereals, canned fruits, soft drinks, fast foods, dietary energy, carbohydrate, polysaccharides, animal fat, methionine, and sodium; the essential fatty acids intake was lower and the sugar intake double as recommended and not different between groups. Most OW children had both parents OW (OR=7.955, P=0,0000) and mothers with higher BMI at pregnancy. Children born by caesarea showed a 2.4 higher risk to be OW at school age (p=0,0031, IC:1.04–5.56). Four factors explained 72% of the sample variance: the association between adiposity, higher fast foods and fat intake and higher levels of CPR and insulin. Key findings: Fat accretion in school children was strongly associated to inflammation, hyperinsulinemia, and high intake of fast foods, refined cereals, total energy, carbohydrates, sodium, and animal fat. Overweight was more related with wrong nutrition, BMI at pregnancy and parents' overweight, than with a sedentary life style.

OT-002

Oral communication

### Antenatal and early infant predictors of postnatal growth in rural Vietnam: A prospective Cohort Study.

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<sup>1</sup>Department of Medicine, University of Melbourne, Royal Melbourne Hospital, Parkville, Victoria, Australia; <sup>2</sup>Research and Training Centre for Community Development (RTCCD), Hanoi, Vietnam; <sup>3</sup>Centre for Molecular, Environmental, Genetic and Analytic Epidemiology, Melbourne School of Population and Global Health, University of Melbourne, Parkville, Victoria, Australia; <sup>4</sup>The Jean Hailes Research Unit, School of Public Health and Preventive Medicine, Monash University, Clayton, Victoria, Australia; <sup>5</sup>The Victorian Infectious Diseases Service, Royal Melbourne Hospital, Parkville, Victoria, Australia.

Objectives: To determine which antenatal and early life factors were associated with infant postnatal growth, in a resource poor setting in Vietnam. Material and methods: Prospective longitudinal study following infants (n=1046) born to women who had previously participated in a cluster randomized trial of micronutrient supplementation, HaNam province, Vietnam. Antenatal and early infant factors were assessed for association with the primary outcome of infant length-for-age z scores at six months of age, using multivariable linear regression and structural equation modelling. Results: Mean length-for-age z score was -0.58 (Standard Deviation (SD) 0.94) and stunting prevalence was 6.4%. Our structural equation model highlights the role of infant birthweight as a predictor of infant growth in the first six months of life, and demonstrates that maternal body mass index (MD 45.6 kg/m<sup>2</sup>; 95% CI 34.2 to 57.1), weight gain during pregnancy (MD 21.4 kg; 95% CI 12.6 to 30.1), and maternal ferritin concentration at 32 weeks gestation (MD -41.5 per two-fold increase in ferritin; 95% CI -78 to -5.0) were indirectly associated with length-for-age z scores at 6 months of age via infant birthweight. A direct association between 25-(OH) vitamin D concentration in late pregnancy and infant length-for-age z scores (MD -0.06 per 20nmol/L; 95% CI -0.11 to -0.01), and infant hospitalisation and infant length-for-age z scores (MD -0.17; 95%CI -0.31 to -0.03) was observed. Key findings: Maternal nutritional status plays an important role in predicting infant growth at six months of age. Elevated antenatal ferritin levels were associated with suboptimal infant growth in this setting, suggesting caution with iron supplementation in populations with low rates of iron deficiency.

OT-003

Oral communication

### National Prevalence of Overweight and Obesity among adolescents: I.R.IRAN, Trends of 2001-2012.

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Background and Objectives: Based on many studies in the country, the prevalence of overweight and obesity among adolescent boys and girls is continuously increasing. To provide current estimates of the prevalence and trends of overweight and obesity among adolescents in the country, we compared the data of two national surveys conducted in 2001 and 2012 as a national integrated micronutrient survey (NIMS).

Material and Methods: Data of the both national surveys (2001, 2012) were collected for two groups of adolescents (15-19 years old boys and 14-19 years old girls). Both surveys were cross-sectional and the samples were nationally and regionally (eleven regions in the country) representative. Standard measuring protocols were used in both surveys. Estimates of the prevalence of overweight and obesity were defined as  $\geq 85^{\text{th}}$  to  $< 95^{\text{th}}$  and  $\geq 95^{\text{th}}$  percentile of body mass index (BMI) for age growth charts respectively.

Results: In 2001, 2.4% of Iranian adolescent boys and 3.2% of girls were overweight and obese. In 2012, the prevalence of overweight and obesity was 19.9% (CI 95%, 18.6 %-21.2%) and 24.1% (CI 95%, 23.0 %-25.5%) among boys and girls respectively.

Conclusion: Over the 11-year period from 2001 through 2012, obesity showed significant increase among boys and girls respectively (P<0.001) which carries a higher risk for adult obesity and earlier puberty. It seems that low level of physical activity and excess energy intake are two primary causes and behavior risk factors of adolescent overweight and obesity.

OT-004

Oral communication

### The effect of malnutrition on the sensory motor development among children from 8 to 24 months, in Mayahi District, Maradi Region, Niger.

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<sup>1</sup>Acción Contra el Hambre. <sup>2</sup>Université Abdou Houmouni of Niamey.

Objectives: The sensory-motor development represents an interesting phenomenon yet reminds unknown in children. The sensory-motor development occurs in the period from 0-2 years old and leads to the acquisition of different behavioral dimensions. Those are bodily posture, locomotion, categorization, memory, the development of language and most important the development of early attachment with the primary figures. The objective of the current study is to evaluate and analyze the impact of malnutrition on language, posture and the acquisition of object permanence.

Material and Methods: A cross-sectional study was carried out in the Therapeutic Feeding Center in Mayahi from October to November 2013. 60 children and their mothers were selected in a randomized way for the current project. Inclusion criteria were: children between the age of 8 to 24 months, diagnosis of malnutrition with Z-score < 3 and the mother present during the children's evaluation. A semi-structured interview was conducted with the mothers. In addition, The Piaget psychometric test was used to evaluate object permanence among those children. The latter test involved the division of children according to their age: group 1 (8-12 months), group 2 (12-18 months) and group 3 (18-24 months). Non-biological mothers, children suffering from Kwashiorkor and chronic malnutrition were excluded from the study.

Results: The results show that the 58,33% of children maintain a good bodily posture despite their nutritional status. In addition, infant's crawling, walking in four legs, remained stable and strong. However, 64,52% of malnourished children with severe acute malnutrition (SAM) were unable to remain fully upright in a standing position and 75% lost sight of walking around without support. A more critical finding was the increasing rate of language impairment among 66,67% of children suffering from SAM. In regards to the acquisition of object permanence, it was found that within the group 1, only 10% of children were capable to mentally represent and look for the object, and for group 2, 16,67% performed better than their counterparts.

Key Findings: The current study suggests that malnutrition has a negative impact on children between the age of 8 and 24 months. Of special importance, it was found that the widespread effect of malnutrition affects primary on different behavioral dimensions: language, sensory - motor development and memory. The present findings suggest that multisectoral actions for children with SAM must be ensured to prevent detrimental effects on their development from happening.

## OT-005

## Oral communication

**The Effect of Daily Vitamin B12 and Folic acid Supplementation on Growth in 6-30 Month Old Children in India: A Randomized Controlled Trial.**

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<sup>1</sup> Society for Applied Studies, New Delhi, India. <sup>2</sup> Society for Essential Health Action and Training, New Delhi, India. <sup>3</sup> Innlandet Hospital Trust, Lillehammer, Norway and Centre for International Health, University of Bergen, Norway. <sup>4</sup> Centre for International Health, University of Bergen. <sup>5</sup> Department of Nutrition, Institute of Basic Medical Sciences, University of Oslo, Norway, and Department of Pharmacology, University of Oxford, United Kingdom. <sup>6</sup> Diabetes Unit, King Edward Memorial Hospital, Pune, Maharashtra, India.

Background: Folate and vitamin B12 are important for growth. Many children in low and middle-income countries have inadequate intake of these nutrients.

Methods: We undertook a randomized, placebo controlled, double blind trial in 1000 North Indian children, 6 to 35 months of age providing 2 RDA of folic acid and/or vitamin B12, or placebo, daily for six months. In a factorial design, we allocated children in a 1:1:1:1 ratio in blocks of 16. We measured the effect of giving vitamin B12, folic acid, or the combination of the two on linear and ponderal growth. We also identified predictors for growth and effect-modifiers for the effects of our interventions on growth in multiple regression analyses.

Results: Compared to placebo, administration of vitamin B12 in combination with folic acid increased the mean weight and length by 116 g (95% CI: 3, 210) and 0.35 cm (95% CI: 0.0, 0.66), respectively. There was no overall effect of giving either of the nutrients alone. Weight for age z scores and height for age z scores increased substantially and significantly following vitamin B12 supplementation in wasted, underweight, and stunted children (P for interaction <0.01). Vitamin B12 status at baseline predicted linear and ponderal growth in children not receiving vitamin B12 supplements but not in those who did (P for interaction <0.001).

Conclusions: We provide evidence that poor vitamin B12 status contribute to poor growth. We recommend local studies to identify the optimal approach for intervention and for confirming our findings.

Source of Support: Thrasher Research Fund (grant no 02827), and the Research Council of Norway (project no. 172226). South-Eastern Norway Regional Health Authority (grant no. 2012090).

## OT-006

## Oral communication

**Sodium intake is associated with higher blood pressure in children of 4-5 years old.**

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Objective: Sodium intake has been associated with higher risk of high blood pressure among adults. We examined the association between systolic blood pressure (SBP) and diastolic blood pressure (DBP) and usual daily intake of sodium (Na) and the main foods contributing to daily Na intake among children at the age of 4-5 years.

Material and methods: Participants were 569 children 4-5 years old from the INMA study, a population-based and prospective mother-child cohort study in Valencia, Spain. Blood pressure (BP) was obtained in a sitting position after a 5 minute child rest (three measurements were attempted for all children at intervals of 2-3 min with an OMRON M4-I device). We used the lowest BP measurement for the analysis. Usual daily Na intake and the main foods contributing to Na intake were estimated by a validated Food Frequency Questionnaire (FFQ). Other covariates in the analysis were child and mother age, child gender, body mass index (BMI=kg/m<sup>2</sup>), energy intake (Kcal) and usual potassium intake. Multiple linear regression was used to estimate the association between Na intake and SBP/DBP.

Results: The mean Na intake was 2066 mg/day (SD 246.3). The main food sources of Na intake in children were processed meat (cured and cooked ham, 8.04%; processed meats "embutidos", 6.03%; sausages 4.4%), breads (white bread, 13.0%; whole bread, 0.7%; bakery products, 0.8%), breakfast cereals (2.0%), legumes (3.3 %), salt added on the table (2.2%). Every 1000 mg/day increase of Na intake was associated with an increase of 6.02 mm Hg in SBP (95%CI: 1.77-10.27). The SBP also increased significantly (p <0.05) per every 10 g/d of processed meats (β=0.86), bread (β=0.54), breakfast cereals (β=0.64) and per every gram of added salt (β=5.45). The DBP only increased significantly with the increase of consumption of bread (β=0.39). These significant associations found with untransformed data, remained very similar in magnitude and significance when log-

transformed and z-scores were used for SBP/DBP.

Key findings: A higher sodium intake and consumption of foods with high sodium content (eg, white bread, processed meats, cereals and added salt intake) is associated with higher blood pressure among children 4-5 years old, particularly for SBP. These findings reinforce the importance of implementing strategies to reduce Na intake and Na content in some processed foods frequently eaten by children.

## OT-007

## Oral communication

**Effect of n-6 and n-3 polyunsaturated fatty acids intake at 4 years old on body fat patterns at 7 years old in the Generation XXI birth cohort.**

Santos S.<sup>1</sup>; Lopes C.<sup>1,2</sup>; Oliveira A.<sup>1,2</sup>

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Objectives: Maternal intake of polyunsaturated fatty acids (PUFA) during gestation and lactation are believed to alter the adipose tissue development of the offspring (n-6 stimulate adipogenesis; n-3 inhibit adipogenesis). However, the effect of these fatty acids intake during early childhood on later adiposity still needs to be clarified. Our aim was to prospectively assess the effect of n-6 and n-3 PUFA intake at 4 years old on body fat patterns identified at 7 years old.

Material and methods: Generation XXI is a population-based birth cohort assembled during 2005-2006 at all public maternity units of Porto, Portugal. These preliminary analyses include singleton children with 3-day food records at 4 years old and body fat patterns identified at 7 years old (n=1958). The intake of n-6 and n-3 PUFA (g/day) at 4 years old was assessed with 3-day food records filled in by parents and/or caregivers and then was expressed as n-6/n-3 ratio. Body mass index (BMI), waist-to-height ratio (WHtR) waist-to-hip ratio (WHR), waist-to-thigh ratio (WTR), waist-to-weight ratio (WWR=waist circumference/√weight) and fat mass index (FMI=fat mass from tetra-polar bioelectric impedance/height<sup>2</sup>) were obtained at 7 years old by trained personnel and then were used to identify body fat patterns by principal component analysis. Regression coefficients (β) and 95% confidence intervals (CI) were obtained from linear regression models.

Results: Two patterns of body fat, similar by sex and explaining 88% of total variance, were identified: a pattern 1 characterized by BMI, FMI and WHtR and a pattern 2 by WHR, WTR and WWR that allow the study of fat quantity and distribution, respectively (higher scores in each pattern mean higher values of the included measures). For these participants, the median n-6/n-3 ratio was approximately 13/1. In a multivariable regression model [adjusted for child's sex, total energy intake, BMI (for pattern 1) or WHR (for pattern 2) at 4 years old and maternal BMI], each increase of 10/1 in n-6/n-3 ratio was not significantly associated with pattern 1 (β=0.025; 95% CI, -0.012-0.061), but was significantly and positively associated with pattern 2 (β=0.069; 95% CI, 0.012-0.126).

Key findings: A higher n-6/n-3 ratio at 4 years old seems to be linked to the development of central fat distribution at 7 years old. Dietary interventions should target the inadequate balance of n-6 and n-3 PUFA intake during early childhood.

## OT-008

## Oral communication

**Obesity, physical inactivity, and homeostasis model assessment (HOMA) as predictors for prediabetes among Egyptian adolescents.**

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Clinical Nutrition Department, National Nutrition Institute (NNI), Cairo, Egypt.

Objectives: revise the prevalence of glucose disorders among adolescents, to test for the presence of insulin resistance among those with glucose disorders particularly the obese, to clarify the association between obesity and physical inactivity and dietary fat, and to test HOMA-R and fasting blood glucose as screening and monitoring tests among adolescents with glucose disorders.

Materials and methods: A probabilistic multistage cross-sectional sample representative of Egyptian preparatory and secondary school students was taken. 4251 were assessed by measuring their fasting blood glucose levels. Those were the targets of this study. Three main types of data were reported to cover topics related to obesity, diabetes, hypertension and physical activity. Blood pressure, weight, height, waist and BMI were measured and referred to their corresponding international reference values properly matched for age and sex.

A Fasting blood sample was drawn to assess lipid (total cholesterol; TC, and triglycerides; TG), lipoprotein patterns (low density lipoprotein; LDL-c, and high density lipoprotein; HDL-c), and fasting plasma insulin. HOMA was calculated using a computer-derived equation to assess body response to insulin among target groups.

Results: the prevalence of D.M. among Egyptian adolescents is 0.7% with no age, gender, or area of residence predilections. Pre-diabetic state was present among 15.0% of adolescents in the pre-pubertal stage up to 21.0% of adolescents in the post-pubertal stage. Fasting lipid and lipoprotein profile were similar in all glucose categories but high blood pressure; of either type, was more prevalent among the pre-diabetic adolescents. Obese adolescents are more to have DM in their families than non-obese. The risk for adolescents with BMI above 85<sup>th</sup> percentile to have high systolic or diastolic blood pressure, high TC, high TG, or high LDL-c was nearly double that for non-obese as reflected by odds ratio. The risk was three times more in presence of central obesity (waist circumference > 90<sup>th</sup> percentile). Receiving more than 30% of total energy from fat was more prevalent among adolescents with central obesity. Physically inactive adolescents have 1.5 times the risk for obesity, and 1.2 the risk for diastolic hypertension more than the physically active adolescents.

Conclusion: type 2 DM in young is serious in terms of morbidity and mortality suggesting that it may be appropriate target for screening. School-based programs promoting healthy eating and increasing physical activity are recommended for prevention of obesity.

#### OT-009

#### Oral communication

##### **The effect of socioeconomic and biological factors on infants' weight gain: Brazilian Demographic and Health Survey - 2006/07.**

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Objective: To analyze the effects of socioeconomic and biological factors on infants' weight gain.

Methods: All infants (0-23 months-old) with available birth and postnatal weight data (n=1763) were selected from the last nationally representative survey with complex probability sampling conducted in Brazil (2006/07). The outcome variable was the Conditional Weight Gain (CWG), which represents how much an individual has deviated from his expected weight gain, given the birth weight. Effects were estimated using simple and hierarchical multiple linear regression, considering the survey sampling design, and presented in standard deviations of CWG with their respective 95% of confidence intervals. Hierarchical models were designed considering the UNICEF Conceptual Framework for Malnutrition (basic, underlying and immediate causes).

Results: The poorest Brazilian regions (-0.14[-0.25; -0.04]) and rural area (-0.14[-0.26; -0.02]) were inversely associated with CWG in the basic causes model. However, this association disappeared after adjusting for maternal and household characteristics. In the final hierarchical model, lower economic status (-0.10[0.17; -0.04]), maternal education <4th grade (-0.16[0.32; -0.01]), maternal height (0.02[0.01; 0.03]) and fever in the past 2 weeks (-0.13[-0.27; 0.01]) were associated with postnatal weight gain.

Key findings: Our results showed that poverty and lower human capital are still key factors associated with poor postnatal weight gain. The approach used in our analyses was sensitive to characterize inequalities among different socioeconomic contexts and to identify factors associated with CWG in different levels of determination. This knowledge may facilitate the planning and evaluation of health and nutrition programs and policies.

#### OT-010

#### Oral communication

##### **Dietary patterns and overweight among 4-years-old children.**

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Objectives: To evaluate the associations between children's dietary patterns and consumption of specific foods with overweight at 4 years of age. Material and Methods: This study involved a sub-sample of 5011 children aged 4 years, enrolled on the Portuguese population-based birth cohort – Generation XXI (Porto, Portugal). Data was collected using structured questionnaires applied by trained interviewers. Children's dietary intake was assessed by Food Frequency Questionnaire, administered to their primary caregiver. For each item, consumption was converted into daily frequencies, further categorized into lower (first quintile), intermediate

(second-fourth quintiles, aggregated) and higher (fifth quintile). Dietary patterns were identified by latent class analysis. Children's and mothers' weight and height were measured using standard procedures. Children's body mass index standard deviation scores were calculated and categorized into normal vs. overweight ( $\leq 2SD$  vs.  $> 2SD$ ), according to the World Health Organization's cut-offs. Binomial logistic regression models were used to examine the associations between dietary exposures and overweight, estimating Odds Ratios and 95% Confidence Intervals (OR, 95%CI). Results: The Bayesian information criteria supported a solution of three dietary patterns: 1. "EDF" – higher in energy-dense-foods and dairy; 2. "LHF" – lower in healthy foods (vegetables, fruit, fish); 3. "Healthier" – higher in healthy foods and lower in unhealthy ones (energy-densefoods, red meat) (pattern 3 used as reference). In the univariate analysis, both unhealthy dietary patterns were associated with higher odds of overweight prevalence (EDF OR=1.29; 95%CI: 1.02-1.63; LHF OR=1.25; 95%CI: 1.02-1.54). After adjustment for children's (sex, age, daily screen time, structured exercise, day-time caregiver) and maternal (education, body mass index) characteristics, these associations did not remain statistically significant. Analyzing the isolated food groups, after adjustment for children's and maternal characteristics, consumption of milk (higher vs. lower OR=0.62; 95%CI: 0.42-0.91), fruit (intermediate vs. lower OR=0.73; 95%CI: 0.54-0.97) and vegetable soup (higher vs. lower OR=0.62; 95%CI: 0.51-0.75) was significantly and negatively associated with overweight. Key findings: This study supports a possible protective effect of fruit, vegetable soup and milk consumption on overweight among children with 4 years of age. Composite measures combining foods into patterns did not shown any significant association.

#### OT-011

#### Oral communication

##### **Impact of underweight on pneumonia mortality in children: results from a twelve years national database in Malawi and a systematic review of literature.**

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Objectives: About 1.4 million children die every year from pneumonia, most of them in low and middle-income countries. On the other hand, underweight is highly prevalent in these countries: in 2011, 3.3% of children younger than five years were severely underweight and 17.4% moderately underweight. To explore the association between being underweight and pneumonia mortality, we analysed data on children admitted for pneumonia in a 12-years period in Malawi and we conducted a systematic review and meta-analysis of observational studies.

Materials and Methods: - Malawian database: we collected all the individual patients' charts of children younger than five years admitted for pneumonia in 40 Malawian hospitals during the period 2001-2012. Data were inputted in a database and analysed with STATA 12. We calculated the crude Odds Ratio (OR) and 95% confidence interval (95%CI) for death from pneumonia in severe underweight (weight-for-age z-score < -3 standard deviations) and moderate underweight (-3 to -2 standard deviations). We performed a logistic multivariate analysis to calculate the Odds Ratio adjusted for sex and age.

- Systematic Review: we searched Medline, Embase, Lilacs, Web of Science, and Global Health Library for published observational studies reporting on the association between underweight and pneumonia mortality in children younger than five years in low and middle-income countries. No date or language filters were applied. Data were meta-analysed using a random-effects model.

Results: -Malawian database: of the 100,936 cases (6,563 deaths) of pneumonia with complete data (89.0% of the total), 11.0% were severely underweight and 12.6% moderately underweight. Univariate analysis showed an increased odds of death in both severe underweight (OR 4.8; 95% CI 4.5-5.1) and moderate underweight (OR 2.2; CI 95% 2.1-2.4). After adjustment for age and sex the ORs increased to 5.3 (95% CI 5.0-5.7) and 2.5 (95% CI 2.3-2.7), respectively.

-Systematic Review: we identified 26 studies from 11 countries, including 18,890 children. The pooled OR for death from pneumonia was 4.3 (95% CI 3.5-5.4) for severe underweight (17 studies) and 2.5 (95% CI 1.9, 3.3) for moderate underweight (16 studies). Substituting the adjusted ORs to the crude ORs in the meta-analysis did not change the results for moderate underweight but increased the pooled OR for severe underweight (OR 5.2; 95%CI 3.8-7.2).

Key findings: These two different types of data and analysis led to similar results, confirming that underweight remains a major risk factor for pneumonia mortality in children in low and middle-income countries.

**OT-012****Oral communication****Dyslipidemia and lifestyle in children in anti-retroviral treatment.**

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**Objectives:** Dyslipidemia is common in HIV-infected children, due to the infection itself and the anti-retroviral drugs, particularly protease-inhibitors. We aimed to study the prevalence of dyslipidemia and its association with diet and physical activity in children in anti-retroviral treatment in El Salvador.

**Materials and Methods:** We surveyed 270 children aged 5-18 years in anti-retroviral therapy at a reference centre of El Salvador. Anthropometric measures were obtained and information gathered on socio-demographic characteristics, type and length of therapy, diet and physical activity.

Triglycerides, total cholesterol, low-density lipoprotein (LDL), high-density lipoprotein (HDL), viral load, and CD4 concentration were measured.

Abnormal lipid concentrations were defined as triglycerides  $\geq 130$  mg/dl in children aged 10-19 years and  $\geq 100$  mg/dl in  $< 10$  years; total cholesterol  $\geq 200$  mg/dl, LDL  $\geq 130$  mg/dl and HDL  $\leq 35$  mg/dl. Dietary patterns were identified by principal component analysis and the "high fat/sugar diet" pattern was used as a proxy of unhealthy diet. We performed a descriptive analysis by sex, and adjusted four logistic multivariate models to assess the association of each type of dyslipidemia with diet and physical exercise.

**Results:** Of the 270 children – 80 of whom taking protease-inhibitors – 128 (47.4%) had high triglycerides and 36 (13.3%) high total cholesterol concentrations. High LDL were observed in 17/176 children (9.7%) and low HDL in 39/183 (21.3%).

No difference by sex were found in the lipids profile nor in the adherence to the unhealthy diet, but significantly more boys than girls were doing exercise at least three times a week (81.4% versus 59.2%,  $p < 0.001$ ).

Treatment with protease-inhibitors was associated with high triglycerides (Odds Ratio (OR) 10.9 95%CI 5.1-23.4) and cholesterol (OR 7.3 95% CI 2.9-18.5).

After adjustment for the rest of variables, children in the highest tertile for "unhealthy diet" showed a 1.8 increased odds (95% CI 1.1-2.8) for high cholesterol and a 1.9 increased odds for high LDL (95% CI 1.0-3.6) with respect to those in the two lowest tertiles. Compared with those exercising less than three times a week, children exercising more often were less likely to have low HDL (OR=0.34 95%CI 0.11-1.1 for 3-6 times a week and OR=0.23 95%CI 0.08-0.67 for more than seven times)

**Key findings:** These results suggest that a healthy diet and exercise habits could be helpful in controlling some aspects of the lipid profile in this population. Girls should be encouraged to exercise more, due to the low frequency of regular physical activity in this group.

**OT-013****Oral communication****The contribution of yellow cassava to nutrient adequacy of primary school children; the use of linear programming.**

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**Background:** Biofortified yellow cassava can increase vitamin A intake, but it is unknown how this will affect other nutrient gaps. Our objective was to evaluate whether inclusion of a school lunch with yellow cassava, as compared to either no lunch, or a lunch with maize and beans, can theoretically ensure a nutritionally adequate diet for schoolchildren in Kenya by using the OptiFood linear programming tool.

**Methods:** Dietary intake of 150 school children aged 7-9 years in Kibwezi district in Eastern Kenya was assessed using a quantitative multi-pass 24-hour recall. Model parameters were derived, including a list of foods consumed, median serving sizes, distribution of frequencies and cost of diet. Food based dietary guidelines were formulated with the linear programming tool for three models: (1) baseline diet comprising exclusively foods not provided

at school but mainly at home, (2) baseline diet complemented with a common school lunch of cooked maize and beans, and (3) baseline diet plus a school lunch of cooked yellow cassava. The target for nutrient adequacy was set at 100% of the recommended nutrient intake (RNI) for selecting the best diet, and this was further modeled with promising (nutrient dense) foods to arrive at the nutritionally most optimal and affordable diet.

**Results:** Out of 13 nutrients, model 3 (yellow cassava) best met the target with adequate intake of 6 nutrients as compared to model 1 (4 nutrients) or model 2 (5 nutrients). However, even in the best scenario with addition of promising foods (i.e. small dried fish and oil) the nutrient adequacy of fat, riboflavin, niacin, folate and vitamin A (range 30-64% of the RNI) could not be ensured.

**Conclusions:** OptiFood is a useful tool to assess the contribution of a biofortified crop to the nutrient adequacy of children. Introduction of yellow cassava should be accompanied by approaches to improve the local diet with fish and oil, and alternative interventions should be formulated to fully eliminate nutrient inadequacy of schoolchildren in Kenya.

**OT-014****Oral communication****Greenhouse gas emission of diets in the Netherlands and associations with food, energy and macronutrient intakes.**

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**Objective:** To evaluate the GHGE of diets in Dutch girls, boys, women and men separately and explore associations with diet composition, total (food and energy) intake, energy density and macronutrient intakes.

**Design:** GHGE of foods and drinks was calculated with life cycle assessment (LCA). Food consumption data were derived from the Dutch Food Consumption Survey 2007-2010. Habitual environmental load of diets were estimated using both databases. Descriptive analyses were carried out for the total population as well as stratified for gender, age and dietary environmental load.

**Setting:** The Netherlands.

**Subjects:** Dutch children and adults aged 7-69 years (n=3818).

**Results:** The GHGE of daily diets was on average 3.2 kg CO<sub>2</sub>e for girls, 3.6 kg CO<sub>2</sub>e for boys, 3.7 kg CO<sub>2</sub>e for women and 4.8 kg CO<sub>2</sub>e for men in the Netherlands. Meat and cheese contributed 40% and drinks (including milk) 17% to daily GHGE. Considerable differences in environmental loads of diets existed within age and gender groups. Persons with higher GHGE diets consumed more (in quantity of food and especially drinks) and diets had a higher energy density than their counterparts of a similar sex and age with low GHGE diets, especially in males. Major differences between high and low GHGE diets were in meat, cheese and dairy consumption as well as in soft drinks (girls, boys and women) and alcoholic drinks (men). Of those, differences in meat consumption determined the differences in GHGE most. Diets with higher GHGE were associated with higher saturated fat intake and lower intake of fiber.

**Conclusions:** GHGE of daily diets in the Netherlands is between 3 and 5 kg CO<sub>2</sub>e, with considerable differences between individuals. Meat, dairy and drinks contribute most to GHGE. The insights of this study may be used in developing (age and gender specific) food based dietary guidelines that take into account both health as sustainability aspects.

**OT-015****Oral communication****Intrapersonal, social-environmental, and physical-environmental factors which predict healthy eating practices in Dutch adults.**

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**Introduction:** Despite global efforts to make healthy choices, the easiest choices, people's eating practices are still challenged daily. We can identify multiple challenges in our modern 'obesogenic' environment. For instance, the sheer overabundance of food, as well as marketing techniques and pricing strategies which favor the overconsumption and accessibility of sugary and fatty foods. Much of the past research on food choice has focused on studying individuals that do not manage these challenges and as a result make unhealthy food choices. However, very little research has focused on the small number of individuals that DO make healthy food choices despite these challenges. What factors enable them to cope with these risks successfully and as a result make healthy food choices? This study aimed to study these enabling factors which support healthy eating in Dutch adults.

**Materials and Methods:** This research applied Antonovsky's salutogenic framework for health development. This is a positive-oriented framework which studies factors which enable coping, health-promoting behaviors and good health. We used the framework to develop a survey instrument

to study intrapersonal, social-environmental, and physical-environmental factors which predict healthy eating practices in a cross-sectional study of Dutch adults. Participants (n=703) aged 18 years and older completed the study's survey in January 2013. Bivariate and multivariate logistic regression analysis was performed to test the association of survey factors on the outcome variable high dietary score.

**Results:** In the multivariate logistic regression model, six factors were significantly ( $p < .05$ ) related to high dietary score: being female; living with partner; sense of coherence (a construct from the salutogenic framework, relates to one's capability to deal with stress), flexible restraint of eating, and self-efficacy for healthy eating.

**Key Findings** Our findings support previous studies which found associations between healthier eating practices and sense of coherence. Within the multivariate model, intrapersonal factors were more significant predictors of a high dietary score whereas socio-environmental and physical-environmental factors were not significant. Previously identified predictors of food choices including income; education level; employment; and nutrition knowledge were not significant factors in our overall model. Future research should further study these intrapersonal factors identified in our study to better understand their origins and mechanisms in relation to healthy eating practices.

#### OT-016

#### Oral communication

##### **Manoeuvring between health benefits and health losses by following or neglecting dietary guidelines: where do we stand?**

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**Objectives:** To develop well informed nutrition policies it is important to know to what level present and future measures and interventions still have potential to improve the health status of the population. Aims are to assess the potential health benefits of five dietary factors (fruit, vegetables, fish, saturated fatty acids (SFA), and trans fatty acids (TFA)) for the Dutch population and to place these benefits against the potential health losses on most unfavourable intakes. **Material and methods:** Health outcomes such as Quality-Adjusted-Life-Years (QALYs), mortality rates and life expectancy, were assessed using the RIVM Chronic Diseases Model R5.1 (September 2012 version). The Dutch National Food Consumption Survey 2007-2010 supplied food consumption data. Food composition data were derived from the Dutch National Food Composition Table version 2011. Two extreme scenarios were developed and compared with the current intake scenario: in the best-case scenario 100% of the population adheres to the recommended intake category and in the worst-case scenario, 100% of the population is assigned to the least favourable intake category.

**Results:** Most health gain can be obtained by increasing fruit and fish consumption, followed by increasing vegetable consumption. Further reduction of SFA and TFA intake results in minor health benefits. Fully following the dietary guidelines for all five dietary factors would result in a reduction of about 3,700 deaths per year [annual mortality rate in the Netherlands is 141,000 including 39,000 for cardiovascular diseases and 43,000 for cancers] and life expectancy would increase by 0.5 year. Following the unhealthiest eating pattern would result in an extra 6,800 deaths per year and a reduction of the life expectancy by 0.8 year.

**Key findings:** In the Netherlands most of the potential health benefits of the five dietary factors have been realized. Nevertheless, a substantial health gain can still be obtained, especially with respect to increasing fruit and fish consumption, and, to a lesser extent, also by increasing vegetable consumption.

#### OT-017

#### Oral communication

##### **Food-choice behavior and coping strategies to deal with food insecurity in low-income Portuguese families: the preliminary results of an exploratory study.**

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In Portugal as in many other European countries, feeding the family with limited economic resources has become one of the biggest challenges, due to current austerity programs. Actually, food insecurity affect a large proportion of the Portuguese population, a prevalence of 50,7% was found for food insecurity in 2013. Literature shows that economic constraints and,

consequently the coping strategies to deal with this situation have a great impact in food-choice behavior of low-income families (LIF). Most food and nutrition researches are lacking on in-depth understanding of the complexity of food-choice behavior in situations of food insecurity. Specially in Europe and other western regions. This study aims to illustrate the complexity of food-choice behavior and its associated factors, providing data on coping strategies to deal with food insecurity in a sample of LIF in Portugal.

This study was carried out between May-December 2013 and fieldwork took place at two social housing neighborhoods in Portugal. A sample of 32 households was selected by a systematic random sampling. Households involved in this study were contacted by the municipality social workers. A qualitative approach was used, in which the households were followed along several months in order to complete three in-depth semi-structured interviews by the main researcher of this work.

Data analysis of the individual's narratives living in low-income Portuguese families suggests that food-choice behavior is broadly influenced by economic, social and psychological determinants. Three main themes emerged from the narratives analysis: 1) food-choice behaviors are influenced by social aspirations; 2) socializing needs affects food-choice behavior (eating out as a socialization process) and 3) food assistance and informal social networks (families/friends) were main coping strategies. Our findings also suggested that economic constraints induce large changes on diet quality and reduction of food intake, with a particular impact for female household members.

The understanding of the broad range of determinants of food-choice behavior, as well as coping strategies used to manage food and economic constraints are quite important to develop public health nutrition interventions addressing social inequalities in health.

#### OT-018

#### Oral communication

##### **Early eating behaviours in relation to fruit and vegetable intake and a healthy diet variety score at 4-5 years of age – a prospective analysis in three European birth cohorts.**

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**Objectives:** Eating behaviours during early childhood could be mediators to a worse health profile. Fruit and vegetables (F&V) intake and overall diet variety are surrogates for healthful diets. This study aims to prospectively relate feeding behaviours at different ages with F&V consumption and a healthy diet variety score of children with 4-5 years of age.

**Material and methods:** Eating behaviours were assessed in three European cohorts (Generation XXI from Portugal, EDEN from France and ALSAPAC from the UK) at 4-6, 12-15, 24 and 48-54 months, based on caregiver's perception of child's eating difficulties, poor eating (defined based on eating small quantities at each meal), food refusal, and establishment of daily food routines. F&V intake and the healthy plate variety score (HPVS) was calculated in each cohort using food frequency questionnaires. HPVS assesses variety of healthy foods within and across the main food groups based on the number of servings recommended for each group in healthy eating guidelines, the maximum score is 5. Associations were tested by logistic regressions (odds ratio and 95% confidence intervals (OR, 95%CI) adjusted for maternal age, education, smoking during pregnancy, any breastfeeding and child's z-score body mass index.

**Results:** Children with more eating difficulties, poor eating, food refusal/neophobia, and difficulties in establishing a daily routine at 12-15, 24 and 48-54 months, as reported by parents, had in general lower fruit and vegetable intake at 4-5 years. The association with vegetables was slightly stronger than with fruits. Early eating difficulties were also inversely associated with the variety score at 4-5 years of age. The association with food refusal/neophobia and difficulties in establishing a daily routine were in the same direction, but only significant when eating behaviours were reported after 12-15 months of age.

**Key findings:** Children with eating difficulties, food refusal/neophobia and difficulties in establishing a daily routine, as reported by their parents, presented a lower fruit and vegetable intake and less dietary variety at 4-5 years of age. These associations were consistent across cohorts, slightly stronger for vegetables than fruits, and more evident when eating behaviours were reported after 12-15 months of age.

## OT-019

## Oral communication

**Race is associated with obesity independent of socioeconomic status among Brazilian adults: 2008-2009 Household Budget Survey.**

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**Objective:** To verify the effect of race independent of socioeconomic status (SES) on obesity in Brazilian adults.

**Material and methods:** We used a sample of 65,645 adults aged between 20 and 50 living in urban areas from the 2008-2009 Brazilian Household Budget Survey. This nationwide survey used a two-stage cluster sampling design. Obese and non-obese people were defined using World Health Organization body mass index classification. We considered a self-declared race classification: white, black and mulatto. We used factor analysis with principal component extraction to derive SES index. SES was formed by income, education, and food access variables. The association between race and obesity independent of SES (estimated by individual factor scores), age, Brazilian's regions was estimated using multivariate survey logistic regression. Interaction between race and gender was tested. All estimates were calculated taking into account the complex sample design.

**Results:** The prevalence of obesity was 12.8% (11.8% in men and 13.8% in women). In SES analysis, both the Kaiser-Meyer-Olkin index (0.79) and Bartlett's test ( $p < 0.01$ ) indicated that the correlations among the variables were sufficiently strong for a factor analysis. The eigenvalue criterion (cutoff in 2.5) allowed for the identification of one factor of SES (52% of variance). The interaction term was statistically significant ( $p < 0.01$ ). We observed a reduced odds of obesity among mulatto men compared to white men (odds ratio 0.88; 95% CI: 0.79-0.99) and no significant association with other classification of race among men. On the other hand, black and "mulatto" women had an important increased odds of obesity compared to white women, odds ratio 1.63 (95% CI: 1.38-1.92) and 1.13 (95% CI: 1.01-1.26), respectively. Moreover, black women had more odds of obesity compared to mulatto one (odds ratio 1.44; 95% CI: 1.24-1.68). **Key findings:** The present population-based study suggests that racial disparities in obesity are independent of SES and gender-dependent. The role of race in obesity is markedly evident in women, in which Brazilian strategies to reduce obesity should focus on mainly in black and mulatto women.

## OT-020

## Oral communication

**The burden of obesity in the population of Cape Verde using different anthropometric approaches.**

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**Objectives:** to assess prevalence and the impact of anthropometric indicators to estimate the obesity and risk factors among Cape Verdeans adults.

**Methods:** a cross-sectional study was conducted with a representative multistage random cluster sample of 1762 adults aged 25 to 64 years in Cape Verde, using the WHO STEPwise approach to chronic disease risk factor surveillance. Information on the socio-demographic characteristics and lifestyle behaviors, as well as physical measurements such as weight, height, waist and hip circumference, and blood pressure were collected using standardized procedures. Overweight were considered when the BMI was between 25 and 29.9 kg/m<sup>2</sup> or obesity when BMI  $\geq$  30 kg/m<sup>2</sup>. Abdominal obesity was defined as Waist Circumference (WC)  $\geq$  88 cm in women and  $\geq$  102 cm in men, and Waist Hip Ratio (WHR) for women  $\geq$  0.85 cm for men and  $\geq$  0.90 cm. Logistic regressions were fitted to study the associations between variables, and odds ratios (OR) and the respective 95% confidence intervals (95% CI) were computed.

**Results:** Based on BMI the prevalence of overweight and of obesity was respectively, 24.9% (21.3-28.9) and 6.5% (3.9-10.7) among men, and 27.8% (23.0-33.1) and 14.4% (10.3-19.8) among women. The prevalence of abdominal obesity was 4.5% (2.7-7.6) and 30.1% (20.0-42.5) among men and 37.9% (31.1-45.2) and 51.6% (37.7-65.2) among women, according WC and WHR respectively. Both general and abdominal obesity measures were significantly more frequent in urban settings (age adjusted odds ratio, urban men: 2.02, 0.96-4.27 and urban women: 2.47; 95%CI: 1.35-4.52 for general obesity; and age adjusted odds ratio, urban men 12.7; 2.83-56.8; urban women: 2.45; 1.33-4.51 for abdominal obesity). Among men, abdominal obesity increased with age (OR: 6.54; 95%CI: 2.77-15.5

for WC; and OR: 7.04; 95%CI: 2.50-19.8) and education years (OR: 18.8; 95%CI: 1.55-220.4 for WC, and OR: 3.02; 95%CI: 1.19-7.64). Among women, general obesity and abdominal obesity increases with increases age (OR: 2.47; 95%CI: 1.35-4.52 for general obesity; OR: 3.25; 95%CI: 1.50-7.03 for WC; and OR: 4.39; 95%CI: 2.13-9.06 for WHR) and income category (OR: 1.65; 95%CI: 1.06-2.57 for general obesity; OR: 1.56; 95%CI: 1.04-2.33 for abdominal obesity). **Key findings:** Overweight/obesity and abdominal obesity are a public health problem in Cape Verdeans adults, with a significantly different gender and rural-urban distribution.

## OT-021

## Oral communication

**Soy Supplementation: Objective & Subjective Health Markers in Preschool Children in Bukoba, Tanzania**

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Throughout the world malnutrition is a primary contributing factor to childhood morbidity and premature mortality. The complexity of malnutrition transcends health issues, impacting children's growth, development and overall quality of life. Tanzania is ranked eighth in the world for greatest incidence of child mortality resulting from the synergistic interactions between moderate and severe malnutrition and infection.

**Objective of the study** was to determine effect of Defatted Soy Flour (DSF) on Objective and Subjective Markers of Health and Wellbeing in three selected preschool children in Bukoba, Tanzania

**Materials and Methods:** Objective health marker included growth data as height, weight and Body Mass Index. Subjective health markers included variables such as presence of diarrhea, symptoms of respiratory illness and health care access. The evaluation was expected to capture the anthropometric and surface level health benefits of the addition of DSF to uji (porridge) within the participants. The baseline survey and measures was to be conducted on approximately 100 children from three selected preschool prior to the start of soy feeding program with follow-up after six months to determine the changes in nutrition status of the participants.

**Results:** The results of 6 month trial depicted that linear velocity remained unrelated to other variables in the study. The only correlation was with weight velocity. This can be interpreted as a positive indicator for the growth of the population since both weight and height increased.

**Key Findings:** Adding DSF as protein sources has positive impact on growth and reduction of childhood malnutrition as presented in this study.

## OT-022

## Oral communication

**The Determinants of Diet and Physical Activity (DEDIPAC) Knowledge Hub.**

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To address major societal challenges and enhance cooperation in research across Europe, the European Commission has initiated and facilitated 'joint programming'. Joint programming is a process by which Member States engage in defining, developing and implementing a common strategic research agenda, based on a shared vision of how to address major societal challenges that no Member State is capable of resolving independently. Setting up a Joint Programming Initiative (JPI) should also contribute to avoiding unnecessary overlap and repetition of research, and enable and enhance the development and use of standardised research methods, procedures and data management. The Determinants of Diet and Physical Activity (DEDIPAC) Knowledge Hub (KH) is the first action of the European JPI 'A Healthy Diet for a Healthy Life'. The objective of DEDIPAC is to contribute to improving the understanding of determinants of dietary, physical activity and sedentary behaviours. DEDIPAC KH is a multi-disciplinary consortium of 46 consortia and organisations supported by joint programming grants from 12 countries across Europe. The work is divided in three thematic areas: (I) Assessment and harmonisation of methods for future research, surveillance and monitoring, and for evaluation of interventions and policies; (II) Determinants of dietary, physical activity and sedentary behaviours across the life course and in vulnerable groups; and (III) Evaluation and benchmarking of public health and policy interventions aimed at improving dietary, physical activity and sedentary behaviours. In the initial three years, DEDIPAC KH will organise, develop, share and harmonise expertise, methods, measures, data and other infrastructure. This should further European research and improve the broad multidisciplinary approach needed to study the interactions between multilevel determinants in influencing dietary, physical activity and sedentary behaviours. Insights will be translated into more effective interventions and policies for promotion of healthier behaviours and more effective monitoring and evaluation of the impacts of such interventions.

#### OT-023

#### Oral communication

##### Trans fatty acids in Europe: where do we stand?

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**Objectives:** The adverse relationship between increased TFA (trans fatty acids) intake and coronary heart disease risk is well established. The objective of this study was to identify and summarise publicly available data on TFA content in foods and on dietary TFA intakes in the European region. **Material and methods:** A structured search of scientific articles and national reports in the English language published in PubMed and other electronic databases was conducted. Additional data from Member States was obtained via a questionnaire survey. Inclusion criteria: studies assessing TFA presence in foods (published from 2003 to 2013) and/or consumption/intakes (published from 2005 to 2013) in the European region. Analysis was performed using Microsoft Office® Excel and MATLAB™. **Results:** The analysis of the data (based on 23 studies) confirms reported reductions of TFA in foods e.g. close to 0 or below 2g of the total fatty acid content, but also shows that there are still a number of foods with high TFA levels in some European markets. These values can be as high as 54g of TFA per 100g total fat (a shortening product sampled in 2008). The average TFA intake (based on 13 studies) lies below the WHO-recommended maximum of 1E% however, up to 25% of surveyed individuals aged 20-30 years have TFA intakes above this maximum level. **Key findings:** The results confirm a reduction of TFA content in foodstuffs and TFA intake over the last two decades but they also demonstrate that there are still a number of foods with high TFA levels in the European market (>2g of TFA/100g of fat). However, data from many countries of the European region are still lacking, in particular for non-labelled and non-packed foods and for specific sub-groups of the population. As it stands there appears to be room for improvement of the European situation as regards the presence of tTFA in foodstuffs. Whether to consider introducing or promoting any additional TFA-related measures at European level, and if so, assessing which measure would be most appropriate to further reduce TFA consumption is beyond the scope of this analysis.

#### OT-024

#### Oral communication

##### Associations between FTO variants and energy intake in adults: a systematic review and meta-analysis.

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Human Nutrition Research Centre, Institute for Ageing and Health, Newcastle University, Newcastle Upon Tyne, UK.

**Objectives:** Risk variants of the fat-mass and obesity (FTO) gene are associated with increased obesity. However the evidence for links between the FTO gene and energy intake have not been systematically assessed. Our aim was to evaluate associations between the FTO gene and energy intake in adults.

**Material and methods:** A systematic literature search in Medline, Scopus, EMBASE and Cochrane identified fifteen studies that reported energy intake and the FTO gene status in adults. Individual study mean intakes and standard deviations, using per-allele comparisons, were evaluated. The analyses were repeated on an energy intake per kilogram body weight basis and random-effects models were used to derive pooled effect sizes. Meta-regression analyses were conducted to estimate regression coefficients for effect sizes following adjustment for study parameters and participant characteristics.

**Results:** The studies identified were published between 2008 and 2012 and included a total of 64,304 participants with a mean age and BMI of 52.1 ± 7.0 years and 27.7 ± 3.6 kgm<sup>-2</sup> respectively. Weight (P<0.001) and BMI (P<0.001) were significantly higher in those carrying two copies of the FTO risk allele than those with no copies. Preliminary findings show that carriage of the FTO risk allele is associated with a 106 KJ/day (95% CI: -191, 21.9; P<0.001) and 5.3 KJ/day/kg body weight (95% CI: -7.28, -4.06; P<0.001) lower energy intake compared with non-carriers of the risk allele.

**Key findings:** Perhaps surprisingly, carriage of the FTO risk allele is associated with a 4.9% lower energy intake compared to those with no risk. Further research is needed to determine whether the inverse relationship between carriage of the FTO risk allele and energy intake is independent of mis-reporting dietary intake and of changes in energy metabolism and physical activity.

#### OT-025

#### Oral communication

##### Sizing it up: Adherence to the Mediterranean Diet and anthropometric and financial measures of the MEDIS study elderly.

Piscopo S<sup>1</sup>, Polychronopoulos E<sup>2</sup>, Panagiotakos DB<sup>2</sup>; for the MEDIS study investigators.

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**Objectives:** This study aimed to evaluate adherence to the traditional Mediterranean Diet (MD) and association with BMI, waist circumference (WC), waist-to-hip ratio (WHR) and financial status in a sample of Mediterranean elderly without known cardiovascular disease.

**Material and methods:** During 2005-2011, 2813 elderly (aged 65-100 years) from 22 Mediterranean islands and the rural Mani region (Peloponnese) voluntarily enrolled in the study. Participants' basic socio-demographic characteristics were recorded and standard procedures were used to determine anthropometric measures. Dietary habits were assessed through a semi-quantitative, validated and reproducible food-frequency questionnaire and level of adherence to the MD was determined using the MedDietScore (theoretical range 0-55). Higher values for this diet score indicate greater adherence to the MD. To measure financial status, participants were asked to report their mean income during the previous three years using a four-point scale (inadequate to cover daily expenses, trying hard to cover daily expenses, adequate to cover daily expenses, more than enough to cover daily expenses).

**Results:** The MedDietScore ranged from 30 to 34, indicating an overall moderate to good adherence to the MD. Across all regions (apart from Crete), reported intakes of cereals, poultry, meat and meat products, fish, milk and milk products, and sweets were below dietary recommendations, whereas vegetables, potatoes, fruit (apart from Crete), and olive oil intake met and exceeded recommendations. Also across all regions, sweet and fast-food intakes were low (apart from Crete), and leafy green plants (consumed three to four times weekly) and alcohol (consumed daily by 35% to 60% of the sample) played an essential role in the diet. The MedDietScore was positively associated with WHR (rho=0.104, p=0.001), but was not associated with BMI or WC (p>0.5). It should be noted that WHR was within normal limits for the vast majority of the elderly. Adherence to the MD was associated with better financial status (p<0.001) of the study participants.

**Key findings:** Traditional MD elements, such as vegetables, cultivated and non-cultivated greens and olive oil are still abundantly present in the diet of Mediterranean elderly, although some regional heterogeneity does exist,

with the greatest deviation displayed by Crete. Simultaneously, study results suggest that new food products and habits are increasingly challenging dietary traditions, even among the elderly population. The processes how greater financial status can facilitate MD adherence, and how health outcomes are impacted as a result of the positive association of adherence to the MD with WHR require further study.

#### OT-026

#### Oral communication

##### **Environmental relevance of human nutrition. A comparison between a nutritional food pyramid, an emissions-based (CO<sub>2</sub>e) and a resource-based (virtual water) pyramid.**

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**Objectives:** The aim of this Study is to analyse the environmental relevance of human nutrition and to investigate if the nutrition recommendations would change if greenhouse gas (GHG) emissions and virtual water are taken into consideration. For this purpose three food pyramids are compared: A nutritive pyramid, an emissions-based pyramid and a resource-based pyramid.

**Material and Methods:** An evaluation of existing studies showed that there are already several nutritive pyramids and one food pyramid based on GHG emissions. Furthermore, the desktop research showed that there was no food pyramid based on virtual water data. Using publicly available data on the water footprint of foods, a food pyramid was developed within this study.

**Results and Discussion:** The three-dimensional pyramid of the German Nutrition Society focuses on nutritional aspects and an adequate supply of nutrients based on food standard groups. The GHG emissions-based pyramid, developed in Denmark, refers to the amount of GHG emissions in kg CO<sub>2</sub>-equivalents per kilogram food, the allocation of which had an effect on the arrangement of the foods in this food pyramid. The virtual water in the form of water footprint in litres per kilogram food, represents the indicator of the resource-based pyramid. A comparison between these three pyramids shows that it is not necessary to give completely different nutrition recommendations if ecological aspects like the CO<sub>2</sub>-equivalents or the water footprint are considered. There are only some food items that stand out. In general, crop products have a lower environmental impact than animal food, which is consistent with the arrangement in the nutritional pyramid. Looking at crop products, it is particularly preferable to choose regional and seasonal products from open land cultivation instead of products cultivated in greenhouses. That way, water resources can be saved and emissions of carbon dioxide equivalent will possibly be reduced. Some food items are conspicuous, for example coffee, rice and beef, whose position in the nutritive pyramid shifts to a higher position when considering the environmental pyramids. Furthermore, potatoes would shift to the base of a food pyramid next to regional fruits and vegetables, instead of their current position with cereals in the nutritive pyramid.

#### OT-027

#### Oral communication

##### **Vitamin A stability in Nigerian retailed flour and fortification compliance level.**

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**Background:** Wheat flour has been mandatorily fortified with vitamin A in Nigeria. Vitamin A is unstable under several environmental factors and quantity in 'fortified' flour at pre and post-production times is not clear. The objective of this study therefore is to determine vitamin A stability in retail flour and assess compliance status.

**Methods:** Seventeen flour samples were randomly selected from twelve bakeries across six Local Government Areas in Lagos, Nigeria. Flour samples were collected from bakeries and stored for 30 days at room temperature. Pre and post-storage retinol analysis were carried out using High Performance Liquid Chromatography method. Stability result was grouped under 1, 2 and 3 months using sample production dates. Fortification compliance was calculated based on three assumptions: All samples were assumed to have been fortified with current Nigerian International standard (NIS) for flour (30IU/g). World Health Organization (WHO) guideline of acceptable range of 30% due to losses during distribution and storage was applied and an acceptable range of 50% was also used to determine if the level of fortification was adequate taken into consi-

deration additional factors such as premix quality and stability, in-process addition challenges. Number of samples that met the required ranges based on the assumptions was calculated in percentages. Data was analyzed using descriptive and inferential statistics at p<.05.

**Result:** Pre and post-storage vitamin A content of flour was 18.2±10.7 IU/g and 6.4±5.2 IU/g respectively. Vitamin A stability in flour at 1, 2 and 3 months were 60.7%, 30.6%, and 21.4%. Only 11.8% samples met NIS standard (≥30IU/g). Initial vitamin A compliance in flour was 23.54% based on WHO guidelines (Feasible Fortification Level/Range (FFL)) of approximately 30% loss (22.5-30 IU/g) and non-compliance was 76.5%. After stability studies, compliance decreased to 5.9% while non-compliance level increased to 94.12%. Out of 17 flour samples, only 29.4% and 17.7 % were compliant at 50% acceptable compliance range (ACR) for vitamin A (15-30 IU/g) at pre and post-storage levels respectively. A significant difference existed between vitamin A content of flour and Nigerian NIS.

**Conclusion:** Low stability and compliance were observed. High premix quality and monitoring should be ensured.

#### OT-028

#### Oral communication

##### **Local vs. Global food chain performance in Denmark.**

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**Introduction:** In recent years a small, but growing number of consumers have increased awareness of the complexities of the food systems, and how their choices might affect the health, the environment, local economies and societies, often very distant from the place of consumption. A growing focus on the concept of 'local foods' has generated a myriad of business, civil society and policy initiatives.

**Objectives:** The aim of the project is to distinguish local and global food chain performance assessment in Denmark by capturing the perceptions and representations of food chain performance in 4 selected spheres: Market, Scientific, Public and Policy. Then to investigate how the spheres cross-cut with the economic, social, environmental, health and ethical dimensions. Finally, to identify which attributes assess the performance of food supply chains.

**Methods:** A multi-criteria methodology was applied, allowing an integrated characterization of the performance of food chains. A desk research was conducted covering scientific publications, media communications and grey literature. Furthermore, 11 expert interviews were carried out to supplement the review's findings, and to identify the main attributes, important issues, debates and methods used to analyse food chains at both local and global levels.

**Results:** Nineteen attributes related to local and global food systems were identified and placed in a Multi-criteria matrix describing the attributes in detail. The most important attributes identified were price, competitiveness and organic foods. Consumer information was also important.

**Key findings:** A clear distinction between the local and global food systems, in a Danish context, was difficult to make. Attributes such as Food miles, Traceability, Nearness and Food quality play a role in distinguishing the systems. The free global market has a great impact on food systems in Denmark, e.g. forage for Danish livestock is imported from Argentina, while Danish producers are placing some parts of their production outside of Denmark, interlinking the local and global food systems. Finally it is suggested, that if a clear definition of a transparent food system is to be made, another term such as a 'Danish food system' could be developed.

**Acknowledgement:** This work is part of the EU FP7 'Global and local food assessment: a multi dimensional performance-based approach' (GLAMUR). Grant agreement: 311778.

#### OT-029

#### Oral communication

##### **An evaluation of the effects of Food and Health Dialogue targets on the salt content of bread, breakfast cereals, and processed meats.**

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**Objectives:** The Australian Government established the Food and Health Dialogue (FHD) in 2009 to encourage food reformulation. Sodium reduction targets for three food categories (breads, breakfast cereals, and processed meats) were scheduled to be achieved in December 2013.

**Materials and methods:** Sodium levels in packaged foods in Australian supermarkets were collected from product labels each year from 2010-2013. Changes in mean sodium content from baseline to Dec 2013 were assessed by linear mixed models and differences in the proportion of products meeting sodium reduction targets examined using chi-squared tests or McNemar's tests. We explored whether results differed according to manufacturers' commitments to participate in the FHD process as declared on the FHD website.

**Results:** Mean sodium levels of bread products were 454mg/100g in 2010 (n=172) and 415mg/100g in 2013 (n=267) representing a 9% reduction

(39mg/100g,  $P < 0.001$ ). By 2013, 67% of the products were below the maximum target of 400mg/100g compared to 42% in 2010 ( $P < 0.005$ ). Declines in sodium content were achieved among manufacturers that declared commitments and those that did not ( $P_{\text{heterogeneity}} = 0.58$ ).

There were 125 cereal products in 2010 and 159 in 2013. Over this period the mean sodium level fell from 316mg/100g to 237mg/100g (25% reduction  $P < 0.001$ ). Sodium reduction did not differ between companies that did and did not make public commitments ( $P = 0.39$ ). 27% ( $n = 34$ ) of products in 2010 had sodium levels  $> 400\text{mg}/100\text{g}$  for which the FHD recommended a 15% reduction. Of the 20 available in 2013, 16 met the target.

There was a reduction of 53mg/100g in mean sodium for luncheon meats (95%CI 1-104,  $P = 0.04$ ). This was true regardless of whether companies made a public commitment ( $P = 0.07$ ). There was no detectable decrease in mean sodium content for bacon ( $P = 0.48$ ). Overall, 34% of processed meat products met sodium targets compared with 22% prior to the FHD. Conclusion: Planned reductions in sodium have been achieved for bread and cereal products but not for processed meats. There needs to be an investigation to understand why two categories succeeded but the other did not. A strengthened FHD could produce significant benefits for the health of the Australian population.

### OT-030

#### Oral communication

#### Validation of a picture book used to estimate food portion to be used in dietary surveys.

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**Objectives:** This study aims to validate a picture book for estimation portion sizes, among adolescents, adults and elderly, through two approaches: visual perception of food portions by comparison with food photos; and by conceptualization and memory, using the same photos to estimate the amount of served food one hour after self-served food portions.

**Material and methods:** The present study was performed within the PANEU project, which was the pilot phase of the study EU-MENU, a Pan-European dietary survey promoted by EFSA. The goals of this project were to develop, test and evaluate the applicability of tools and procedures for the estimation of dietary risks and identification of dietary habits in adolescents, adults and elderly in Europe. Each PANEU partner developed country specific picture book based on the picture book of the electronic tool 24h-recall EPIC-SOFT. A sample of adolescents and adults was recruited in each PANEU country (Bulgaria, Finland, Germany, Hungary, Poland and Portugal), ranging from 34 (Finland) to 103 (Bulgaria). Representative food photo series were chosen to cover a wide range of food groups, achieving approximately 25% of the PILOT-PANEU Picture Book (21 photographs). Three portions of each photo series were randomly chosen.

**Results:** 18% (cheese) to 96% (ratatouille) of the participants chose the correct picture portion. Between 0 to 30% of the participants chose a distant picture. In the perception study the main source of variance in the measurement was the different portion sizes on the plates (67.8%), and not the error of instrument and the individual characteristics. Moreover, the agreement between the real portion and the reported portion was substantial (79.3%) and the bias was very low. Typically, overestimated or underestimated foods in the perception approach were similarly overestimated or underestimated, respectively, in the memory study. Compared with perception results, the variance explained in the memory study by plate was lower and the error was higher, increasing from 0.59 to 0.95. The agreement between real portions and the reported portions was lower. The agreement seems to decrease as the appearance of the food presented differs from the food in the picture (e.g. fish, slices).

**Key findings:** In conclusion, the results confirmed that the picture series included in the EPIC-Soft picture book can only be applied in future intake surveys for similar foods as those depicted on the pictures.

### OT-031

#### Oral communication

#### Standardisation of food selection for portion sizes quantification using photos in pan-Latin American dietary monitoring surveys: Report from Brazil.

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One of the major challenges in measuring diet concerns accurate estimation of food portions consumed/reported. In the perspective of the LA-DIETA<sup>1</sup> project, there is the need to develop/adapt the GloboDiet (formerly

EPIC-Soft) picture book for estimating food portion amounts during 24-h recalls in future surveys in Latin America, one of the starting countries being Brazil. The objective of this work is to present the results of the standard operating procedure to deliver a list of foods that require photos for standardized portion size estimates in pan-Latin American dietary monitoring surveys, with a pilot initiative in Brazil (and Mexico not reported here). Data from adults participating in the latest Brazilian Food Consumption Survey (POF2008/2009) were used to identify the most consumed foods in the 5 macro-regions of Brazil ( $n = 1085$  foods). The number of foods (inc. recipes) selected to be quantified by photos was obtained through two approaches. First, variability analysis using stepwise regression was performed to detect between person variation for selected nutrients by region and sex. Foods with over 90% accumulated r-square for the different nutrients in each region and sex were selected. In addition, a top list with 50 most consumed foods was generated by sex and regions. Next, the two approaches were combined ( $n = 379$  foods) and each of the consumed foods was evaluated for its inclusion in the photo album, following IARC's guidelines (i.e. recommendations for quantifying a food with photos or rather using other types of quantification methods like standard units or shapes;  $n = 121$  selected foods). Foods that were very rarely reported (by  $< 0.01\%$  of the population in each one of the regions) were excluded from the selection of foods ( $n = 17$ ). Selected foods were then searched in the existing GloboDiet photo albums and divided into two groups (with existing photos and new photos to be created). For the existing photos, the weight ranges between GloboDiet photos and the ones from the last Brazilian survey were also compared. Finally, 45 new photos will be developed and 59 existing GloboDiet photos will be used in the Brazilian photo album. Similar procedure is being followed for the development of Mexican photo album and a workshop is foreseen in the near future to discuss the main results and harmonization aspects for the development and application of the picture portion size album in other LA countries. Ultimately, this work will lead to the development of an IARC-WHO2 standard operating procedure, which will serve new joining countries and ensure high standardisation of food portion size estimates worldwide.

### OT-032

#### Oral communication

#### Olive leaf extract favourably modifies cardiovascular risk markers.

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Consumption of dietary polyphenols has been demonstrated to modulate a variety of cardiovascular risk markers. The leaves of the olive plant (*Olea europaea*) are rich in polyphenols, of which hydroxytyrosol (HT) and the secoiridoid oleuropein are most characteristic. This project aimed to assess the impact of olive leaf extract (OLE) in humans in both an acute and a chronic setting. In an acute, postprandial, cross-over study, 18 healthy subjects (9 male, 9 female, mean age 25.4 years, BMI 23.0 kg/m<sup>2</sup>) consumed either olive leaf extract (OLE), delivering 58 mg oleuropein and 4 mg HT, or placebo, separated by a 4 week wash out. Vascular function was assessed at baseline, 0.5, 1, 1.5, 2, 3, 4, 6 and 8 hours via Digital Volume Pulse (DVP). Blood collected at baseline, 1, 3 and 6 hours was cultured for 24 hours in the presence of lipopolysaccharide. Interleukin (IL)-8, IL-6, IL-18, tumor necrosis factor- $\alpha$  and IL-10 concentrations were measured in supernatants. DVP-stiffness index ( $p = 0.009$ ) and ex vivo IL-8 production ( $p = 0.0326$ ) were both significantly lower across the intervention period compared to the control. Absorption of OLE was confirmed by the presence of specific olive phenolic metabolites in urine samples. To investigate the effect of chronic OLE supplementation, we conducted a randomised double-blind placebo controlled cross-over trial using a group of 60 prehypertensive (systolic blood pressure (SBP) 121-140 mm Hg and/or diastolic blood pressure (DBP) 81-90 mm Hg) males (mean age 45 years, BMI 27.0 kg/m<sup>2</sup>). The primary outcome measure was ambulatory blood pressure and the secondary outcome measures were plasma lipids, vascular function assessed by Pulse Wave Velocity (PWV), Pulse Wave Analysis (PWA) and DVP, cytokines, cell adhesion molecules, CRP, markers of glucose control and adiponectin. Subjects consumed 20 ml of liquid OLE providing 136 mg oleuropein and 6 mg HT, or a placebo liquid, daily for 6 weeks separated by a 4 week washout. Significantly lower values ( $P < 0.05$ ) were seen after OLE consumption vs control for SBP (daytime  $-3.95 \pm 11.48$  mmHg; 24 hour  $-3.33 \pm 10.81$  mmHg), DBP ( $-3.00 \pm 8.54$  mmHg;  $-2.42 \pm 7.61$  mmHg), total cholesterol ( $-0.32 \pm 0.70$  mmol/L), LDL cholesterol ( $-0.19 \pm 0.56$  mmol/L), triglycerides ( $-0.18 \pm 0.48$  mmol/L) and circulating interleukin-8 ( $-0.63 \pm 1.13$  pg/ml). All values are means  $\pm$  SD. We present compelling evidence that OLE could represent a useful dietary supplement to reduce risk of CVD.

**OT-033****Oral communication****The effect of timing of iron supplementation on iron absorption and haemoglobin in post-malaria anaemia: a longitudinal stable isotope study in Malawian toddlers.**Glinz D<sup>1</sup>, Phiri K<sup>2</sup>, Kamiyango M<sup>3</sup>, Zimmermann MB<sup>1</sup>, Hurrell RF<sup>1</sup>, Wegmüller R<sup>1</sup><sup>1</sup>Laboratory of Human Nutrition, Institute of Food, Nutrition and Health, ETH Zurich, Zurich, Switzerland. <sup>2</sup>Health Department, College of Medicine, Blantyre, Malawi. <sup>3</sup>Basic Medical Sciences Department, College of Medicine, Blantyre, Malawi.

**Objective:** In sub-Saharan Africa, children with *P. falciparum* malaria and anaemia are often given iron supplementation at the time of malaria treatment. Inflammation during and after malaria may decrease iron absorption, thus, absorption might be improved if the start of supplementation is delayed. Our study objective was to measure iron absorption from iron supplements started immediately or delayed by two weeks during recovery from uncomplicated *P. falciparum* malaria.

**Material and methods:** Malawian toddlers (n=48; age 12-24 months) were assigned to two groups: group A was provided iron supplements (30 mg iron daily) as an iron sulphate-containing syrup for 8 weeks starting immediately after malarial treatment; group B was given the iron after a two-week delay. Iron absorption from the syrup was measured on the first day of iron supplementation, and after 2 and 8 weeks in both groups. Haemoglobin, iron status and inflammation were assessed every 2 weeks. Fractional iron absorption at each time point and cumulative absorption was quantified by measuring erythrocyte incorporation of <sup>57</sup>Fe and compared using mixed models.

**Results:** Comparing group A and B, geometric mean iron absorption did not differ on the first day of supplementation (9.0% vs. 11.4%, P = 0.213) and cumulative iron absorption from the three time points did not differ (6.0% vs. 7.2%, P = 0.124). Haemoglobin concentration increased in both groups two weeks after malaria treatment (P < 0.001) and did not differ after 8 weeks of supplementation (P = 0.542). Inflammation biomarkers were increased directly after treatment, but subsided two weeks after malaria treatment.

**Key findings:** In anaemic toddlers after uncomplicated malaria, a two-week delay in iron supplementation had no benefit in relation to iron absorption or the recovery of haemoglobin concentration. Our findings support the current practice of immediate iron supplementation after malaria treatment, considering that providing supplementation immediately after malaria treatment is generally thought to increase compliance.

**OT-034****Oral communication****Greenhouse gas emissions from production of foods for the American diet.**

Rose D, Storck K.

School of Public Health and Tropical Medicine. Tulane University.

**Objectives:** The agriculture, livestock, and forestry sector accounts for about 30% of worldwide human-induced greenhouse gas emissions, and the United States is one of the top emitting countries. However, unlike Europe, where a number of investigators have explored the relationship between diet and emissions, little is known about the contribution of the U.S. diet to this process. This paper estimates greenhouse gases emitted in the production of foods for American consumption, and examines socio-demographic correlates associated with these emissions.

**Materials and methods:** The study is based on nationally representative 24-hour recall data from the National Health and Nutrition Examination Survey (NHANES) for 2007-2008, which was conducted under the auspices of the U.S. Centers for Disease Control and Prevention. Food intake data for adult individuals (N=5989), aged 16 years and older, were converted to commodity form through algorithms developed by the U.S. Environmental Protection Agency. Carbon dioxide-equivalent (CO<sub>2</sub>-eq) emissions from the production of these food commodities, or their nearest match, were determined using published data from the World Wildlife Foundation, and linked to the consumption data. Emissions for the complete diet for two independent observation days on each individual were calculated and averaged. Bivariate analyses, including t-tests and analysis of variance, used survey weights and sample design parameters of the NHANES data.

**Results:** Production of foods that were consumed by U.S. individuals was estimated to contribute 4.43 kg CO<sub>2</sub>-eq per person per day (95% Confidence Interval: 4.25 – 4.61). Expressed on a per-1000-kilocalorie basis, gas emissions from diets were higher for older individuals, men, those with self-rated very good or excellent diets, or those on special diets, such as weight-loss diets. Emissions also varied by the race-ethnicity of the respondent, and were lower for self-described vegetarians.

**Discussion:** The result for emissions from the production of food for U.S. diets is roughly consistent with previous research on European diets. This research allows for an improved understanding of the consumer's role in the production of greenhouse gases derived from the agricultural sector, and can further inform policies that seek to reduce the negative environ-

mental impact of the U.S. diet. The methodology developed here also allows for future research on the relationship between sustainability and healthiness of diets.

**OT-035****Oral communication****Thermic effect, substrate oxidation, and satiety sensation of fish and chicken protein-based diets in middle-aged women.**Tsani AFA.<sup>1</sup>; Son HR.<sup>2</sup>; Kim EK.<sup>2</sup><sup>1</sup>School of Nutrition and Health, Faculty of Medicine, Universitas Gadjah Mada, Indonesia. <sup>2</sup>Department of Food and Nutrition, Gangneung Wonju National University, Korea.

The purpose of this study was to measure and investigate the effects of high protein diets using fish and chicken sources on thermic effect of food (TEF), substrate oxidation, and satiety. Six middle-aged women (mean age 44.5±3.08 y) participated in two isocaloric diet ingestions: fish meal and chicken meal. Each meal provided 25 % of daily basal energy need (32/28/40 % as protein/fat/carbohydrates) of the subjects. Preprandial and 5-hours postprandial energy expenditures (measured at each 30 minutes), and substrate oxidation were measured by indirect calorimetry, while satiety profiles were estimated by visual analogue scales (VAS). The 5-hours TEF was not significantly different between fish meal (8.21 % of energy intake) and chicken meal (8.51 % of energy intake). Although both of the meals directly reached the TEF peak at 30 minutes, the significant increment of postprandial energy expenditure in fish meal lasted longer (up to 270 minutes) than that of chicken meal (up to 60 minutes). In both of meals, all of macronutrient oxidation rates were increased after ingestion. Satiety profiles seemed similar in both of meals, but recovery of hunger and desire to eat sensation to the preprandial state was faster in chicken meal rather than in fish meal. In conclusions, even though high protein with fish and chicken diets did not differ in energy expenditure, fish diet had longer effect on thermic effect and satiety sensation rather than chicken-based diet. A low TEF (8.21% - 8.51% of energy intake) suggested that the age might influence the thermogenic process after meal ingestions, which may be the other factor to predict energy need in this middle-aged group.

**OT-036****Oral communication****EMBRACE-ME BOWL: An assessment of a new plate-ware designed to improve nutrition and commensality.**Virgen Castro DJ.<sup>1,2</sup>; Souza BSN.<sup>2,3</sup>; Santos Q.<sup>2,3</sup>; Perez-Cueto FJA.<sup>3</sup><sup>1</sup>Integrated Food Studies, Aalborg University-Copenhagen. <sup>2</sup>Institute of Social Medicine, State University of Rio de Janeiro, Brazil. <sup>3</sup>Department of Development and Planning, Aalborg University-Copenhagen

**Objectives:** The aim of the study was to assess the effects of a new plate-ware – 'embrace-me bowl' designed to improve vegetable intake and social interaction (commensality) in a self-served meal by university students in a laboratory setting.

**Methods and materials:** The investigation was part of laboratory trials based on a pilot study through a 'cross-over' experimental design. These were carried out at the Food Scape Lab located in Aalborg University Copenhagen in Denmark. Thirty participants took part in the study, between 20 to 30 years (M=23.4 years, SD=2.6), where 25 were male.

The treatment was the 'embrace-me bowl', whereas the non-treatment consisted of a conventional plastic bowl.

The two dependent variables were food intake – total consumption of soup (grams), vegetable (grams) and energy intake (Kcal) – and social interaction – rated by the participants' meal experiences through questionnaires ('Visual Analogue Scale' questions; scale 1-10).

The variables were compared by fitting mixed models in SAS Proc Mixed (SAS version 9.3, SAS Institute, Inc). Preliminary tests for normality of each variable were executed (SAS Proc Univariate). These analyses suggested that all variables were not normally distributed and were transformed with the log function, with exception of the social interaction variable (during the analysis a score variable was created by merging the original variables on social interaction with the intention to simplify this measurement). The models used considered missing outcome data and included all participants. Results: According to the SAS Proc Univariate results, the 'embrace-me bowl' did not exert a significant effect on participants' consumption of soup (p=0.9106), vegetables (p=0.9829), and caloric intake (p=0.9829). Moreover, the 'embrace-me bowl' had no effect in terms of participants' ratings of social interaction (the score created from different variables has a Cronbach's Alpha of 0.833), while the plastic bowl had a significant effect instead (p=0.0451).

**Key findings:** The 'embrace-me bowl' fully connects with its user, it is immune enough to the distractions that encompass the meal scenario; capable of provoking full intimacy without posing any risk of under or over consumption of foods. The results might suggest that the object can be useful for purposes different from commensality. For instance, the 'embrace-me bowl' may have the potential to benefit health and nutrition in specific personas with eating difficulties like children, elderly and ill people, etc. Still, further research is needed before making a final conclusion on the object's potential users.

OT-037

Oral communication

**Photo voice - a powerful tool for mapping the obesity facilitators in the Arab Israeli women population.**Adler D.<sup>1</sup>; Saliva S.<sup>2</sup>; Abed El Razic M.<sup>3</sup>; Harari R.<sup>4</sup>

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Photo voice is a process by which people can identify, represent, and enhance their community through a specific photographic technique. In Israel, the highest obesity rates are found among Arab Israeli women. Arab women are at 3.5 times higher risk for obesity than the Jewish women at the same age group. The study is a pilot.

Objectives: a. to recruit Arab women in their towns that will record and reflect their community's food environment through photos. b. To record thru the photo voice the major causes of obesity in their villages. c. To assess the impact of the tool on the awareness of the participating women to their obesogenic environment.

Material and methods: Arab nutrition students at their practicum chose to learn the photo voice technique and to run a pilot study practicing it in their 2 home towns. They recruited 8 women willing to participate in a pilot with cameras with which they photographed any scenario relating to obesogenic environment, inside their homes and in the town streets.

Results: the impact of the method on the students was overwhelming. Even though they were nutrition students who lived in their towns all their lives, the awareness to the obesogenic environment was striking. Mapping the obesogenic promoters from the photos included: sugary drinks, high fat dairy products, high fat meats, white flour bakery products, cakes, cookies, extensive use of samne (high milk fat product) in cooking, and high use of sugar liquid on top of bakery products.

Key findings: The photos voicing loud: the portion sizes are huge everywhere; at restaurants, at home, and even of traditional foods. Frying and sugary drinks are everywhere; the tables on which the food is served are totally covered with foods and sugary drinks. The environment is loaded with variety of high fat bakery products. There is lack of even basic walking trails. The photos included the very low salaries, taken by the women themselves, voicing the correlation of inequality to obesity. The tool had a striking effect on the awareness of the Arab women to the impact of the environment on their food habits. The lecture will include the photos as the powerful essence of the study, and its public health nutrition potential.

OT-038

Oral communication

**The precarious livelihood in waste dumps: a report on food insecurity and health risk environmental factors among Brazilian recyclable waste collectors.**Wallace S.<sup>1</sup>; Santos LMP<sup>2</sup>; Hoefel MGL<sup>2</sup>; Gubert MB<sup>3</sup>; Carneiro FF<sup>2</sup>; Nogueira TQ<sup>4</sup>; Amate EM<sup>4</sup><sup>1</sup>Public Health, University of Brazilian, Brazil. <sup>2</sup>Department of Public Health, University of Brazilian, Brazil. <sup>3</sup>Department of Nutrition, University of Brazilian, Brazil. <sup>4</sup>Public Health, University of Brazilian, Brazil.

Objective: This study aimed to estimate the prevalence of food insecurity and health risk environmental factors in recyclable material collectors who work at the open dump close to center of the Brazilian capital city.

Methods: The study area is located in the Federal District, about 20 miles from the civic center. It is named "Estrutural open dump" and was created more than 50 years ago, along with the construction of the capital of Brazil. About 6,500 people survive on the collection of recyclable solid waste on this dump. A census was performed of the collectors' families living on five blocks near the dump. A pre-tested form was used, containing questions about socio-demographic status, social programs, feeding, housing conditions, basic sanitation, work and the environment. Food security was assessed from the short scale, with six questions, used in Brazil and in the United States.

Results: A total of 204 households composed of 835 residents and 286 collectors was studied. 43.1% of the households had five or more people and 88.3% of the family incomes were below \$680.25 United States dollar. 93.1% had piped water and almost all had electricity. However almost half the families reported not treating the drink water in any way. 65% of the households had sanitation. But the presence of rats and cockroaches occurred in 90% of them. Most segregators have had an accident at work (55.5%) and perceived the danger of their working environment (95.0%). Based on the food insecurity scale, 50.0% of the families were classified as food secure. Even though, 55.0% of the study families informed that they eat foods found in the dump. Crossing this information shows that the percentage of families who are indeed food secure drops to 24.5% and that 75.5% of families are exposed to food insecurity.

Key findings: The consumption of food from the garbage and food insecurity are present in the daily life of waste segregators. Their living conditions are poor and do not offer all the resources needed for the representation of a decent housing. In this sense, segregators are in a vulnerable community, not solely from the perspective of the workers' health, but from

the environmental aspect. We will not be capable of eliminating poverty in Brazil while the dump issue is not solved and the work of collectors in these environments in subhuman conditions remain.

OT-039

Oral communication

**The effect of iron-fortified complementary food and intermittent preventive treatment of malaria on anaemia in young children: a 2x2 randomized controlled intervention trial.**Glinz D<sup>1</sup>, Wegmüller R<sup>1</sup>, Zimmermann MB<sup>1</sup>, Brittenham GM<sup>2</sup>, N'Goran EK<sup>3</sup>, Hurrell RF<sup>1</sup><sup>1</sup>Human Nutrition Laboratory, ETH Zurich, Zurich, Switzerland. <sup>2</sup>Department of Pediatrics, Columbia University College of Physicians and Surgeons, New York, United States of America. <sup>3</sup>Unité de Formation et de Recherche Biosciences, Université Félix Houphouët-Boigny, and Centre Suisse de Recherches Scientifiques en Côte d'Ivoire, Abidjan, Côte d'Ivoire.

Objective Iron deficiency and malaria are major causes of anaemia in tropical regions, but the proportion of anaemia attributed to these two causes varies with setting and population group. Because inflammation during malaria reduces absorption of dietary iron and systemic iron recycling, intermittent preventive treatment of malaria may improve the efficacy of iron fortification. The objective was to investigate the impact of an iron fortified complementary food and intermittent preventive treatment for malaria, on haemoglobin concentration, anaemia and iron status in a nine-month intervention study in young Ivorian children.

Material and methods We conducted a 9-month cluster-randomised, single-blinded, placebo-controlled 2x2 trial in 12-36 month-old children (n=502) in rural Côte d'Ivoire. The treatments were: a) consumption of an iron-fortified complementary food providing 2 mg iron as NaFeEDTA and 3.8 mg as ferrous fumarate 6 days/week; b) intermittent preventive treatment of malaria at 3 month intervals using sulfadoxine-pyrimethamine in combination with amodiaquine; c) both iron-fortified complementary food and intermittent preventive treatment; or d) neither. The primary outcomes were haemoglobin and anaemia prevalence. Secondary outcomes were: plasma ferritin, iron deficiency prevalence and *P. falciparum* prevalence and intensity. Data were analysed with random effect models.

Results At baseline, anaemia, iron deficiency and malaria prevalence were 82.1%, 40.8% and 58.7%. Compliance to treatments was ≥90%. There were no significant treatment effects of iron-fortified complementary food on haemoglobin, plasma ferritin or anaemia, but iron-fortified complementary food reduced iron deficiency prevalence (OR=0.08, 95% CI 0.02-0.38). There was no significant treatment effect of intermittent preventive treatment on haemoglobin, but intermittent preventive treatment significantly reduced malaria prevalence (OR=0.46, 95% CI 0.22-0.97) and anaemia prevalence (OR=0.41, 95% CI 0.19-0.90). There were no significant treatment interactions on any of the primary or secondary outcomes in the 2x2 analysis.

Key findings Intermittent preventive treatment in young children in Côte d'Ivoire modestly reduced *P. falciparum* prevalence and anaemia, while iron-fortified complementary food sharply reduced iron deficiency but did not reduce anaemia. Intermittent preventive treatment did not improve efficacy of iron-fortified complementary food against anaemia. These findings suggest that anaemia in iron deficient children is mostly not due to iron deficiency alone and that malaria is the major cause of anaemia in this setting in young children. Thus, reducing malaria transmission should be the focus of anaemia control efforts.

OT-040

Oral communication

**Incentivising healthier vending options using price discounting: A multi-centre study in central Scotland.**Mooney JD<sup>1,2</sup>, Anderson AS<sup>3</sup>, Graham T<sup>4</sup>, Frank J<sup>4</sup><sup>1</sup>School of Health & Related Research, University of Sheffield, UK. <sup>2</sup>Scottish Collaboration Public Health Research and Policy, University of Edinburgh, UK. <sup>3</sup>Department of Public Health Nutrition, University of Dundee, UK. <sup>4</sup>Abercromby Vending Ltd. Glasgow, UK.

Introduction: Price reductions have previously been demonstrated to increase the uptake of healthier vending machine options in both colleges and workplaces in the US. While higher price sensitivities have been reported for more economically deprived social groups, the extent to which this might impact on the success of workplace interventions remains unexplored. We examined the relative effectiveness of a 25% price reduction in increasing the uptake of nutritionally balanced vending machine options across 4 diverse worksites in Scotland serviced by the same vending company. Methods: Four worksites were selected for their size (min.250 to max 1200 employees), internal workforce homogeneity, diversity of business (From IT to manufacturing) and featuring shift-work. At least 30% of all vending options were classed as nutritionally balanced using FSA-approved software. Weekly average uptake of these healthier options was monitored by electronic till receipts over a 12 week baseline period before the introduction of a 6 week long price discount of 25%. Results have been monitored for a further 6 weeks after the discount was withdrawn.

Results~ 'Eat-wise' balanced options were increased in the price discount phase by 34.5% ( $p<0.001$ ); 1.8% ( $p=0.42$ ); 12.9% ( $p<0.001$ ) and 19.6% ( $p<0.001$ ) for sites A to D respectively. After the discount period, the extent of the increase was reduced but remained statistically significant for sites A(+5.2%;  $p<0.05$ ) and D(+8.1%;  $p=0.023$ ), but not for site C(+0.5%;  $p=0.655$ ). Site B had high uptake at baseline (>70%), which did not change significantly throughout the study.

Conclusion: Price-discounting can be an effective means of initiating improvements of nutritionally balanced vending options among diverse groups of employees, from white-collar public sector to semi-skilled environments. The apparent maintenance of increased uptake, albeit at a reduced level, offers hope that some of the behaviour change was sustained. Interpretation of the variability across sites was complicated by differences in baseline uptake and stocking levels.

[~Note Analysis was by z-test for changes in mean proportions in STATA release 13].

#### OT-041

#### Oral communication

##### **Effectiveness of eHealth tailored interventions in achieving weight loss and reducing central obesity in adults: a systematic review and meta-analysis of randomised controlled trials.**

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Objectives: The numbers of overweight people continue rising globally, and more than one billion adults have a body mass index (BMI) greater than  $25\text{kg}\cdot\text{m}^{-2}$ . Face-to-face intervention programs for treatment of obesity are known to result in significant weight loss but can be expensive and limited in reach. Personalised (or tailored) eHealth lifestyle-based interventions offer potentially attractive and scalable approaches for obesity management and prevention, but their effectiveness remains unclear. The objective of the present study was to conduct a systematic review and meta-analysis of randomised controlled trials (RCTs) that tested the effect of personalised, eHealth lifestyle-based interventions on weight loss and in reduction of central obesity in adults.

Material and methods: Seven databases (ASSIA, CAB Abstracts, IBSS, Medline, Psych Info, Scopus and Embase) were searched using the following criteria: 1) RCTs; 2) tailored versus non-tailored advice; 3) web-based interventions; 4) dietary-related outcomes; 5) weight or obesity-related outcomes; 6) adult participants  $\geq 18$  years. Data were pooled as weighted mean difference (WMD) and analysed using a random effects model.

Results: We identified 29 studies meeting our inclusion criteria and focusing on body weight (17 studies,  $n=5,789$ , mean age  $45.7\pm 9.1$  years, 68.9% females) and waist circumference (12 studies,  $n=2,790$ , mean age  $43.9\pm 8.1$  years, 47.2% females) as intervention outcomes. These studies were conducted in the United States, The Netherlands, Australia and Japan. Pooled analysis of the studies showed that web-based personalised interventions were more effective in reducing body weight (WMD:  $-1.97\text{ Kg}$  [95% CI:  $-2.4$  to  $-1.5$ ];  $p<0.0001$ ) and waist circumference (WMD:  $-1.93\text{ cm}$  [95% CI:  $-2.8$  to  $-1.1$ ];  $p<0.0001$ ) than non-personalised web-based interventions in the short- to medium-term (12 to 48 weeks).

Key findings: These results provide strong evidence that personalised interventions delivered digitally are more effective in inducing weight loss and reducing central obesity, than non-personalised interventions at least in the short- to medium-term.

#### OT-042

#### Oral communication

##### **Nutrientes de Aloe vera. Eliminación de la aloína.**

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*Universidad de Las Palmas de Gran Canaria, grupo de Tecnología Química y Desarrollo Sostenible.*

1. Objetivos: Abordar el estudio químico de los nutrientes aportados por la planta Aloe vera, la cual se aplica cada vez más en nutrición funcional. Se pretendía analizar el zumo de la planta en orden a identificar y cuantificar los productos químicos descritos en la literatura. Al mismo tiempo se deseaba encontrar un camino para la reducción y posible eliminación de la aloína (suma de las antraquinonas emodina y barbaloina).

2. Material y métodos: Se puso a punto un método analítico capaz de identificar y cuantificar en una sola inyección tanto los mucopolisacáridos como las antraquinonas basado en espectrofotometría y UHPLC. Para ello se instaló una columna shodex OHPak SB-806 HQ en un aparato para UHPLC VWR-Hitachi, modelo Elite La Chrom dotado con dos bombas, un inyector automático, un detector de índice de refracción y un detector UV. Las hojas frescas de Aloe vera se recolectaron en la finca de Antonio del Rosario (Arinaga, Gran Canaria). Los intentos de eliminación de las antraquinonas del zumo fresco consistieron en métodos enzimáticos –con la lacasa de Rhus vernificera-, químicos –ozonólisis-, físicos –filtración a través de gel- y finalmente lavado con agua. La filtración a través de gel se realizó con un aparato para cromatografía a media presión BUCHI.

3. Resultados: 3.1.- Intento de eliminación de las antraquinonas por oxidación con la lacasa de Rhus vernificera.- Después de varios días de tratamiento, la aloína permaneció en sus valores iniciales, los que se midieron tanto por espectrofotometría como por UHPLC.

3.2.- Intento de eliminación de las antraquinonas por oxidación con ozono.- La aplicación de una corriente de oxígeno ozonizado (~60 mg x L-1 de O<sub>3</sub>; 0.1 L x minuto-1) elimina totalmente tanto emodina como barbaloina en un intervalo de dos horas. En 45 minutos se ha reducido la aloína total (emodina + barbaloina) de 336 ppm a 8.7 ppm. Sin embargo, el mucopolisacárido AVMP resultó afectado negativamente, pues las fracciones de mayor tamaño se transformaron en las de menor tamaño, lo que hace el método desaconsejable en la industria por pérdida de la calidad.

3.3.- Intento de eliminación de las antraquinonas por filtración a través de gel.- La primera fracción que se eluye de la columna posee 1198.10 ppm de AVMP y 90.98 ppm de aloína, lo que supone un ligero aumento de la relación AVMP/Aloína. Rediseño del aparato en orden a mejorar esta relación supuso la subida de la presión y ruptura de la columna, lo que atribuimos a la alta viscosidad del zumo fresco del Aloe vera.

3.4.- Intento de eliminación de las antraquinonas por lavado con agua.- Lavados sucesivos (x3) de cubos de pulpa de Aloe vera (10 a 15 mm de lado) redujo la aloína de 57.00 ppm a 19.92 ppm, si bien el mucopolisacárido también resultó disminuido (3423.50 ppm a 1531.54 ppm).

4. Conclusiones: Aloe vera (Aloe barbadensis) produce un zumo incoloro compuesto por tres fracciones de mucopolisacáridos de diferente tamaño molecular y dos de aloína compuestos por las antraquinonas emodina y barbaloina. Si bien las tres primeras son beneficiosas para la salud humana –estimulan el sistema inmunológico-, las dos últimas producen cuadros diarreicos y problemas nefríticos. Los diferentes experimentos para la eliminación de las mencionadas antraquinonas (aloína) resultaron sólo parcialmente exitosos.

#### OT-043

#### Oral communication

##### **Diversidad alimentaria y su asociación con el retraso del crecimiento en niños de 6-23 meses. Perú, 2008-2010.**

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Objetivos. Analizar la situación de la diversidad alimentaria en niños de 6-23 meses en el Perú y su relación con el crecimiento infantil y factores sociodemográficos asociados.

Material y métodos. Se desarrolló un análisis secundario del Monitoreo Nacional de Indicadores Nutricionales 2008-2010, encuesta poblacional representativa a nivel nacional. Se construyeron puntajes de diversidad alimentaria según la metodología propuesta por la Organización Mundial de la Salud (consumo de 4 o más grupos alimentarios de 7 posibles el día previo a la entrevista). Se describió la situación de la diversidad alimentaria y sus factores asociados según características de la madre, el niño y los hogares. Asimismo, se calculó el riesgo de retraso de crecimiento asociado a una baja diversidad alimentaria aislando potenciales variables de confusión.

Resultados. El 81.1% de niños tuvo diversidad alimentaria mínima adecuada. El retraso de crecimiento estuvo presente en un 18.2%. La diversidad alimentaria fue significativamente más baja en los niños de 6-11 meses (61%) y en hijos de madres sin nivel educativo (60.6%). La situación de pobreza no mostró diferencias significativas. Los niños con retraso de crecimiento tuvieron un consumo menor de lácteos (-6.8%), carnes (-6.8%), legumbres y nueces (-4.0%), respecto a aquellos con un crecimiento normal. Los principales factores de riesgo para baja diversidad alimentaria fueron tener entre 6-11 meses (OR 3.4), ser hijo de madres sin nivel educativo (OR 2.6) y vivir en áreas rurales (OR 2.3). Alcanzar una diversidad alimentaria mínima adecuada supone disminuir en 27% el riesgo de retraso de crecimiento.

Principales conclusiones. La alimentación del niño de 6-23 meses en el Perú es monótona, con un bajo consumo generalizado de alimentos de origen animal. Nuestro estudio demuestra que gran parte de los problemas de baja diversidad alimentaria en los niños no pueden ser explicados únicamente por la pobreza, sino que la baja educación materna es uno de los más fuertes predictores de riesgo. Mejorar las prácticas de alimentación complementaria, especialmente a través de la diversificación de la dieta son aspectos cruciales para prevenir el retraso de crecimiento.

#### OT-044

#### Oral communication

##### **Consumo de calcio en embarazadas puérperas en un Sanatorio privado de la Ciudad de Buenos Aires, Argentina.**

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Introducción: Una ingesta inadecuada de calcio compromete el tejido óseo materno debiendo soportar el crecimiento fetal y la producción de leche materna.

Objetivos: Evaluar el consumo de calcio de alimentos de fuentes convencionales y no convencionales y valorar la importancia otorgada al consumo del mismo.

**Material y Métodos:** Estudio cuantitativo, descriptivo, transversal. Se han evaluado 204 mujeres en período de Lactancia pertenecientes al Sanatorio de la Trinidad de Palermo, Buenos Aires, Argentina durante el período agosto – noviembre 2013. Las variables evaluadas fueron el consumo de calcio de alimentos de fuentes convencionales y no convencionales, su porcentaje de cobertura en porciones por día según las recomendaciones de las Guías Alimentarias para la población argentina y la importancia otorgada a su consumo.

**Resultados:** El promedio de edad fue de 31,5±7,7 años. El 80,1% (n=117) consume tres porciones diarias o más. Entre los alimentos de fuentes convencionales, el queso es el alimento más consumido por porción diaria (2,62±2,49) observando una gran dispersión de los resultados. Si bien el promedio de consumo de la leche y el yogur fue igual (1,38 porciones diarias), se observa un mayor desvío para el yogur (1,67 Vs 1,24).

Dentro de los alimentos de fuentes no convencionales, el 3,9% (n=8) consume 30gramos o más entre frutos secos y semillas al menos una vez por semana.

El 77,7% de la muestra considera que el consumo de calcio en la lactancia es muy importante y el 5,7% reconoce haber tenido problemas de salud por su consumo inadecuado y que debería aumentar su consumo tanto para su salud como para la de su hijo.

**Conclusión:** En nuestra población se observa que la mayoría cubre con las recomendaciones de calcio y reconoce su importancia tanto a nivel individual como para su hijo.

#### OT-045

#### Oral communication

### ¿Desigualdad en la Educación Física Chilena? Diferencias en intensidad y actividad física total en escuelas de distinto nivel socioeconómico.

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**Introducción:** El sistema educativo chileno es uno de los más desiguales del mundo. Son pocos los estudios que relacionan la educación física (EF) con las características socioculturales y económicas de los escolares, junto a mediciones objetivas de la actividad física total (AFT) y de la intensidad desplegada.

**Objetivo:** Analizar de manera contextualizada las diferencias en intensidad y AFT de escolares de sexto básico durante la clase de EF de tres escuelas de distinto nivel socioeconómico.

**Metodología:** Se seleccionaron aleatoriamente 10 escuelas índice de centros de conglomerados del sistema de medición de la calidad de la EF 2011 derivadas de un estudio previo. Se visitaron 2 de las 10 escuelas índice. Las escuelas fueron seleccionadas según nivel socioeconómico alto (A), medio (B) y medio bajo (C). En tres clases sucesivas de 60 básico, se utilizaron acelerómetros Actigraph GT3X en tres niños y tres niñas al azar. Durante 90 min aproximadamente se registraron a 100 Hz y épocas de 10 s. la actividad realizada. Los acelerómetros se usaron a nivel de cresta iliaca. Los vectores de magnitud (VM) fueron expresados en cuentas por minuto (cpm) e intensidad según categorías de Freedson et al. Los datos fueron analizados utilizando el programa Actilife v 6.11 y posteriormente SPSS v19 para realizar las pruebas de Anova y Kruskal-Wallis.

**Resultados:** La media total de cpm fueron de 2.399 ± 653,3 entre las escuelas. La escuela C presentó 2234,7 ± 500,69, la B 2217,1 ± 730,3 y la A 2745,56 ± 596,32 (p=0,019). Los niños presentan mayores cpm v/s las niñas de modo estadísticamente significativo (p=0,000) tanto entre grupos como en el tiempo. En ninguna de las clases los escolares de las escuelas B y C pudieron expresar intensidades vigorosas (V) y muy vigorosas (MV), ocupando entre el 37-55,6% de la clase en actividades sedentarias y 8,6 y 14,2 en actividades ligeras. La escuela A mostró entre un 1 y 2,5% de actividades MV y 12,2 % de actividades V.

**Conclusiones:** Los resultados muestran las diferencias entre clases de EF de estas escuelas. La explicación debe considerar además del efecto de la clase de EF como tal, el efecto de la vida extraescolar de los niños, la cual está conectada de manera indisoluble con su condición física, estilos de vida y condiciones arquitectónicas diferenciadas que se dan en la RM de Chile.

#### OT-046

#### Oral communication

### Influencia de una intervención nutricional a través de una dieta individualizada sobre el control de la diabetes gestacional en mujeres embarazadas que acuden al Hospital de Clínicas.

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Facultad de Ciencias Médicas, Universidad Nacional de Asunción

**Objetivos:** Analizar la influencia de una intervención nutricional a través de una dieta individualizada sobre el control de la diabetes gestacional.

**Materiales y métodos:** Ensayo clínico, cuasi experimental, prospectivo, efectuado en 41 mujeres embarazadas con diabetes gestacional del Hospital de Clínicas San Lorenzo, entre enero de 2013 a 2014. Se les indicó una dieta de 1800 a 2000 Kcal/día con 52% de carbohidratos, 18% de proteínas y 30% de grasas, y se evaluó en cada control la ingesta dietética, la ganancia

de peso, los controles de glucemia capilar en ayunas y postprandial, registrándose el peso del neonato al nacer.

**Resultados:** El promedio de edad de las embarazadas fue de 32 ± 5,6 años. El 36,5% de las embarazadas con diabetes gestacional presentaban sobrepeso, siendo el mismo porcentaje para obesidad. La ganancia de peso promedio al final del estudio fue de 10 ± 8,7 Kg. La ganancia promedio en mujeres que partieron de un peso normal fue de 12,5 Kg ± 8,4 Kg, y la ganancia promedio en mujeres obesas fue de 10 Kg ± 8,7 Kg. Hubo una mejora de las glucemias capilares tanto en ayunas como postprandial, en el transcurso de la intervención nutricional (1er control: ayunas 93,4 ± 12 mg/dl, postprandial 128 ± 17 mg/dl, 2do control: ayunas 89,5 ± 7,6 mg/dl, postprandial 123,2 ± 13,5 mg/dl, 3er control: ayunas 89,4 ± 4 mg/dl, postprandial 122 ± 4 mg/dl, 4to control: ayunas 88 ± 3,4 mg/dl, postprandial 117 ± 7 mg/dl). El 68,2% de las embarazadas controlaron su glucemia solo con plan de alimentación, sin necesidad de insulina. La ingestión energética antes y después de la intervención nutricional fue de (3747 ± 834 Kcal/día vs. 1769 ± 389 Kcal/día, p<0,0001), la diferencia también fue significativa para los macronutrientes. Los neonatos pesaron en promedio 3,2 Kg ± 0,5 g. El 75% de las embarazadas tuvieron parto por cesárea. Al final del estudio el 95% de las embarazadas consumía una dieta equilibrada, completa y variada.

**Conclusión:** La dieta prescrita y el correcto seguimiento controló la diabetes gestacional con controles normales de glucemia capilar en ayunas y postprandial, y permitió neonatos de peso normal.

#### OT-047

#### Oral communication

### KIDMED. Prevalencia de la baja adherencia a la Dieta Mediterránea en niños y adolescentes.

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**Introducción:** En los últimos años se ha observado, en el mundo occidental, una tendencia alarmante al abandono del llamado "estilo de vida mediterráneo", lo que se traduce, entre otras cosas, en una importante modificación de los hábitos alimentarios. Esto parece afectar especialmente a la población más joven, produciendo, de manera paralela, la aparición de enfermedades con graves repercusiones para la salud humana (obesidad, diabetes, enfermedades cardiovasculares, etc.). Varios autores han estudiado la adherencia al patrón de Dieta Mediterránea en esta población, utilizando para ello el test KIDMED (Mediterranean Diet Quality Index for children and adolescent). Este test consiste en un cuestionario de 16 preguntas que evalúa el grado de adherencia a la Dieta Mediterránea. **Objetivo:** Desarrollar una revisión sistemática y un metaanálisis para valorar los resultados de los estudios que han utilizado el test KIDMED para evaluar la adherencia a la Dieta Mediterránea, estimada por medio de proporciones. Además, se evaluaron los estudios de baja adherencia a la Dieta Mediterránea según diferentes subgrupos: dividiéndolos por género, por edades, por grupos de países, según sea la muestra de cada estudio, representativa o no, y según la proporción de baja adherencia que presenta cada uno.

**Material y métodos:** El método utilizado fue una revisión sistemática y un metaanálisis de carácter descriptivo. Se consideró un modelo de efectos aleatorios. Adicionalmente se efectuaron análisis por subgrupos definidos.

**Resultados:** Se incluyeron 18 estudios transversales de 6 países (Chile, Chipre, España, Grecia, Italia y Turquía), que utilizaron el test KIDMED para valorar la adherencia a la Dieta Mediterránea. La población estudiada fue niños y adolescentes de entre 2 y 25 años, siendo la muestra total de los estudios de 24.067 personas. De los estudios revisados, el porcentaje global de alta adherencia a la Dieta Mediterránea fue del 10% (IC 95% 0.07-0.13), mientras que el de baja adherencia fue del 21% (IC 95% 0.14-0.27). En este último, no se observaron diferencias entre hombres y mujeres, ni entre estudios representativos o no. Se encontraron diferencias con relación a la edad de la población (27% en los menores de 12 años frente al 19% en los mayores de 12 años) y al país de origen (28% en los países occidentales frente al 11% en los países orientales).

**Principales conclusiones:** El test KIDMED constituye una herramienta eficaz para evaluar la calidad de los hábitos alimentarios en niños y jóvenes.

#### OT-048

#### Oral communication

### Influencia de la adherencia a la dieta mediterránea en el estado de salud autopercibido en población joven.

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Universidad Miguel Hernández. CIBERESP.

**Objetivos:** Describir el estado de salud autopercibido en población joven universitaria y explorar la asociación con la adherencia a la dieta mediterránea y otros factores.

**Material y Métodos:** Se utilizaron los datos basales de 1110 participantes del estudio DiSA-UMH. El estado de salud autopercebido se recogió mediante la pregunta "En general, ¿cómo diría que es su salud?". Las repuestas se categorizaron de la siguiente forma: 1) muy buena, 2) buena y 3) regular/mala/muy mala. La ingesta dietética se evaluó mediante cuestionario de frecuencia alimentaria validado y se estimó la adherencia a la dieta mediterránea mediante el índice relativo Mediterranean Diet Score (rMED). La adherencia a la dieta mediterránea se clasificó como alta: 11-18 puntos; media: 7-10 puntos y baja: 0-6 puntos. Además se recogió información sobre variables sociodemográficas y estilos de vida. Se usó regresión logística multinomial para explorar los factores asociados con una salud autopercebida buena o regular/mala/muy mala comparadas con la muy buena. Para examinar la asociación entre la adherencia a la dieta mediterránea y el estado de salud autopercebido se utilizó también la regresión logística multinomial.

**Resultados:** El 23.1, 65.1 y 11.8% de los participantes reportaron una muy buena, buena y regular/mala/muy mala salud autopercebida respectivamente. Los factores asociados con buena salud autopercebida fue ser fumador (OR si vs no= 1.84; IC 95%: 1.29-2.65) y menos activo (OR activo vs menos activo= 0.41; IC 95%: 0.30-0.55). El perfil de los participantes con regular/mala/muy mala salud autopercebida fue ser fumador (OR si vs no= 5.19; IC 95%: 3.12-8.63), tener exceso de peso (OR si vs no= 2.19; IC 95%: 1.17-4.07) y ser menos activos físicamente (OR activo vs menos activo= 0.19; IC 95%: 0.12-0.32). Los participantes que tienen una adherencia media a la dieta mediterránea tienen un menor riesgo de tener una buena salud autopercebida (OR= 0.81; IC 95%: 0.67-0.97) o regular/mala/muy mala salud autopercebida (OR= 0.70; IC 95%: 0.58- 0.85) y los que tenían una adherencia alta tienen un menor riesgo de tener una buena (OR= 0.69; IC 95%: 0.61-0.79) o regular/mala/muy mala salud (OR= 0.68; IC 95%: 0.65-0.72).

**Hallazgos claves:** La mayoría de los participantes indicaron tener un buen o muy buen estado de salud. Los participantes con adherencia media-alta a dieta mediterránea indicaron tener mejor estado de salud. Los universitarios que indicaron buena o regular/mala/muy mala salud presentaron mayor consumo de tabaco, menor actividad física y exceso de peso. Estos hallazgos podrían formar parte de las estrategias de intervención en universidades saludables para mejorar la salud de los universitarios.

#### OT-049

Oral communication

#### Asociación entre el índice de masa corporal pregestacional y patologías durante el embarazo.

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**Objetivo:** evaluar la relación entre el índice de masa corporal pregestacional y el riesgo de patologías durante el embarazo.

**Sujetos y método:** estudio transversal en 420 gestantes sanas de Gran Canaria con edades comprendidas entre 15 y 44 años que dieron a luz en septiembre de 2013. Sólo participaron mujeres con embarazos simples y que no fueran considerados como embarazos de alto riesgo. El índice de masa corporal se determinó al inicio de la gestación a partir de los datos de peso y talla de la cartilla del embarazo clasificándose en normopeso (18,5-24,9 Kg/m<sup>2</sup>), sobrepeso (25,0-29,9) Kg/m<sup>2</sup> y obesidad  $\geq$  30Kg/m<sup>2</sup>. Se recogieron los registros correspondientes a la aparición de patología al final de la gestación.

La asociación entre el índice de masa corporal pregestacional (agrupado) y la incidencia de las principales patologías del embarazo (anemia leve, diabetes gestacional, placenta previa asintomática, polihidramnios, preeclampsia, malformación fetal, amenaza de aborto y pequeño para la edad gestacional) fue determinada a través de modelos de regresión logística (OR e intervalos de confianza al 95%). Se llevaron a cabo análisis crudos y ajustados por posibles factores de confusión.

El estudio fue aprobado por el comité ético del Hospital Universitario Materno Infantil y todas las participantes firmaron el correspondiente consentimiento informado.

**Resultados:** las mujeres que iniciaban la gestación con un índice de masa corporal dentro de la categoría de sobrepeso y obesidad tuvieron un menor riesgo de desarrollar anemia leve (OR=0,35; Intervalo de confianza al 95%: 0,13-0,88).

Por otro lado, las mujeres que eran obesas al inicio del embarazo, presentaron una mayor incidencia de diabetes gestacional (OR= 5,18; Intervalo de confianza al 95%: 2,12-12,6), preeclampsia (OR=7,28; intervalo de confianza al 95%: 1,17-45,06) así como del grupo de patologías gestacionales más frecuentes (OR=2,22, intervalo de confianza al 95%: 1,25-3,92).

**Conclusiones:** una situación pregestacional de normopeso podría proteger frente a estados de diabetes gestacional y preeclampsia en el embarazo mientras que padecer sobrepeso u obesidad antes del embarazo disminuiría el riesgo de desarrollar anemia durante el mismo.

#### OT-050

Oral communication

#### Proyecto "BCN comparteix el menjar": implementación de una red de aprovechamiento de alimentos elaborados excedentes del sector de la hostelería en la ciudad de Barcelona.

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Centro donde se ha realizado el proyecto: ONG Nutrición Sin Fronteras (NSF)

**Introducción:** Se estima que durante el 2011 se han generado en Europa 89 millones de toneladas anuales de residuos alimentarios. En Cataluña se producen anualmente 262.471 toneladas de despilfarro alimentario. Durante el mismo año, un 4.98 % de la población catalana presentó privaciones materiales que afectaban a la alimentación.

**Objetivos:** Los objetivos de este proyecto son: reducir la vulnerabilidad del derecho a la alimentación de las personas en situación de pobreza y contribuir a la disminución del despilfarro alimentario producido en el sector de la hostelería.

**Material y métodos:** Diariamente NSF recoge y distribuye los alimentos excedentes (aptos para el consumo) de los hoteles/empresas, cocinados y congelados, aplicando medidas de seguridad alimentaria. Para garantizar y certificar la calidad higiénica de los alimentos, un laboratorio realiza análisis de muestras de forma aleatoria. Todos los datos de los alimentos distribuidos se registran en una base de datos.

**Resultados:** En un total de 20 meses de implementación del proyecto, se han distribuido un total de 37571 kg de alimentos. Estos alimentos se han distribuido entre más de 8000 beneficiarios de 16 comedores sociales. Del total de comida, un 32,1% han sido alimentos para el desayuno/merienda y un 67,9% de los alimentos distribuidos han sido almuerzos/cenas. Se han distribuido en mayor proporción alimentos ricos en carbohidratos (55,86%), y en menor cantidad alimentos proteicos (22,55%) frutas y verduras (19,9%) y lácteos (1,6%). Según el origen de estos alimentos, la mayor parte proviene de los hoteles (66%), en menor cantidad de catering (19%) y de empresas alimentarias (15%).

**Conclusiones:** Los excedentes alimentarios generados en el sector de la hostelería han sido aprovechados para reducir la vulnerabilidad del derecho a la alimentación de las personas en situación de pobreza. Además, se ha mejorado el nivel de conocimientos en higiene y alimentación saludable de los usuarios de las entidades sociales mediante formaciones específicas en estas materias.

#### OT-051

Oral communication

#### Proyecto "Piecitos Colorados": evaluación de la implantación de una intervención educativa y nutricional en escuelas de América Latina.

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**Objetivos:** La inseguridad alimentaria es una de las 3 principales causas de la malnutrición y a la vez causa subyacente de la desnutrición infantil. En cooperación con la Fundación Prosegur, la ONG Nutrición Sin Fronteras (NSF) diseñó el Proyecto "Piecitos Colorados" con el objetivo de reducir los efectos producidos por la inseguridad alimentaria y mejorar la situación nutricional de los niños de las escuelas de la fundación Prosegur en Argentina, Paraguay, Uruguay y Colombia.

**Material y métodos:** Para el análisis de la situación nutricional se utilizaron parámetros antropométricos: talla para edad (desnutrición crónica), peso para talla (desnutrición aguda) y peso para edad (bajo peso). La diversidad alimentaria como indicador de posibles deficiencias alimentarias se analizó a través de los datos del recordatorio de 24 horas y el cuestionario de diversidad alimentaria. Para evaluar el grado de inseguridad alimentaria se utilizó la encuesta Household Food Insecurity Access Scale (HFAS).

**Resultados:** Hasta el momento, se han muestreado un total de 786 niños de edades comprendidas entre 5 y 15 años de un total de 22 escuelas. Un total de 154 niños (29%) presentaban desnutrición crónica. Se observaron diferencias significativas entre países, ya que en Argentina se observó un 11% de los casos, porcentaje similar a Colombia (13%), pero diferente a Uruguay (36.5%) y Paraguay (42.5%). Por el contrario, también se observaron porcentajes moderadamente altos de obesidad y/o sobrepeso en Argentina (21%), Uruguay (12%), Paraguay (20.7%) y Colombia (19%). Las encuestas diversidad alimentaria y de seguridad alimentaria revelaron unos índices elevados de inseguridad alimentaria moderada y/o severa (41.6% y 52.5% en Uruguay y Paraguay respectivamente) y un porcentaje importante de dieta pobre en diversidad (39.1%). Entre los hogares con un grado moderado y/o severo de inseguridad alimentaria, existe un porcentaje significativo de niños con problemas de obesidad y sobrepeso (16.8%). Además se ha observado que entre los niños y niñas con baja talla, un 51.2% pertenecen a hogares con inseguridad severa.

**Conclusiones:** Las escuelas de Piecitos en Argentina, Uruguay, Paraguay y Colombia reflejan el fenómeno de la "transición nutricional" con cam-

bios de patrones de alimentación, modificaciones de las necesidades nutricionales de la población y una creciente importancia que tiene algunas enfermedades nutricionales como el retraso crónico de crecimiento (talla corta), la obesidad, las enfermedades crónicas no transmisibles y las carencias de nutrientes específicos. Se observa específicamente en los escolares la coexistencia de la talla corta por edad con el sobrepeso y la obesidad.

**OT-052** **Oral communication**  
**Evaluación del programa “Seis pasos hacia la salud del niño escolar” en el Estado de Querétaro, México.**

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Introducción: En México la obesidad en escolares aunada a carencias nutricionales y pobreza representa un problema de salud pública complejo. Objetivo: evaluar el impacto de un programa educativo de nutrición en el estado nutricio, hábitos alimentarios (HA) y actividad física (AF) de niños escolares de zona urbana(U), semiurbana(SU) y rural(R) del estado de Querétaro. Métodos: estudio longitudinal con intervención educativa de 7 meses en (N1338) niños de 6 a 12 años y sus padres, con grupo de intervención GI (n=498) y control GC (n=840). Se evaluó pre y post-intervención: antropometría(OMS,2007), HA y AF (EnKid,2003).

Resultados: Inicialmente en población total ZIMC>1 fue 37% y déficit de peso o talla <2%. Al final ambos grupos incrementaron ZIMC>1 pero el GI mostró - 2.1% del incremento del GC (p<0.05). Disminuyeron las medias(IC95%) de IMC en el GI; ZIMC y cintura en zona SU y R; el GI mejoró el score global de HA(p<0.05); sin cambios en el score global de AF. La zona SU mejoró score de HA y AF (p<0.05). En el GI disminuyó el % de niños que consumían refresco y aumentó el de niños que consumían verduras >1 vez/día (p<0.05).

Discusión: pocos programas semejantes logran impacto en el IMC cambiando solo hábitos.

Conclusión: la prevalencia de ZIMC>1 fue mayor a la media nacional; el programa desaceleró el incremento del IMC y la adiposidad central y mejoró el score de hábitos de alimentación, el consumo de verduras y refresco. Su impacto fue mayor en zona semiurbana y rural.

**OT-053** **Oral communication**  
**Costo-eficiencia de la implementación de la dieta mediterránea en un hospital .**

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Objetivos: Valorar la importancia y dificultades de implantar la Dieta Mediterránea en ambiente hospitalario.

Material y Métodos: Dos hospitales del mismo grupo de gestión privada y localizados en el mismo área geográfica, son incluidos en este estudio. El área no tiene tradición en la Dieta Mediterránea y sin embargo se introduce la dieta. El total de camas de los hospitales son 296 con una rotación de 12000 pacientes año.

Se ofrecen a los pacientes ingresados tres menús y uno de ellos es Dieta Mediterránea. Se les explica a los pacientes los beneficios de la Dieta Mediterránea como que dicha dieta: descende la probabilidad de desarrollar enfermedades crónicas como diabetes tipo 2, enfermedad cardiovascular y cáncer.

Se valora mediante encuesta la opinión y calidad de la dieta y los datos son recogidos cada día por la enfermería de planta.

Se compara grupos por patologías.

Resultados: Los datos recogidos referentes a calidad de comida, opinión del paciente y resultados analíticos son evaluados estadísticamente. El costo beneficio es estudiado no solo por el gasto total de la dieta sino también por el espacio físico que se necesita para su preparación, almacenaje, número de empleados, cantidad, variedad de comida y su distribución. Los datos demuestran una clara deferencia entre las diferentes dietas.

Conclusión: Los beneficios que se obtienen con esta dieta son conocidos, sin embargo, se precisa de una mayor educación y esfuerzo para integrarla en el ámbito hospitalario.

**OW-001****Oral communication****Study of the Effect of Turmeric on Glycemic Status, Lipid Profile, Total Antioxidant Capacity and hs-CRP in Hyperlipidemic Type 2 Diabetes Mellitus Patients.**

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**Objectives:** Diabetes mellitus (DM) is the most common metabolic disorder all around the world. The goal of this study was to assess the effect of turmeric on, glycemic status, lipid profile, total antioxidant capacity and hs-CRP in hyperlipidemic type 2 diabetes mellitus patients.

**Materials and Methods:** This study was a double blind randomized clinical trial in which 80 hyperlipidemic patients with type 2 DM were studied. Patients were categorized into two groups each containing 40 individuals. Intervention group received 2400 mg of turmeric powder daily for 8 weeks, while individuals of control group took placebo during this time. In two groups at the beginning and the end of the study 10 ml blood samples were withdrawn and the average fasting blood sugar, insulin, HOMA-IR, HbA1C, triglyceride (TG), total cholesterol (TC), LDL-c, HDL-c, apolipoprotein A1, and apolipoprotein B, total antioxidant capacity (TAC) and hs-CRP of serum were measured. Food intakes were recorded using 24 h food recall. Anthropometric indices and systolic and diastolic blood pressure were measured. The statistical analysis was carried out using paired and independent t and chi-square tests.

**Results:** After 8 weeks of intervention, among the turmeric receiving group, BMI ( $p=0.000$ ), Systolic and Diastolic Blood Pressure ( $p=0.000$ ), TG concentration ( $p=0.000$ ) and LDL-c ( $p=0.009$ ) were significantly decreased and significant changes were observed between two groups ( $p < 0.05$ ) as well. Total cholesterol, HDL-c and apolipoprotein A1 were significantly different between the two groups at the end of the study ( $p < 0.05$ ). No significant changes were observed with regard to other parameters such as average levels of blood glucose, serum insulin, glycosylated hemoglobin, insulin resistance, TAC and hs-CRP after the period of the study. No significant difference in dietary intake and physical activity levels were observed in either groups during the study.

**Key findings:** The result of this study showed that intake of turmeric powder has caused improving lipid profiles, lowering body mass index and blood pressure in patients with type 2 DM. There was no significant effect on glycemic status, TAC and serum hs-CRP.

**OW-002****Oral communication****Fruit and vegetable consumption and mortality in Eastern Europe.**

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**Objectives:** According to the World Health Organization's estimates, disease burden due to low fruit and vegetable consumption is higher in Central and Eastern Europe and the former Soviet Union than in any other parts of the World. However, no large scale studies have investigated the association between fruit and vegetable intake and mortality in these regions yet. The aim of our study was to examine the relationship between fruit and vegetable intake and all-cause and cardiovascular disease (including coronary heart disease and stroke) mortality in Czech, Polish and Russian participants of the Health, Alcohol and Psychosocial Factors in Eastern Europe (HAPEE) prospective cohort study.

**Material and methods:** Dietary data was collected using a validated food frequency questionnaire. The European Food Safety Authority's FoodEx 2 food classification and description system was used to categorise food items into fruit and vegetable food groups. Participants with existing chronic diseases at baseline were excluded. Missing covariate data was imputed using multiple imputation procedures, and Cox regression analysis was applied to analyse the association between fruit and vegetable intake and mortality.

**Results:** From the 19,415 participants, 1,327 died over the average follow-up time of 7.1 years. In the multivariable adjusted model, statistically significant inverse association was found between cohort-specific fruit and vegetable intake quartiles and cardiovascular disease mortality (highest vs. lowest quartile HR: 0.70, 95%CI: 0.51-0.95; p-value for trend: 0.020), but not with total mortality (HR: 0.90, 95%CI: 0.75-1.07; p-value for trend: 0.313). We found that 2.69% of all-cause, 9.21% of cardio-

vascular disease, 4.16% of coronary heart disease and 15.34% of stroke deaths could be prevented if participants in the bottom three quartiles shifted their intake one quartile upwards. Additional adjustment for mean arterial blood pressure attenuated the associations with all mortality outcomes.

**Key findings:** The intake of fruits and vegetables was inversely associated with cardiovascular mortality in three large, population based cohorts from Central and Eastern Europe and the former Soviet Union. If fruit and vegetable consumption was increased, the reduction in mortality would be the most substantial for stroke deaths. Blood pressure lowering effect seemed to be an important mediator of the inverse association between fruit and vegetable intake and cardiovascular mortality.

**OW-003****Oral communication****The APOB insertion/deletion polymorphism (rs17240441) influences the postprandial triacylglycerol and insulin response in healthy Caucasian adults - insights from the DISRUPT cohort.**

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**Objectives:** The concept of personalized medicine is now being extended to the field of nutrigenetics with the ambition of giving personalised/stratified dietary advice with greater efficacy in health promotion and disease prevention. To this end, we investigated the impact of 18 genetic polymorphisms on postprandial lipid, glucose and insulin responses in up to 262 healthy adults from the DISRUPT (Dietary Studies: Reading Unilever Postprandial Trials) cohort.

**Materials and Methods:** We examined the impact of 18 genetic polymorphisms in the PPARG, IRS1, INS, FABP2, APOB, CETP, LPL, APOC, APOCIII, MTP and ESR1 genes (previously implicated in lipid metabolism) on postprandial lipid, glucose and insulin responses in up to 262 healthy adults. The participants consumed a standard sequential mixed test meal, which included a test breakfast (0 min; 49g fat) and lunch (330 min; 29g fat). Blood was collected at baseline (0 min) and on 11 subsequent occasions until 480 min after the test breakfast. Plasma total (TC), low density lipoprotein (LDL-C) and high density (HDL-C) cholesterol, triacylglycerol, insulin and glucose was determined. SPSS 21.0 for Windows (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Area under the curve (AUC, 0-480 min) was calculated using the trapezoidal rule and incremental AUC (IAUC, 0-480 min) was calculated as AUC minus the fasting concentration.

**Results:** There was a significant impact of APOB (Apolipoprotein B) insertion/deletion polymorphism (rs17240441) on fasting TC ( $P=0.004$ ), LDL-C ( $P=0.007$ ), HDL-C ( $P=0.002$ ), triacylglycerol ( $P=0.007$ ) and insulin ( $P=0.007$ ) with higher concentrations in the insertion allele carriers. A significantly higher area under the time response curve was evident for the triacylglycerol ( $P=4.5 \times 10^{-8}$ ) and insulin ( $P=0.05$ ) response in the insertion allele carriers ( $n=93$ ) relative to the deletion/deletion homozygotes ( $n=52$ ). None of the other polymorphisms had an impact on the postprandial lipaemic response after Bonferroni correction.

**Key findings:** Our findings indicate that the APOB polymorphism is likely to be an important genetic determinant of the large inter-individual variability in the postprandial response to dietary fat intake. Greater understanding of how APOB gene influences postprandial lipaemia will advance the prospects for personalised nutrition, where the insertion allele carriers may benefit from personalized dietary strategies to reduce the marked lipaemia in response to meal ingestion.

**OW-004****Oral communication****Reducing our Environmental Footprint and improving our Health: Greenhouse Gas Emission and Land Use of Usual Diet and Mortality in EPIC-NL.**

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**Objectives:** Food choices influence health status, but also have a great impact on the environment. The production of animal-derived foods has a high environmental burden, whereas the burden of refined carbohydrates,

vegetables and fruit is low. The aim of this study was to investigate the associations of greenhouse gas emission (GHGE) and land use of usual diet with mortality risk, and to estimate the effect of a modelled meat substitution scenario on health and the environment.

**Material and methods:** The usual diet of 40011 subjects in the EPIC-NL cohort was assessed using a food frequency questionnaire. GHGE and land use of food products were based on life cycle analysis. Cox proportional hazard ratios (HR) were calculated to determine relative mortality risk. In the modelled meat-substitution scenario, one-third (35 gram) of the usual daily meat intake (105 gram) was substituted by other foods.

**Results:** During a follow-up of 15.9 years, 2563 deaths were registered. GHGE and land use of the usual diet were not associated with all-cause or with cause-specific mortality. Highest vs. lowest quartile of GHGE and land use adjusted hazard ratios for all-cause mortality were respectively 1.00 (95% CI: 0.86-1.17) and 1.05 (95% CI: 0.89-1.23). Modelled substitution of 35 g/d of meat with vegetables, fruit-nuts-seeds, pasta-rice-couscous, or fish significantly increased survival rates (6-19%), reduced GHGE (4-11%), and land use (10-12%).

**Key findings:** There were no significant associations observed between dietary-derived GHGE and land use and mortality in this Dutch cohort. However, the scenario-study showed that substitution of meat with other major food groups was associated with a lower mortality risk and a reduced environmental burden. Especially when vegetables, fruit-nuts-seeds, fish, or pasta-rice-couscous replaced meat.

### OW-005

#### Oral communication

#### **Adiposity has a greater impact on hypertension in lean than not-lean populations: a systematic review and meta-analysis.**

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**Objectives:** Hypertension is the leading risk factor for global burden of disease. The majority of people with hypertension (75%) live in low-to-middle income countries (LMICs). Based on the mismatch theory of developmental origins of disease, we hypothesized that the impact of adiposity on hypertension is augmented in lean compared with not-lean populations in rural areas of LMICs.

**Material and methods:** We used citation databases to identify studies conducted in rural areas of LMICs in which the association between body mass index (BMI) or waist circumference (WC) and hypertension was assessed using multivariable models. We applied random effect models and conducted separate meta-analyses, depending on whether BMI/WC was assessed as a continuous or categorical variable. In each analysis, the studies were ranked by the mean BMI of the total population. Populations with a mean BMI below the median were grouped as lean and those above the median as not-lean.

**Results:** We identified 46 studies of BMI and 12 of WC. Greater BMI and greater WC were associated with hypertension in both lean and not-lean populations. The impact of obesity on the risk of hypertension was greater in lean than in not-lean populations. Obese males in lean populations were 45% more likely to be hypertensive compared to obese males in not-lean populations: ratio of the two effect sizes: 1.45 (95%CI 1.04, 2.03),  $p=0.027$ . In addition, individuals with WC above normal in lean populations were 52% more likely to be hypertensive than their counterparts in not-lean populations, ratio of the two effect sizes: 1.52 (95%CI 1.06, 2.17),  $p=0.021$ .

**Key findings:** Increased adiposity increases the risk of hypertension in both lean and not-lean rural populations of LMICs. The risk of hypertension associated with adiposity is greater in lean than in not-lean populations. This provides further supportive evidence for the mismatch theory which proposes indicating that nutritional deficiencies during human development, followed by later excesses, may predispose individuals to development of obesity-related diseases. Findings from this meta-analysis highlight the need for strategies to improve nutrition in disadvantaged rural regions of LMICs, particularly in women of child-bearing age.

### OW-006

#### Oral communication

#### **Association of selenium status and selenoprotein gene variation with colorectal cancer risk.**

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**Background and objectives:** Suboptimal intakes of the micronutrient selenium (Se) are found in many parts of Europe. Low Se status may contribute to colorectal cancer (CRC) development. Se exerts its biological roles through 25 selenoproteins involved in cell protection from oxidative stress, redox control and inflammatory response. Variants in several selenoprotein genes have been reported to affect CRC risk. We are currently using a case-control study of 1478 CRC cases and 1478 matched controls nested within the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort to assess both the association of Se status and selenoprotein genotype with CRC risk, and their interaction in disease risk modification.

**Methods:** Serum levels of Se (total reflection X-ray fluorescence) and SePP (immunoluminometric sandwich assay) were measured in samples available from 966 of the cases and 966 controls. Multivariable incidence rate ratios (IRRs) and 95% confidence intervals (CIs) were calculated using conditional logistic regression. Selenoprotein genotypes (in DNA samples available for all 1478 cases and 1478 controls) were assayed by Illumina Goldengate genotyping.

**Results:** Respective mean Se and SePP levels were 84.0 µg/L and 4.3 mg/L in cases and 85.6 µg/L and 4.4 mg/L in controls. Higher Se concentrations were associated with a non-significant lower CRC risk (IRR = 0.92, 95%CI: 0.82-1.03 per 25 µg/L increase). However, sub-group analyses by sex showed a statistically significant association for women (IRR = 0.83, 95%CI: 0.70-0.97 per 25 µg/L Se increase;  $P_{\text{trend}} = 0.032$ ) but not for men. Higher SePP concentrations were inversely associated with CRC risk (IRR = 0.89, 95%CI: 0.82-0.98 per 0.806 mg/L increase;  $P_{\text{trend}} = 0.009$ ) with the association more apparent in women (IRR = 0.82, 95%CI: 0.72-0.94 per 0.806 mg/L increase;  $P_{\text{trend}} = 0.004$ ) than men (IRR = 0.98, 95%CI: 0.86-1.12 per 0.806 mg/L increase;  $P_{\text{trend}} = 0.485$ ). Selenoprotein genotypes are currently being analyzed. **Conclusions:** The findings from this large prospective nested case-control study indicate that Se status is suboptimal in many Europeans and suggest an inverse association between CRC risk and higher serum Se status, which is more evident in women.

### OW-007

#### Oral communication

#### **Effect of pomegranate extract consumption on CVD risk factors, stress and quality of life in human volunteers - a double-blind, randomised, placebo-controlled trial.**

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**Objectives:** Pomegranate extract (PE) provides a rich and varied source of biophenols with the most abundant being ellagitannins, tannins, anthocyanins, ellagic and gallic acids. Biophenols can act as powerful antioxidants. We have shown that pomegranate juice consumption may alleviate cardiovascular disease (CVD) risk factors by reducing systolic and diastolic blood pressure (BP) and exercise-induced oxidative stress. This study investigates the effect of pomegranate extract intake on BP, insulin resistance (HOMA-IR), stress hormone levels (cortisol/cortisone) and quality of life in human volunteers.

**Material and Methods:** Healthy volunteers (7 males and 22 females) participated in a parallel, randomized, double-blind, placebo-controlled study (BMI: 25.05±3.91kg/m<sup>2</sup>, age: 34.5±13.7 years). All subjects consumed either one PE (Pomaxon, Pomegreat) or placebo capsule daily, after a meal, for 4 weeks. Each PE capsule weighed 1.083g, containing 650mg of PE and 433mg maltodextrin. Dietary history and habits and the health related Quality of Life questionnaire (Rand 36) were also recorded pre- and post-intervention. BP, salivary cortisol and cortisone levels (am, noon, and pm) were assessed by specific and sensitive ELISAs, and fasting blood was obtained at baseline plus after 4 weeks to compare glucose, insulin and insulin resistance parameters.

**Results:** Systolic BP was significantly reduced following PE from 120.3 ±13.3 to 115.6 ±13.1mmHg ( $P=0.012$ ). There was a reduction in the HOMA-IR levels from 2.22 ±2.6 to 1.61 ± 1.9 ( $P=0.045$ ), and glucose, insulin and uric acid all decreased from baseline. No significant changes were recorded in volunteers taking the placebo. Pomegranate extract intake caused a significant drop of salivary cortisol levels (Am; 39.5±19.6%,  $p<0.001$  and noon; 43.1±32.3%,  $p=0.016$ ). Salivary cortisol/cortisone ratio was also significantly reduced (Am from 1.11±0.51 to 0.55±0.26,  $p<0.001$ , noon 1.57±0.85 to 0.75±0.72,  $p<0.001$  and PM; 1.22±0.9 to 0.74±0.59,  $p=0.011$ ). Physical ( $p=0.018$ ) and social functioning ( $p=0.021$ ), pain ( $p=0.003$ ), general health ( $p=0.008$ ) and overall Quality of Life score ( $p=0.007$ ) were significantly improved in those taking the pomegranate extract capsules. There was a slight increase in salivary cortisol and cortisol/cortisone ratio in those taking the placebo.

**Key findings:** These results suggest that pomegranate extract intake rich in biophenols ameliorates cardiovascular risk factors, reduces stress levels and improves health related quality of life. The reduction in salivary cortisol levels may prove to be beneficial for people suffering from chronic stress. The decrease in insulin resistance may improve health outcomes for those who suffer from CVD, type2 diabetes and metabolic syndrome.

**OW-008****Oral communication****Life-course changes in dietary patterns and type 2 diabetes risk among British adults.**

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MRC Unit for Lifelong Health and Ageing at UCL, United Kingdom. <sup>1</sup>MRC Human Nutrition Research, Cambridge, UK and School of Population Health, University of Western Australia, Australia.

Dietary fat, glycemic index (GI) and fibre intakes have been linked to Type 2 Diabetes risk, however few studies have investigated their combined, longitudinal relationships. The objective of this analysis was to examine a high-fat, high-GI, low-fibre dietary pattern across the adult life course and risk of type 2 diabetes (T2D).

Materials and methods: Participants were 1180 adults from the 1946 British Birth Cohort. T2D was identified using validated self-report, fasting blood glucose and haemoglobin A1c levels. Dietary intake was measured at age 36, 43 and 53 using a 5-day diet diary. Reduced rank regression was used to identify a dietary pattern characterised by high-GI, low-fibre density (g/kcal) and high-fat density (g/kcal). Each subject received a z-score for the dietary pattern at age 36, 43 and 53. Change in dietary pattern z-score for each period was calculated by subtracting the z-score at each age from the z-score at the subsequent age; changes were then modelled conditional on earlier z-scores Logistic regression models, adjusted for socio-economic class, education, smoking, physical activity, body mass index (BMI) and waist circumference were used to examine prospective associations between changes in dietary pattern z-scores between 35 and 53 years of age and risk of T2D between age 53 and 60-64 years (n=106). Results: The high-fat, high-GI, low-fibre dietary pattern was characterised by low intakes of fruit, vegetables, low-fat dairy products, and whole grain cereals, and high intakes of white bread, fried potatoes, processed meat and animal fats. For each 1 SD unit increase in dietary pattern z-score between 36 and 53 years of age there was a 37% (95% CI: 1.07, 1.74) increased risk of type 2 diabetes independently of simultaneous changes in BMI and waist circumference. Increases in z-scores between 43-53 years showed stronger associations with T2D risk (1.29, 95% CI: 1.01, 1.65) than increases between 36 and 43 years of age (1.21, 95% CI: 0.95, 1.54).

Key findings: A dietary pattern increasingly characterised by high fat, high GI and low fibre over the adult life-course is associated with higher T2D risk in older adulthood independent of weight gain.

**OW-009****Oral communication****Soft drink, and juice and nectar consumption and risk of pancreatic cancer in the European Prospective Investigation into Cancer and Nutrition.**

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Objectives: To assess associations of soft drink (total, sugar sweetened and artificially sweetened), and juice and nectar consumption with pancreatic cancer risk in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort.

Material and methods: A total of 477,199 EPIC participants from 10 European countries recruited between 1992 and 2000 were included in our analysis. Of the 865 exocrine pancreatic cancers diagnosed during an average 12.2 years of follow-up, 608 (70.3%) were microscopically confirmed. Soft drink, and juice and nectar consumption were assessed using validated dietary questionnaires administered at baseline. Total soft drink consumption was subdivided into sugar sweetened soft drink and artificially sweetened soft drink consumption. Juice and nectar consumption combines the information collected on consumption of juices (obtained from either 100% fruit and vegetable, or concentrates) and nectars (juices with up to 20% added sugar). Hazard ratios (HRs) and 95% confidence intervals (CIs) were obtained using Cox regression models stratified by age, sex and centre and adjusted for educational level, physical activity, smoking status and alcohol consumption. Associations with total soft drink were adjusted for juice and nectar consumption, and vice versa. Adjustment for energy intake, self-reported diabetes status and body mass index (BMI) were done separately as these factors could mediate the

studied associations.

Results: Total soft drink (HR per 100 g/day=1.03, 95% CI=0.99-1.07), sugar sweetened soft drink (HR per 100 g/day=1.02, 95% CI=0.97-1.08) and artificially sweetened soft drink (HR per 100 g/day=1.04, 95% CI=0.98-1.10) consumption were not associated with pancreatic cancer risk. Juice & nectar consumption was inversely associated with pancreatic cancer risk (HR per 100 g/day=0.91, 95% CI=0.84-0.99). Further adjustment for energy intake, diabetes and BMI did not substantially affect the estimates. The results did not materially change after exclusion of the first 5 years of follow-up, or after restricting the analysis to pathologically confirmed cases, to non-diabetics, or following exclusion of obese participants (BMI  $\geq 30$  kg/m<sup>2</sup>).

Key findings: Soft drink consumption appears not to be associated with pancreatic cancer risk. Although the underlying mechanism and causality of the association remain to be elucidated, consumption of juices & nectars might be associated with decreased pancreatic cancer risk.

**OW-010****Oral communication****Mediterranean Diet and Invasive Breast Cancer Risk in the PREDIMED trial.**

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Objectives: Our objective was to assess the effect of two interventions with Mediterranean diet on the primary prevention of breast cancer in the PREDIMED trial, a randomized controlled trial.

Materials and methods: The PREDIMED study (Prevención con Dieta Mediterránea) is a randomized, single-blind, and controlled trial conducted in Spanish primary healthcare centres. For the purpose of this study, we included 4,282 women aged 60 to 80 years. They were randomly allocated to a Mediterranean diet supplemented with extra-virgin olive oil (n=1478), to a Mediterranean diet supplemented with mixed nuts (n=1288) or to a control diet (advice to reduce dietary fat) (n=1393). Analyses were performed on an intention-to-treat basis. We used Poisson regression models to address the association between the dietary intervention and the incidence of confirmed invasive breast cancer.

Results: After a median time of 4.3 years of intervention, the observed rates (per 1000 person-years) were 1.14 for the Mediterranean diet with extra-virgin olive oil group, 1.82 for the Mediterranean diet supplemented with nuts group, and 2.90 for the control group. The multivariable-adjusted rate ratio (RR) for the group allocated to Mediterranean diet with extra-virgin olive oil versus control was 0.34 (95% CI: 0.14 to 0.83). The multivariable-adjusted RR for the Mediterranean diet with mixed nuts group versus control was 0.60 (95% CI: 0.26 to 1.35).

Key findings: Our results suggest that the risk of invasive breast cancer in women 60 years or older may be substantially reduced with a dietary intervention promoting the adherence to the Mediterranean dietary pattern, specially when it is supplemented with extra-virgin olive oil.

**OW-011****Oral communication****Association between dietary intakes of polychlorinated biphenyls (pcbs) and the incidence of hypertension in a spanish cohort: the sun project.**

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Objective: Polychlorinated biphenyls (PCBs) are persistent organic pollutants (POPs) that are consumed because of their bioaccumulation through the food chain. Scientific evidence from different sources suggests a positive association between PCB exposure and the incidence of hypertension. However, no previous prospective study corroborated this potential relationship in an adult population. Our objective was to assess the association between dietary intake of PCBs and the incidence of hypertension. Material and Methods: Prospective analyses using data from the SUN Project, a dynamic cohort of Spanish university graduates. For the present analyses, we included 14,521 participants, initially free of hypertension, who were followed-up for a median of 8.3 years and a retention rate of 91%. New cases of medically diagnosed hypertension (HT) were identified

through responses to a mailed questionnaire after at least 2 years from recruitment. Dietary intakes of PCBs, expressed as World Health Organization toxic equivalents, were assessed at baseline through a previously validated 136-item semi-quantitative food-frequency questionnaire. The published concentration levels of PCBs measured in samples of food consumed in Spain were used to estimate intakes. Multivariable Cox regression models were fitted to estimate hazard ratios (HR) and 95% confidence interval for incident hypertension.

Results: During follow-up, 1577 incident cases of medically-diagnosed hypertension were identified. After adjusting for total energy intake and additional adjustment for potential confounders, participants in the fifth quintile of PCBs intake were at higher risk of developing hypertension [adjusted HR: 1.30; (95% CI: 1.08 to 1.57, p for trend 0.005) compared to those in the first quintile.

Key findings: In this Mediterranean cohort study, dietary intake of PCBs as estimated using a FFQ was associated with a higher risk of developing hypertension during the follow-up. Nevertheless, further longitudinal studies are needed to confirm our results.

Funding: The SUN Study has received funding from the Instituto de Salud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/O2658, PI10/O2293, PI13/O0615, RD06/O045, G03/140 and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra.

### OW-012 Oral communication **Investigation of the nutritional status of children and the nutrition knowledge of child and youth care workers in residential care settings in Durban, South Africa.**

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Durban University of Technology.

The purpose of this study was to investigate the nutritional status of children and the nutrition knowledge of child and youth care workers (CYCWs) in residential care settings to inform the development of reliable and valid nutrition education material (NEM).

The total purposive sample included boys (n = 112), girls (n = 38) (both 5-19 years of age) and CCWs (n = 40). Anthropometric measurements were captured and analysed using the World Health Organisation's (WHO) AnthroPlus version 1.0.2. statistical software. The WHO growth standards for school-aged children and adolescents were used to compare the anthropometric indicators. Dietary intake measurements were done by cycle menu analysis using Food Finder® Version 3 computer software program and comparing the results with the Dietary Reference Intakes (DRIs). Average portion sizes were established by weighed food records, observation of practices and focus group discussions with the CYCWs. Nutrition knowledge of the CYCWs was determined by a self-administered questionnaire developed and tested for reliability and validity. Seven point ten percent of the boys and 15.8% of the girls were stunted, 3.6% and 2.6% were severely stunted. Fifteen point two percent of boys and 39.5% of girls were at risk of being overweight, while 1.8% of the boys and 15.8% of the girls were overweight. Two point six percent of the girls were obese. Five point four percent of the boys were underweight and 7.7% severely underweight.

The DRIs for girls and boys were met for energy and protein in all the age groups except for boys aged 14-18 years. Comparison of macro nutrient intake with the WHO guidelines indicated that the protein (10.78%) and carbohydrate (58.07%) was within the recommendations of 10-15% and 55-75% respectively and fat intake (31.15%) was above the recommended intake of 15-30%. Weighed food records indicated the fruit and vegetable intake was 17% of recommended intake. None of the groups met the DRIs for calcium. Results showed that micro nutrient inadequacies were more prevalent in age groups 9-13 and 14-18 years in both girls and boys. General nutrition knowledge of CYCWs was fair. Knowledge on diet diversity, serving sizes and hygiene practices were very poor.

This study established that malnutrition is evident in the establishments and that there were many gaps in the nutrition knowledge of the CYCWs. The NEM developed in this study will address these gaps.

### OW-013 Oral communication **Lead and cadmium in maternal blood and placenta in pregnant women from a mining- smelting zone of Peru and transfer of these metals to their newborns.**

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Objectives: The cross-sectional study was carried out to determine the lead and cadmium concentration in maternal and umbilical cord blood and placental tissue and breast milk of pregnant women living in a min-

g-smelting town in Peru.

Material and methods: Forty deliveries with normal evolution of pregnant women of the Oroya city (Junin-Peru, 3,730 masl) were evaluated. Maternal blood and umbilical cord blood samples were taken using tubes with anticoagulant and mineral free. Was taken 200 g of placenta. All samples were coded and stored in a freezer (-18°C). Breast milk samples were taken on the thirteenth day of delivery. Blood and breast milk samples were unfrozen, placental tissue samples were dried (6h/70°C) and grinded (Iyengar et al., 2001a,b,c). The analyses of lead and cadmium concentration were realized in Peruvian Institute of Nuclear Energy Chemistry Laboratory by atomic absorption with graphite furnace. Analytical blanks were considered. Two reference materials, DORM-2 dogfish muscle and Simulated Diet F were used to ensure the quality data of plasma and breast milk analysis, respectively. Data analysis was done using the statistical software (SPSS V.15). Associations between variables were examined by Pearson's correlation analysis.

Results: Mean lead concentration in the blood of both women and their neonates were 27.2±15.9 and 18.5±13.0 µg/dl, respectively with 83% of the women and 65% of the neonates having toxic levels. Mean cadmium concentrations in maternal blood were below the safe upper limit, but 45% of women had levels above 10 µg/dl. On the other hand, the mean cadmium concentration in umbilical cord blood was 12.0±17.8 µg/dl, with 38% of neonates having levels above 10 µg/dl. The lead and cadmium concentrations in maternal milk were 108.9±69.4 and 5.6±4.3 µg/dl, respectively. In addition, lead and cadmium in cord blood accounted for 67.8 and 136.4% compared to concentrations in maternal blood. There was negative relationship between the concentration of lead in the umbilical cord blood and the birth weight of the neonate (p=0.006).

Key findings: It is evident that lead contamination and to lesser extent cadmium, pose a problem in pregnant women in this region. Although the placenta appears to act as a protective barrier to the fetus, transfers of these metals to the fetus still persist. The concentration of lead was quite high in maternal milk and could be an important source of contamination to the infant.

### OW-014 Oral communication **Maternal knowledge and practices of exclusive breast feeding and anthropometric indices of their infants in Southeast Nigeria.**

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Department of Home Science, Nutrition and Dietetics University of Nigeria, Nsukka.

Objective: This study assessed maternal knowledge and practices of exclusive breastfeeding (EBF) and the anthropometric indices of their infants in urban and rural areas of a commercial state in southeast Nigeria.

Material and methods: Five hundred (500) out of 1126 lactating mother-child pairs were randomly selected during their postnatal visits to 6 health centers out of 17 in the study area. Ethical clearance and consent were obtained before pre-tested and validated questionnaire was administered to the mothers. Anthropometric measurements of the children (length, weight, head, chest and mid upper arm circumferences) were obtained using standard procedures. Information from the questionnaire were statistically analysed and data obtained were expressed as frequencies, means and percentages. Analysis of variance (ANOVA) was used to separate and compare means. Anthropometric indices were derived from anthropometric measurements of the children and compared with the new WHO child growth standards for the age group. The nutritional status of the children was subsequently classified as normal or malnourished. The malnourished ones were further classified under different categories of underweight, wasting, overweight, obesity and stunting.

Results: Sixty-eight percent (68%) urban and 53.6% rural mothers had adequate knowledge of EBF; out of these, 24.6% in urban and 20.1% in rural practiced EBF. Only 16.4% urban and 8% rural mothers initiated breastfeeding within 30-60 minutes of child delivery. Pre-lactal feeds were used by 34.8% urban and 57.7% rural mothers. These pre-lactal feeds included glucose water (16.8%) and plain warm water (20.8%). Insufficient milk production (20.8% rural) and employment outside the home (16% in urban) were among the reasons for non-compliance by the mothers. Rate of EBF of 0-3 month old children varied from 20% to 28% and for 0-6 month olds from 10.8% to 16.8% in rural and urban areas, respectively. Maternal age, education, health facility used for child delivery and mode of delivery affected the rate of EBF. Mean weight of EBF male and female children 0-6 months old in urban area were 9.40±0.1 and 8.56±0.1kg, respectively and 8.01±1.3 and 7.84±1.5kg, respectively of their non-EBF counterparts. Similarly, at 0-6 months EBF rural males and females weighed (9.21±0.9 and 8.32±0.6, respectively) more than their non-EBF counterparts (7.74±1.1 and 7.36±1.4kg, respectively). Moderate (4.7%) and severe underweight (8%) were observed in urban and rural non-EBF children, respectively. Moderate wasting was seen in 6.8% rural and 5.8% urban non-EBF children. Family and community support is essential for the success of exclusive breast feeding.

**OW-015****Oral communication****Nutritional status and risk factors for malnutrition among preschool-age children in Sao Tome and Principe.**

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**Objectives:** to assess the nutritional status as well as evaluate the risk factors that may contribute to malnutrition during infancy in a representative sample from Sao Tome and Principe.

**Material and methods:** 1285 children aged less than 5 years old were randomly selected from 24704 children enrolled in the vaccination program of 2010. Children's nutritional status was assessed by weight-for-length ( $\leq 24$  months) and Body Mass Index ( $> 24$  months); mothers nutritional status was determined using BMI, according to the World Health Organization. Birth weight was evaluated based on Olsen growth curves. Catch-up and catch-down growth were defined as a change in standard deviation scores of  $> 0.67$  from birth to 2 years of age. Statistical analysis was performed with SPSS®, according to the total sample and by age groups. The study was approved by Ethics Committee of Hospital Dr. Ayres Menezes and Centro Hospitalar São João.

**Results:** Of the 1285 children, 45.5% were male and the median age 22 months. A high percentage (30%) of malnutrition was observed in the youngest children (0-24 months) vs 22% of the older (>24  $\leq 60$  meses). In children older than 12 months there is a lower risk of malnutrition associated with BMI ( $\geq 25$  kg/m<sup>2</sup>) [OR=0.476 (0.234-0.968)] ( $p=0.04$ ) and maternal education ( $> 10$  years) [OR=0.448 (0.244- 0.825)] ( $p=0.01$ ). Likewise, it is observed a lower risk of malnutrition in children with adequate birth weight [OR=0.485 (0.299-0.785)] ( $p=0.003$ ) and catch-up growth in the first half of life [OR=0.261 (0.148-0.461)] ( $p<0.001$ ), whereas mother pregnancies ( $\geq 4$ ) negatively influences the nutritional status [OR=1.610 (1.004-2.582)] ( $p=0.004$ ). At 24 months, only the high educational level of the mother ( $> 10$  years) [OR=0.186 (0.064-0.540)] ( $p=0.002$ ) and the catch-up growth in the first 6 months [OR=0.282 (0.133-0.596)] ( $p=0.001$ ) showed a protective effect against malnutrition. On the contrary, mother's number of pregnancies ( $\geq 4$ ) [OR=2.428 (1.348-4.373)] ( $p=0.003$ ) and the number of siblings ( $> 1$  brother) [OR=1.537 (1.025-2.303)] ( $p=0.038$ ) increase the risk of malnutrition of children at 24 months.

**Key findings:** The high prevalence of malnutrition observed in the study population seems to be related to social indicators and nutritional markers of the mother. We emphasized the huge importance of mothers information/education, with priority intervention in pregnancy.

**OW-016****Oral communication****Is dietary diversity associated with biomarkers of micronutrient status among non-pregnant adolescent Mozambican girls in two different seasons?**

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**Objectives:** Studies in low-income settings have shown that dietary diversity scores (DDSs) are positively associated with micronutrient adequacy of diets. Less is known about whether different DDSs could be used as proxy tools to assess the risk of micronutrient deficiencies on a population level. We studied whether one of the dietary diversity tools proposed by FAO, the Women's Dietary Diversity Score (WDDS), is associated with low concentrations of haemoglobin, serum ferritin, zinc, and folate, and plasma retinol among 14- 19-year-old non-pregnant Mozambican girls.

**Materials and methods:** We used data from the ZANE Study (Estudo do Estado Nutricional e da Dieta em Raparigas Adolescentes na Zambézia). The data were collected cross-sectionally in different regions of Zambézia Province in 2010. Non-pregnant participants with a venous blood sample and 24-hour dietary recall data ( $n=225$  in January- February and  $n=220$  in May-June) were included in the analysis. We constructed the WDDS consisting of nine food groups from 24-hour dietary recall data.

We performed logistic regression analyses stratified by season to examine associations between low ( $\leq 3$ ), and medium/high ( $\geq 4$  food groups) WDDS and low blood concentrations (the lowest quartile in each season). An asset score was created by assigning scores for type of housing and possession of household items, animals and land. Sampling weights were used.

**Results:** In January-February, a low WDDS was associated with a higher odds of having low serum zinc, compared with a medium/high WDDS. This association remained significant after adjusting for region, age, breastfeeding, BMI-for-age, elevated high-sensitivity C-reactive protein, asset score, and literacy (adjusted odds ratio: 3.35, 95% confidence interval: 1.41-7.94;  $n=221$ ). No other significant associations were found for either of the seasons.

**Key findings:** Although we found modest evidence that this simple tool could be used to predict low serum zinc, the finding was not consistent in both seasons. WDDS was not a predictor of low haemoglobin, iron depletion, or low vitamin A or folate status. As a tool, the score might be too simple to capture the different qualities of diets that may predict micronutrient status. Moreover, micronutrient status is affected by factors other than the diet, some of which we may not have been able to control for. Small samples sizes may have precluded us from finding some associations. Our data from Mozambique provides very little evidence supporting the idea that WDDS could be used to assess low micronutrient status when used in a cross-sectional manner.

**OW-017****Oral communication****Community health workers prevent harmful infant feeding and caring practices among mothers of children under 2 in Palestine.**

Al Rabadi H.

World Vision Jerusalem –West Bank –Gaza

**Objective:** Infant and young child feeding practices are critically important for children's survival growth and development. Sub-optimal feeding practices, inappropriate feeding during illness, low supplements intake and poor newborn caring practices are known to be prevalent in Bethlehem villages.

The objective of this intervention is to assess the effectiveness of home targeted and timely visits by trained community health workers (CHWs) for increased knowledge and improved practices among caregivers.

**Methods and Materials:** An intervention study was carried out by World Vision in eleven villages surrounding Bethlehem. Mothers ( $n=360$ ) of infants born during the year 2011, 2012 were identified by 17 trained CHWs. The CHWs targeted the mothers with key messages and support for positive infant and young child feeding practices during organized home-visits throughout 14 months. Baseline and end-line data were collected through household interviews.

**Results:** Infant and young child feeding practices were significantly improved after the intervention; exclusive breastfeeding until 6 months increased from 44.7% to 65.7% ( $P < 0.001$ ), duration of breastfeeding above one year increased from 66.8% to 82.5% ( $P < 0.001$ ), timely introduction of the complementary meals increased from 71.5% to 87%, offering the minimum meal diversity increased from 28.5% to 78.9% ( $P < 0.001$ ), meal frequency increased from 4.2%-75.9% ( $P < 0.001$ ), giving the appropriate feeding during illness increased from 40.7% to 76% ( $P < 0.001$ ), giving regular VIT A supplements increased from 44.6% to 75.6% ( $P < 0.001$ ) and giving regular iron supplementation increased from 38.8% to 76.7% ( $P < 0.001$ ). As per the new born caring practices ;bathing newborns within 24 hours after birth decreased from 65.1% to 34.9% ( $P$  value  $< 0.001$ ); harmful massage practice decreased from 25.8% to 5% ( $P$  value  $< 0.001$ ); putting salt on babies' skin and cord decreased from 41.8% to 11.1% ( $P$  value  $< 0.001$ ), tight wrapping decreased from 61.2% to 25.8% ( $P$  value  $< 0.001$ ); recognizing infants' danger signs and timely referral for health care increased from 26% to 77.8% ( $P$  value  $< 0.001$ ).

**Key findings:** Home based interventions by trained community health workers have positively influenced different practices related to infant and young child feeding, feeding during illness supplements intake and newborn caring practices in Bethlehem villages. Due to context similarities in most Palestinian localities scale up plans for this intervention, integrated with early childhood stimulation component, is envisioned.

**OW-018****Oral communication****Nutritional Status of Primary Schools Children in the Oio and Cacheu Region in Guinea-Bissau.**

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<sup>1</sup>Global Food & Nutrition Inc. <sup>2</sup>Tufts University. <sup>3</sup>International partnership for Human Development.

To date, there has been no survey of nutrition status among primary school children in Guinea-Bissau. To fill this gap and in preparation for a Randomized Control Trial to improve nutrition in the population, we assessed anthropometry and anemia in 4,807 children in two rural areas: Cacheu and Oio. This research was funded by the United States Department of Agriculture (USDA) Micronutrient Fortified Food Aid Pilot Project and took place in primary schools participating in a Food for Education program run by International Partnership for Human Development.

**Methods:** Student's weight in light clothing and no shoes was measured using a portable digital scale (Seca model 813) placed on a flat surface and calibrated at regular intervals. Standing height was measured without shoes using a portable stadiometer (Seca model 213). Hemoglobin was analyzed by Hemocue™ from finger stick blood samples. WHO cut-offs for Weight-for-Age Z-scores (WAZ), Height-for-Age Z-scores (HAZ), BMI-for-age Z-score (BAZ), and Hemoglobin (Hb) concentration were used for analysis.

**Results:** Nutrition status of children in primary school (2,163 girls and 2,647

boys) warrants concern (23.8% had WAZ <-2, 6.9% WAZ <-3, 16.0% HAZ <-2, 3.8% HAZ <-3, 15.7% BAZ <-2, 3.5% BAZ <-3, 18% mild anemia, 21.6% moderate anemia, and 5.5% of severe anemia), with boys doing worse than girls on all measures. Many children (n=1633, 40.0% of children surveyed) were older than the expected primary school age range (6-12 years old); the oldest being 18 years of age. These 12-18 year-old boys have a much worse nutrition status ( $p < 0.05$ ) compared to those aged 6-12 years on all measures and compared to 12-18 year old girls. Nutrition status of 12-18 year old girls was similar to those aged 6-12 years of age. Nutrition status among boys and girls aged 6-12 years was similar.

Conclusions: There is a high rate of malnutrition among children in primary school in rural Guinea-Bissau. Moreover, a larger than expected number of children in primary schools were older than 12 years of age. Those planning nutrition programs for primary school in rural Guinea-Bissau should also be prepared to specifically address the special nutrition needs of adolescents. The school platform can be important venue to address nutrition in this age group that is often underserved by the public health system.

#### OW-019

#### Oral communication

##### **Dietary patterns associated with socio-economic status in HIV-infected Salvadorian children.**

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Objective: to identify the dietary patterns of HIV-infected Salvadorian children and to test the association between these patterns and socio-economic status.

Material and methods: In September and November 2010, a cross sectional survey including a food frequency questionnaire was conducted to all HIV-infected children attended at Centro de Excelencia para Niños con Inmunodeficiencias (CENID), Hospital de Niños Benjamin Bloom in San Salvador. Food items were classified in 9 food groups and dietary patterns were identified by principal component analysis (PCA).

Results: 312 children were surveyed. The 3 dietary patterns identified by PCA were "healthy diet", "unhealthy diet" and "low variety diet" and together accounted for 49.38% of explained variance. The "healthy diet" pattern included vegetables, dairy products, fruits and meat and fish. The "unhealthy diet" pattern consisted of fast food, fats and oils, eggs and meat and fish; and the "low variety diet" pattern consisted mainly in cereals, tubers and beans. Younger children and children living in shelter houses were significantly more likely to show a high adherence to the "healthy diet" pattern ( $p=0.004$  and  $p < 0.0001$  respectively), whereas older children and children living in poverty were significantly more likely to adhere to the "unhealthy diet" pattern ( $p=0.009$  and  $p=0.005$  respectively). Children living in extreme poverty showed a significant higher adherence to the "low variety diet" pattern ( $p=0.018$ ) but no significant association with age was found. There were no significant differences between boys and girls in the adherence to any of the three patterns.

Key findings: Salvadorian HIV-infected children living in shelter houses were more likely to adhere to the "healthy diet" pattern. The "unhealthy diet" pattern was mainly followed by children living in poverty and the "low variety diet" pattern by children living in extreme poverty.

#### OW-020

#### Oral communication

##### **School Nutrition Pilot in rural and urban Bangladesh: evaluation of nutritional and cognitive effects.**

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Objectives: To assess effects of school nutrition on class attendance, cognitive and hygiene outcomes of students 5-11 years, and on nutritional and hygiene knowledge and practices in their mothers, in 102 primary schools from 1 urban and 2 rural sites with high food insecurity and malnutrition and no existing nutrition programs.

Materials and methods: Over May/June 2012 to October 2013, NGOs BRAC and Banchte Sheka provided hot cooked meals on 340 days, to 18,386 students. Meals were prepared in 8 centralized cluster kitchens, and served in class rooms by mothers' clubs. Interventions further included awareness raising on deworming and hand-washing/hygiene, and training and supervision of mothers.

Surveys randomly sampled 60 schools (30 intervention, 30 control) and 4,602 households in October 2012, of which 48 schools and 4,254 respondents were revisited in October 2013. Propensity score matching was used to select comparable 'control' households. Interviews included 24-hour dietary recall from students, and nutrition knowledge and practices from students and mothers. An arithmetic test measured cognitive skills in cross-sectional samples of grade-3 students (N=600 intervention, 600 control). Focus Group Discussions with parents, interviews with project staff, (un-announced) observations in kitchens and class-rooms, nutritional assessment and a mid-term process

evaluation supported the evaluation.

Results: Mothers' respect of instructions on food purchase, storage, cooking and hygiene improved over the year, as did programme staff's efficiency in dealing with food vendors, mothers and school authorities and in providing varied meals within the fixed budget and without hampering school activities. Students appreciated and finished most school meals, which contributed an average 14-24% of energy, 18% of protein, 11% of iron, 25% of zinc and 6% of vitamin A, compared to Recommended Daily Amounts. School meals partially replaced students' eating at home, increasing food availability for other household members. Mothers appreciated their social mobilization, engagement with schools, learning on nutrition/health/hygiene, and income obtained through the program, and thought their children's school participation, learning and health improved.

Univariate difference-in-difference analysis found no significant effects on school attendance, class completion/pass rates, or cognitive/arithmetic performance.

Key findings: The program improved mothers' nutritional knowledge and practices, and nutrient intake by students. Enhancing impact requires intensified activities to improve hygiene and sanitation practices and infrastructure, in schools and homes. Longer-term follow-up should assess cognitive and health effects. The pilot helps inform development of a National School Feeding and Nutrition Policy, to strategically guide replication and scale-up of school nutrition programs across Bangladesh.

#### OW-021

#### Oral communication

##### **School based malaria clearance in Mali: impact on anemia and cognition.**

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Objectives: In Sikasso region, Mali, an estimated 80% of school children at the end of the malaria transmission season harbour malaria parasites and 63% are anemic, with similar rates amongst girls and boys. The main objective of the study was to evaluate the impact and cost effectiveness of a one time malaria treatment (clearance) targeting all school children at the end of the malaria transmission season and beginning of the school year on malaria, anemia and cognitive function.

Methods: A cluster-randomized controlled trial was conducted in 80 primary schools in Sikasso, Mali where the majority of schoolchildren already slept under insecticide-treated nets. Children in intervention schools received a single treatment dose of AS-SP (artesunate; sulphadoxine/pyrimethamine combination) at the end of November 2011; administered in school by teachers over three consecutive days.

Results: Parasite clearance was associated with dramatic reductions in malaria parasitaemia and gametocyte carriage at follow-up in February 2012 in intervention compared to control schools. Malaria parasite clearance was also associated with a significant decrease in anaemia (OR=0.56, 95% CI 0.39 to 0.78,  $p=0.001$ ), and increase in sustained attention ( $p < 0.001$ ). This effect was sustained until May 2012, the beginning of the next transmission season and the end of the school year. The intervention was estimated to cost \$2.72 per child treated.

Key findings: These results add to the growing body of evidence on the impact of asymptomatic malaria infection on anemia and cognitive performance in schoolchildren. School based malaria clearance is a potential cost effective strategy for reducing anemia in school age children including adolescent girls in settings of seasonal malaria transmission. From November 2013, Save the Children has scaled this intervention to 250 schools and combined it with annual deworming and intermittent iron supplementation, as recommended by WHO for school age children where the prevalence of anemia is 20% or higher. This approach has the potential to reach adolescent girls both in and out of school and improve their health and nutritional status before pregnancy.

#### OW-022

#### Oral communication

##### **The provision of a free school meal in underprivileged areas of Greece.**

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Objectives: This is the first study to measure food insecurity among students and their families that participate in a program on food aid and promotion of healthy nutrition, in low socioeconomic status districts in Greece.

Material and methods: The 2012-2013 program was targeting students attending both elementary and secondary schools in underprivileged areas, selected based on income tax data, unemployment and other socioeconomic

features. 162 schools with 25349 students participated. About half of the schools entered the program in October 2012, the others gradually by May 2013 (pre-intervention phase, collecting well-completed 13457 questionnaires), until the end of the school year (June-July 2013, post-intervention phase, collecting 7494 questionnaires). Each student on a daily basis received a lunch box, different for each school day, containing a meal designed by nutrition specialists. Food insecurity levels were measured through the Food Security Schedule Module. A personal id of the respondent's choice was used to match pre- and post-intervention responses (2886 matched questionnaires), enabling us evaluate the impact on food insecurity at a person level.

Results: In the total sample food insecurity decreased from 64.2% (pre-intervention), to 59.1% (post-intervention),  $p < 0.0001$ . Food insecurity with hunger decreased from 26.9%, to 23.1%,  $p < 0.0001$ .

In the matched sample food insecurity decreased from 59.6%, to 56.3%,  $p = 0.013$ , whereas food insecurity with hunger decreased from 22.3%, to 19.9%,  $p = 0.0236$ . The food insecurity score reduced by 6.5%,  $p < 0.0001$ .

Duration of participation in the program was a statistically significant predictor after controlling for various socio-demographic characteristics. For each additional month of participation in the program, the odds of reducing the food insecurity score increased by 6% (OR = 1.06, 95%CI: 1.02-1.11).

Students whose father stopped being unemployed during the program have higher odds of reducing food insecurity (OR = 1.80, 95%CI: 1.18-2.73). Children who are not living with their parents have 2.55 times higher odds to reduce food insecurity ( $p = 0.035$ ). Families that have 5 children or more are twice as likely to reduce food insecurity (OR=2.27, 95%CI: 1.25-4.11). Fathers with higher level of education are less likely to decrease food insecurity score (OR=0.88, 95%CI: 0.80-0.97).

Key findings: Families residing in low socioeconomic areas of Greece, which were selected to participate in the food aid program, experience high levels of food insecurity. The reduction in food insecurity rates was significant and was found to increase with the duration of participation, indicating the importance of food aid programs among these populations.

#### OW-023

#### Oral communication

#### The need for global partnership in encouraging the production and utilization of traditional crops, a perfect way of combating malnutrition.

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Background: in the context of establishing priorities for national and/or international agricultural research, several and indeed contradictory arguments can be advanced to support and/or to undermine support for research on roots and tubers. The objective of this study is to re-enact the conscious re-orientation and mobilization of foreign investors, donors and partners interest in root and tuber crops research through initiatives and campaigns, designing and implementing pragmatic research program dissemination of the improved technologies, as well as advocacy support for overall development.

Methodology: a district was selected in the western region of Nigeria based on its environmental suitability for root and tuber production and consumption trends. In order to ensure a reasonable representation of root and tubers farming population in the entire district, a two-stage stratified random sampling technique was used. A random sampling technique was used to select the required number of communities/villages from the sampling frame provided by the Statistics, Research and Information Directorate. A simple random sample technique without replacement was applied to select a total of 110 producers for interviews. Both qualitative and quantitative data on socio-economic characteristics, agronomic practices, cost and income as well as constraints involved in the production were collected. The survey was essentially participatory using key informant interviews, focus group discussions and one-on-one structured interviews as well as participant observation. Data on socio-economic characteristics, varietal differences, scale of production, and costing were analyzed with SPSS version 16.

Result: root and tuber production in western region of Nigeria was discovered to be profitable. For a hectare of root farm, total cost of production, total revenue and net revenue were \$669, \$1426 and of \$757 respectively. From the survey findings majority (92%) of the farmers interviewed cultivated cocoyam, cassava and potato purposely for both the root and leaf. Only eight percent (8%) cultivated purposely for root and cornel only. Production levels of cocoyam were very low. Average acreage cultivated per farmer (for both root and leaf) was 0.8 hectares. The average yield per acre was 2566kg or 6.2mt/hectare.

Conclusion: the increasing pressure on the use of maize by human population and livestock feed millers coupled with the cost of maize which fluctuates with the time of the year, thus making the cereal grain to be either scarce or expensive, stimulate the use of alternative sources of energy that are locally available, particularly the starchy roots and tubers that abound in many areas of humid tropics. In addition, their by products such as peels, vines and leaves are non competitive feed materials that can be developed as components of poultry and pig feeds. Their development would help diversify agricultural sector development, will create a coalition of partners to create critical mass, improve efficiency and leverage additional resources.

#### OW-024

#### Oral communication

#### Healthy diet indicator score and metabolic syndrome in the Czech Republic, Russia, and Poland: cross-sectional findings from the Health, Alcohol, and Psychosocial factors in Eastern Europe study.

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Objectives: To estimate the prevalence of metabolic syndrome and to examine the association between healthy diet indicator and risk of metabolic syndrome.

Materials and methods: This cross-sectional study used data from the baseline wave of the prospective Health, Alcohol and Psychosocial factors in Eastern Europe study—21,142 randomly selected adults aged 45-69 years. Metabolic syndrome was defined using the National Cholesterol Education Program's Adult Treatment Panel III definition (at least three of the following: central obesity (waist circumference  $\geq 102$  cm in men;  $\geq 88$  cm in women), high blood pressure ( $\geq 130/85$  mmHg), high triglycerides ( $\geq 1.7$  mmol/L), low high-density lipoprotein cholesterol ( $< 1.03$  mmol/L in men;  $< 1.29$  mmol/L in women), high plasma blood glucose ( $\geq 6.1$  mmol/L)). Dietary intake was obtained using a self-reported food frequency questionnaire in the preceding 3 months, and the healthy diet indicator was derived using World Health Organisation 2003 recommendations (intake of polyunsaturated/saturated fatty acids, fruit and vegetables, fibre, cholesterol, sugar, and protein; each component has a score ranging from 0 (worst) to 10 (best adherence) and the total score ranges from 0 (worst) to 70 (best dietary quality)). Anthropometric data and blood samples were collected during clinic visits, and other data by structured questionnaire. Logistic regression was used to examine the association between healthy diet indicator and metabolic syndrome (using Stata 12). All models were adjusted for potential confounders.

Results: Prevalence of metabolic syndrome was high in the Czech Republic (45.8%), Russia (29.1%), and Poland (27.8%). The risk of having metabolic syndrome increased with age in all three countries ( $P < 0.001$ ). Higher healthy diet indicator score was associated with lower risk of metabolic syndrome in the Czech Republic (odds ratio of metabolic syndrome per 10 unit increase in healthy diet indicator=0.91, 95% CI: 0.83-1.00) and Russia (0.92, 0.85-0.99) but not Poland (1.01, 0.94-1.11).

Key findings: In the Czech Republic and Russia (but not Poland), higher adherence to healthy diet indicator was associated with lower risk of metabolic syndrome. Findings provide some support for the beneficial role of diet quality in lowering metabolic syndrome prevalence. Future longitudinal studies should examine whether higher adherence to healthy diet indicator reduces the risk of metabolic syndrome and cardiovascular disease.

#### OW-025

#### Oral communication

#### Nutrient patterns and prospective weight change in adults from 10 European countries: results from the EPIC-PANACEA study.

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Objectives: We investigated associations between four main nutrient patterns and 5-year weight change in adults from 10 European countries participating in the European Prospective Investigation into Cancer and Nutrition study.

Material and methods: This study includes 356,485 participants (~70% women) between 25 and 70 years recruited between 1992 and 2000 in 23 centers from 10 European countries. The intakes of 23 nutrients were estimated from country-specific validated dietary questionnaires using the harmonized EPIC Nutrient DataBase (ENDB). Nutrient patterns were derived from Principle Component Analysis (PCA) of log-transformed nutrient densities using non-alcohol energy intake. Weight was measured at baseline and self-reported during follow-up in most centers. The relationship between each pattern and weight change was examined using linear mixed models with random effect according to center controlling for age, sex, BMI at baseline, total energy intake, and other potential confounders.

Results: Four nutrient patterns were identified explaining 67% of the total variance: Principle Component (PC) 1 was characterized by nutrients from plant food sources; PC2 by micro-nutrients and protein; PC3 by polyunsaturated fatty acids and vitamin D; and PC4 by protein, vitamin B2 (riboflavin), calcium, and phosphorus. After exclusion of subjects with chronic diseases at baseline and subjects who were likely to misreport energy intakes, the annual weight change per one SD-unit increase in the pattern scores were as follows. PC1 was inversely associated with weight change in men (-18 g/y; 95% CI: -28 to -7) and women (-15 g/y; 95% CI: -22 to -8). Contrarily, PC4 was associated with a higher weight gain of 45 g/y (95% CI: 9 to 81) and 90 g/y (95% CI: 40 to 140) in men and women, respectively. Associations in opposite directions for men and women were observed for PC2: -23 g/y (95% CI: -44 to -2) in

men and 38 g/y (95% CI: 14 to 62) in women. With regard to PC3, no significant associations with weight change were observed in men ( $P=0.875$ ), while increased weight gain was observed in women (67 g/y (95% CI: 35 to 99)). Key findings: We looked at the most important sources of variation in nutrient composition of diets in Europe, which together explained 67% of individual variation. Although there were associations found with weight change, none of these appeared as clinically relevant. We acknowledge the contribution of all EPIC colleagues to the study and funding by the EC, the Fondation de France and other national funding organizations.

#### OW-026

#### Oral communication

##### Ten year change in individual monetary diet cost predicts changes in diet quality and weight development in Spaniards.

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**Objective:** A high-quality diet is associated with a healthier weight status but also with higher cost in cross-sectional studies. The aim of the present study was to determine the prospective association between 10 year changes in individual monetary diet cost and changes in diet quality and weight in a representative population of Spanish men and women.

**Material and methods:** We conducted a prospective population-based study of 2181 male and female aged 25 to 74 years who were followed from 2000 through 2010. Diet and leisure-time physical activity (LTPA) were recorded on validated questionnaires. Weight and height were measured. Average food cost was calculated from official Spanish government data. Diet quality was determined by adherence to the Mediterranean diet and energy density. General linear and multivariate linear regression models were fitted.

**Results:** Individual energy-adjusted (per 1000kcal) monetary diet cost increased by 0.46€ (27%) per day [Range: -4.39 to 6.68; (Range: -66% to 350%)] during the analyzed period. Participants in the first (mean=0.11€) and third (mean=1.05€) tertile of changes in individual energy-adjusted monetary diet cost decreased and increased, respectively, their consumption in vegetables (-26%/+59%), fruit (-6%/+116%), and fish (-4%/+100%). The opposite was observed for soft drinks consumption (+14%/+2%). Multiple linear regression analysis revealed a negative association between changes in individual energy-adjusted monetary diet cost and changes in energy density ( $B = 0.290$ ;  $p < 0.001$ ) and weight gain ( $B = 0.594$ ;  $p = 0.008$ ). In contrast an increase in the adherence to the Mediterranean diet was positively related to an increase in individual energy-adjusted monetary diet cost ( $B = 0.250$ ;  $p = 0.004$ )

**Key findings:** Healthier diet changes and weight development are negatively affected by increase in individual monetary diet cost. This finding might be particularly important for individuals and families with less economic resources and during economical constraints.

#### OW-027

#### Oral communication

##### Focused Ethnographic Study on Infant and Young Child Feeding Behaviors, Beliefs, Contexts and Environments in three Arid and Semi Arid counties in Kenya.

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**Introduction and purpose:** When designing programs to promote effective public health practices, it is important to respond to the household and community contexts within which families live. This study was designed to provide in-depth information about household behaviors that could be used to guide planning and decision-making regarding interventions aimed at improving infant and young child nutrition in three counties in Kenya. The FES study was undertaken as part of a systematic research plan to support the government led multi-donor effort to identify, integrate and sustain humanitarian investments that prove to be effective in sustainably increasing resilience and reducing the need for recurrent humanitarian assistance in the arid and semi arid areas. Improved nutritional outcomes at the household level is one of the program objectives.

**Background:** In resource-poor settings, childhood malnutrition remains a major health problem. Approximately one-third of children less than five years of age in developing countries have stunted growth, and an even larger proportion are deficient in one or more micronutrients. In Kenya, poor breastfeeding and complementary feeding practices, coupled with high rates of childhood diseases result in high rates of malnutrition and mortality during the first two years of life (UNICEF – ESARO, 2007). Results

of the 2008 Kenya Demographic and Health Survey (KDHS) reveal persistently high levels of malnutrition with stunting peaking at 46% among children in the second year of life. Inadequate quantity and quality of complementary foods given, poor child-feeding practices and high rates of infections contribute to poor health and growth during these important years. In response, the Government of Kenya has developed a National Strategy on Infant and Young Child Feeding that underscores the importance of community based programs targeting improvement of feeding practices of infants and young children.

**Methods:** The focused ethnographic study approach which integrates classic ethnographic methods and survey research methods to collect both quantitative and qualitative data was used. Study protocols were adapted to meet the data needs of the landscape analysis and the languages and cultures in the three counties. The studies examined infant and young child (IYC) feeding practices, behaviors and beliefs from a household perspective in three counties. The study explored the determinants of IYC nutrition from a social, environmental, physical and cultural-ecological perspective in order to address specific research questions on what infants 6-23 months consume, sources of those foods, reasons mothers choose them and how they are prepared and fed to young children. The study was conducted in 3 counties targeting pure pastoralists, agro-pastoralists and settled communities. A total of 132 caregivers and 60 key informant caregivers were interviewed for the study. Digital recorders were used for recording interviews with all information uploaded concurrently to a common platform, 'form hub'.

Information was collected on a 24-hour recall for the index child and a 7-day household food record; food preparation and storage; food acquisition and estimated weekly food expenditure; perceptions about value dimensions related to health and food; perceptions about factors that influence IYC feeding: food and feeding-related problems and effects of seasonality on diets of young children. Data analysis was conducted using ATLAS.TI, a qualitative data analysis software. Quantitative data was analyzed using the Statistical Package for Social Scientists (SPSS).

**Key findings:** Home fortification and recipe modifications to improve flavor, taste, and/or nutritional value of diets fed to young children is common. There is a large overlap between the IYC core and the core foods for older children and adults in the community. With the exception of animal milk from household livestock, households in the three counties purchase the vast majority of their foods. Caregivers understand the importance of food quality, not only for child survival, but also for growth and development. The conflict between child care time and other household management tasks is a challenge from respondents in all three counties. Inadequate water to meet multiple household needs, time demands on women for obtaining water coupled with and consequences of seasonal drought all have a strong influence on household food security and diets of young children. There are marked seasonal differences in meal and food consumption patterns among adults and children in households in all counties covered.

**Conclusion:** Multiple aspects of household function and conditions affect nutritional vulnerability in infants and young children. Integrated planning and coordination across sectors for interventions that affect nutrition of infants and young children are a prerequisite for effectiveness in achieving the program objective of improved nutritional outcomes at the household level. The interactions among the critical determinants of food intake in infants and children have important implications for activities to increase resilience. Simultaneous attention to both "nutrition-specific" and "nutrition-sensitive" investments are required.

## POSTERS

## PM-001

Poster

**Evaluación sensorial de arroz biofortificado, variedad IDIAP Santa Cruz 11, en granjas del Patronato de Nutrición en la provincia de Coclé<sup>1</sup>.**

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El presente estudio tuvo como objetivo principal determinar el grado de aceptabilidad del arroz mejorado nutricionalmente con hierro y zinc (biofortificado), variedad IDIAP Santa Cruz 11, mediante la metodología de evaluación sensorial. El mismo fue desarrollado en cuatro comunidades rurales de provincia de Coclé (La Martillada, Santa Cruz, Loma Larga y La Chumicosa), en la cual el Patronato de Nutrición desarrolla actividades a través de las granjas autosostenibles. Como parte de la metodología de evaluación en el estudio se implementó una encuesta socioeconómica a cada uno de los participantes. El arroz se preparó momentos antes de realizar la prueba de análisis sensorial, con el fin de servirlo tibio, de manera que sus características fueran mejor apreciadas. En cada comunidad 30 panelistas tuvieron la oportunidad de participar en la evaluación. Para el análisis sensorial se utilizó la prueba discriminativa triangular, donde las panelistas debían identificar la muestra diferente; Posteriormente los datos obtenidos fueron sometidos a pruebas estadísticas de Ji<sup>2</sup> (Chi cuadrada), con un nivel de confianza ( $\alpha=0.05$ ). La encuesta sociodemográfica demostró que los participantes en este estudio son consumidores de arroz y que viven por debajo de la línea de pobreza. Los resultados obtenidos permitieron concluir que No existe diferencia significativa ( $\alpha=0.05$ ) entre el arroz biofortificado variedad IDIAP-Santa Cruz 11 y el arroz de consumo local en cuanto a la percepción sensorial de las panelistas. No es necesario realizar pruebas adicionales para determinar la aceptación del arroz biofortificado por que no lograron identificar diferencias sensoriales significativas entre ambos tipos de arroz.

## PM-002

Poster

**Enteral nutrition in patients with Traumatic Brain Injury admitted in the Intensive Care Unit of a Mexican Hospital.**

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Objectives: Traumatic Brain Injury (TBI) usually occurs in patients who were previously healthy and in good nutritional status. Several studies suggest that nutritional support in patients with TBI in the Intensive Care Unit (ICU) that is initiated in the first 24 hrs after admission is associated with an improvement in clinical outcome, less percentage of infections and a diminished Length of Stay (LOS). The objective was to determine the prevalence of TBI and its relationship with the initiation and type of feeding implemented, morbi-mortality, nutritional markers and LOS in the ICU of a Mexican second level hospital.

Methods: A descriptive, retrospective and correlation study was performed. 33 medical files of patients admitted in the ICU from January to December of 2012 were reviewed, 3 were discarded for lack of information. A T test and Pearson correlation  $p<0.05$  were performed.

Results: of 208 patients admitted to the ICU, 15.8% presented TBI, 90% were male and 10% female, with a mean age of  $32 \pm 13$  years.

The most common cause of TBI was falls with 36.7% followed by automobile accidents with 30%. Regarding grade of severity of TBI using the Glasgow Coma Score (GCS), 40% presented mild, 36.6% moderate and 23.3% severe. Blended artisanal enteral diet was provided to 86.6% of patients, 42.3% during the first 48 hours and 57.6% 72 hours after admission in the ICU. 91.6% developed infectious complications and 20% died. The average length of stay was 7.5 days. Nutritional markers showed a median leukocyte count of 17,139 mm<sup>3</sup> at admission and 17,340 at discharge ( $p<0.00$ ), serum albumin of 3.0 g/dl and 2.6 g/dl at admission and discharge respectively ( $p<0.00$ ) and total proteins with a median of 5.580 g/dl at admission and 5.413 g/dl at discharge ( $p<0.00$ ). None of the patients had a nutritional evaluation on admission to the ICU.

Conclusions: A significant association was found ( $p<0.05$ ) between the initiation of feeding diet with the length of stay and nutritional markers in the population studied at discharge from the ICU.

## PM-003

Poster

**Impact Evaluation of the TAS Program on eating habits and physical activity levels in a group of Spanish adolescents aged 14 to 15 years.**

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Background: The program TAS (Tú y Alicia por la Salud, [www.programa-TAS.com](http://www.programa-TAS.com)) is a project that evaluates and promotes healthy eating and physical activity habits in Spanish school children in the 3rd year of secondary school (aged 14-15).

Objectives: To promote and improve consumption habits and physical activity levels of Spanish adolescents.

Methodology: A before and after intervention has been designed and conducted in several implementation phases. A random sample of 2173 students in the third year of secondary education from of a total of 103 high schools representing distinct geographic zones in Spain participated in the initial pre-intervention phase. In this second phase of the study (post intervention phase) changes in food habits and physical activity levels were evaluated in a random sample of students ( $n=1209$ ) in the third year of secondary school who had previously received and actively participated in 9 months of events, classes and cookery workshops in which they themselves had proposed actions and strategies to promote and improve eating and physical activity habits. Food intake was assessed by 7 consecutive days of food records and physical activity was evaluated with the validated PAQ-A questionnaire.

Results: The results obtained in the post-intervention period indicate a significant improvement in fruit and vegetable consumption. In the first phase, the mean intakes of fruit and vegetables were 6.3 and 3.4 servings/week, respectively. In the second evaluation mean intakes were 9.6 and 4.5 servings/week, respectively, which reflect an increase of 11% and 13.8% of participants who met the recommendations for fruit and vegetable consumption, respectively. Legume consumption also significantly improved, from a mean consumption of 1.6 to 1.9 servings/week. This change represents a 6% increase of students who met the recommendations for legume consumption. As for fish

intake, significant improvement was only seen for white fish and not blue fish. Mean weekly intake of white fish was 2.5 servings, which represents an increase of almost 6% in students who met minimum recommendations for fish consumption. Despite these improvements, it is worth noting that the most important change was the reduced consumption of sugared beverages and of sweet baked goods, cakes and cookies. Mean intakes for these two groups were 3.9 and 3.2 servings/week, respectively which represent a reduction of 1.3 and 2 servings, respectively in each group as compared to baseline evaluation. The level of physical activity in study subjects significantly improved. In the first evaluation, 50% of the students showed a low level of physical activity. In the second assessment, this percentage decreased to 35%, reflecting a 15% reduction in adolescent males and females who had a low level of physical activity.

Conclusions: The TAS program, which promotes that adolescent students cook and prepare their own healthy recipes and dishes as well as realising daily physical activity, has demonstrated a strong impact on improving the eating and physical activity habits of this target population over a short and long term period.

## PM-004

Poster

**Assessment of body image in young people (15 to 35 years old).**

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Objectives: For over 20 years, most research has focused on the overestimation of body size in individuals with eating disorders. However it has been verified that in individuals without eating disorders, body image disorders are also given in the form of body dissatisfaction or perceptual imprecision. Therefore the objective of this work was to assess the perception of body image in a population of 15-35 years of age using the anatomical model of Montero, Morales and Carbajal and compare that perception with the actual values of body mass index (BMI) to detect possible changes in self-perception of body image.

Material and methods: Informed participation in a population of young people 15 to 35 years old were asked. Those who accepted were asked to perform the Montero, Morales and Carbajal test for perception of body image. Subsequently underwent measurement of height and weight and they answered a survey of eating habits and lifestyle. Finally it was compared the perceived BMI and the actual BMI and the results were correlated with the results of the lifestyle and eating habits survey, using the R-sigma Babel program for statistical analysis.

Results: The population consisted of 500 young people (250 women and 250 men) with a mean age of 22.5 years, the average of the BMI perceived was 25.92 for men and 25.43 for women, in contrast, the avera-

ge actual BMI was 23.91 for men and 23.52 for women, being in both cases significantly different ( $p < 0.05$ ). Regarding their weight 22% felt underweight, 31.6% healthy weight and 46.4% felt that they had a few extra kilos, but only 43.6% would like to lose weight. Most of the study population perceived their feeding habits as regulars and only 18.4% have done diets to lose weight. Generally they eliminated carbohydrates to lose weight and explained that to lose weight should eat a variety of food, half of the population has tried dieting with exercise but 16.6% reported that it did not work.

Key findings: Although the mean of the population had a healthy BMI, most of them would like to lose some weight, but only 18.4% has tried through dieting and half of the population thinks that there are "good" and "bad" food.

#### PM-005

Poster

##### **Adherence to Mediterranean diet and risk of overall cancer and cancer types: a systematic review and meta-analysis of observational studies.**

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Objectives: Meta-analyses of cohort studies provided convincing evidence that a 2-point increase of adherence to Mediterranean diet score was associated with a significant protection against mortality, cardiovascular diseases and major chronic degenerative diseases such as cancer. However, to our knowledge, no previous meta-analysis has investigated the effects of adherence to Mediterranean diet on different cancer types. Therefore, the aim of this research study was to meta-analyze the effects of adherence to Mediterranean diet on overall cancer risk and different cancer types. Materials/Methods: Literature search was performed using the three electronic databases MEDLINE, SCOPUS and EMBASE until March 31, 2014. Inclusion criteria were cohort or case-control studies. Study specific risk ratios (RRs), hazard ratios, and odds ratios were pooled using a random effect model by the Cochrane software package Review Manager 5.2. Twenty-three cohort studies including 1,398,600 subjects and twelve case-control studies with 62,725 subjects met the objectives and were included in the meta-analyses. Furthermore, the impact of the singular Mediterranean diet score components on cancer risk were evaluated.

Results: The highest adherence to Mediterranean diet category resulted in a significant risk reduction for overall cancer mortality/incidence (cohort; RR: 0.90, 95% CI 0.86-0.95,  $p < 0.0001$ ;  $I^2 = 50\%$ ) as well as colorectal (cohort/case-control; RR: 0.86, 95% CI 0.80-0.93,  $p < 0.0001$ ;  $I^2 = 62\%$ ), prostate (cohort/case-control; RR: 0.96, 95% CI 0.92-0.99,  $p = 0.03$ ;  $I^2 = 0\%$ ) and aerodigestive cancer (cohort/case-control; RR: 0.44, 95% CI 0.26-0.77,  $p = 0.003$ ;  $I^2 = 83\%$ ). Non-significant changes could be observed for breast cancer, gastric cancer, and pancreatic cancer. Among the singular Mediterranean diet score components, vegetables showed the strongest cancer-protective effect. The Egger regression tests provided limited evidence of substantial publication bias.

Key findings: High adherence to a Mediterranean diet is associated with a significant reduction in the risk of overall cancer mortality/incidence (10%), colorectal cancer (14%), prostate cancer (4%) and aerodigestive cancer (56%).

#### PM-006

Poster

##### **NCHS-1977, CDC-2000 and WHO-2006 Nutritional Classification in Children in the Central Highlands of Peru (1992-2007).**

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Objective. The aim is to compare the three references used for the classification of the nutritional status of 36 to 60 month-old children in Huancayo province (Peru). For a long time, NCHS-1977 reference has been used for child growth monitoring, recently the new WHO-2006 Child Growth Standards is being used, and CDC-2000 reference usage has been restricted. Material and methods. The study was performed in 25 of 28 districts of Huancayo province (3250-3500 MASL). Data collected from 2640 children over the period 1992 to 2007 served as basis for determining the nutritional children status using Anthro V.3.0 and EpiInfo 6.04. The sample was divided into four chronological periods: 1) Baseline, 1992, with 532 children (20.2%); 2) 1993-1997, with 370 children (14%); 3) 1998-2002, with 494 children (18.7%) and 4) 2003-2007, with 1244 children (47.1%). Internationally cutoff points used in every assessed reference system helped to determine the nutritional status and to calculate the Z-scores of height-for-age, weight-for-age, weight-for-height and body mass index differentiated by sex. The information was processed using SPSS V16.0 and Excel. Before anthropometric assessment, mothers were informed about the study and its objectives and signed the consent formulary. Results. The underweight, stunting and wasting percentages (period 1992-2007), determined with NCHS-1977 were 8.4%, 28.8% and 0.9%; with CDC-2000 were 10.2%; 19.1% and 3.3%, and with WHO-2006

were 6.6%, 33.9% and 1.4% respectively. The overweight and obesity percentages determined with CDC-2000 were 11.4% and 4.20%, and with WHO-2006 were 8.0% and 0.9%, respectively. With respect to the assessment of nutritional status based on height for age, the new WHO pattern determined greater stunting prevalence, increasing by 5.1% compared to the NCHS reference and 14.8% regarding with CDC reference. With the new WHO pattern, relative to NCHS, stunting percentage increased by 17.7% (28.8% vs. 33.9%). This result validates and allows considering the proposed new anthropometric assessment as the most suitable for use in our conditions, as suggested by WHO. With regard to obesity and overweight condition assessed by the BMI, CDC reference detection was 6.6% more than WHO pattern, equivalent to 1.74 times more; this result recommends using CDC reference as intervention strategy to counteract the weight excess problems.

Key findings. A more realistic and accurate detection of malnutrition prevalence in 36-to-60 month-old children was carried out using the new WHO Child Growth Standard, which would be a reliable model for widespread use in the central highlands of Peru. on improving the eating and physical activity habits of this target population over a short and long term period.

#### PM-007

Poster

##### **Content of nitrates, lead and cadmium in fresh and frozen vegetables from montenegrin market.**

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Natural nitrates content in soil, as well as the use of fertilizers for additional nutrition, contributes to the accumulation of nitrates in the vegetable tissues. Also, air and soil pollution with trace elements, particularly lead and cadmium, as well as potentially high content of cadmium in phosphorous fertilizers, may increased content of these elements in vegetables.

The aim of this study was to analyze the samples of fresh vegetables from the market and the samples of frozen vegetables from the stores, and to define the content of the above mentioned chemical components as potential toxicants. The soil samples do not belong to organic production. Nitrates content was determined by HPLC, while concentration of lead and cadmium determined by using GF-AAS after microwave digestion.

These analyzes include 17 samples of fresh vegetables (carrots, cabbage, chard, leeks, spinach and celery) and 6 samples of frozen vegetables (4 mixes and single samples of carrots and spinach).

Samples of fresh vegetables are mainly produced in Montenegro, with the exception of two samples of carrots that were produced in Serbia. Frozen samples of vegetables were produced in Serbia and Belgium.

According to the analysis of fresh and frozen vegetables on the content of nitrates, lead and cadmium, all tested samples comply with the national and EU legislation.

The values obtained for nitrates in fresh vegetables are in the range of 309 mg/kg (carrots) to 350 mg/kg (lettuce). Defined average value for this parameter in these products is 1223 mg/kg.

The highest values of nitrates were found in lettuce, particularly in the winter harvest from greenhouses (average 1986 mg/kg), and the lowest in carrots (average of 350 mg/kg).

The analyzed products of fresh vegetables are characterized by low lead content (average 0.055 mg/kg) and low cadmium content (average 0.025 mg/kg). Values of nitrates in frozen vegetables are in the range of 133 mg/kg (carrots) to 865 mg/kg (spinach) and the average value was 442 mg/kg.

The content of lead in samples of frozen vegetables was below LOQ (0.01 mg/kg), and the average value for cadmium was 0.009 mg/kg.

The conclusion of this study is that the content of nitrates in the frozen vegetables is significantly lower (about three times) than the content of nitrates in fresh vegetables. Nitrates content in fresh vegetables in the winter period is much higher (two to five times). This is especially distinct in lettuce. All tested samples are characterized by low content of lead and cadmium (two to ten times below the prescribed limit).

#### PM-008

Poster

##### **Evaluation of patient care hypertensive e, ou diabetic in the family health strategy.**

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Support: FAPESP (process 2011/20628-9)

Introduction: The Family Health Strategy, the result of the attempt to reorganize the Basic Attention, aims to strengthen the guidelines and principles of the Unique Health System and answer to the real health needs of the users that seek for this care, among them, the patients with hypertension and/or Diabetes Mellitus, diseases that are exponentially growing, becoming a

great problem of public health, thus, the necessity of running studies that evaluate the quality of the services that attend this population highlights. Objective: By the former exposed this study was developed to assess the quality of health care for patients with arterial hypertension and / or diabetes with the perception of the patient and family health team, from the analysis of the structure, process and outcome.

Methodology: Study presenting a quanti-qualitative approach, focused on the evaluation of the health assistance quality and its relation with the perception of the hypertension and Diabetes Mellitus bearer and the professionals of the family health team from the city of Botucatu, São Paulo, Brazil. The theoretical referential adopted was the one described by Donabedian and the methodological referential was the Collective Subject Speech to analyze the qualitative data.

Results: We evidenced expressive precariousness in the structure of the Family Health Unit regarding human resources, obtaining a medium quality score of 69,4, where 77,7% of the units presented insufficient number of Health Community Agents. We identified fragilities in the caring process, both in the quality of the organizing process, and patient clinical records related to the anamnesis and physical exams, the medium evaluated score was 43,8. However, the patients and health professionals evaluated the caring as satisfactory, despite the related difficulties in the speech of the team regarding the assistance. It was identified a significant positive correlation between the caring process score and the perception of the professionals regarding the USF structure.

Conclusion: We noted that the Family Health Strategy is surrounded by fragilities, being necessary a reformulation in the mode of action of the teams that provide assistance to the population, besides, as showed in this study, an adequacy in the Family Health Unit structure to reach improvements in health care.

#### PM-009

Poster

##### Association of consumption of sugary, energy and alcoholic drinks with BMI in Mexican adolescents.

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Objectives: To determine whether there are differences in sweetened, energy and alcoholic beverages intake, milk consumption and calorie intake according to Body Mass Index (BMI) status, age, sex, and waist circumference among 15 to 17yo Mexican.

Material and methods: This study was conducted in two public high schools from Tijuana. Weight, height, and waist circumference (WC) were measured. A previously designed and validated questionnaire among college student in Virginia Tech was administered. The questionnaire was developed to estimate mean daily intake of 19 beverage categories. BMI was calculated and weight status was classified according to WHO. Abdominal obesity according to the NHANES 90th percentile for Mexico-American was calculated. Z scores of BMI for age and gender were calculated. Rank differences of drinks and calorie consumption by sex, age, BMI and WC were calculated using the Mann-Whitney test.

Results: 1677, 15 to 17yo students were assessed (55% female). The prevalence of overweight and obesity was 43% in men and 57% in women and the prevalence of abdominal obesity in men was 53% and in women was 47%. The consumption of energy drinks, alcohol, milk and sugar in milliliters and kilocalories per week, was higher in men than women ( $p = 0.001$ ). Differences in total weekly consumption of sugar sweetened beverages ( $p=0.03$ ) and non-sugar drinks ( $p=0.0001$ ) and water ( $p=0.001$ ) intake between normal weight and overweight and obese were observed. Key Findings: Men consumed more sugar sweetened, milk, and alcoholic and energy beverages than women. Adolescent who were overweight or obese consume more kilocalories per week than normal weight.

#### PM-010

Poster

##### Nutrition policy actions performed in Finland in order to increase the vitamin D intake and serum 25OHD concentration in the population.

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Objectives: Due to low vitamin D intake and low serum 25-hydroxyvitamin D (25OHD) levels, the fortification of liquid dairy products with 0.5 µg vitamin D/100 g and dietary fats with 10 µg/100 g started in Finland in 2003. In 2007 FINDIET Survey revealed that intake was still below recommendations and in 2010 National Nutrition Council doubled the recommendation of vitamin D amount to be added to liquid dairy products and dietary fats.

Aim of this study was to investigate whether the vitamin D intake and the serum 25OHD concentration have been improved among Finnish adults as a consequence of these nutrition policy actions.

Material and methods: The National FINDIET 2012 Survey was conducted in five regions around Finland as part of the National FINRISK 2012 Study that has been the main health monitoring system for Finnish adults since 1972. Study included a self-administered questionnaire and a health examination, where anthropometric measurements, blood pressure measurements and blood sampling was carried out. Dietary data were collected for 1708 Finns aged 25–74 years by using a computer-assisted 48-h dietary recall. Working age Finns, aged 25–64 years, were included in this study (585 men and 710 women).

Results: On average, Finnish men met current vitamin D recommendation (10 µg/day). The mean vitamin D intake from food increased from 7,1 µg/day in 2007 to 11 µg/day. Women did not quite reach the recommendation although daily vitamin D intake from food rose from 5,2 µg in 2007 to 9 µg. The most important food sources of vitamin D for both men and women were fortified milk products, fortified dietary fats, and fish dishes, these foods covered on average 80% of total intake. Vitamin D supplements were used by 33% of men and 55% of women and the vitamin D intake from supplements for men was 19 µg/day and for women 16 µg/day. Among supplement users the vitamin D intake altogether was 30 µg/day for men and 25 µg/day for women.

In 2012 the average serum 25OHD concentration for men was 63 nmol/l and for women 66 nmol/l. On average, the serum 25OHD concentrations have reached the recommended level as the most experts recommend levels of 50–75 nmol/l.

Key findings: According to this study, the fortification of commonly used food products with vitamin D and vitamin D supplementation seems to be an efficient way to increase the average intake and the serum 25OHD concentration in the population.

#### PM-011

Poster

##### Offer and demand sides of balanced nutrition: the European FOOD programme.

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Objectives: FOOD (Fighting Obesity through Offer and Demand) was initiated as a pilot project in 2009, thanks to EU funds. Edenred, as coordinator, partnered with Public Health Authorities, Nutritionists and Universities to join in France, Spain, Belgium, Italy, Czech Republic and Sweden. The main objective was to promote healthy eating habits and offers to employees during their working day.

Material and methods: The FOOD project has created channels of communication between the enterprises and the restaurants using the unique network of the meal voucher system. The experts proposed five complementary sets of phased actions from an inventory of existing practices to the evaluation of recommendations and communication pilots.

Additional effort was put into creating a network of dedicated restaurants that adhere to the national FOOD recommendations, thought as the most effective way to reconnect the offer and the demand sides of balanced nutrition.

Results: After the co-funding period, most of the partners decided to continue under a long-term programme. Now also implemented in Slovakia and Portugal, the partners still act to connect the offer and demand sides of healthy eating. More than 170 tools have reached 6 million employees and 400,000 restaurants since 2009. They are all adapted to the cultural context and professional constraints of the target groups.

Key findings: A European barometer was launched in order to understand and analyse societal changes and needs of employees and restaurants. In 2013, more than 4600 employees and 670 restaurants coming from seven Member States answered the questionnaires.

It was found that the proportion of employees having a lunch break every working day remains very high (72%).

Compared to 2012, there are slightly more employees who have lunch in the common room of their company (37%) whereas restaurants are still the second place to have a meal (29%). On the other hand, eating in front of the computer remains the third preferred option with 21%.

In restaurants, the nutritional quality of the food is at the same level of importance as affordability when it comes to choosing a restaurant for lunch (70% each). The barometer answered by restaurants in 6 countries confirmed this trend with 57% of them agreeing that their customers notice and appreciate the offer of healthy/balanced meals.

Conclusion: The FOOD project was selected by the European Commission as one of the best projects funded under the second Health Programme.

#### PM-012

Poster

##### Does Family income interfere with children's diet and nutritional status? MUNSI Programme, Portugal.

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**Objectives:** To evaluate the association between family income, obesity and food intake in children from three Portuguese municipalities (Oeiras, Seixal and Viana do Castelo) within the MUNSI Program ([www.mun-si.com](http://www.mun-si.com)).

**Material and methods:** An observational cross-sectional study was performed in 1673 children aged between 9-11 years old from 91 elementary schools of Oeiras (n=512), Seixal (n=489) and Viana do Castelo (n=672) municipalities. Family income data were obtained by a self-response questionnaire. Nutritional status evaluation was assessed using BMI according to CDC Criteria. Children Dietary habits were achieved by the application of a qualitative food frequency questionnaire with 25 food items. Statistical analysis was performed by Z test for proportions and binary logistic regression model. Statistical significance was obtained at 0.05 level.

**Results:** The prevalence of underweight (BMI<P5) was lower than 4% in all municipalities. Pre-obesity (P85≥BMI<P95) was more prevalent in Viana do Castelo (21.6%) when compared with Seixal (16.1%) and Oeiras (16.9%). No statistical differences were observed in obesity prevalence (BMI>P95) from the three municipalities (Oeiras: 12.7% vs. Viana do Castelo: 15.0% vs. Seixal: 15.1%). More than 45% of the children have a daily intake of skimmed or semi-skimmed milk. At least 50% of the participants from the three municipalities consumed meat 3 to 7 times a week and 35% of them consumed fish with the same frequency. Viana do Castelo was the municipality where the frequency of soup consumption (42.9% consume at least weekly) and vegetables (74% consume at least weekly) was higher, but also where the consumption of fresh fruit was less frequent. Higher prevalence of obesity (16.4% and 19.0%) was found in families with low income (<500 Euros/month and 501-850 Euros/month, respectively) compared to those with high income (>2751 Euros/month). The odd ratios associated were statistical significant (OR = 2.151 and OR = 2.628, respectively) in both cases. The frequency of vegetables or fruits consumption was not statistically associated with childhood obesity.

**Key findings:** Overweight prevalence was similar and relevant (>30%) in all municipalities. Childhood obesity, and poorer diet was inversely related with Family income. This study supports the idea that family based community interventions at local level are needed for childhood obesity.

#### PM-013

Poster

##### **A strategy to evaluate the program of iron fortification.**

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**Objective:** This study reports a strategy to calculate the intake of iron from fortification based on data available for folic acid and also evaluate the program of flour fortification in Brazil.

**Material and methods:** Cross-sectional study conducted in Brazil during 2008 and 2009. A two-day dietary record of 34003 individuals (men and women, aged 10 to over 60 years) from a Brazilian nationwide survey was used. The usual intake of folic acid and total iron by sex and age group was estimated using the National Cancer Institute method. The quantity of folic acid and iron established by mandatory flour fortification in Brazil (150 mcg of folic acid and 4.2 mg of iron per 100 mg of flour) was used and, based on that quantity we calculated the amount of flour consumed. Based on the amount of flour consumed and once fortified flour includes both folic acid and iron, we calculated the intake of iron from fortification, using the value proposed by mandatory fortification. Iron from food was obtained through the difference between total iron calculated by National Cancer Institute method and iron from fortification. Then, the absorption of each nutrient was calculated.

**Results:** Mean intake and absorption of iron from fortification (electrolytic iron) was low in men and women.

**Key findings:** The impact from the consumption of fortified products is small in relation to iron intake in Brazil. The strategy proposed to estimate iron from fortification program indicates that the amount of flour intake observed in Brazil does not justify the current ranges of mandatory flour fortification and the form of iron which is mainly used, electrolytic iron.

#### PM-014

Poster

##### **Industry approach using nutrient profiling for reformulation.**

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**Objective:** Demonstrate the application of a global nutrient profiling system used for the development and reformulation of food and beverages at Nestlé.

**Material and methods:** The Nestlé Nutritional Profiling System is used to evaluate and continuously improve the nutrient profile of Nestlé food and beverage products. This system has been progressively applied across the Nestlé portfolio since 2004. The Nestlé Nutritional Profiling System sets

nutritional thresholds for adults and children, evaluates products per serving and is a category-based system. The nutritional targets, based on Dietary Recommendations, are established for: energy, total fat, saturated fat, trans fat, sodium, added sugars, fructose and in certain categories nutrients to encourage, such as protein, dietary fiber and vitamins and minerals. The Nestlé Nutritional Profiling System covers 40 food and beverage categories. These categories are based on the contribution to the daily energy recommendation: larger meal components contain between 15-30% of the daily energy recommendation, smaller meal components contain less than 10% of the daily recommendation and accessories contain less than 5% of the daily energy recommendation.

**Results:** The Nestlé Nutritional Profiling System was designed to allow for product innovation and support product development and through reformulation, to continually optimize the nutritional composition of products. Products achieving all the nutritional targets in the Nestlé Nutritional Profiling System attain the Nestlé Nutritional Foundation®.

**Key findings:** The Nestlé Nutritional Profiling System is a global approach to measure and improve the nutritional value of Nestlé food and beverage products. In 2013, 7789 products were reformulated for nutrition or health considerations, based on nutritional targets defined in the Nestlé Nutritional Profiling System. This sets the basis for further research needs in nutrient profiling to measure the relationship between the reformulation of food and beverages and diet quality.

#### PM-015

Poster

##### **Child Nutrition in the Post-2015 Development Agenda.**

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**Objectives:** While the Millennium Development Goals induced many countries to undertake additional efforts to reduce poverty and infant mortality, several of the goals will not be met. This paper will argue that in the Post-2015 Development Agenda a stronger emphasis must be given to end child malnutrition, which is a basic condition to eliminate poverty. For this purpose it proposes that in the new Post-2015 Agenda absolute targets be established for several manifestations of child malnutrition, setting minimum standards that would be considered acceptable by the international community. Furthermore, it suggests that the targets for low birth weight and stunting, wasting and anemia in children below 5 years be established at 0%. This should be the objective that all countries must achieve in a reasonable number of years.

**Methods and key findings:** The document will analyze the present situation of child malnutrition at the global and country level and the experience that has been gained with policies and programs to reduce it. The main finding is that the actions that are needed to end child malnutrition are well known, but in several places there is lack of political decision to fully implement the recommended policies and programs and in others the implementation has not been successful because of inadequate institutional arrangements and lack of appropriate financial and managerial resources. The international community needs to send a strong and forceful message to all countries and political leaders about the new target of ending child malnutrition as soon as possible. This will not be obtained with goals that establish a certain relative percentage of reduction in the present levels of child nutrition, but with an absolute figure that reflects the right to food and to develop adequate cognitive and physical capabilities in all children. Furthermore, this absolute target will also help to identify the countries that are in urgent need of financial and managerial support from international organization and foundations.

The addition of goals in relation to stunting and wasting of children below 5 years - to complement the child mortality objective - as proposed in the Report of the High Level Panel of Eminent Persons in the Post-2015 Development Agenda, is a positive advance. But the specific value for the new target must be established in absolute terms and must be at the zero level, in concordance with the Zero Hunger Challenge of the Secretary General of the United Nations and the present knowledge about effective ways to reduce child malnutrition.

#### PM-016

Poster

##### **Energy expenditure in resting and free-living activities using indirect calorimetry in Mexican scholar children.**

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**Objectives:** To estimate the energy expenditure in resting and free-living activities using indirect calorimetry in children by age and nutritional status.

**Material and Methods:** Volunteers were 69 children aged 6 to 12 years old. Nutritional status was assessed with percentage of body fat and body mass index. The percentage of body fat was measured using bioelectric impedance analyzer (InBody 720). Energy expenditure in resting and free-living activities was evaluated with an indirect calorimetry device model k4b2 (Cosmed). Energy expenditure in resting was calculated with Weir

equation. Energy expenditure in free-living activities (light, moderate and vigorous intensity) was expressed as metabolic equivalents (METs).

Statistical analyses Descriptive statistics were analyzed. Independent t-tests were performed to determine if significant differences in sex, percentage of body fat and body mass index existed. Statistical significance was used at  $p < 0.05$ .

Results: Resting energy expenditure was significantly higher in older children (>9 years old), with overweight/obesity and with a great adiposity compared with those younger, with normal body mass index and percentage of body fat (0.92 kilocalories/minute vs. 0.66 kilocalories/minute, 0.87 kilocalories/minute vs. 0.73 kilocalories/minute, 0.84 kcal/min vs. 0.74 kilocalories/minute, respectively). Energy expenditure was significantly greater in younger children than older ones in typing on computing (1.90 METs vs. 1.44 METs), sweeping (5.16 METs vs. 3.43 METs), and washing dishes (2.36 METs vs. 1.91 METs), and marginally significant in reading while sitting (1.93 METs vs. 1.51 METs).

Overweight children had significantly more energy expenditure than those with normal body mass index in walking (4.66 METs vs. 3.61 METs). Obese children presented higher energy expenditure than those with normal body fat in walking (4.39 METs vs. 3.62 METs) and running (8.76 METs vs. 7.27 METs). There was not difference in vigorous intensity activities by age and in sedentary and light activities by nutritional status.

Key findings: Energy expenditure in light and moderate intensity activities was higher in younger children. Overweight/obese children had more energy expenditure in moderate and vigorous intensity activities. Therefore, the same METs cannot be used to estimate total energy expenditure in children of different age and nutritional status.

#### PM-017

Poster

##### **Minimizing nutrients to limit, calories, and cost while meeting calcium requirements from dairy foods in France.**

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Objectives: Inadequate calcium intakes are an important concern for public health. Dairy products account for 40 to 50% of calcium intakes in France, more than any other food group. The present objective was to assess calories, nutrients to limit, and monetary costs associated with meeting calcium requirements (15% calcium RDI or 120mg/d) from milk and dairy foods.

Material and Methods: All analyses were based on 837 dairy products available in France. The main subgroups were milks ( $n=101$ ), fresh dairy products, mostly yogurts and fermented milks ( $n=326$ ), dairy desserts ( $n=162$ ) and cheeses ( $n=248$ ). Products were aggregated into 21 categories by nutrient content and price using clustering analyses. Nutritional composition was obtained from labels or the national CIQUAL database. Retail prices were obtained from Paris supermarkets. Relative energy costs were calculated as kcal/120mg calcium. Relative nutrient costs were calculated as the mean LIM score (based on saturated fat, added sugar, and sodium) per 120 mg calcium. Relative monetary costs were calculated in €/120mg calcium. Rankings for dairy foods were obtained for each value metric.

Results: Dairy products met calcium requirements at varying levels of energy, nutrient, or monetary cost. Plain milks supplied dietary calcium at the lowest energy and nutrient cost and at lowest price. Plain and light fresh dairy products supplied dietary calcium at low energy and nutrient cost and at low prices. These were followed by sweetened yogurts and flavored milks. Light dairy desserts provided calcium at low energy cost but were more expensive than were fresh dairy products. Cheeses represented a very heterogeneous category, depending on their calcium content. High calcium hard cheeses provided calcium at energy, nutrient and monetary cost comparable to plain yogurts. Soft cheeses ("camembert") and blue cheese were comparable on all counts to sweetened yogurts and flavored milks. Goat cheese, soft cheese and double cream cheese were less-than-optimal calcium sources.

Key findings: Milk and milk products, including yogurts and cheese, represent a diversified source of calcium in the French diet. The present analyses identified those dairy products that provided calcium at minimal cost and without excessive calories, and nutrients to limit. Economic and nutrition considerations play a role in selecting optimal food patterns for children, the elderly, or low income families.

#### PM-018

Poster

##### **Challenges in immigrant mothers' infant feeding practices. A qualitative study of Iraqi and Somali mothers living in Norway.**

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Objectives : There is limited information about infant feeding practices among immigrant mothers living in Norway. The main objectives of the InnBaKost qualitative substudy were to generate knowledge about infant

feeding practices of, potential challenges to and influential information sources for Somali and Iraqi women living in Norway.

Materials & Methods: Thirty mothers from Iraq ( $n=15$ ) and Somalia ( $n=15$ ) participated in the in-depth interviews at infant age six months and a follow-up interview was conducted at infant age one year. Focus group discussions will be conducted with the same mothers when infants are two years old. The mother/child-pairs were purposively selected using a multi-recruitment strategy.

Results: Most of the mothers were partially breastfeeding when infants were six months old. One third had never breastfed exclusively, and most of them had stopped exclusive breastfeeding before the infant was three months old. At infant age one year, ten of the Iraqis and two of the Somali mothers were still breastfeeding. According to most of the mothers, they had received limited support and information from the health clinics to help overcome breastfeeding problems. The lack of knowledge about how to overcome such problems may have induced them to either combine breastfeeding with other foods early, or to stop breastfeeding completely. The mothers also found it challenging to breastfeed in public, and had therefore introduced formula early. The mothers received conflicting advice from their close social network and the health clinic regarding the introduction of water, formula and weaning food. The Somali mothers mentioned that the notion of a chubby child being a healthy child as reason for providing early formula feeding and practise mixed feeding. Most of the participating mothers prepared complementary food from scratch because it had a better taste, was regarded as superior and was halal. Most of the mothers expressed a need to know more about Norwegian food when their children were to start Kindergarten.

Key findings: The health workers must be aware of the mothers' perceptions and strategies regarding the conflicting advice from their social network and the health clinic. Appropriate infant feeding support and knowledge of the cultural infant feeding traditions in the mothers' home country are pivotal and need to be embedded in the health-promotion strategies and advice provided at the health clinic.

#### PM-019

Poster

##### **Food variety of young children from three major ethnic groups in Singapore.**

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Background and objectives: Exposure to a variety of foods in early life is important in developing healthy eating habits. A recent study in Singapore showed that around 25% of the interviewed parents considered their child as picky eater with the highest prevalence among children aged one year old. Early detection of poor dietary intake in young children is paramount to improve their future nutritional status.

This study aims to understand food variety of young children based on three major ethnic groups in Singapore, namely Chinese, Malays and Indians.

Material and methods: Mothers of children aged 11-24 months from each ethnic group were asked to complete a 3-day food diary (2 weekdays and 1 weekend). They also attended a focus group discussion which was designed to obtain a complete overview of foods consumed by the children. Thus, common foods consumed across the three ethnic groups as well as foods which ethnic-specific were identified.

Results: In total, 27 mothers (10 Chinese, 10 Malays and 7 Indians) completed the food diaries and attended the mono-ethnic Focus Group Discussion. All mothers had similar socio-economic background.

Rice porridge was the common food item fed to the young children in all the three ethnic groups. However, the food ingredients added to the rice porridge varied across ethnicity. For examples, Chinese mothers prepared rice porridge with fish/minced pork or chicken and vegetables; Malay prepared with broccoli/carrot or with chicken and carrot or with mashed pumpkin.

Wholegrain or wholemeal bread was introduced during this stage, noticeably among the Chinese and the Malays. Bread was generally consumed plain or with margarine or sweet spread, or cheese.

A large variety of fruits and vegetables was given. Apple, banana, papaya, kiwi, broccoli, carrot, potato, sweet potato and spinach were common fruits and vegetables given across three ethnicities. In addition, Chinese young children were also given asparagus, bitter melon, Chinese yam, Kai Lan, Chinese cabbage, lotus root, lotus seed, old cucumber and wolfberries. Malay young children were given bean sprouts, Japanese cucumber, tapioca and turnip. Different variety of vegetables were given to Indian young children which included beet root, banana flower, bottle gourd, brinjal, capsicum drumstick leaves, eggplant, fenugreek leaves, ivy gourd, radish and snake gourd. The provision of vegetables seems to be culture-specific.

In addition to ice-cream and chocolates, Indian young children were more exposed to sweet desserts such as halva, kesari, laddoo, milk cake (palkova). Some of the parents had also introduced coffee, tea, sweetened beverages like cola, processed fruit juices and fast-food meals.

Conclusion: Regardless of ethnicity, young children in Singapore were exposed to diverse foods. The study findings will be a starting point for development of Food Frequency Questionnaire to further assess habitual food intake in a young children from diverse ethnicity.

**PM-020**

Poster

**Nutritional status and overweight among preschool children Kenitra city North-Western of Morocco.**

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Ibn Tofail University Morocco

Objective: The objective of this Article was to study the obesity and nutritional status among preschool children in the Morocco.

Material and methods: This study consists of 247 pre-school children including 120 boys and 127 girls aged from 60 to 84 months. Children were recruited from the private nursery schools. The anthropometric parameters (weight, height, body mass index) were measured. Data were collected using a questionnaire.

Results: The results showed that 14% of preschool children are overweight, while 6% were obese. The weight, size, and the z-score of the weight are significantly elevated in boys than in girls. Most preschool children do not eat dried fruit, legumes, olives and olive oil, tea, and juices. Most preschool children consume pasta, cakes, biscuits and cakes.

Conclusion: The preschool children have a high prevalence of obesity and overweight. Preschool children are at risk of developing obesity-related illnesses that can persist into adolescence and adult age. Several studies on nutritional status will be recommended among preschool children in the Morocco.

**PM-021**

Poster

**A baseline evaluation of the front-of-package labels, nutrient content and price of packaged food in Mexico**

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Background: Recently, the Mexican government enforced two policies to tackle obesity: tax for soda and snacks (10% and 8% respectively) and a front-of-package labelling system (FOPLS) based on the Guideline Daily Allowance (GDA) criteria defined voluntarily by the industry.

Objective: To assess a baseline dataset of packaged foods regarding the usage of the voluntary FOPLS-GDA, their nutrient profile according to the WHO recommendations, and assess their pricing in urban supermarkets.

Methods: A convenience sample in 14 supermarkets of Mexico City with a two-stage sample selection was performed using geographical income classification. We included 100 products from six food groups defined previously by an expert group: sweet snacks, sour snacks, breakfast cereals, dairy products, corn products and sweetened beverages. Information about critical nutrients (energy, fat, saturated fats, sugars and sodium), type of FOPLS used and price was computed. Nutrient content was compared to a) the World Health Organization (WHO) recommendations; b) the criteria adopted by the FOPLS-GDA regulation; and c) the snacks cut-off criteria (275kcal/100g) for the excise tax.

Results: Of 1668 products, 45% (n=754) have FOPLS-GDA: At least 13% (n=212) were labeled as "light", "reduced fat" or "low in sodium". The average content of energy per 100g was: 292kcal for sweets snacks, 510kcal for sour snacks and 380kcal for breakfast cereals. Dairy products had on average 94kcal, corn products 318kcal and sweetened beverages 90kcal. The FOPLS-GDA criteria were much higher than the WHO recommendations as follow: For total sugar, sweet snacks had a difference of 29.4%, sour snacks of 2.6%, and breakfast cereals of 23.3%. For saturated fats the difference was 12.6% for sweet snacks, 17.3% for sour snacks, 2.1% for breakfast cereals and 3.3% for dairy products. Regarding price per 100g/100ml, half of the sweetened beverages were less than 2.00MXP (0.015USD), sweet and sour snacks 11.00 MXP (0.84 USD), breakfast cereals 8.00MXP (0.61USD), dairy 2.00MXP (0.15USD), and for corn products less than 5.00MXP(0.38USD). Even with an increase in price on beverages and snacks, they will be on average, half the price of corn products.

Conclusion: Price increase on sweetened beverages and snacks with the tax regulation is still minor compared to prices to other food categories. The nutrient cut-off points outlined in obesity prevention strategy not only overlap between them, but are weak according to WHO recommendations. This information is relevant to understand changes in nutrient profile and prices of packaged food as a result of the new regulations enforced in Mexico.

**PM-022**

Poster

**Immunoassay response, serum of gut balb / c immunized and treated sublingual immunotherapy milk cow.**

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Sublingual immunotherapy (SLIT) allergens is a treatment that has developed over the past 100 years and whose mechanisms consist of a reprogramming of the immune response. STI is to redirect the immune system by administering increasing doses of allergen to induce tolerance to a specific long term. This therapeutic intervention is a major opportunity to improve the quality of life of patients with persistent food allergy especially in children with allergy to cow 's milk protein (CMA), the ITS cow's milk is actively studied, it is avenues of research.

The aim of our work is improved efficiency of SLIT cow's milk by reducing the duration of treatment with increasing doses of the allergen administered. For this we determined the IgG / serum IgE compared by ELISA serum from BALB / C mice immunized with the bovine protein (β- Lg and -Lac) by intraperitoneal and processed by SLIT cow's milk pathway for 6 months respecting the administered allergen doses (50 and 100 ul). The effect of immunization and treatment on the integrity of the epithelial structure is evaluated by the histological study of the intestinal mucosa.

The results obtained show that :

A rate of IgG and IgE anti- serum proteins (β- Lg and -Lac) significantly higher in immunized mice. This rate is reduced during processing.

Histological study reveals bowel in mice immunized with the (β- Lg and -Lac) a decrease in villous height accompanied by infiltration of intraepithelial lymphocytes.

Conclusion: In our experimental model, the duration of treatment can be reduced in a few months while respecting doses of allergen administered without exceeding the threshold reactivity. This is to verify these results in children allergic to cow's milk.

**PM-023**

Poster

**Effect of soymilk on biochemical parameters (cholesterol and albumin)**

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Aim of the study. - Consider the impact of the consumption of soy milk on fertility Swiss male mice and to assess the consequences of the consumption of this milk on the biochemical assay cholesterol, albumin, urea, creatinine, uric acid, transaminases (TGO and TGP).

Methods. - 40 Swiss male mice aged 4 weeks and weighing an average of 23.27 ± 0.50 g . Are divided into 4 groups (n = 10) . Group1 mothers and their young receive only soy milk . Group 2 consists of animals from a mother who is fed only soy milk during the lactation period and receive, after weaning , a standard food and water . The group includes three mice from a mother who consumed a standard diet during lactation and receive, after weaning, as soy milk . The animals in group 4 are the witnesses. The experimental period of 90 days A weekly weight gain , measurement of testosterone, semen analysis , and determination of biochemical parameters are made.

Results. The sperm motility was decreased in all groups who consumed soy milk. Serum testosterone is decreased in group 2 (1.08 ± 0.41 ng / ml) compared to controls (6.21 ± 1.54 ng / ml). The albumin is reduced unlike cholesterol level is higher in the experimental group.

Conclusion: The ingestion of soy milk is not without consequence that seems to cause alterations in some serum biochemical parameters as well as renal dysfunction mice having ingested.

**PM-024**

Poster

**Biomarkers of inflammation among Guatemalan preschool children attending daycare centers with a common menu offering.**

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Objective: To describe and compare cellular, fecal, plasma and salivary inflammation biomarkers in preschoolers from 3 daycare centers in Guatemala to evaluate whether the site or mini-population of subjects influenced the level of inflammation.

Materials and Methods: We enrolled 80 (2-6 y/o) children (38 F / 42 M) attending 3 government-subsidized daycare centers identified by location: A (semi-urban n=20); B (marginal-urban n=22); and C (rural n=38). All children received a common institutional meal from a 40-day rotating menu supplying over 90% of their estimated caloric requirements. We measured biomarkers of inflammation as: white blood cell count (WBC) by automated cell counter; fecal calprotectin (Calpro kit), plasma and salivary IL-1β, IL-6, IL-8, IL-10 and TNF- α by antibody based fluorescent detection (Luminex).

Results: Using the Kruskal-Wallis test to compare across the three day-care sites, significant differences were found for six indicators: plasma IL-1 $\beta$  (p=0.001); salivary IL-10 (p=0.021); plasma (p=0.01) and salivary (p=0.009) IL-8; and plasma (p=0.0001) and salivary (p=0.008) TNF- $\alpha$ . No differences were found for: WBC, fecal calprotectin, plasma IL-10; salivary IL-1 $\beta$  and plasma and salivary IL-6 (all p>0.05). By post-hoc inspection, Center B, the marginal urban site was the most aberrant of the three sites with the extreme value. Our median values that present significant differences between centers have the highest median values for Center B (marginal-urban), followed by Center C (rural) and the lowest value for Center A (semi-urban); with the exception of plasma IL-1 $\beta$ , which showed the lowest median value in Center B, followed by Center C and the highest value resulted in Center A.

Key findings: According to our findings, having a common diet -- but different environmental conditions -- can influence the normative inflammation status.

Funded by: Fundación Iberoamericana de Nutrición (FINUT), Spain and The Hildegard Grunow Foundation (HGF), Germany

## PM-025

Poster

### Long-term effects of armed conflict induced growth impairment during early life on growth and final height - a longitudinal community study in northern Uganda and Guinea-Bissau.

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Background: Chronic malnutrition in early life can lead to childhood stunting, shorter adult attained height and is believed play a crucial role in adult obesity and cardiovascular disease risk. However, limited data are available from sub-Saharan Africa, where the developmental origin of health and disease theories may apply differently. Populations affected by armed conflict are exposed to multiple stressors to growth. Preliminary findings from northern Uganda indicates unexpected sex-differential effects of exposure to conflict during early life on the risk of being short statured, suggesting that males are more vulnerable than females. However, people born during the conflict had not yet reached their final height at the time of the study.

Objectives: Examine the long-term, including sex-differential-, effects of conflict induced impairment of nutrition and growth during early life on later growth patterns and final height in two different conflict cohorts: a long lasting armed conflict in northern Uganda and a shorter armed conflict in Guinea-Bissau.

Material and methods: The longitudinal community study will be conducted in 2014-17 within two health and demographic surveillance systems (HDSS); Gulu HDSS, Uganda and Bandim Health Project, Guinea-Bissau. Exposure groups are defined based on conflict intensities, date of birth and residency at the time of exposure for every participants. Information on childhood growth (<3 years), vaccination status and breastfeeding is available in the Guinean cohort. Outcome measurements: adult final height, height, leg length, knee-heel length, weight, arm-, waist- and hip-circumference. Biannual measurements of children and adolescents (<23years) will be obtained. Trained field assistants will administer questionnaires and carry out the anthropometric measurements.

Output: The study will provide unique growth monitoring data beyond childhood, which is rare in sub-Saharan Africa, and build a foundation to study early life exposures, growth, height, nutrition and chronic diseases in later life in low-income settings.

## PM-026

Poster

### Field training camp - energy expenditure at the beginning of the training of future Polish fire service officers.

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Prospective officers of the Polish State Fire Service must complete their studies at the Main School of Fire Service. After being qualified to the Main School of Fire Service, in the first days of August, candidates begin fire protection training that is carried out in the field conditions. The first two, three weeks of the stay in the training camp are the hardest. It is adaptation to new reality. In the seventh and eighth week candidates adapt to the training cycle. The last stage of the training are exercises to get used to work together requiring maximum efforts from the candidates. Time, precision and safety of performed tasks were subjects to the assessment. The amount of energy expenditure associated with the training candidate for firefighter undergo in the field conditions, is an important determinant of the daily energy expenditure.

The aim of the work was to assess energy expenditure of candidates for officers of the State Fire Service during the field training camp on the training ground in years 2011 and 2012.

In studies of daily energy expenditure, including participation in the scheduled training classes, use of leisure time and rest a night, was attended by 32 candidates for the students Measurements of energy expenditure were done based on the frequency of heart contractions, registered by the Polar Sport Tester 810 heart rate monitors. The following parameters were determined in all examined students: body height, body mass, Body Mass Index, percentage fat content and lean body mass.

The mean age was 19.7 $\pm$ 0.9 years, height and weight of the tested candidates for firefighters amounted 179.2 $\pm$ 4.7 cm and 73.2  $\pm$  5.9 kg. Value of Body Mass index was on average 22.8 $\pm$  1.3 kg/m<sup>2</sup>. The percentage of fat ranged from 8.2 to 18.8%, representing on average 12.9 $\pm$  2.4%, while the lean body mass averaged 64.5 $\pm$  6.2 kg.

The average value of daily energy expenditure in the examined years was very similar and amounted to 4188 kcal and 4118 kcal respectively.

The average value of daily energy expenditure of candidates for firefighters during the field training shows that the work load of these young men is a heavy one.

## PM-027

Poster

### Assessment according to number of days of within and between variations of food intake among children in Japan.

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Objectives: The adequate number of days to assess habitual dietary intake has been discussed in many reports, most of which were from Western countries. Thus, their suggestions are not necessarily applicable to Japan. We examined the within and between variations in food intake by the number of days among Japanese children.

Materials and methods: Data from the Children's Dietary Survey, conducted by the National Institute for Environmental Studies in Japan, were used in this study. Mothers and/or guardians along with their 2-6-year-old children from 13 prefectures were enrolled by the network of professional dietitians and public health centres between March and June 2012. The participants' background characteristics were collected through a questionnaire survey. Detailed dietary information was collected into weighted dietary record for a week, four times in a year. We used the data of participants (n = 97, 50 boys and 47 girls) with complete 7-day dietary records in the first time, collected from four areas, namely Shinhidaka-Hokkaidou, Iwate, Miyagi, and Sagami-hara-Kanagawa.

We assigned the foods consumed to 18 food groups and compared the food intake distribution and the intra- and inter-individual differences for each food group between the 3- and 7-day dietary records.

Results: The median age of the participants was 4 years. Of the participants, 78% spent half or all day at preschool, 42% attended private lessons, 5% had nutrient supplementation, and 4% had food allergies and restrictions. Outstanding ratios of intra- to inter-individual difference were 0.6 and 0.9 for dairy product intake on the 3- and 7-day dietary records, respectively. Similar low values were observed in the 'sweets and snacks' food group. High values of 14.3 and 7.1 were obtained for meat products on the 3- and 7-day dietary records, respectively.

Key findings: The participants frequently consumed dairy products such as yogurt and milk but seldom consumed meat products. Further studies are needed to determine the minimum and/or adequate number of days required to estimate children's food and nutrient intakes.

Acknowledgement: This study was supported by research grants from Advanced Research Programs in National Institute for Environmental Studies, Japan.

## PM-028

Poster

### Eating habits at school children with normal and excess weight/obesity.

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Background: Childhood obesity is a serious public health concern worldwide. Dietary behaviors, physical activity and sedentary lifestyle, which includes television viewing, working or playing games on the computer are independent risk factors for increased BMI (increasing weight).

Methods: The aim of this study was to explore dietary habits, physical activity and lifestyle associated with overweight and obesity among children 8-14 years of age, in Hradec Kralove, Liberec and Pardubice district. The target population (N=2042) was elementary school children in the 2nd, 4th, 6th and 8th grade. All monitored parameters (skipping meals, total energy intake, food and beverage preferences ...) were evaluated by frequency (%) in the group, by gender and according to body weight. Children completed 24-hour recall and of food frequency questionnaire.

Dietary intakes were analyzed using nutrient analysis software NUTRIDAN (©2003 Danone Institut).

Results: The majority of children are not meeting recommendations for energy intake. Much of this deficit is attributed to changing beverage consumption patterns, characterized by declining milk intakes and substantial increases in soft-drink consumption. On average children are not eating the recommended amount of fruits and vegetables. Overall, children consumed larger part of their total daily energy from fat. Boys consumed higher portion of energy derived from fat and girls consumed more energy from carbohydrates.

#### PM-029

Poster

##### **Dietary intake of acrylamide and risk for endometrial and epithelial ovarian cancer in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort.**

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On behalf of the acrylamide, and endometrial and ovarian cancer working groups, and EPIC Pls.

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Background: Acrylamide, classified in 1994 by IARC as 'probably carcinogenic' to humans, was discovered in 2002 in some heat-treated, carbohydrate-rich foods. Three prospective studies have evaluated the association between acrylamide intake and endometrial cancer (EC), and the association between acrylamide intake and epithelial ovarian cancer (EOC) has been studied in one case-control and three prospective cohort studies with inconsistent results.

Objectives: 1) Evaluate the association between acrylamide intake and EC risk: for overall EC, and for Type-I EC. 2) Evaluate the association between acrylamide intake and EOC risk: for overall EOC, and for different histological EOC subtypes. Secondary objectives were to determine whether these associations differed by smoking status (smoking is a source of acrylamide), oral contraceptive (OC) use (strong protective factor for EC and EOC risk), and other baseline participant characteristics.

Methods: This study was carried out in the European Prospective Investigation into Cancer and Nutrition (EPIC) sub-cohort of women with a mean follow-up of 11 years of observation. Multivariate Cox proportional hazards models were used to assess the association between questionnaire-based dietary acrylamide intake (corrected by energy intake using the residual method) and EC or EOC risk. Acrylamide was evaluated both as a continuous variable (per 10µg/day) and as categorical variables. Dietary acrylamide intake was estimated from the EU acrylamide monitoring database which was matched with EPIC questionnaire-based food consumption data.

Results: No associations were observed between acrylamide intake and overall EC (n cases=1,382) or Type-I EC risk (n cases=627). We observed increasing relative risks for Type-I EC with increasing acrylamide intake among women who both never smoked and were non-users of OCs (HRQ5vsQ1: 1.97, 95%CI: 1.08-3.62; likelihood ratio test P-value: 0.01, n cases=203). No associations, and no evidence for a linear dose-response trend were observed between dietary acrylamide intake and EOC risk (HR10µg/day: 1.02, 95%CI: 0.96-1.09; HRQ5vsQ1: 1.02, 95%CI: 0.79-1.31, n cases=1,191). No differences were seen when invasive EOC subtypes (582 serous, 118 endometrioid, and 79 mucinous tumors) were analyzed separately.

#### PM-030

Poster

##### **Nutrient intake of School Children (6 - 15 years) in a rural Nigerian community.**

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Objectives: The objective of the study was to assess the nutrient intake of school children (6-15 years) in Ede-Oballa, Nsukka area of Enugu State, Nigeria.

Material and methods: Ninety school children aged 6 - 15 years in Ede-Oballa, Nsukka area of Enugu State, Nigeria were randomly selected for household 3-day weighed food intake study. All ingredients and the cooking pot were weighed with kitchen scales prior to cooking of the food and their values recorded. After cooking, the pot containing the food was weighed and the weight of the empty pot subtracted from it to obtain the weight of the cooked food. A weighed portion was served each child. Plate wastes and leftovers were subtracted and the actual quantity (g) of food consumed was obtained. Snacks and foods bought and consumed

outside the homes were estimated using household measures and the values recorded. The ingredients were translated into nutrients with food composition table. Nutrient contents of Nigerian foods were also used where some of the foods could not be found in the food composition tables. The results were compared to the recommended nutrient intake (RNI) of the children to determine the adequacy of intake.

Results: The 6 - 9 year old male's mean energy intake of 2322Kcal supplied more than 100% (106%) of their energy requirement. The children in the other years did not meet the energy requirement. Male and female children (6 - 9 years) had mean protein intake that provided 194.2% and 115% each of their daily protein requirement. The mean iron intakes of the male children (6- 9 and 10 - 12 years) and females of 10 - 12 years met up to 100% of their daily iron RNI. Children of 6 - 9 and 13 - 15 years had more than 100% of vitamin A RNI for their ages and sex. Thiamine, vitamin C and zinc intakes contributed more than 100% of the RNI. The intakes of carbohydrate, calcium and niacin were much more below the children's RNI for the nutrients. The implication of these low intakes is nutrient deficiencies. This predisposes the children to infections and nutritional problems like anaemia and chronic health problems in later life. Key findings: The nutrient intakes of the children were generally low in relation to their RNI. Nutrition education to improve consumption of nutritionally adequate diet should be encouraged.

#### PM-031

Poster

##### **Main food sources of solid fat, sodium, added sugars, and nutrients of public health concern in the U.S. diet of children and adolescents: data from the National Health and Nutrition Examination Survey (2007-2010)**

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Dietary patterns of US children are similar to the problematic eating habits of adults. To understand the development of dietary patterns in children and adolescents, data from the National Health and Nutrition Examination Survey 2007-2010 were analyzed to identify food sources of solid fat, sodium, added sugars, calcium, vitamin D, potassium and dietary fiber in children (2-8) and adolescents (9-18). The What We Eat in America 150 Food Categories were used to define food sources. Children consumed 32g of solid fat and 2501mg of sodium, with pizza the main contributing food source (6.7% solid fat; 5.6% sodium). In adolescents, pizza was also the main food source of solid fat (11.1%; 40g total) and sodium (8.3%; 3437mg total). Dietary fiber intake was 12g in children with yeast breads (5.7%) as main food source. For adolescents, fiber intake was 14g and the main contributing food source was pizza (6.8%). Fruit drinks and soft drinks were the main sources of added sugar in the diets of children (29%) and adolescents (40%). Various types of milk and flavored milk were the most important food sources for vitamin D (67%), calcium (41%) and potassium (24%) in 2-8 year old children. Milk consumption decreased in adolescents, but milks were still the most important source for vitamin D (57%), calcium (28%), and potassium (16%). Other food sources became more important such as French fries for potassium (3.8%) and pizza for calcium (8.6%). The data highlights that unhealthy eating habits become more pronounced from childhood to adolescence.

#### PM-032

Poster

##### **Body mass index among a sample of college students: environmental and genetic factors.**

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Objectives: During the past decades an important increase in obesity and obesity-related disorders, such as metabolic syndrome, has occurred among people in their teens and 20s, due to a combination of environmental and genetic factors which favor excessive energy intake and deficient energy expenditure. The aims of this contribution were to describe body mass index (BMI) among college students at the Florida International University and to study the influence of some genetic and environmental factors.

Material and methods: Ninety-seven students (71 women and 26 men) who were enrolled during the academic year 2012/2013 were recruited for this pilot sample. For each volunteer, a questionnaire including the following features was used: demographic data (gender, age), anthropometric measurements (weight, height), race, lunch place, lifestyle smoking habit. BMI (kg/m<sup>2</sup>) was calculated from anthropometric data and used to classify individuals into 4 categories:

underweight (BMI <18.5), normal range (18.5 ≤ BMI <25), overweight

(25 ≤ BMI <30) and obese (BMI ≥30). Statistical analysis was performed with IBM SPSS 19 (SPSS Inc Chicago IL USA). Mann-Whitney U test and Kruskal Wallis test were used. Level of significance was established as a p-value <0.05.

Results: Mean age was 26.60±8.01 years and mean BMI was 25.78±6.19. Approximately, 46% of individuals were classified as overweight or obese. Obesity was higher in male (30% of men) than female (16% of women) and only 4% of women were underweight. Mean BMI by ethnicity in our pilot sample showed: 15% of non-Hispanic black (BMI 27.39±9.29), 9% of non-Hispanic white (BMI 26.50±7.74), 69% of Hispanic (BMI 25.53±5.28), 2% of Asian

(BMI 21.41±0.08) and 4% of others (BMI 24.56±4.20). Significance differences were found in BMI by age; individuals aged equal or lower than 24 showed mean BMI 24.44±5.93 while students aged 25 or older showed BMI 27.45±6.16. Our results also indicated that students which lunch place was fast food restaurant (25%) were overweight (BMI 28.33±6.18) while students which lunch place was home or family home (60%) showed normal weight (BMI 24.25±5.80). Besides, only 7% of individuals were smoker and their BMI was close to obesity (30 kg/m<sup>2</sup>).

Key findings: Almost 46% of college students were overweight or obese. Obesity is twice in male than in female. Being 25 years old or older and non-Hispanic black increases overweight and risk for obesity. Having lunch at home or family home protects overweight. Smokers have their BMI nearly obesity.

### PM-033

Poster

#### Fortified condiments and noodles to improve health problems in children and adults – a literature review and meta-analysis

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Objectives: Micronutrient deficiencies imply a considerable burden of disease for many middle and low income countries. Examples are reduced growth, high anemia prevalence or increased infection rates. Several strategies have shown to be effective in improving micronutrient deficiencies in different target populations and with different nutrient carriers. However, the impact of fortified condiments as well as fortified noodles is less well documented. Our aim was to assess the impact of micronutrient fortified condiments and noodles on patient relevant outcomes in children and adults.

Material and methods: We conducted a literature review in electronic databases (Medline and Cochrane-Library; from inception to December 2013). In addition, we screened homepages of relevant organisations (e.g. Global Alliance for Improved Nutrition, United Nations) and relevant journals with developing country focus. We included randomised controlled trials which assessed the impact of micronutrient fortified condiments or noodles on patient relevant outcomes (e.g. anemia rates, morbidity, cognition) in children and adults (5–50 years). We defined condiments as salt, seasonings, soy sauce, fish sauce, bouillon, sprinkles and powder. Two reviewers extracted data and assessed risk of bias. Data was pooled with meta-analysis.

Results: Of 1046 retrieved studies, 14 RCT were included for analysis. Micronutrient fortification of condiments and noodles increased haemoglobin levels by 0.68 g/dl (95%–CI: 0.51 to 0.85; 15 comparisons in 14 RCT with 8845 included children and adults). Thus, micronutrient fortification led to a reduced risk of having anemia (risk ratio 0.59 [95%–CI 0.44 to 0.80]; data of 11 comparisons in 10 RCT). Morbidity and cognition were rarely assessed in the primary studies. Due to poor reporting, the risk of bias is unclear. However, two RCT with low risk of bias led to similar results for the investigated outcomes haemoglobin change and anemia rates to those of the main analysis.

Key findings: Micronutrient fortified condiments and noodles can be a strategy to improve health problems in children and adults due to micronutrient deficiencies, beyond supplementation programs and fortification of staple food. Risk of bias in the included studies is unclear and should be considered in the final conclusion.

### PM-034

Poster

#### Dietary polyunsaturated fatty acids intake modulate the association between IL-6 genetic variants and systemic inflammatory pattern.

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Objective: To investigate the association of three genetics variants of the interleukin (IL)-6 gene, polyunsaturated fatty acids (PUFA) intake and systemic inflammatory pattern.

Material and Methods: Data were obtained from the population-based

cross-sectional study, with a random sample of residents of the city of São Paulo, Brazil, aged between 20 and 59 years (n=262). Dietary intake was estimated by two 24-hour dietary recalls. Single nucleotide polymorphisms (SNP) in IL-6 gene (rs1800795, rs1800796 and rs1800797) were genotyped by Taqman® Open Array® system. The chi-squared test was used to determine whether genotype distribution followed the Hardy-Weinberg equilibrium. Linkage Disequilibrium between SNP was calculated using Haploview software. Cluster analysis was used to group individuals according to similarities based upon eleven plasma inflammatory biomarkers. The relationship between SNP and clusters (called inflammatory and non-inflammatory), as well as the relationship between PUFA intake and clusters and gene-PUFA interaction effects were derived from a generalized linear regression, with Poisson distribution and robust variance, adjusted for age, body mass index, gender, smoke status, alcohol consumption, physical activity and skin color, and are presented as Prevalence Ratio (PR) and 95% CI. To investigate gene-diet interaction, the PR between clusters and genotypes was stratified by percentiles of PUFA intake. Statistical significance was set at P<.05 for all statistical tests.

Results: All SNP were in Hardy-Weinberg equilibrium. The SNP rs1800795 and rs1800797 were in strong Linkage Disequilibrium (r<sup>2</sup>=0.93). The inflammatory cluster presented higher age, body mass index and prevalence of smoke habits in comparison with non-inflammatory cluster. No significant differences related to PUFA intake or genotype frequencies were observed between clusters. Individuals in upper percentile of total PUFA, n-6 and n-3 PUFA, expressed in percentage of total energy intake, showed a higher prevalence of GC+CC genotype for SNP rs1800795 into inflammatory cluster (PR (CI95%)=1.53 (1.02–2.31); 1.60 (1.06–2.43); 1.80 (1.20–2.69), respectively), which remained significant after adjustment. When n-6 and n-3 PUFA percentiles were expressed in grams, the results were opposite — individuals in lower percentiles showed a higher prevalence of GC+CC genotype into inflammation cluster (PR (CI95%)=1.76 (1.12–2.76); 1.78 (1.13–2.81), respectively), which remained significant after adjustment. The n-3 PUFA-cluster interaction was statistically significant (p=0.047) when PUFA intake was expressed in percentage of total energy intake. These results suggest that dietary PUFA intake may modulate the association between IL-6 genetic variants and systemic inflammatory pattern.

Key findings: polyunsaturated fatty acids; single nucleotide polymorphism; inflammation; interleukin-6

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### PM-035

Poster

#### CLYMBOL European survey of nutrient and health claims prevalence – classification issues.

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Objectives: Health claims state, suggest or imply a relationship between a certain food product or one of its constituents and health. To ensure consistent consumer protection and fair industry competition the EC developed regulation on the use of nutrient and health claims on food (No. 1924/2006) and a register of authorised nutrition and health claims on food (No. 432/2012).

The aim of this study was to design a protocol that could aid the classification of nutrient and health claims using EFSA and EC documentation on nutrient content, nutrient comparison, function, disease risk-reduction and child development/health claims. This was carried out as part of a larger study, which surveyed the prevalence of nutrient and health claims in Europe six months after the release of the EU register.

Material and methods: EC documentation was qualified and adapted to develop a claim classification protocol. This was used in a survey to assess the prevalence of health and nutrient claims (symbolic and non-symbolic) on pre-packaged food available to purchase in five European countries (Germany, the Netherlands, Slovenia, Spain and the UK) during Jun-Aug 2013.

Each country surveyed three stores: large retailer (~60%), discount store (~20%) and neighbourhood store (~20%). A weighted random sampling procedure based upon store product categories and store maps/product lists was used to sample products (Germany, n=399, Netherlands, n=416, Slovenia, n=416, Spain, n=405, UK, n=398). Non-food products, alcohol, food supplements and unpackaged products were excluded.

A sample of products (~5%) was re-coded and inter-coder differences assessed qualitatively by a sub-section of researchers. Difficulties in classification were discussed and amendments made to the protocol where necessary.

Results: A minority of protocol amendments were required following initial data extraction. Firstly, consistent claim frequency identification was ensured by the standardised separation of multiple claims on a single product. For example, "contains calcium and vitamin D to help build strong

bones and teeth" was classified as two nutrient content claims and two function health claims. Secondly, the "health-related ingredients claim" category was created as a type of nutrient content claim to avoid misclassification with claims related to a non-nutrient that had a nutritional/physiological effect e.g., fruit and or vegetables. Lastly three categories were created to aid the identification and classification of symbolic health and nutrient claims: published criteria symbolic claim; non-published criteria symbolic claim or non-claim imagery context.

Key findings: Amendments to the CLYMBOL survey protocol highlight areas of potential claim misclassification.

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### PM-036

### Poster

#### Estimation of benzoic acid (E 210) and benzoates (E211-E213) intake by Polish population.

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Objectives: the aim of the study was to estimate the intake of benzoic acid (E 210) and benzoates (E211-E213) as food additives by Polish population and the assessment of risk for human health resulting from the intake of that substance with diet.

Material and methods: data on food consumption (24-hour recalls) was collected in 2000 under the FAO project „Household Food Consumption and Anthropometric Survey“. The survey covered 4134 individuals from all over Poland, aged 1-96 years. Maximum permitted levels usage of benzoic acid (E 210) and benzoates (E211-E213) were taken into consideration according to the European Union regulation. There was also conducted analysis recipes of food products containing ingredients to which you can add additional tested substances and the food labels (market analysis). Statistical analysis were performed in Statistica ver. 6 - on the basis of a nonparametric test of Mann - Whitney U. Health risk assessment was based on the acceptable daily intake (ADI) -5 mg/kg bw/day.

Results: the average intake of benzoic acid (E 210) and benzoates (E211-E213) by Polish population amounted to 99,7 mg/person/day (33.4% ADI). Taking into account P95 the intake of those preservatives accounted for 139% ADI. The highest exposure to those substances was found in the group of children and teenagers (aged 1-17); mean - 43% ADI, P95 - 174% ADI. Benzoic acid (E 210) and benzoates (E211-E213) may be added to various products including: fine vegetable products, soups, beverages (at children) which can become the significant source of that preservatives in Polish diets.

Key findings: taking into account the food market development with increasing usage of additives, including preservatives, it is necessary to educate population on the selection of foodstuffs in the daily diet. Adherence to the principles of proper nutrition and where possible the use of unprocessed foodstuffs can support lower intake of food additives from diet.

### PM-037

### Poster

#### Changes in the Composition and Content of Volatile Compounds of Marrone Cultivar Fresh and Processed Products.

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Objectives: Fresh chestnut fruits are rarely consumed raw. They are processed in various ways, at home (mainly boiling or roasting) or on an industrial scale. This study was conducted using SPME-GC/MS to evaluate the volatile profiles of the fresh and processed chestnut. The objective was to determine if volatile profile patterns of compounds are differ in response to mode of processing.

Material and methods: Fresh chestnut sample of Lovran's marrone cultivar was collected in the area of the Istria (Croatia), in 2011. The amount of 4 g milled fresh chestnut (FC), boiled chestnut (BC) or roasted chestnut (RC) sample was put in 20 mL vial. All experiments were performed at least in triplicate. The samples were analysed using solid phase micro-extraction (SPME) kit.

On the solid phase SPME device (Supelco, Bellefonte, PA, USA), the 20 mm 50/30 µm divinylbenzene / carboxen / polydimethylsiloxane fiber was mounted. Samples were conditioned for 45 min at 37 ± 1°C and then exposed another 45 min to the SPME fiber under the same conditions. Afterwards the device was introduced in a gas chromatograph with mass selective detector (GC-MS - Agilent 6890 Series GC System with Agilent 5973 Mass Selective Detector). The total volatile production was estimated by the sum of all peak areas in the chromatogram. Relative volatile abundances were obtained by dividing each individual peak with the total volatile produced.

Results: In the FC esters were prevalent volatiles (66.90% of the total peak area) with the main constituents ethyl acetate (49.4%) (pineapple, ethereal aroma), followed by alcohols (17.6%) with most abundant compound 1-octanol (5.2%) (fruity-flowery, sweet soap, orange, waxy, sweet). The main volatile compounds found in BC were alcohols (61,5%) with the most abundant 1-octanol (29.8%), followed by ethanol (16,1%) (alcoholic aroma). On the other hand, the most represented volatiles in RC were furfural (12.1%) (bread) and 4-cymene (6.6%) (turpentine like, cola beverage aroma).

Key findings: This study showed that there was huge differences in the amount and content of volatile compounds in relation to processing. In RC volatiles analysis 74 main components were detected, which was much more in comparison to 34 in FC and 33 in BC. Alcohols were the leading volatiles in RC (22%), as well as in BC (61,5%), while prevalent volatiles in FC were esters (66.90%). It well known that volatile esters are flavor components of the majority of fruits.

### PM-038

### Poster

#### Determinants of food consumption during pregnancy among Portuguese pregnant women.

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Objectives: to investigate maternal determinants of food consumption during pregnancy.

Material and Methods: A prospective study was conducted with 105 pregnant women aged 18-40, from the city of Porto, Portugal between 2010 and 2012. Socio-demographic characteristics, pre-pregnancy weight and height were assessed via questionnaire in first trimester. Physical activity (PA), self-esteem and anxiety were evaluated by validated questionnaires in each trimester (mean score of the three trimester was used in the analysis). Food consumption during pregnancy was assessed via an interviewer administered food frequency questionnaire in the immediate post-partum period. For the present study, we defined 14 food groups: (i) dairy; (ii) meat; (iii) seafood; (iv) eggs; (v) fats and oils; (vi) starchy foods; (vii) vegetables; (viii) vegetable soup; (ix) legumes; (x) fruits; (xi) nuts; (xii) sweets and pastries; (xiii) fast food; and (xiv) sugar-sweetened beverages. Linear regression

analysis was used to explore the maternal determinants (age, parity, pre-pregnancy body mass index (BMI), self-esteem, anxiety, PA educational level (12 years), marital status (single/divorced), nutritional attendance (yes), employment status (unemployed), monthly income ( 875 Euros) of food consumption during pregnancy. Each food group entered as dependent variable in linear regression model.

Results: After mutual adjustment for all potential maternal determinants in multiple regression models, pre-pregnancy BMI was negatively associated with dairy (= -13.4, P=0.002) and sweets and pastries (= -2.9, P=0.003) consumption. Vegetable consumption was significantly and positively associated with PA (= 0.4, P=0.003), self-esteem (= 6.8, P=0.005) and monthly income (= 67.9, P=0.030). Parity was positively associated with meat and seafood (P<0.05, for all). Starchy food consumption was significantly and positively associated with parity (= 54.2, P=0.003), self-esteem (= 3.6, P=0.023) and negatively associated with age (= -4.5, P=0.031). Higher dairy and fruits consumption was significantly associated with higher PA (= 0.7, P=0.001; = 1.0, P=0.009, respectively). Higher sweets and pastries, sugar-sweetened beverages and vegetable soup intake were significantly associated with monthly income (= 20.2, P=0.025), employment status (= 337.9, P=0.004) and nutritional attendance (= 232.8, P=0.006), respectively.

Key findings: Maternal age, parity, pre-pregnancy BMI, PA, employment status, monthly income and nutritional attendance, were all determinants of food consumption during pregnancy. The higher consumption of energy-dense nutrient-poor foods seems to be related to socio-demographic characteristics as monthly income and employment status, and lower pre-pregnancy BMI.

## PM-039

## Poster

**Compliance with the dietary recommendations in the Norwegian Fit for Delivery Study.**

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**Objectives:** Maternal diet and lifestyle during pregnancy may influence long term maternal and child health. As part of the life style intervention package in the Norwegian Fit for Delivery study, dietary advice confined to ten specific recommendations was conveyed to nulliparous pregnant women with the goal of promoting healthy dietary habits and optimizing weight gain during pregnancy. The aim of the present study was to assess change in dietary behavior as measured by a summative diet score developed to reflect degree of adherence to the study-specific dietary recommendations.

**Material and methods:** The Fit for Delivery study is a randomized controlled trial of a lifestyle intervention carried out among nulliparous pregnant women in the Southern part of Norway between 2009 and 2013. Nulliparous women who consented to participation were randomly assigned to either lifestyle intervention or standard pregnancy care. A questionnaire including a 43-item food frequency questionnaire concerning selected dietary aspects was completed at baseline. The dietary intervention consisted of a postal pamphlet describing the dietary recommendations reinforced by two scheduled telephone contacts of 20 minutes duration soon after inclusion, one month apart. The 43-item food frequency questionnaire was repeated in gestational week 36 to monitor potential dietary changes. The diet score was constructed from ten dichotomized subscales thematically corresponding to the ten dietary recommendations. The score comprised values from 0 to 10 with increasing score indicating higher compliance with the recommendations. For analysis the score was used as a continuous measure quantifying adherence to the recommendations at baseline and gestational week 36. Difference in score according to intervention status was measured by independent sample t-test.

**Results:** Of 538 eligible women 487 (91.5%) equally distributed in intervention and control group had completed the food frequency questionnaire in gestational week 36 and were included in the present analysis. There was no difference in dietary score between the intervention and control group at baseline, mean score 4.7 (SD 2.0) vs 4.6 (SD 2.0),  $p=0.511$ . At gestational week 36 there was a significant difference favoring the intervention group, with mean score 5.1 (SD 2.1) vs 4.6 (SD 2.1),  $p=0.002$ , indicating behavioral dietary change in the intervention group. **Key findings:** Women in the intervention group in the Fit for Delivery study increased their dietary score from inclusion to late pregnancy. A similar level of intervention could be feasible as part of routine pregnancy care. More details concerning the dietary changes will be presented.

## PM-040

## Poster

**Coverage of High-dose Vitamin A Capsules, Factors Associated with the Coverage and Serum Retinol Status of Indonesian Children 12-59 Month Old.**

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**Objectives:** Vitamin A deficiency is still a public health problem in Indonesia. We, therefore, have a twice-yearly (February and August) national vitamin A supplementation program for 6-59 month children. Evaluation of the coverage can be used to measure the progress or success over time in a targeted province or in a whole nation. This study aimed to assess the coverage of high-dose vitamin A capsule, its associated factors, and serum retinol status of Indonesian children 12-59 month from the South East Asian Nutrition Surveys (SEANUTS).

**Material and methods:** SEANUTS was conducted in Indonesia, Malaysia, Thailand and Vietnam in a country representative sample of 16,744 children aged 0.5-12 years. In Indonesia, 7,211 children were randomly selected from 48 districts from January-December 2011. In a sub-sample of 3,595 children, coverage of vitamin A capsule in the last six months and its associated factors was assessed using interviewer-administered questionnaires. Serum retinol was measured in 504 children using high pressure liquid chromatography. Data were analyzed using SPSS16.0.

**Results:** The overall coverage of vitamin A capsule was 83.0 percent. Monthly weighing of the children at posyandu or community centre was significantly associated with the coverage ( $p=0.000$ ). Vitamin A capsule coverage for children who did not visit posyandu, visited 1-3 times and visited 4-6 times in the last 6 months was 56.0, 81.0 and 91.9 percent, respectively. Other factors associated with vitamin A capsule coverage were birth attendance by health personnel, high mother's education, mother's age 30-49 year, high socio-economic status, living in urban areas ( $p<0.05$ ). Child's age, gender, father's age and father's education were not associated with the capsule coverage. Serum retinol was significantly higher ( $p<0.039$ ) for children who received vitamin A capsule in the last 6 months compared to

those who did not (1.51+0.53 vs. 1.37+0.47  $\mu\text{mol/L}$ ). Children who received capsules had the highest serum retinol in the first two months after supplementation (1.58+0.62 to 1.79+0.45  $\mu\text{mol/L}$ ) and the levels declined towards the fifth and sixth month (1.21+0.45 and 1.28+0.40  $\mu\text{mol/L}$ ), prior to the next supplementation.

**Key findings:** Overall vitamin A capsule coverage is good and is strongly associated with the monthly weighing program at posyandu among children 12-59 month old. Program of high-dose vitamin A capsule supplementation also improved serum retinol status by 0.41-0.58  $\mu\text{mol/L}$ , albeit only in the first 2 month after distribution. Therefore, to have a continued or sustained benefit, options of dietary diversification and food fortification should be considered.

## PM-041

## Poster

**Analysis of carotenoids in microsamples of human faeces.**

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**Introduction:** The human colon is continuously exposed to a complex mixture of gut luminal compounds of dietary origin or digestive and microbial processes. Carotenoids have a chemopreventive action against colonic carcinogenesis and they may be essential for the functioning and structural integrity of the gastrointestinal epithelium.

Human stools consist of a mixture of undigested food residues, colonic microflora, and cellular components. Thus, to monitor the potential action of bioactive dietary compounds, it is essential to assess their availability and bioactivity in target tissues. In this context, analysis of faeces represents a useful, non-invasive approach to assess the availability of bioactive compounds in colon.

**Objective:** To assess the carotenoid profile in human faeces after intervention with b-carotene and b-cryptoxanthin-enriched beverages.

**Methods:** As part of a bioavailability study (NCT 02065024), two beverages were developed; 1)  $\beta$ -Cx-enriched milk-based fruit drink, 2) milk-based fruit drink containing b-carotene (ca. 50% as cis-isomer). Post-menopausal women supplemented their diet with 1 x 250 ml juice/day for six weeks. The study protocol was approved by the Research Ethics Committee of the Hospital Universitario Puerta de Hierro-Majadahonda (Madrid, Spain).

Faeces collection and carotenoid analysis; Microsamples of faeces (10 mg) were collected at start and at the end of the intervention using OC-Auto sampling bottles containing HEPES buffer (Biogen Diagnostica) and frozen at -20 °C until analysis. Individual carotenoids, ester forms, isomers and metabolites in faeces were compared to those present in the beverages consumed. Aliquots were simultaneously analyzed, with and without saponification, and identification was performed on two LC systems.

**Results:** Beverage A contained mostly b-cryptoxanthin (free and ester forms), b-carotene (50% as cis-form), lutein, zeaxanthin and other xanthophylls. Beverage B contained b-carotene (50% as cis-form) and minor amounts of xanthophylls. No b-cryptoxanthin was present.

Carotenoids in faeces after beverage A; Minor amounts of free b-cryptoxanthin were detected while b-cryptoxanthin esters were absent. All-trans, cis-b-carotene, lutein and two unidentified xanthophylls, not provided with the beverage, were also present. Lycopene, not provided with beverage, was clearly found.

Carotenoids in faeces after beverage B; All-trans and cis-b-carotene with a relative proportion similar to that found in the beverage were present. Lutein and two unidentified xanthophylls, as observed with beverage A, were also present. No b-cryptoxanthin was detected.

**Conclusion:** Carotenoid profile in human faeces may provide relevant information regarding stability, metabolic changes during digestion and availability of bioactive compounds for colonocytes from gut lumen.

**Funding:** Ministerio de Economía y Competitividad (AGL2012-39503-C02-02).

## PM-042

## Poster

**B-cryptoxanthin modulates the response to plant sterols in post-menopausal women carrying NPC1L1 L272L polymorphism: An exploratory study.**

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**Introduction:** Numerous clinical trials have shown that plant sterols (PS) are effective in reducing circulating cholesterol levels in humans when included in a broad range of food matrices, although the presence of non-responders is well known.

On assessing the potential functional effect of a doubly modified beverage containing b-cryptoxanthin ( $\beta$ -Cx) and phytosterols (PS), we found that

several volunteers did not reduce their serum cholesterol levels after consuming PS and some even displayed an increase. However, these subjects showed a lower increase or even a decrease in their serum cholesterol and cLDL levels when they consumed a beverage containing PS plus  $\beta$ -Cx  
Objective: To assess the effect of  $\beta$ -Cx and genetic polymorphisms on the response to plant sterols supplementation.

Methods: As part of a randomized intervention trial with  $\beta$ -Cx and PS (NCT01074723), post-menopausal women supplemented their diets with low-fat milk fruit-based beverages containing PS (1.5 g/day) and PS plus  $\beta$ -Cx (750  $\mu$ g/day) for 4 weeks with a one month of wash-out in between. Fasting blood samples were collected before and after each supplementation period for  $\beta$ -Cx (by UHPLC) and lipids analysis. Lymphocytes were isolated by standard procedures (Lymphoprep™) and stored in liquid nitrogen. Genetic polymorphisms were assayed from RNA material and its conversion to cDNA in 19 volunteers. Primer pairs for NPC1L1 L272L were designed using Primer Express version 2.0 (Applied Biosystems).

The study protocol was approved by the Research Ethics Committee of the Hospital Universitario Puerta de Hierro-Majadahonda (Madrid, Spain). Results: Based on the prevalence of polymorphisms, subjects were pooled for comparisons. A significant and inverse response was observed upon intake of PS depending on the NPC1L1 polymorphism. Subjects carrying the CC variant (n=9) showed, on average, a net increase in total (mean (SE); +14.6 (11.4) mg/dl) and LDL-cholesterol (13.0 (10.0) mg/dl) while volunteers carrying CG/GG (n=10) showed a net decrease (-11.3 (4.4) and -7.0 (4.6) mg/dl for total and LDL-cholesterol). Interestingly, CC subjects showed a significant decrease in both lipid fractions after consuming the beverage containing PS plus  $\beta$ -Cx (-9.3 (7.3) and -10.4 (4.6) mg/dl for total and LDL-c), reaching on average a similar reduction as those with CG/GG polymorphism (change not significant according to the genetic variant). Conclusions: Our findings suggest CC polymorphism of NPC1L1 L272L is associated with a lower or non-response to PS and that  $\beta$ -Cx cancels out partly this effect when simultaneously supplied with PS.

Funding source; Ministerio de Ciencia e Innovación (AGL-2008-02591-C02-02).

#### PM-043

Poster

##### Poor vitamin D status in young Guatemalans from coast to coast.

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Objective: To determine vitamin D status in childhood populations on the two, tropical coasts of Guatemala: the southern (Pacific) and northern (Atlantic Caribbean), by determining 25-hydroxy vitamin D (25(OH)vitD), a realiable marker of human vitamin D status.

Materials and Methods: We enrolled convenience samples in the Retalhuleu Province on the Pacific coastal plain (134 schoolchildren of both ladino and indigenous ethnicities {mixed origins, MO}, of both sexes and aged 7 - 11 y), and in Izabal Province along a river flowing into the Caribbean Sea (43 adolescents of Maya-Kekchí {MK} origin and 43 adolescents of Afro-Caribe {AC} ascent of both sexes and aged 12-18 y). Blood samples were extracted and serum samples were maintained as -20°C until shipping for analysis. Serum specimens were measured for 25(OH)vit D in Omaha, NE, USA, with values expressed in ng/dL.

Results: For the MO schoolchildren on the Pacific coast, the composite mean 25(OH)vit D concentration was 30.7 $\pm$ 6.9, with 4.5% deficient (<20 ng/dL) and 45.5% insufficient (20-29.9 ng/dL). For the MK adolescents on the Caribbean coast, the mean was 25.8 $\pm$ 5.8, with 21% deficient and 51% insufficient. For the AC adolescents on the same coast, the mean was 29.8 $\pm$ 7.9, with 5% deficient and 51% insufficient.

Key Findings: From a public health perspective, vitamin D has been a forgotten nutrient in Latin America. Nevertheless, Brito et al. (Food Nutr Bull. 2013;34:52-64) have documented a deficit in vitamin D status or dietary intake in all reported instances of its evaluation in the region. Despite lifelong residence in a tropical, coastal zone and notwithstanding outdoor activities in recreation and household chores, more than half of all sampled individuals have abnormal vitamin D status. A public health problem involving this nutrient is likely to exist throughout Guatemala's juvenile population.

#### PM-044

Poster

##### Body mass index and arterial pressure across two diverse ethnicities living in a common geographic zone on the Caribbean coast of Guatemala.

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Objective: To compare/contrast body measurements and indices of adolescents of two ethnic groups (Afro-Caribe and Mayan-indigenous) of an identical age, reared in a common, tropical geographic zone and to relate the arterial blood pressure to physical dimensions of body size.

Materials and Methods: The setting was the Izabal Province along a 43 km stretch of the Río Dulce, which flows from Lake Izabal into the Bay of Amatique of the Caribbean Sea. The inland, lakeside region is inhabited by Kekchí-speaking indigenous Guatemalans (MK), displaced from the northern highlands. The original inhabitants of the coastal, seaside are of African-Caribe (AC) ascent. We recruited 44 adolescents (median age: 13.0y), 48% males in the MK group and 46 adolescents (median age: 14.0 y), 41% males in the AC group. Their height was measured to the nearest 0.5 cm on a wall-mounted stadiometer, weight was measured in kg to the nearest 0.1 kg on a calibrated portable digital scale (Model BF-522, Tanita, Japan). Arterial blood pressure (ABP) was measured to the nearest mm of Hg on a digital sphygmomanometer (Model EW3106W, Panasonic Electric Works, China). Each measure was taken by a variable-specific investigator for all subjects. Z-scores of height-for-age (HAZ), weight-for-age (WAZ) and body mass index (BMI, kg/m<sup>2</sup>) were calculated. The BMI classifications were interpreted using the CDC (2001) criteria. In the presentation of results, means not sharing the same superscript letters were significant different using ANOVA (p<0.05) for weight and BMI, and, using the Kruskal-Wallis test, for height.

Results: The mean heights (in cm) for the subgroups by ethnicity and sex were: 148.3 $\pm$ 9.4a MK-M; 146.3 $\pm$ 7.1a MK-F; 161.7 $\pm$ 11.0b AC-M; and 156.6 $\pm$ 6.3b AC-F. The respective weights (in kg) were: 41.9 $\pm$ 6.9a, MK-M; 43.1 $\pm$ 6.4a MK-F; 59.0 $\pm$ 17.6b AC-M; and 51.8 $\pm$ 9.7b AC-F. The respective BMI (kg/m<sup>2</sup>) were: 18.9 $\pm$ 1.5a, MK-M; 20.2 $\pm$ 2.7ab MK-F; 22.0 $\pm$ 4.3b AC-M; and 21.0 $\pm$ 3.2ab AC-F. The mean ABP were 109/63 $\pm$ 11.0/8.4 mmHg. The Spearman correlation coefficients for Systolic ABP and Diastolic ABP vs respective variables were, respectively: (systolic) r=0.077 with HAZ (p=0.468); r=0.104 with WAZ (p=0.328); and r=0.063 with BMI (p=0.553); (diastolic) r=0.076 with HAZ (p=0.475); r=0.107 with WAZ (p=0.317); and r=0.085 with BMI (p=0.424).

Key Findings: A striking difference in weight and height is found across two ethnic groups living in a very common geographical and ecological environment; in BMI there is a difference across settings only in boys. Diet, genetic and micro-environmental differences must be considered. No significant association was found between ABP and anthropometric indexes.

#### PM-045

Poster

##### Analysis of sodium intake from bread in an institutionalized elderly population.

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Egas Moniz Interdisciplinary Research Center

Introduction: Bread ingestion has been considered as one relevant item in total sodium intake of some populations. In Portugal, the 2009 annual per capita intake of bread was 70kg.

Current guidelines on salt intake are usually exceeded, being that more serious, when we're talking about elderly and hypertensive individuals.

Objectives: Assess the importance of bread intake in total daily sodium intake on an institutionalized elderly population and analyze the potential effect and enforcement of the law no. 75/2009 which took effect on August 12th 2010.

Material and methods: Assessment of total sodium excretion from 24 h urine samples, which were used to estimate daily salt intake.

The glomerular filtration rate was estimated using three different methods (creatinine clearance, Cockcroft-Gault and Modification of Diet in Renal Disease equations).

Bread intake was assessed through a questionnaire (before and after the law no. 75/2009 took effect) and to assess bread salt level the Charpenier-Volhard method.

Results: Mean daily salt intake among participants was 12,7 g (sd = 5,6), with 27,53% of all salt ingestion coming from bread.

After the law no. 75/2009 took effect, the levels of salt intake coming from bread, lowered 19,42% (sd = 0,53).

Key findings: We observed, that the studied elderly had excessive salt intake (3,35 times more) compared to current recommendations (3,8 g/day), and that bread represented more than one-quarter of that total salt intake.

We also observed that the law no. 75/2009 which took effect on August 12th 2010 had been respected by the local bakery and the types of bread consumed in the institution had their salt levels reduced.

#### PM-046

Poster

##### Folate consumption patterns and intake levels from different folate sources in the Canadian diet: analysis of the Canadian Community Health Survey on Nutrition.

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**Objectives:** To determine the folate intake of the Canadian population ( $\geq 1$  y) post folate fortification by form (naturally occurring, the dietary folate equivalent from folic acid food fortification and dietary supplements) as well as by age/gender groups and to identify any potential groups who are consuming folic acid at levels above the tolerable upper intake level established by the Institute of Medicine.

**Materials and Methods:** Secondary data analysis was performed using data from the Canadian Community Health Survey, Cycle 2.2 (N=32776), which utilized a complex cross sectional sample design to represent the Canadian population. Folate intake from foods and food fortification sources of the Canadian population was examined using the 24 hour dietary recall component. Prevalence of folate inadequacy as well as prevalence above the tolerable upper intake level were calculated based on intake of naturally occurring folate alone, as well as with food fortification sources, supplements and potential overage factors.

**Results:** Based on unfortified food sources, Canadians struggle to consume adequate intakes of folate. When folate intakes from all food sources are considered, the overall prevalence of folate inadequacy was low across all age/gender groups, with the exception of females'  $\geq 70$  y and non-supplement using women of child-bearing age, whose inadequacy levels ranged from 16.5 to 28.8%, compared to <1.6% of supplement using women. Almost 18% of supplement users were above the tolerable upper intake level.

**Key Findings:** Results from this study suggest that insufficient dietary intakes of folate in Canadians have been ameliorated due to the fortification policy. However, the general population should also be informed of the potential risks of folic acid overconsumption resulting from supplement use. It may be prudent to consider removing folic acid from supplements targeted towards men and children.

#### PM-047

Poster

**Higher level of saturated fatty acid intake has a higher prevalence of systemic inflammatory pattern among subjects with -238 G/A polymorphism in the tumor necrosis factor- $\alpha$  gene.** Oki, E<sup>1</sup>; Norde, MM<sup>1</sup>; Fisberg, RM<sup>1</sup>; Marchioni, DML<sup>1</sup>; Souza, JMP<sup>2</sup>; Rogero, MM<sup>1</sup>

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**Objectives:** To investigate the association between tumor necrosis factor (TNF)- $\alpha$  polymorphism, saturated fatty acid (SFA) intake and systemic inflammatory pattern.

**Material and Methods:** Data were obtained from the population-based cross-sectional study, with a random sample of residents of the city of São Paulo, Brazil, aged between 20 and 59 years of both sexes (n=262). Dietary intake was estimated by two 24-hour dietary recalls. The information about living style was obtained from a questionnaire. Anthropometrics measures were collected and blood samples were drawn after fasting overnight. From blood samples, eleven plasma inflammatory biomarkers were determined by multiplex immunoassay and the genomic DNA was extracted for genotyping by TaqMan® Open Array® System for the TNF- $\alpha$  (rs361525) polymorphism. Multivariate Cluster Analysis (K-means) was performed to group the individuals according with eleven inflammatory biomarkers to generate inflammatory profiles. The chi-square test was used to determine whether genotype distribution followed the Hardy-Weinberg equilibrium. Subjects were separated into two clusters, representing Low (L; n=169) and High (H; n=93) level of inflammation. To determine the prevalence ratio (PR) between the single nucleotide polymorphism (SNP) and clusters groups, a general linear model using Poisson distribution and robust variance was performed, adjusted by confounders factors included age, body mass index, smoking status, alcohol consumption, moderated physical activity and skin color. The interaction between SNP and SFA intake were tested with SFA as dichotomous variable (cut off by the median levels intake). A 2-tailed p-value of <0.05 was considered significant.

**Results:** Genotype distributions did not deviate from Hardy-Weinberg equilibrium (p>0.05). The H cluster had significantly difference in age, waist circumference, blood pressure, inflammatory biomarkers and smoking status in comparison with L cluster. No difference in SFA intake was observed between clusters groups, neither in SNP genotypes. Among subjects in the highest 50th percentile of saturated fatty acid intake, GA+AA genotypes had a higher prevalence of systemic inflammatory pattern than GG genotypes (adjusted PR=2.32; 95%CI=1.12-4.83; p=0.024). No interaction was observed between SFA and SNP (p=0.18). These results suggest that TNF- $\alpha$  (rs361525) gene polymorphism among subjects with high saturated fatty acid intake is associated with a systemic inflammatory pattern. Financial support: FAPESP (Grants: 2012/20401-7 and 2013/01741-4).

**Key findings:** Tumor necrosis factor- $\alpha$ , single nucleotide polymorphism, saturated fatty acid intake, inflammation.

#### PM-048

Poster

**Narratives of mother's feeding practices during the traditional 40-day post-partum "Quarantine" period in urban and rural areas of Guatemala.**

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**Objective:** The study aimed to describe narratives of mother's feeding practice perceptions during the early post-partum period known as the Cuarentena (which translates into the English word of "quarantine"), meaning roughly the first 40 days after birth. It was conducted among Mayan women in urban and rural areas in the Western Highlands of Guatemala. **Material and methods:** The reported findings are from a larger study. This part of the study was held at 2 urban public health clinics in the urban area of Quetzaltenango and 2 rural communities in the rural area of San Juan Ostuncalco, Quetzaltenango. Participation was voluntary and no compensation was given. A total of 39 mothers (22 rural and 17 urban) participated in 4 focus groups, with 7-13 participants each. Open question guides were used to start discussions. Focus groups were recorded, transcribed verbatim and translated from Mayan Mam language to Spanish. Data were coded using predetermined domains using HyperResearch® software.

**Results:** Participants' age was 16-55 y, and mothered 1-10 children. Urban respondents reported less time for "resting" than their rural peers. Mothers identified intergenerational changes in Cuarentena duration and maternal care practices. Participants reported changes in mother's eating patterns during the "Cuarentena" in both settings. "Hot and cold" perceived properties of food and drinks gained a special value during this period. The consumption of perceived "hot" properties food and beverages such as gruel and herbal infusions is associated to greater breast milk production. The consumption of food and drinks with "cold" properties is associated with maternal illness conditions and consequently "weaker" newborn's health. Duties such as newborn care, care of older siblings and household food preparation for members are supported by neighbors, close family and traditional midwives.

**Key Findings:** These narratives describe variability in the observance of the "Cuarentena" as a variable period depending on mother latitude to rest. Special feeding practices are undertaken during the period in response to the perceived newborns' fragility and susceptibility to adverse effects of mothers' dietary intake. Recent generations, especially among urban mothers, tend to diminish observance of the Cuarentena care during post partum. Funded by: HormelTM Food Corporation of Austin, MN.

#### PM-049

Poster

**Glycaemic index, glycaemic load and insulinaemic index of five different Spanish breads.**

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1. **Objective:** To evaluate the glycaemic index (GI), the glycaemic load (GL) and the insulinaemic index (InI) of five different Spanish breads: ordinary white bread, precooked white bread, Alfacar white bread, Candeal white bread and organic whole-grain bread.

2. **Subjects and methods:** Twenty-two healthy adults were randomly assigned to a sequence of the five different breads. Likewise, 50 g of glucose were administered twice. The study was performed during seven weeks (wash-out period  $\geq 1$  week). Blood samples were taken at 0 (fasting), 15, 30, 45, 60, 90, 120 and 180 min after the intake of the bread or the glucose. Postprandial glucose and insulin curves were determined in order to calculate the GI, GL and InI, according to the FAO protocol.

3. **Results:** GI, GL and InI for each bread were: ordinary white bread 85 $\pm$ 12, 18 $\pm$ 3 and 74 $\pm$ 7, respectively; precooked: 102 $\pm$ 16, 20 $\pm$ 3 and 76 $\pm$ 9, respectively; Candeal: 108 $\pm$ 17, 23 $\pm$ 4 and 77 $\pm$ 6, respectively; Alfacar: 85 $\pm$ 12, 18 $\pm$ 2 and 78 $\pm$ 4, respectively and organic whole-grain: 73 $\pm$ 8, 11 $\pm$ 1 and 79 $\pm$ 5, respectively.

There were neither significant differences in GI between the different tested breads nor compared to glucose control. Organic whole-grain bread GI tended to be lower compared to glucose control (P=0.068) and was significantly lower compared to precooked and Candeal white breads.

All breads in the present study had a GL significantly lower than glucose control (P<0.001). There were no significant differences in InI among the breads.

4. **Key findings:** All tested breads have a lower GL in comparison to glucose control and the whole-grain bread has the lowest GL value.

The present work was supported by ORGANIZACIÓN INTERPROFESIONAL AGROALIMENTARIA DE CEREALES PANIFICABLES Y DERIVADOS (contract no. 3714 signed with the Fundación General Empresa-Universidad de

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#### PM-050

Poster

##### Coffee consumption is not an important risk factor for low femoral neck bone mineral density.

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**Objectives:** Aim of study was to evaluate the impact of coffee consumption to blood vitamin D, calcium level, and bone mineral density (BMD) considering other influencing factors as age, sex, and level of school-time physical activity.

**Material and methods:** Altogether 103 subjects were recruited to the study and average coffee intake in last 3 years was considered. All participants were divided into three groups: no coffee consumption (NCC; n=39; F=33; M=6); average coffee consumption – 1-4 cups per day (ACC; n=40; F=33; M=7); excessive coffee consumption – >5 cups per day (ECC; n=24; F=15; M=9). One cup contained ca 200ml coffees and ca 100mg caffeine. 5 cups (ca 450mg caffeine) is considered in excess of safe limit. Femoral neck BMD was measured using dual-energy X-ray absorptiometry (DXA, Hologic) method. School-time physical activity level according to WHO recommendations (below and above of sufficient level of 7x60 and 7x90 minutes per week, respectively) was calculated. Vitamin D and calcium level were measured by using Elisa analyser and CPC method, respectively. Univariate and multiple linear regression analysis were done. **Results:** The average age of participants was 30.8±9.4 years. No differences between groups in sex, education level, vitamin D (median 55.6; IQR 41.58-77.13 nmol/L) and calcium (median 2.17; IQR 2.29-2.07 mmol/L) level were found. School-time physical activity levels were below sufficient, sufficient, and above sufficient, respectively 35%, 28.1%, and 36.9%. NCC had significantly higher body mass index than ACC, probably due to their higher age (p<0.001). ECC had significantly higher femoral neck BMD compared to ACC (0.079; p=0.02). The linear regression model was adjusted additionally to other potentially influencing factors as school-time physical activity, age, and sex; school-time physical activity was proved as a significant predictor of femoral neck BMD. School-time physical activity above sufficient level in comparing with levels below sufficient and sufficient had significantly higher BMD (respectively 0.077; p=0.01 and 0.059; p=0.04). Females compared to males had lower BMD (-0.076; p=0.01). Coffee consumption does not affect vitamin D or calcium levels. **Key findings:** People who were physically more active in childhood have higher BMD in adulthood. Coffee drinking is not an important risk factor for low femoral neck BMD.

#### PM-051

Poster

##### National Prevalence of Overweight and Obesity among adolescents: I.R.IRAN, Trends of 2001-2012.

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**Background and Objectives:** Based on many studies in the country, the prevalence of overweight and obesity among adolescent boys and girls is continuously increasing. To provide current estimates of the prevalence and trends of overweight and obesity among adolescents in the country, we compared the data of two national surveys conducted in 2001 and 2012 as a national integrated micronutrient survey (NIMS).

**Material and Methods:** Data of the both national surveys (2001, 2012) were collected for two groups of adolescents (15-19 years old boys and 14-19 years old girls). Both surveys were cross-sectional and the samples were nationally and regionally (eleven regions in the country) representative. Standard measuring protocols were used in both surveys. Estimates of the prevalence of overweight and obesity were defined as ≥85th to <95th and ≥ 95th percentile of body mass index (BMI) for age growth charts respectively.

**Results:** In 2001, 2.4% of Iranian adolescent boys and 3.2% of girls were overweight and obese. In 2012, the prevalence of overweight and obesity was 19.9% (CI 95%, 18.6 %-21.2%) and 24.1% (CI 95%, 23.0 %-25.5%) among boys and girls respectively.

**Conclusion:** Over the 11-year period from 2001 through 2012, obesity showed significant increase among boys and girls respectively (P<0.001) which carries a higher risk for adult obesity and earlier puberty. It seems

that low level of physical activity and excess energy intake are two primary causes and behavior risk factors of adolescent overweight and obesity. Creative approaches must focus on early adolescence to start behavior changes in this group.

#### PM-052

Poster

##### Dietary factors and breast cancer: modifications in DNA methylation patterns.

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**Objectives:** Among the molecular alterations that occur during neoplastic transformation, epigenomic disruption, such as abnormal DNA methylation profile, has a key role. Epigenetic changes are reversible and may be modified by environment, especially dietetic factors. The aim of this work is to determine if nutritional factors may modify epigenetic patterns in healthy volunteers and breast cancer patients.

**Material and Methods:** In this initial phase we have selected genes with an important role on the key hallmarks that a neoplastic cell acquires: sustaining proliferative signaling, evading growth suppressors, activating invasion and metastasis, enabling replicative immortality, inducing angiogenesis, resisting cell death and avoiding immune destruction. We have determined their methylation status by methylation-specific PCR (MSP) in samples of blood obtained from healthy volunteers and locally advanced breast cancer patients and in biopsies of mammary gland and tumor of such patients. Additionally, the global DNA methylation has been determined through the study of repetitive DNA elements (LINE-1) by bisulfite pyrosequencing. We also have analyzed biochemical markers of lipid intake in samples of peripheral blood of healthy volunteers and breast cancer patients by gas chromatography.

**Results:** The analysis of these genes showed a different DNA methylation pattern among blood and mammary tissues. Differences on DNA methylation were observed in blood from healthy volunteers and breast cancer patients, but results did not reach statistic significance. Gene methylation was always increased in tumor compared to mammary gland, such increase being statistically significant for most of the studied genes. The global DNA methylation showed a significant progressive decrease in blood, mammary gland and tumor of breast cancer patients. Moreover, significant differences were detected in fatty acid composition of erythrocyte membrane phospholipid between healthy volunteers and breast cancer patients: a decrease in C16:0, C17:0, c10-C17:1, c9-C18:1, c11-C18:1, C18:3n3, C20:0 and an increase in C15:0, c9,12-C18:2, C20:2, C20:3n6, C20:4, C20:5n3, C22:6n3 were detected in breast cancer patients compared to healthy volunteers.

**Key findings:** The study of methylation of specific genes in human samples showed hypermethylation in most of them in tumor respect mammary gland, accompanied by a decreased in global DNA methylation. On the other hand, several statistically significant differences were observed in erythrocyte membrane phospholipid fatty acids, suggesting different dietary habits between healthy volunteers and breast cancer patients.

#### PM-053

Poster

##### Key challenges of implementing multi-sector nutrition plan in Nepal.

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**Introduction:** Forty-one per cent of Nepalese children suffer from chronic malnutrition. The process of stunting occurs between conception and two years of age, and is an irreversible process. Furthermore, the population of Nepal, especially women and children, are affected by major micronutrient deficiencies. Nepal has been part of the global movement on nutrition and is committed to improve the nutrition status of all people. Under nutrition is caused by a number of interrelated factors, which call for a multi-disciplinary approach. Therefore, multi-sector nutrition plan is an attempt to address the issue of nutrition in a systematic and coordinated manner, adopting a multi-sector perspective.

**Objectives:** The purpose of this research is to explore the key challenges faced during the implementation of multi-sector nutrition plan in Nepal. **Materials and methods:** It is a descriptive study which utilized qualitative research methodologies such as focus group discussions, in-depth interview, key informant interviews and participatory observations for data collection and analysis.

**Results:** The multi-sector nutrition plan is envisaged as an important approach to address the problems and challenges of malnutrition in Nepal. There are capacity gaps within sectors to effectively plan and integrate both nutrition specific and nutrition sensitive interventions in sectoral

policies, strategies and programmes at all levels. Multi-sector coordination across a range of stakeholders is challenged by several factors. The political transition in the country, and the emerging needs for strong political will and commitment from sectors for multi-sector approach to nutrition have profound impacts on nutrition governance. The decentralization of multi-sector nutrition plans at local levels is another challenge to meet the unmet needs of nutrition services in the communities.

Key findings: Multi-sector approach to nutrition is a newly emerging priority which needs more efforts for advocacy and capacity development to a range of stakeholders. Integration of nutrition sensitive interventions across sectors is a key challenge to ensure effective implementation of multi-sector plan in Nepal.

#### PM-054

Poster

##### Nutritional status among 4 th year medical students.

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Objectives: Appropriate nutritional and eating habits in childhood, adolescence and young adulthood create conditions for optimal development. Overweight and obesity, major threats to public health, have an increasing tendency among the young generation also in Slovakia; according to IASO there are 39.5 % overweight and 18.1% obese males and 24.4% overweight and 15.9% obese females in our country.

Material and Methods: During the years 2012 and 2013 we obtained data from 713 fourth year medical students; 243 (34%) men and 470 (66%) women, mean age  $22.9 \pm 1.88$  yrs. There were 555 Slovak and 158 foreign-born students in this group. Anthropometric measurements (BMI, WHR, body fat percentage measured by means of Caliper, Near Infrared Interactance and Bioimpedance methods), blood lipid levels (total cholesterol, LDL-C, HDL-C, TAG), food intake data (24-hours recall, food frequency questionnaire) and energy balance were assessed as outcomes. Results and key findings: Student's food consumption did not meet the recommended dietary allowances. Poor eating habits were recorded.

The average values of the anthropometric parameters in the groups of foreign men and women were slightly above the recommended limits (the mean value of body fat percentage in females was  $25.58 \pm 5.12$ ; the mean BMI of males was  $25.79 \pm 4.52$ ).

BMI above 25 was observed among 8.3% of Slovak females compared to 18.9% of foreign female students ( $p=0.006$ ). 42.2% of Slovak males and 42.7% of foreign male students were overweight or obese according to BMI ( $p=0.94$ ). A larger WHR ( $\geq 1.0$  in men,  $\geq 0.8$  in women) was observed in 16.3% of Slovak female students vs. 31.3% of foreign female students ( $p=0.003$ ) and in men 3.3% vs. 2.4, respectively ( $p=0.5$ ). Increased body fat ( $>20\%$  in men,  $>25\%$  in women) was observed in 25.6% of Slovak females vs. 53.6% of foreign females ( $p=0.0001$ ), and 21.6% of Slovak males vs. 42.7% of foreign males, respectively ( $p=0.005$ ).

In multivariable analysis, BMI was positively associated with body fat percentage, previous reduction diet, male gender, higher age, and negatively associated with an energy balance (AOR=0.54; 95%CI=0.34-0.85).

Conclusion: Foreign students had higher occurrence of being overweight and obese for different reasons. After adjustment for age and gender there were no significant differences between foreigner-born and Slovak students. From the standpoint of overweight and obesity it is necessary to focus higher attention on primary prevention. The education of medical students in public health nutrition may play an important role in this process.

#### PM-055

Poster

##### Estimation of water balance in elderly people living in Greece.

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Objectives: Elderly people are at greatest risk for dehydration and its' potentially life-threatening consequences. Unrecognized and untreated dehydration can also complicate chronic medical problems and increase morbidity. The objective of the study was to estimate water balance, water intake and water loss in elderly people living in Greece using the validated Water Balance Questionnaire (WBQ).

Material and methods: The WBQ was administered in winter in the area of Athens, Greece to 108 independents aged 65-81y (54 males) (Group A), 94 independents aged 82-92 y (45 males) (Group B) and 51 hospitalized aged 65-92 y (34 males) (Group C). In addition, a database from previous study with common tool, area and season, of 335 adults aged 18-65 y (167 males) (Group D) was revisited and used for comparison.

Results: Mean estimates of water balance, intake and loss were, respectively, for Group A  $-749 \pm 1386$  ml/day,  $2571 \pm 739$  ml/day and  $3320 \pm 1216$  ml/day, for Group B  $-38 \pm 933$  ml/day,  $2571 \pm 739$  ml/day and  $3320 \pm 1216$

ml/day, for Group C the  $64 \pm 1399$  ml/day,  $2586 \pm 1071$  ml/day and  $2522 \pm 1048$  ml/day and for Group D  $-253 \pm 1495$  ml/day,  $2912 \pm 1025$  ml/day and  $3492 \pm 2099$  ml/day. Significant differences were detected in water balance ( $p<0.01$ ), water intake ( $p<0.01$ ) and water loss ( $p<0.01$ ) amongst the four Groups. In particular, water balance and water intake in Group A was the lowest of all the other groups. For Groups A, B, C or D contribution of solid foods to water intake was 36%, 29%, 32% and 25%, contribution of drinking water was 32%, 48%, 45% or 47%, while contribution of beverages was 32%, 23%, 23% and 28% respectively. There were differences in the contribution of drinking water ( $p<0.01$ ) and in the contribution of beverages ( $p<0.01$ ).

Key findings: The study delivered data on the estimation of water balance, intake and loss in the elderly. Sources of water intake were reported in detail. Independents aged 65-81 y had lower estimated water balance, water intake and water from drinking water than independents above 81 y or hospitalized aged 65-92 y. These later groups had lower water intake from beverages.

#### PM-056

Poster

##### Consumer perceptions of plant food supplements- a focus group study in three European countries.

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Objectives: With a growing trend in the consumption of plant food supplements it is important to understand consumers' perceptions of these products and in particular to gain insight into why these products are used or not used.

The aim of this study was to elicit and compare perceptions of plant food supplements between groups of consumers and non-consumers, in three European countries. More specifically we wanted to explore what assumptions and beliefs consumers and non-consumers hold about the role and efficacy of these products and the basis of this knowledge.

Material and methods: Two focus groups were conducted in each of the three countries (Italy, Romania and the UK); one with users and one with non-users of plant food supplements. The study was designed and piloted in the UK and the questions subsequently translated for use in the other countries. The discussions were moderated by members of the local research teams and the sessions recorded digitally. The recordings were transcribed verbatim and subjected to thematic analysis in each of the countries with a summary of the findings translated into English to allow comparison across the three countries.

Results: Users in the UK perceived plant food supplements as natural products and hence unlikely to cause any harm. Italian users expressed a mistrust of pharmaceutical drugs for treating less serious conditions whilst in Romania products were viewed as a natural alternative to conventional medicine. Plant food supplements were perceived as having a role in compensating for demanding lifestyles or addressing dietary deficiencies. Non-users expressed the opinion that eating an adequate diet and having a healthy lifestyle negated the need for such products. Trust was a central issue for both users and non-users with the former often referring to brand trust. Across all countries 'word of mouth' was frequently mentioned as a primary source of information.

Key findings: In general users of plant food supplements perceive them to be natural products, with a role in compensating for busy or unhealthy lifestyles.

#### PM-057

Poster

##### Is French diet quality improving? 40 years of households purchases, 1969-2010.

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Objectives: In a context of increasing chronic diseases related to nutrition, the study of the long-term evolution of the diet is crucial. The aim of this study was to observe the changes occurring in the diet structure of French households and their impact on nutritional quality during the past 40 years, from 1969 to 2010.

Material and methods: Time series of food purchases were built based on two representative annual surveys on household expenditures for food-at-home: INSEE (1969 to 1991) and Kantar (1991 to 2010). The average quantities purchased per capita each year were calculated for each food item and then aggregated into 18 main food groups and 80 sub-groups. Food quantities were also converted in energy and nutrients using a unique food composition

database (i.e. Ciquel) dating from 1995. The nutritional quality of food purchases was estimated by the macronutrients energy share, and by the Mean Adequacy Ratio, i.e. the mean percentage of daily recommended intakes for 15 key nutrients (namely proteins, fiber, retinol equivalents, thiamine, riboflavin, niacin, vitamin B-6, vitamin B-12, ascorbic acid, vita-

min E, vitamin D, calcium, potassium, iron, magnesium), calculated on a 2000 kcal basis.

Results: The purchases of several food groups increased during the last 40 years: in particular ready-to-eat dishes increased by 17.1kg/person. year, fruit juices by 19.3kg, yogurts by 11.2kg, dairy desserts by 6.5kg, soft drinks by 14.9kg, and sweets by 5.1kg. During the same period the purchases of sugar decreased by 13.8kg, as well as the purchases of fresh meats by 11.1kg, oils by 6.8kg and butter by 4.7kg. Fresh vegetables decreased by 12.0kg and fresh fruit by 8.0kg. A slight increase of caloric purchases (alcohol excluded) was observed from 2084kcal to 2222kcal (+138kcal/person.day). The energy provided by proteins increased (from 13.5 % to 15.7 %), that of carbohydrates decreased (from 47.4% to 45.3%) while fats remained quite stable at 39%. The Mean Adequacy Ratio increased (from 69.9% to 82.8% adequacy), showing an overall improvement.

Key findings: The structure of purchases for food-at-home changed from 1969 to 2010 in France. Processed foods such as ready-to-eat dishes, processed dairy products and soft drinks strongly increased, while raw products, in particular sugar and added fats, decreased. These substitutions had a moderate impact on the macronutrients balance and were associated with an overall improvement of the nutritional quality of food purchases.

#### PM-058

Poster

#### Maternal vitamin D status and Infant Outcomes in Rural Vietnam: A Prospective Cohort Study.

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Objectives: Vitamin D deficiency affects 1 billion people globally. It has an important role in bone homeostasis, brain development and modulation of the immune system and yet the impact of antenatal vitamin D deficiency on infant outcomes is poorly understood. We sought to assess the association of 25- hydroxyvitamin D levels in late pregnancy with early infant growth and developmental outcomes in rural Vietnam.

Material and methods: A prospective cohort study of 894 infants, born to women who had previously participated in a double-blind cluster randomized controlled trial of antenatal micronutrient supplementation in rural Vietnam was undertaken. Maternal vitamin D concentration was measured at 32 weeks gestation, and infants were followed until 6 months of age. Main outcome measures were cognitive, motor, socio-emotional and language scores using the Bayley Scales of Infant Development, 3rd edition, and infant length-for-age z scores at 6 months of age.

Results: 60 % (582/960) of women had vitamin D levels <75nmol/L at 32 weeks gestation. Infants born to women with 25- hydroxyvitamin D deficiency (< 37.5nmol/L) had reduced developmental language scores compared to those born to women who were vitamin D replete (≥75nmol/L) (Mean Difference (MD) -3.48, 95% Confidence Interval (CI) -5.67 to -1.28). For every 25nmol increase in 25- hydroxyvitamin D concentration in late pregnancy, infant length-for-age z scores at 6 months of age decreased by 0.08 (95% CI -0.15 to -0.02).

Key findings: Low maternal 25- hydroxyvitamin D levels during late pregnancy are of concern in rural Vietnam, and are associated with reduced language developmental outcomes at 6 months of age. Our findings strengthen the evidence for giving vitamin D supplementation during pregnancy.

#### PM-059

Poster

#### Factors associated with adherence to nutritional intervention to promote consumption of fruits and vegetables based on Transtheoretical Model.

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Objectives: Evaluate the level of adherence to nutritional intervention to promote consumption of fruits and vegetables based on Transtheoretical Model (TTM) and associated factors.

Material and methods: This was community trial randomized controlled with adults users the Program Academia da Saúde – PAS (public service to promote health) of Brazil.

Assessed socioeconomic data and the stages of change in TTM, collected at baseline, and the percentage of adherence in the intervention (number of participation/ total number of activities offered).

The nutritional intervention, executed in the morning, lasted seven months and consisted of: 4 educational group workshops, 3 actions on the en-

vironment the PAS (posters, food tasting, movie), 3 card with motivational messages, distribution of crop calendar and spelling book with culinary preparations. The percentage of adherence was rated satisfactory (≥50%) or insufficient (<50%).

Results: The sample consisted of 286 individuals, most women (87.8%) with mean age of 54.9 ± 13.2 years and 6.7 ± 4.5 years of study. Participated in the PAS 12.2 ± 8.8 months ago and lived on average 3.9 ± 2.3 blocks away from the PAS. Regarding the stages of change for fruit and vegetable consumption 22.4% were preaction (precontemplation and contemplation); 33.5% preparation and 44.1% action (action and maintenance). At the end of the intervention, 51.4% had satisfactory percentage of adherence. Among who has insufficient percentage of adherence (<50%), 74.8% left the PAS, 6.5% were in problems health/family and 18.7% for reasons unknown. Individual with satisfactory adhesion compared with insufficient were older (58.8 ± 11.2 vs. 50.9 ± 14.0 years; p=0.001); longer attending the PAS (15.0 ± 8.3 vs. 9.3 ± 8.4 months; p=0.002) and were not included in the labor market (74.8% vs. 54.0%; p<0.001).

Key findings: The adherence to nutritional intervention was low and suggests adopting new strategies for younger, with lower bond with PAS and entered the labor market with aimed at enhancing interventions.

#### PM-060

Poster

#### Association between alcohol drinking consumption and coronary Atherosclerotic burden.

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Objectives: To verify the association between alcohol consumption and coronary atherosclerotic burden.

Material and methods: Cross-sectional Study. Adult patients referred for coronary angiography were invited to participate of the study. The socio demographic data (age, education and occupation), cardiovascular risk factors (smoking, systemic arterial hypertension, dyslipidemia, diabetes, and family history of CAD) and the alcohol drinking habit were collected during the interview. The alcohol drinking consumption was divided in three categories: not drink; less than 15g ethanol/day (for women) or less than 30g ethanol/day (for man); and more than 15g ethanol/day (for women) or more than 30g ethanol/day (for man). The coronary atherosclerotic burden was assessed by a interventional cardiologists blinded to the alcohol drinking consumption, through the Friesinger Score (FS) in the coronary angiography.

Results: The study population was composed of 356 adult patients; 229 were male (63.1%). The average age was 60.5±11 years. Any level of alcohol consumption was reported by, 26 woman (19.4%) and 108 man (47.2%). There was lower alcohol consumption among patients with hypertension when compared to the ones without hypertension (p=0.031) and a more alcohol consumption among smoking patients when compared to the no smoking (p=0.003). There was no significant association between alcohol consumption and the remaining cardiovascular risk factors evaluated. Moderate alcohol consumption was inversely correlated to atherosclerotic burden as assessed by the FS in men (p=0.05) but not in women (P=NS). By multivariate analysis atherosclerotic burden was independently associated with sex, age, hypertension, and dyslipidemia, but not with alcohol consumption.

Key findings: An association between moderate alcohol consumption and lower coronary atherosclerotic burden was observed only in men by univariate analysis. This association was not significant after controlling for traditional risk factors.

#### PM-061

Poster

#### Anemia and vitamin A deficiency in Brazilian children.

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Objective: To analyze the determinants of anemia, vitamin A deficiency in Brazilian children.

Material and Methods: Reanalysis of data from the National Survey on Demography and Health of Women and Children (PNDS/2006), of which was based on a complex random sampling with national representation. This study analyzed 3.417 children aged from 6 to 59 months of age. Anemia was defined as hemoglobin <11g/dL determined by cyanmethemoglobin method. Vitamin A deficiency (VAD) was set as serum retinol <0.7 µmol/L, evaluated by high performance liquid chromatography. To expand the sample, the criteria adopted by PNDS were used. The variable

responses were presence of anemia and of VAD, while the explanatory variables were analyzed socioeconomic, environmental, maternal, of safety and food consumption and biological characteristics of the child. The strength of association between variables was evaluated by odds ratio (OR), with a significance level of 5%.

**Results:** Determinants of anemia: The prevalence of anemia in the Country was 20.5%. In multiple analysis, remained associated with anemia living in the Northeast [OR:3,45;CI:2,21-5,40], Southeast [OR:2,55;CI:1,60-4,06] and South [OR: 2,22; IC: 1,39-3,55]; in urban area [OR:2,01;CI:1,35-3,00], and having severe food insecurity [OR:1,78; CI:1,00-3,16], highlighting as protection having a mother with 5 to 8 years of study [OR:0,62; CI:0,41-0,92] and consuming meat at least once a week [OR: 0,45; CI: 0,22-0,93]. Determinants of VAD: The prevalence of VAD in the Country was 17.5%. After adjustment for confounding variables, remained associated with DVA living in the Northeast [OR:1,77;CI:1,16-2,77] and Southeast [OR:1,74;CI: 1,16-2,72]; in urban area [OR:1,29;CI:0,91-1,87]; and having a mother aged  $\geq 36$  years [OR:3,14;CI:1,48-7,09], while consuming meat at least once a week [OR:0,19;CI:0,09-0,40] resulted in protection.

**Key findings:** The prevalence of child anemia and VAD in Brazil reduced significantly, although, continue as a moderate public health problem. Despite different have some common determinants (living in macro-regions less and more developed and in urban areas), reaffirming the trans-social character of these deficiencies. Have determining food insecurity and as protection consuming meat at least once a week reinforces the social determination of these deficiencies, although food insecurity was not associated with VAD. It is evident that government strategies have contributed to the reduction of these nutritional deficiencies in the Country, but it is signaled the need for expansion of the government's strategy for prevention and control of VAD, so far restricted to high-risk areas Northeast and poor areas of the Southeast.

#### PM-062

#### Poster

##### **Results for open access competency test for food service students and staff are very similar.**

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JAMK University of Applied Sciences<sup>1</sup>; Seinäjoki University of Applied Sciences<sup>2</sup>; The Finnish Hearth Association<sup>3</sup>

**Objectives:** Finnish Heart Association in collaboration with two UAS in Finland created an open access nutrition educational material and competency test. The aim of the whole project was to increase the nutrition competence within food services national wide. The test and the learning material were created via studies (6) and thesis of students in co-operation with nutritionists in Finnish Hearth Association and two UAS.

The aim of the present study was to assess if there is differences between students and food service staff groups passed the test, and if the test results varied by age or student groups.

**Material and methods:** The data from accepted tests (passing limit 112/120) from October 2012 to November 2013 were evaluated (n=3387). The data consist of the scores together with the job title and age of the person passed the test. The job titles were classified to six groups (students, food service staff, food service managers, teachers, nutritionists). The data about not passed tests was not available. The results are described in number of passed test (SD) and differences between groups.

**Results:** The average score reached was 113.9 $\pm$ 2.7. Test was accomplished by 1191 students (average score 113.9  $\pm$  2.9) and 76 teachers (113.9 $\pm$ 1.6) of catering and related fields, 1491 food service worker (113.8 $\pm$ 1.8), 394 food service manager (114.0 $\pm$ 1.9) and 31 nutritionists (114.3  $\pm$  2.1). The differences between groups passed the test are minor. However, results hint that when analyzed by age groups, the older groups got less high points both in students (p=0.058) and food service staff (p=0.064). The service staff got lower points than those working in kitchen (p=0.115). The teachers got lower points than students (p=0.712), which should not be the case. Food service managers got slightly better points than food service staff (p=0.375).

**Key findings:** Public health can be improved by increasing the nutrition competence within food services. For that purpose easily feasible open access nutrition educational material with competency test is a new innovative method. The results can be used in developing the test and material, and developing the next phase of test, which is targeting managers and teachers. The results show that continuing education for teachers is in most importance, the results of teachers should be better than those of students.

#### PM-063

#### Poster

##### **Consumer research on commercial fortified rice program in Brazil provides insight on marketing messages for nutrition.**

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<sup>2</sup>PATH, Seattle, Washington.

**Objectives:** Rice fortification has vast potential to address micronutrient de-

ficiencies; however a large-scale commercial model for fortified rice has never been implemented. Brazilian consumer rice-purchasing behavior and decision drivers were analyzed in order to inform a replicable market development model for scaling fortified rice through commercial channels.

**Material and methods:** Qualitative and quantitative randomized consumer responses and data were collected at point of sale. Consumers over age 18 who contribute to household rice purchasing decisions were individually interviewed from 30 January - 7 February 2014. Thirty qualitative interviews were conducted in 3 stores in São Paulo, 200 quantitative interviews were conducted in 5 stores in São Paulo, and 200 quantitative interviews were conducted in 5 stores in João Pessoa. Information collected included general rice purchasing habits, brand and type of rice preferences, household demographics, level of awareness of rice fortification, and reasons for purchase or non-purchase of fortified rice.

**Results:** Based on the analyzed samples, 73% of respondents considered women as the primary rice purchase decision makers. Such decisions are driven by brand loyalty, appearance (as a proxy for quality), and to a lesser extent, price. The two sampled cities showed distinctive preferences between package size (5kg vs. 1kg) and type of rice (white vs. parboiled). Based on the 400 quantitative responses, 93% of consumers were not aware of micronutrient malnutrition. However, 78% would be likely to buy fortified rice if it were established to them that it can reduce micronutrient malnutrition. Thirty-two percent of consumers were aware of fortified rice, and out of those aware, 13% had purchased it. Those consumers first heard of fortified rice on TV (41%), followed by in-store product packaging (23%). Primary reasons given for not buying fortified rice were that the packaging did not catch consumers' attention (57%) or consumers were accustomed to other rice types (21%).

**Key findings:** Initial research with Brazilian consumers indicates a positive attitude towards fortified rice despite current low uptake. While most consumers interviewed were unaware of micronutrient malnutrition, they claimed they would be likely to consume fortified rice if they understood its benefits. Fortified brand marketing should adapt to local purchase preferences which vary by geographic region. Rice is deeply rooted in Brazilian food culture; therefore any change, such as fortification, requires significant consumer reassurance.

#### PM-064

#### Poster

##### **High sodium intakes in toddlers from China estimated by 24-hour dietary recalls.**

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**Objectives:** Sodium consumption is one of several dietary factors that contribute to increased blood pressure. Eating too much salt in childhood can lead to a preference for salty foods. The sodium intake in adults in China is reported to be high (5235 mg/day) but that in young children is less known. The objective of the study was to understand the sodium intakes in infants and toddlers from China.

**Material and methods:** Subjects were a total of 1405 infants aged 6-11 months (n443), toddlers aged 12-23 (n476) and 24-35 months (n488) recruited from 8 cities in China for Maternal Infant Nutrition Growth (MING) study. Dietary information was collected by using 24-hour dietary recalls for one day via a structured face to face interview referencing a standard picture book of common food to estimate the amount consumed. Nutrient intakes were analysed based on China Food Composition 2002 (China CDC). The adequate intake (AI) of sodium, 200 mg/day for infants of 6-11 months and 650 mg/day for toddlers of 12-35 months recommended by Chinese Nutrition Society and the upper intake level (UL), 1500 mg/day recommended by Institute of Medicine US were used to evaluate the sodium intakes estimated.

**Results:** The mean sodium intakes (SD) for the infants aged 6-11 months, toddlers aged 12-23 and 24-35 months were 564 (1005), 2398 (1757) and 2270 (2351) mg/day respectively. The mean sodium intake in toddlers aged 12-23 months exceeded by 269% and that in toddlers aged 24-35 months exceeded by 249% compared with China AI. A sodium intake higher than UL was found in 59% and 60% of the toddlers in each group respectively. Top 3 sources of sodium were for infants aged 6-11 months: added salt (during cooking) 60.1%, infant formula 14.8% and eggs 6.9%; for toddlers aged 12-23 months: added salt 81.3%, infant formula 4.9%, fish/shellfish/shrimps 3.4%; for toddlers aged 24-35 months: added salt 80.5%, infant formula 3.0%, fish/shellfish/shrimps 2.9%. These results suggested that the salt added during cooking was the main source of sodium intake from 6 months and increased significantly from 12 months.

**Key findings:** Sodium intakes in toddlers from China exceed recommended intakes by far too much. The high sodium intakes mainly come from home-cooked food. This finding also indicates that a higher-than-recommended dietary exposure to salty food starts early in life. Public health workers should pay attention to this finding and more investigations are needed.

**PM-065****Poster****Effects of Typhoon Yolanda on the nutritional status of children in the Philippines.**

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<sup>1</sup>Accion contra el Hambre (Action contre la Faim).<sup>2</sup>World Food Programme-Philippines.<sup>3</sup>National Nutrition Council.<sup>4</sup>UNICEF-Philippines

**Background and objectives:** On November 8<sup>th</sup>, 2013, Typhoon Haiyan, locally known as Yolanda, struck the Philippines. In its wake, 14.1 million people were affected and 4.1 million displaced. Infrastructure, water and sanitation, food security and medical facilities were severely damaged, along with the shelter and security of domestic households. The main objective of this survey was to determine the nutritional status of children 6-59 months in typhoon-affected areas. In addition, the coverage of vitamin A supplementation, deworming, measles vaccination and feeding programmes; the prevalence of childhood illnesses (diarrhea and acute respiratory infection) and malnutrition among women 15-49 years of age; and information on breastfeeding practices in surveyed households were also assessed.

**Methods:** A cross-sectional nutritional assessment using the standardized field methodology SMART (Standardized Monitoring and Assessment of Relief and Transitions) was undertaken by ACF in collaboration with the Nutrition Working Group, including UNICEF, WFP, WHO and the National Nutrition Council, from February 3<sup>rd</sup>-March 14<sup>th</sup>, 2014. Cluster sampling using a three stage sampling methodology was employed across 3 regions affected by Typhoon Yolanda of the Philippines, with a sample size being representative of these affected areas. ENA software was used to generate the anthropometric scores. The nutritional status of children was analysed using WHO Child Growth Standards and SMART Flags were excluded (-3/+3 SD) from the observed survey mean. EpiInfo was used to analyse the additional information collected.

**Results:** A total of 1386 households were visited with 645 children aged 6-59 months from 60 different clusters. The main results of the survey found an overall prevalence of wasting, stunting, and underweight in children aged 6-59 months of 4.1% (95% CI: 2.9-5.9), 30.6% (95% CI: 25.6-36.0) and 20.7% (95% CI: 17.3-24.6) respectively. No alarming results were found with regards to child morbidity nor the prevalence of undernutrition among women of reproductive age, based on MUAC. In terms of infant and young child feeding practices, 14% of children aged 0-23 months were never breastfed and 58% initiated breastfeeding within the first hour in the typhoon-affected areas.

**Conclusions:** Prevalence of acute malnutrition did not raise emergency thresholds. Programming for stunting prevention interventions will require a more comprehensive and long-term approach (outside an emergency context). The survey results suggest that breastfeeding practices are generally suboptimal and inappropriate, underlining the need to step up and improve the quality of breastfeeding support systems.

**PM-066****Poster****Evaluation on nutrient intakes of infants and toddlers from 8 cities in China.**

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**Objectives:** The knowledge on dietary status in young children in China is scarce. The objective of the study was to evaluate the nutrient intakes of infants and toddlers from urban areas in China.

**Material and methods:** A cross-sectional study of Maternal Infant Nutrition Growth (MING) was conducted to investigate the nutrient intakes and nutrition status of pregnant and lactating women and young children from 8 cities in China. Subjects of present report were a total of 2481 infants and toddlers from MING study in five age groups as 0-5 month breastfeeding and non-breast feeding, 6-11, 12-23 and 24-36 months. Dietary information was collected by using one-single 24-hour dietary recall via a face to face interview referencing a standard picture book of common food to estimate the amount consumed. Nutrient intakes from food were analysed based on China Food Composition 2002 (China CDC). The estimated average requirement (EARs) or adequate intakes (AIs), and upper intake level (ULs) recommended by Chinese Nutrition Society were used to assess the nutrient intakes from food and supplements.

**Results:** Average intakes of energy and macronutrients met recommendations but with lower than recommended energy contribution from fat in 40-50 % of infants and toddlers diets. Mean calcium intakes exceeded AI, but an intake lower than the AI was found in 25% of infants and 50% of toddlers. Mean iron intakes met the AI in toddlers, but not in older infants and iron intake lower than the AI was found in 75% of the infants of 6-11 months. Zinc intakes were low, about 70% of infants and 50% of toddlers had intakes below the EAR. About 20% of infants and toddlers had vitamin A intakes below the EAR. In addition, although no UL is defined for vitamin A in China, a subset of infants and toddlers may be at risk of excessive intake. Sodium intakes exceeded AI significantly in toddlers. While there is also no UL for sodium in China, over 50% of toddlers have intake above the UL set by the Institute of medicine in the US.

**Key findings:** The present dietary survey is the first large-scale survey done in infants and toddlers in China. Results indicate that intake of several nutrients are inadequate or excessive in the diets of many infants and toddlers. Further investigations to understand the imbalances of these nutrients are ongoing.

**PM-067****Poster****Assessment of diet quality in health staff using the Healthy Eating Index in Kastamonu, Turkey.**

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**Objectives:** This study aims at determining the food varieties and total diet quality of the health staff using the US Department of Agriculture (USDA) Healthy Eating Index-05 (HEI-05).

**Material and methods:** The research was carried among total 350 health staff, 282 female and 68 male selected randomly among the health staff in the Kastamonu province, Turkey. Research data was collected by using a questionnaire form, and a face to face interview method by the researcher. The data about daily food consumptions of the health staff was collected using "24-hour dietary recalls", the energy and nutrient values of the food consumed by the subjects were calculated by using the "Nutrition Information System (BEBIS) Software Version 4". Anthropometric measures were taken according to standard methods. Statistical evaluation was held using SPSS 17.0 software pack, and frequency (f) distribution of percentages (%), mean, chi-square significant test<sup>(χ)</sup>, Kruskal-Wallis Test<sup>(K)</sup>, Mann-Whitney test (U) and Hollander-Wolfe method were applied for the independent samples.

**Results:** The mean age of the health staff was 33.6±7.5 in women and 34.6±8.7 in men. Body Mass Index values of the participants, in the 18.5-24.9 kg/m<sup>2</sup> range, were 61.4%. Among females, food varieties mean score was 8.5±2.1 and 7.6±1.8 in man (p<0.001). No health staff was found to have 10 (≥16 varieties) food varieties score. It was seen that 79.5% of the physicians, 69.2% of the health professional with bachelor's degree (psychologist, dietician, etc.), 77.8% of the nurse-health officers, and 93.3% of the health technicians consumed 6-15 varieties of food in a day (p>0.05). It was determined that the HEI-05 mean scores of the man health professional was 61.6±8.1, 65.9±8.9 in woman (p<0.000). Ninety percent of the health staff consume "a diet that needs improvement" (51-80 score), 5.5% consume "a good diet" (81-100 score), and 4.5% consume "a poor diet" (0-50 score).

**Key findings:** It was concluded that the health staff had lower HEI-05 score and food varieties than the ones recommended by USDA. The health staff should be motivated to enrich their food pattern through in-service trainings and certain educational strategies.

**PM-068****Poster****Prejudices of health workers on the rural population in the rural Peruvian Andes.**

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<sup>1</sup>Action Against Hunger.<sup>2</sup>Health Micro Network Vilcas Huaman

**Objectives:** To identify health workers' prejudices to rural families that can result in cultural barriers between supply and demand for health care and nutritional counseling at Vilcas Huaman health centers, Ayacucho, Peru.

**Methods:** This is a descriptive research developed in 8 districts at Vilcas Huaman Province. The target population is 55% of the staff working in 20 health facilities. 60 surveys were administered to health workers (45 % to health technicians, 20 % to nurses, 13% obstetricians, 10% to medical doctors and 12 % to other professions).

**Results:** The health workers evaluated were between 35 and 45 years old; 95 % were Quechua speakers and have over 1 year working in the health centers. 87 % of health workers affirm that "rural families are lazy and simplistic", 84 % said that "rural families do not concern about the health care and feeding of their children and take more care about their cattle"; 61 % reported that "rural parents senseless act according to their beliefs and customs" other 61 % believe that "parents are not interested in the education and the future of their children"; 82 % perceived that "mothers do not understand the nutrition and health counseling"; 90% affirm that "mothers bring their children to the health facilities because are obligated"; and 63 % said that "rural parents have enough time and never are busy". It is noted that as younger respondents are more likely to be prejudiced about users.

**Main conclusions:** The perception of health workers about the culture of this rural population is characterized by a high content of unfounded prejudices; these workers must consider about the health quality processes and health and nutrition counseling in the first care referral.

**PM-069****Poster****Association of vitamin D and psychological wellbeing.**

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**Objectives:** Recently, there has been increased interest in the role of vitamin D in psychological health and wellbeing. Sun exposure is the major source of vitamin D for humans, and thus, in absence of supplementation or suitable fortification, the level of circulating serum 25-hydroxyvitamin D, the main marker for vitamin D status, decreases significantly during winter. Low levels of circulating serum 25-hydroxyvitamin D have been associated with suboptimal psychological wellbeing. However, time spent outdoors has not been taken into account in previous studies of the relationship between vitamin D and wellbeing. We investigated the association of vitamin D and depression in a young adult sample, controlling for time spent outdoors during daylight hours.

**Material and methods:** A cross-sectional sample of 615 students (234 men, 37.5%, mean age 19 years, range 17-25y.) participated in the Daily Life Study, a micro-longitudinal study of student experiences, during southern hemisphere autumn in Dunedin, New Zealand (S45°52'). Participants completed an initial questionnaire including demographics (age, gender, and ethnicity) and the Centre for Epidemiological Studies Depression Scale to measure the presence of depression symptoms. Ambulatory assessment of time spent outdoors was conducted using a 2-week protocol where participants reported on their time spent outdoors each day through an online daily diary. Finally, we measured their height and weight, and obtained a venous blood sample for 25-hydroxyvitamin D analysis. Serum 25-hydroxyvitamin D was analysed using isotope-dilution liquid chromatography tandem mass spectrophotometry. 25-hydroxyvitamin D was used to predict depression scores, adjusting for age, gender, ethnicity, BMI and time spent outdoors.

**Results:** Prevalence of low vitamin D was high whereby 32% of participants had 25-hydroxyvitamin D below 50 nmol/L. Mean 25-hydroxyvitamin D was 63.9 nmol/L (SD=26.5 nmol/L, range 8.2-177.0 nmol/L), and women had higher 25-hydroxyvitamin D than men ( $p<0.001$ ) although they spent less time outdoors on average. 25-hydroxyvitamin D was a significant predictor of depression symptoms even after controlling for other predictors including time spent outdoors. Every standard deviation increase in serum 25-hydroxyvitamin D was associated with a 4.5-point decrease in the CES-D score on average ( $r = .152, p<0.001$ ).

**Key findings:** The prevalence of vitamin D deficiency was high even in this young community sample. Serum 25(OH)D3 was inversely associated with depression scores in this young community sample. The findings support further investigation through an appropriately designed, randomised controlled trial of supplementation with vitamin D among young adults in the general population.

#### PM-070

Poster

#### Association of body mass index with bone mineral density in southern Brazilian womens.

Chagas, P<sup>1</sup>; Mazocco L<sup>1</sup>

<sup>1</sup>UFMS - Federal University of Santa Maria, Palmeira das Missões- RS, Brazil

**Objectives:** To verify the association between Body Mass Index (BMI) and Bone Mineral Density (BMD) in womens.

**Material and methods:** Cross-sectional study. Womens patients referred for bone densitometry were invited to participate of the study, in Palmeira das Missões - RS, from October 2012 to December 2013. The socio demographic data (age, marital status, education and occupation) were collected during the interview. For anthropometric measurements all patients were evaluated only wearing hospital apron. The weight in kilograms (kg) was measured using an anthropometric Filizola (São Paulo, Brazil). The height, in meters (m) was measured with the stadiometer of anthropometric scale.<sup>1</sup> The BMI was calculated using the equation weight (kg) divided by height (m) squared. The BMD measurement was performed using bone densitometry, and was performed by blinded to BMI technician. The classification of normal BMD, osteopenia and osteoporosis was obtained according to the diagnostic criteria proposed by the Brazilian Society of Clinical Densitometry<sup>2</sup>. Data were analyzed using the statistical software Statistical Package for Social Sciences (SPSS) version 18.0 and are presented as mean  $\pm$  standard deviation and percentages. To compare the three categories of BMD and BMI the One-Way ANOVA was used.

The study is part of a larger project approved by the ethics committee of the University under the number of CAEE 05494112.0.0000.5346 and all participants agreed to participate freely signing the consent form.

**Results:** The sample consisted of 489 women with a mean age of 56.9  $\pm$  9.45 years, with the most prevalent married ( $n=337, 68.9\%$ ), schooling from 4-8 years of study ( $n=252, 51.5\%$ ) and retired ( $n= 184, 37.6\%$ ). Of the total sample 31.08% ( $n=152$ ) had normal BMD, 45.39% ( $n=222$ ) osteopenia and 23.51% ( $n= 115$ ) osteoporosis. The BMI was inversely and significantly with BMD ( $p<0.001$ ), and the mean BMI in women with normal BMD was 29.29  $\pm$  5.29 kg/m<sup>2</sup>, in participants with osteopenia was 28.85  $\pm$  5 kg/m<sup>2</sup> and in women with osteoporosis was 26.90  $\pm$  4.78 kg/m<sup>2</sup>.

**Key findings:** In women, BMI was inversely and significantly associated with BMD.

#### PM-071

Poster

#### Application of Nutrimetry to the Mexican National Health and Nutrition Survey 2012.

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<sup>1</sup>Centro de salud de Tenabo, Campeche. Secretaría de Salud del Estado de Campeche, México. <sup>2</sup>Programa PIAOY, Secretaría de Educación del Gobierno del Estado de Yucatán, México. <sup>3</sup>Grupo de investigación en ejercicio para la salud, Mérida, Yucatán, México.

**Objectives:** To run the application of Nutrimetry into a representative dataset of Mexican children and adolescents, as a way to show how this instrument can help assess malnutrition and decide appropriate public health interventions.

**Material and methods:** 20,550 males and 20,451 females aged 0-19 years from the 2012 National Health and Nutrition Survey (ENSANUT 2012) were studied. The calculi of Nutrimetry (Nutrimetría) were applied as explained elsewhere, based on the SD scores of Height-for-age and BMI-for-age after the World Health Organization references.

**Results:** About 50% of the Mexican children and adolescents are coded as 6 (normal BMI and stature). About 30% of children are coded as 9 (normal height and high BMI, 20/25% in adolescents). The high stature codes (5, 8 and 11) sum no more than 2% within childhood. Code 4 (short stature, normal BMI) is about 8% during early childhood and 4.8% during childhood. However, boys and girls show clearly different patterns during adolescence, with 2.3% and 23.3% of code 4 prevalence respectively. Different patterns were also found for each State. Children in some southern states as Yucatan and Campeche show less code 6 and more code 9 than the Mexican average. Adolescent women from Yucatan show an increase of prevalence in short stature codes 4 and 7. In contrast, some northern states may show lower prevalence of codes 4 and 7 than the Mexican average.

**Key findings:** The generalized high prevalence detected in code 9 children and adolescents should be treated with strict control of weight and physical activity. In some states, where the low stature obesity (code 7) is high, the subjects should follow a differential diagnosis from congenital and genetic syndromes, cardiopathy, endocrinopathy, and nephropathy, to low familial stature as primary cause. The use of Nutrimetry has been shown to be useful to understand intra-group differences across nutritional status categories. It also allowed us to detect differences between Mexican states that should be considered in public health policies.

#### PM-072

Poster

#### Challenges in the promotion of healthy nutrition in early life.

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National Center of Public Health and Analyses, Sofia, Bulgaria

**Background:** The National Nutritional Survey of Children aged under five years and their mothers (2007) provided data to identify main problems in early life nutrition of Bulgarian children: breastfeeding – short duration, low prevalence of exclusive breastfeeding; complementary feeding - early introduction of fruit juices, low iron and n-3 PUFA intake; nutritional status - widespread stunting among infants, overweight in children aged 1-2 years, anemia in children 6-36 months old and mothers. Based on the observed data, national/local nutrition policy measures were initiated. **Activities:** Variety of tools, approaches and channels for promotion of healthy nutrition were applied: national dietary guidelines were developed for women in child-bearing age, pregnancy and lactation, and for infants; campaigns were carried out annually related to World Breastfeeding Week & National Week for Counteracting Obesity; established were schools for future parents, interactive web sites, training of voluntary consultants on breastfeeding and consultative centers on breastfeeding; media were involved. Manual with Book of Recipes for the feeding of children up to 3 years of age was published and is under implementation in the feeding in the nurseries.

**What went well:** Promotion of healthy nutrition on national / local level with focus on risk population groups (infants, children in different age, pregnant and lactating women), regularly provided from experts by media and national campaigns, improved the awareness of the community. Promotion of folic acid supplementation of women in child-bearing age /pregnant women was implemented by multisectoral multichannel approach. Promotion of breastfeeding by Consultative Centers on Breastfeeding involving personal consultancies and training of mothers was accepted very well. Through the national campaigns against obesity the population became familiar with the problem and the interest for healthy nutrition was increased. Implementation of nutrition regulation/meal standards in nurseries is promising.

**Challenges and lessons learned:** There is no harmonization in the recommendations given from health professionals on exclusive breastfeeding and complementary feeding of infants. Pediatricians, GPs, gynecologists,

nurses have no adequate knowledge on early life nutrition and it is necessary such information to be involved in their education. Mothers' associations are enthusiastic and effective, but are not well informed. The personal contacts of the local known health specialists with people on site are very effective. The schools for future parents and websites often provide incorrect nutritional information and give inadequate recommendations, and need accreditation. Enough and sustainable support from the government is necessary.

**PM-073**

Poster

**Correlation of serum 25-(OH)-vitamin D levels with the type of obesity in overweight and obese people.**Nikolova M.<sup>1</sup>, Rangelova L.<sup>2</sup><sup>1</sup>Medical University-Department of Hygiene, Medical Ecology and Nutrition, Sofia, Bulgaria.<sup>2</sup>National Centre of Public Health and Analyses, Sofia, Bulgaria.

**Objectives:** Vitamin D deficiency is widely spread around the world. The relation between the serum vitamin D levels and the body fat distribution in obesity is not sufficiently studied in Bulgarian population. There are no published studies that combine bioelectrical impedance and DXA in the examination of body composition in respect to the serum levels of vitamin D. The aim of the current study is to evaluate the body composition and the type of obesity in overweight and obese adults and searching the connection with serum levels of 25(OH) vitamin D (25(OH)D).

**Material and methods:** Between January - April 2014 a cross-sectional survey on nutrition, nutritional and vitamin D status, including a sample of 168 adult volunteers (18-65 years) was conducted. The height, weight and waist circumference, blood pressure were measured. Body mass index (BMI) was assessed by standard methodology. Food consumption was examined by 24-h recall, food frequency questionnaire (FFQ), and the physical activity level (PAL) by IPAQ. Body fat distribution and type of obesity were evaluated using two methods: bioelectrical impedance on the device Tanita BC 420 MA and dual-energy X-ray absorptiometry (DXA) on the GE Lunar Prodigy PRO. The serum levels of 25(OH)D were measured by an immunoassay for quantitative in vitro measurement of 25(OH)D (Roche Diagnostic). Also fasting blood glucose levels, total cholesterol, HDL, LDL, TG were measured.

The results were collected and will be compared with reference values for healthy adults defer from age, gender and PAL. The factors associated with vitamin D levels, namely age, sex, milk consumption, supplement use, season of sun exposure and BMI, were also examined.

**Results:** The relative rate of adults with overweight was 32.1 % (BMI 25.0-29.9 kg/m<sup>2</sup>), obesity was 67.9% (BMI ≥ 30.0 kg/m<sup>2</sup>). The gender distribution revealed that the prevalence of obesity among men was 76.3% and among women was 60.2%.

Vitamin D status in 89.3% of studied adults was impaired: 35.7% had insufficient levels of vitamin D (25(OH)D < 50 nmol/L) and 53.6% had vitamin D deficiency (25(OH)D < 30 nmol/L). The prevalence of Vitamin D deficiency was the highest among obese women (39.7%).

**Key Findings:** The results will be a basis to establish the relationship as between the serum levels of 25(OH) D and the quantity of fat and fat-free tissue in overweight and obesity as the type of obesity - visceral or subcutaneous in adults.

**PM-074**

Poster

**Can gamification influence food behavior in adolescent athletes?**Vepsäläinen H<sup>1</sup>, Lehtovirta M<sup>2</sup>, Aistrich A<sup>3</sup>, Quarshie M<sup>3</sup>, Fogelholm M<sup>1</sup>, Erkkola M<sup>1</sup>.<sup>1</sup>Department of Food and Environmental Sciences, Division of Nutrition, University of Helsinki.<sup>2</sup>Department of Public Health, Hjelt-institute, University of Helsinki.<sup>3</sup>Wellness Foundry Holding Ltd., Helsinki, Finland

**Objectives:** We aim to determine if the eating habits of adolescent athletes could be influenced using a game-like smartphone application.

**Materials and methods:** A total of 53 adolescent basketball (34%) and soccer players (66%) were recruited to the study. They were randomized to game (n=24, 45%) and tutorial (n=29, 55%) groups. The game group members kept visual food journals during a four week study period using a smartphone application. The meals uploaded to the application were given scores by a nutritionist if specific food items defined in the rules were present. The participants were able to see each other's scores and they competed with each other. Each tutorial group member took part in a single small group meeting discussing healthy diets. Food intake was measured at baseline and after the intervention using a food frequency questionnaire (FFQ) specifically designed for the study. The changes occurring during the intervention were examined within and between the game and tutorial groups.

**Results:** Altogether 40 participants (77%) completed the FFQ after the intervention. Baseline characteristics of the participants were similar in both groups. Among the female athletes, the gamified application triggered a more substantial increase in the consumption of wholegrain porridge compared to the tutorial group (p = 0.028). Among the male athletes,

the tutorial group increased the consumption of vegetables, fruits, and berries more than the game group (p = 0.005), whereas changes in the consumption of milk were more apparent in the game group (p = 0.009). Among the male athletes within the game group, the consumption of milk with 1% or more fat and that of total milk decreased 2.2 (SD 1.9) and 1.5 times/day (1.8), (p for both = 0.028), respectively. The male athletes within the tutorial group increased their consumption of vegetables, fruits, and berries 1.4 times/day (SD 1.9, p = 0.024) and nuts 1.5 times/week (SD 2.2, p = 0.019). The smartphone application was thought to be fun, challenging, and educational.

**Key findings:** During the intervention period, the male athletes showed more changes in their diets compared to the female athletes. Among the male athletes, both the gamified and the more conventional interventions were effective. In the future, the two intervention methods could be combined to enhance the role of social support and to enable individual tailoring.

**PM-075**

Poster

**From wasting to thriving: Community-based feeding counseling improved feeding and growth in rural Bangladesh.**

Guldan G.S., Islam T., Begum, A.

Asian University for women, Chittagong, Bangladesh

**Objectives:** Only 21% of Bangladesh infants and young children aged 0 to 29 months are fed adequate complementary food, perhaps indicating a lack of caregiver feeding knowledge. Stunting and underweight rates are around 40%, and urban/rural growth disparities make the scenario more problematic. This study, conducted in rural Chittagong, tested the efficacy of a year-long infant and young child feeding (IYCF) intervention featuring weekly counseling home visits by four local community health educators aiming to improve IYCF, energy and nutrient intakes and growth of children <30m.

**Material and methods:** After a needs assessment, a culturally tailored complementary feeding intervention was designed and women educators trained. Following intervention implementation from mid-2012 to mid-2013, a cross sectional survey was conducted to evaluate the intervention outcomes, comparing the counseled (n=60) group to a control group without counseling (n=85).

**Results:** After intervention, the counseling group had significantly fewer wasted (17% vs. 32%; p=0.04) participants than the control group. Also, the caregivers from the counseling group had significantly higher positive responses about what they did when the infant asked for more food (82% vs. 42%; p<0.001). The counseling group children had significantly higher intake adequacies of iron (90% vs. 72%; p=0.04) and marginally significantly higher zinc intake adequacies (17% vs. 6%; p=0.06) than the control group. Multivariate logistic regression adjusting for various confounders showed the likelihood of being wasted after receiving counseling decreased from 46% to 19% relative to the controls. However, the proximal effect of the complementary feeding on wasting could not be assessed due to lack of significant power.

**Key findings:** An educational intervention delivered through local health educators improved caregivers' IYCF and child growth with respect to wasting.

**PM-076**

Poster

**A comparison of dietary characteristics among adolescents in two neighboring villages in Chittagong, Bangladesh: A trend towards a micro nutrition transition?**

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Asian University for Women, Chittagong, Bangladesh

**Objectives:** The objective of this geographical nutrition study was to compare nutrition transition characteristics indicated by intakes of energy-dense snacks and sweetened beverages, fat, sugar and dietary fiber consumption, physical activity and the prevalence of under- and overweight among adolescents aged 13-16y in two neighboring, but more and less urbanized villages, in Chittagong, Bangladesh.

**Material and methods:** We conducted a cross-sectional study using a door-to-door survey method, interviewing all 85 adolescents from the urbanized village and all 68 adolescents from the remote village.

**Results:** Only 23.5% of the participants in the remote village vs. 9.4% in the urbanized village consumed vegetables at least daily (P=0.008). The reported consumption frequencies of non-homemade savory fried snacks such as singara/samosa, peaju, chanachur, parata, chola, pickles, sweetmeats and soft drinks, all from shops, were all significantly higher in the urbanized village than in the remote village (p<0.05). About 80% of the adolescents from each village did not consume adequate dietary fiber, and 30% of all the adolescents exceeded the new WHO-recommended limit for sugar. The urbanized village had both underweight (11%) and overweight (16.5%) participants, mostly males, whereas the prevalence of overweight in the remote village was 13.8%. Physical activity status did not differ by gender or adolescent weight status.

**Key findings:** Adolescents from both villages had similar reasonable macronutrient energy proportions but low fruit, vegetable and dietary fiber intakes and excessive sugar intakes. The urbanized village adolescents

ate more purchased energy-dense snacks and beverages from shops. The overweight rates were similar, and a nutritional double burden with underweight also existed. Both villages displayed trends of moving through a nutrition transition, with the urbanized village perhaps a step ahead. Further research with larger sample size is needed to understand the nutrition transition characteristics among rural adolescents and other populations.

#### PM-077

Poster

##### Association of consumption of soft drink with coronary atherosclerotic burden.

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<sup>1</sup>Department of Food and Nutrition, Universidade Federal de Santa Maria, RS, Brazil. <sup>2</sup>Universidade Federal de Pelotas, RS, Brazil. <sup>3</sup>Cardiovascular Research Center - Hospital São Lucas-Pontifícia Universidade Católica do Rio Grande do Sul, Brazil. <sup>4</sup>Postgraduate in Cardiology - Fundação Universitária de Cardiologia, RS, Brazil. <sup>5</sup>Institute of Geriatrics and Gerontology, Pontifícia Universidade Católica do Rio Grande do Sul, RS, Brazil.

Objectives: To verify the association between soft drink and coronary atherosclerotic burden.

Material and methods: Cross-sectional study. Adult patients referred for coronary angiography were invited to participate of the study. Sociodemographic data (age, education and occupation), the cardiovascular risk factors (smoking, hypertension [HAS], dyslipidemia, diabetes mellitus [DM], and family history of CAD [CAD+HF]) and soft drink consumption were collected through interviews using a structured questionnaire. Soft drink consumption was divided into three categories: not consume soft drinks, consume regular soft drink and consume diet soft drink. Coronary atherosclerotic burden was assessed using the score Friesinger (EF) on coronary angiography. This score ranges from 0 to 15 and scores separately in each of the three main coronary arteries. All coronary lesions were assessed by blinded interventional cardiologists to soft drink consumption. Data analyzes were performed using the Statistical Package for Social Sciences (SPSS) version 18.0. Chi-square test was used for categorical variables and one-way ANOVA for the three categories of consumption of soft drinks and EF. A multiple linear regression model was completed with the EF as the dependent variable and the other variables as independent variables. This is an arm of a larger study entitled "Food habits and anthropometric profile and its association with coronary atherosclerotic burden." The research protocol was approved by the Ethics Committee of PUCRS under number 08/04211.

Results: The sample consisted of 310 adult patients with suspected coronary artery disease undergoing coronary angiography (63.1% men). The mean age was 60.03±11.02 years, with the highest prevalence of married (69.7%), schooling between 4-8 years of education (42.6%) and retired (51.6%). In relation to cardiovascular risk factors sample showed: 77.4% hypertension, 53.7% dyslipidemia, 28.7% DM, 20.1% were smokers and 21.4% HF+DAC. Of the total sample, 23.9% reported not consuming soft drinks, 57.1% reported consuming regular soft drink and 19% diet soft drink. Among the sociodemographic data, the consumption of soft drinks was significantly associated only with the time of study ( $p < 0.001$ ) and between cardiovascular risk factors soft drink consumption was significant with hypertension ( $p = 0.004$ ) and DM ( $p < 0.001$ ). The EF average of non-consumers of soft drinks, regular soft drink consumers and diet soft drink consumers, was, respectively, 7.43±4.53, 7.13±4.01 and 7.8±3.88. No significant association of soft drink consumption was found with the EF ( $p = 0.544$ ). The atherosclerotic burden was independently associated with age ( $p < 0.001$ ), gender ( $p = 0.002$ ), hypertension ( $p = 0.025$ ) and smoking ( $p = 0.024$ ).

Key findings: No significant association of soft drink consumption was found with coronary atherosclerotic burden.

#### PM-078

Poster

##### Efficacy and acceptability of the Lipid Based Nutrient Supplement (LNS)- Nutributter® in the Peruvian Andes.

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<sup>1</sup>Actions Against Hunger. <sup>2</sup>Universidad de Cádiz. <sup>3</sup>Centro Nacional de Alimentación y Nutrición

Objective: To evaluate the impact on the linear growth and haemoglobin levels and aspects of LNS consumption among children 6 to 11 months of rural communities in Peru.

Material and Methods: A single no blinded trial was conducted in 5 districts with high child under nutrition from the Ambo province, Huánuco Region, Peru. The sample included 147 children aged 6 months attending to the health centres from July 2012 to March 2013. They received monthly 30 sachets of 20g LNS for daily consumption from the 6th to the 11th month, and nutritional counselling. Additionally, one monthly home visit was done in order to assess the monthly consumption of the supplement, the length of the child at 6, 9 and 12 months of age and haemoglobin levels at 6 and 12 months.

Results: The mothers knowledge on the benefits of LNS was high; 89.8% mentioned that serves to the child's growth and 46.9% for intelligence. The

level of LNS daily consumption was progressively increased, from 89.1% in children 6 months to 97.3% at 11 months. Regarding the amount of sachet consumed, at the age of 6 months all of them consumed more than half, and at 11 months of age children consumed almost everything.

Regarding how the family shared the Nutributter among children of 6 months of age, 94.6% of the mothers reported that they did not share with other family members and at the age of 11 months, the result reached 98%. 98% of mothers reported that their children had no problems with consuming LNS at 11 months.

When comparing the mean z-score for height for age, at the 6 months ( $z = -0.98$ ) and at 12 months ( $z = -1.10$ ) there is a decrease in 0.13 z score ( $p = 0.048$ ); resulting in an increased of the stunting prevalence rising from 13.7% to 17.4%.

When comparing the mean values of the haemoglobin concentration, there is a significantly increase of 0.66 mg/dl ( $p = 0.000$ ) between 6 months (10.26mg/dl) and 12 months (10.93mg/dl) and the anaemia prevalence decreased significantly in 27 percentage points from 80% to 53% at the age of 6 and 12 months respectively.

Key findings: Mostly, the consumption was at daily bases, there was a good tolerance and the product was little shared with the rest of the family members. The anaemia levels decreased and the linear growth levels remain almost the same in the second semester of life.

(1) Action Against Hunger; (2) Universidad de Cádiz; (3) Centro Nacional de Alimentación y Nutrición.

#### PM-079

Poster

##### Factors associated with undernutrition among young children in Albania.

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 University of Medicine, Tirana, Albania

Objectives: Child growth is internationally recognized as an important indicator of nutritional status and health in populations. Child undernutrition is estimated to be the largest contributor to global burden of disease. The study aimed to assess the prevalence of stunting, wasting and underweight among young children in Diber, Albania and analyze the associations between socio-economic characteristics and poor nutrition outcomes in order to improve the targeting of maternal and child health interventions in this region.

Material and methods: A cross-sectional community-based survey was conducted during June-July 2012 in Diber, Albania. The socio-demographic and economic data were collected through interviews of 600 mothers selected using two-stage 30-cluster sampling technique. Anthropometric measurements of weight and height were taken from a sample of 720 children 0-59 months old. Stunting ( $< -2$  SD of height-for-age z-score), wasting ( $< -2$  SD of weight-for-height z-score) and underweight ( $< -2$  SD weight-for-age z-score) were defined using the World Health Organization reference 2007. Data were analysed using descriptive statistics, chi-square test of independence (significance level set at  $p < 0.05$ ,  $p < 0.01$  and  $p < 0.1$ ). For stunting and underweight, binary logistic regression was used and for wasting, multinomial logistic regression was used to measure the relative risk of all confounding factors (odds ratios).

Results: 13.3% (95% CI 10.4 -16.3) children were stunted, 5.5% (95% CI 3.5 - 7.4) children were underweight and 3.8% (95% CI 2.2 - 5.4) children were wasted. Stunting and underweight were not significantly associated with gender. Prevalence of stunting significantly increased with age among both boys and girls (both  $p < 0.001$ ) while wasting showed significant decreasing trend with age among boys only ( $p = 0.034$ ). Age of the child ( $p < 0.001$ ), birth order ( $p = 0.003$ ), wealth index ( $p = 0.001$ ) and mothers' level of education ( $p < 0.058$ ) were strong predictors of stunting. Wasting was significantly related to age of the child ( $p < 0.001$ ), sex of the child ( $p = 0.013$ ), and urban/rural residence ( $p = 0.079$ ). Child's age ( $p = 0.026$ ) and wealth index ( $p = 0.062$ ) were significantly related with underweight.

Key findings: Nutrition problems appear to be clustered in specific population groups and require comprehensive interventions. Identified profiles of children most at risk for chronic or acute malnutrition could help decide the best mix of strategies according to the main differences observed in age of the child, gender, socioeconomic status and urban/rural residence.

#### PM-080

Poster

##### Effects Of Two Micronutrient-Fortified Food Aid Products Containing Different Levels Of Dairy Protein On Mother's Nutrition Status In Rural Guinea-Bissau.

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<sup>1</sup>Global Food & Nutrition Inc. <sup>2</sup>Tufts University. <sup>3</sup>International partnership for Human Development

Food insecurity in Guinea-Bissau is widespread and micronutrient deficiencies are likely among vulnerable groups. This work was funded by the United States Department of Agriculture as part of a larger pilot project

with the International Partnership for Human Development, testing different supplements in vulnerable populations. This was the first such study among mothers in Guinea-Bissau.

**Objective:** Conduct a Randomized Control Trial (RCT) to test the effectiveness of 2 Micronutrient-Rich Ready to Use Supplementary Foods (MNR-RUSF) in rural village mothers in a 12 week program.

**Material and methods:** Participants were mothers who had a malnourished infant or child under 5 years of age enrolled in a parallel program for infants and children. 497 mothers (average age: 27 years old) were randomly assigned to one of two intervention arms (92g sachets containing 500 kcal/sachet and either 15% or 33% of protein from a dairy source, provided 5 days per week at a supplement distribution center in the village) or to a control group that received no supplements. Self-reported pregnant mothers were excluded from the current analysis. Weight, height, mid upper arm circumference (MUAC), hemoglobin, and retinol-binding protein (RBP) were measured at baseline and end-line.

**Results:** The supplements were rated highly for acceptability by the mothers and there was a high rate of supplement consumption. Randomization was successfully performed, and there was a mean increase in body weight that approached significance (combined 15% and 33% dairy protein group). The intervention also resulted in a significant reduction in self-reported sick days due to malaria. Moreover, mothers in the intervention groups experienced a trend towards a smaller decrease in hemoglobin compared to control mothers (-0.38±1.45 vs. -0.87±1.21). Study mothers are especially vulnerable to iron deficiency due to seasonal food shortages and higher iron needs among reproductive age women.

**Key findings:** Overall, these findings demonstrate the feasibility of providing supplement to mothers in villages, administered by local community health workers, with positive health outcomes.

#### PM-081

Poster

##### **Food consumption and dietary practices of Brazilian indigenous children.**

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**Objective:** To assess the dietary habits and practices related to supply Brazilian indigenous children.

**Material and methods:** This study consists of an analysis of dietary practices of Brazilian indigenous children, from data provided by the Ministry of Health regarding Food Consumption by period, Phase of Life and Race / color, about Indigenous children from throughout Brazil, aged 2 and 5 years. Changes were observed in the consumption of vegetables, fruits and meats as well as eating habits, the period between the years 2009 and 2013. Data were analyzed using Microsoft Excel 2013®.

**Results:** Compared to food consumption, the results showed that in the period studied, there was no change in the rates of consumption of vegetables, which remained at 67.4% of the population. Fruit intake was reduced by -0.04 percentage points, from 76 % in 2009 to 73 % in 2013. Meat consumption also declined, from 84 % in 2009 to 74 % in 2013; with a coefficient of variation of -0.11 percentage points. Regarding behavior, it can be noticed that in 2009 the habit of watching television eating was observed in 46 % of children and decreased to 34 % in 2013, a decrease of -0.26 percentage points. Have the habit of consuming homemade food increased from 87 % in 2009 to 90 % in 2013, reaching an increase of 0.03 percentage points in the period.

**Conclusions:** Based on these results and considering the population studied, we conclude that the consumption of vegetables, fruits and meats should be encouraged, since these foods are essential for the growth and development of children, particularly in indigenous populations representing population groups at social risk. The reduction in the habit of eating and watching television and the increased consumption of homemade food at dinner, may indicate improvements unhealthy life related to physical inactivity and snacking.

#### PM-082

Poster

##### **Meal location and energy intake among school children.**

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**Objectives:** This study aims to evaluate if there is an association between the location where meals are consumed and its total energy value, among school children from the 7th to the 12th grade.

**Material and methods:** A total of 297 students (160 girls), aged 12 to 19 years old completed a 3 day food diary including 2 weekdays and 1 weekend day. Meal location was self-reported and categorized in home, school, coffee shop, restaurant, fast-food restaurant and other. Statistical analysis was conducted using IBM SPSS 21 and Kruskal-Wallis and Mann-Whitney U tests were applied.

**Results:** Our results show that energy intake was significantly different between the different locations for all the meals from weekday 1 (breakfast: p=0,031; lunch: p=0,040; dinner: p=0,033) and for lunch (p=0,011) and dinner (p<0,001) from weekday 2. The energy intake on breakfast was only significantly different between home and school for weekday 1 (p=0,006), with school meals having a higher energy content, but no differences were found on breakfast from weekday 2. It should be noted that no statistically significant differences were found on the energy content of meals between the different locations on the weekend day reported.

**Key findings:** In general, energy intake was lower in meals consumed at home than at other locations. The most evident differences were found for lunch and dinner of weekdays. There was not a single meal from weekend that presented significant differences on the energy content between the various locations. The highest energy value of meals was found for those consumed at restaurants and fast-food restaurants, but between these two places no significant differences were found. Moreover, household meals had, in general, the lowest caloric value and meals consumed at school were usually lower in calories than those from coffee shops, restaurants and fast-food restaurants. Generally, meals consumed outside of home and school environments had a higher energetic value.

**Grants:** Project supported by: PTDC/DTP-DES/1328/2012 (FCOMP-01-0124-FE-DER-028619); and Research Center supported by: PEst-OE/SAU/UI0617/2011.

#### PM-083

Poster

##### **Hospitality meal serving practices as means to improve hospital meals.**

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**Objectives:** This study aims at exploring hospitality meal serving practices among kitchen professionals serving meals in hospitals. Hospitality has recently been introduced as a concept to improve hospital meal experiences and to address that 30-40% of hospitalised patients are at risk of being undernourished.

**Material and methods:** The study is based upon a six month ethnographic study in a Danish Hospital in 2012 at a gynaecology and cardiology ward. Meal serving practices were explored using a multi-disciplinary approach applying visual ethnography and participant observation. Further, 22 semi-structured interviews were conducted with professionals and patients. In addition one focus group interview were conducted with kitchen professionals. Based upon a thematic analysis, meal serving practices were identified in terms of doings and sayings and categorised into different serving and plating expressions. The French philosopher Derrida's approach towards hospitality was applied as an analytical frame in order to discuss hospitality meal practices among kitchen professionals.

**Results:** Four different categories of serving and plating expressions were identified. They were categorised as 'The component expression', 'The picturesque expression', 'The build-up expression' and 'The splashed expression'. These expressions appeared as both bodily and verbal expressions but also as plate expressions. 'The component expression', was considered and elaborated by kitchen professionals as a hospitality meal serving practice, whereas the other expressions originated from either non intended efficiency practices or from culturally learned but however non-elaborated practices among kitchen professionals.

**Key findings:** Hospitality might be a concept to improve hospital meal experiences. However, there is a need to explicitly elaborate different serving and plating expressions among kitchen professionals serving hospital meals. Furthermore, hospitality serving practices comprise an ability to know when to use the different serving and plating expressions in accordance to the individual patient's needs and expectations.

#### PM-084

Poster

##### **Food waste: compositional and organoleptic analysis of fruits and vegetables.**

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**Introduction:** Hispacoop data (2012) show that in Spain are discarded 32.2kg of food per person/year.

Fruits and vegetables are the food group most wasted after bread and cereal group. This waste is due to deterioration by a poor preservation, storage, an over time, or ignoring the lifespan (including the nutritional aspects) of the product.

**Objectives:** To know the changes in nutritional value and consumer preferences in vegetables and fruits with different times and types of conservation in order to minimize food waste.

**Methods/Design:** The sample was formed by 45 foods, according to information provided by the MAGRAMA (Agriculture Ministry, Food and Envi-

ronment). Part of the study involved the compositional analysis of vitamin C, thiamin, Calcium, iron, zinc and folic acid but we focus on vitamin C and folic acid. Analysis it also included organoleptic analysis, based on: hedonic, ordination and triangular tests. The group of subjects consisted of 30 untrained tasters.

Results: Compositional analysis: Kiwi and orange have the highest levels of vitamin C in fresh fruit.

In potatoes and onions, vitamin C has statistically significant differences ( $p < 0.05$ ) between fresh, frozen and stored for 1 month, being these decreasing levels.

Vitamin C in lettuce have statistically significant differences ( $p < 0.05$ ) between fresh, 2 days and 5 days preserved. Finding no differences in folic acid levels.

In tomato there are significant differences in vitamin C and folic acid between sterile preserved and preserved for 2 days.

As for apples, pears, melons, bananas and peppers we don't find statistically significant differences ( $p < 0.05$ ) between fresh fruit and preserved for 5 days in vitamin C and folic acid. There is a higher level of folic acid in frozen samples of fruits and vegetables.

#### PM-085

Poster

##### **Breastfeeding practices in the first six months of life among infants of Somali- and Iraqi-born mothers living in Norway: The InnBaKost study.**

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Objectives: To describe breastfeeding practices of Norwegian-born infants (6 months) whose mothers have immigrated from Somalia and Iraq. Materials and methods: We targeted women born in Somalia and Iraq, living in the counties of Oslo, Akershus and Buskerud during 2013-14, and who had 6-month old infants for study inclusion. Several methods were used to approach the target group: health centers, lists over eligible mothers obtained from the National Population Register and the "snowball method". Data on breastfeeding and feeding practices was collected using a food frequency questionnaire similar to the one used previously in the national dietary survey among infants of Scandinavian-born mothers living in Norway.

Results: The final sample consisted of 107 Somali- and 80 Iraqi-born mothers. Breastfeeding was almost universally initiated after birth in both groups. At 4 months of age, breastfeeding was more common among Somali infants, as compared with Iraqi infants, 94% vs 74%, respectively ( $p < 0.001$ ). Exclusive breastfeeding for 4 months was more commonly reported among Iraqi than Somali mothers, 29% vs 19%, respectively ( $p = 0.106$ ), both lower than national averages (46%). Infant formula was introduced within the first four weeks of life among 44% of infants of Somali origin and 34% of Iraqi origin. Further, 62% and 52% of the Somali and Iraqi infants, respectively, were introduced to formula before 4 months of age; higher than the national average of 28%.

At six months of age, 79% of infants of Somali origin and 58% of infants of Iraqi origin were still breastfed, ( $p = 0.001$ ), whereas the national average is 80%. Only one infant of Iraqi and none of Somali origin were exclusively breastfed for six full months. A higher proportion of the Somali mothers reported giving infant formula to their child at six months compared to the Iraqi mothers, 79% and 61%, respectively ( $p = 0.01$ ), both groups higher than the national average (36%). More Somali-born mothers gave both breastmilk and formula to their child at six months of age, as compared with the Iraqi-born mothers who either breastfed or gave formula ( $p < 0.001$ ).

Key findings: Breastfeeding initiation was common among both Iraqi and Somali mothers, but exclusive breastfeeding period was shorter than recommended in both groups. Compared to Iraqi mothers in the sample, Somali mothers were more likely to breastfeed for at least six months and less likely to practice exclusive breastfeeding. These findings have implications for the development of strategies for supporting recommended infant feeding practices among Somali- and Iraqi immigrants to Norway.

#### PM-086

Poster

##### **A qualitative study among women to identify current food culture practices in four low-income communities in north Mexico.**

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Background and Objective: We can identify among the Mexican population an increment in the prevalence of obesity that is simultaneous with a high rate of undernutrition. Food transition in Mexico is occurring in a polarized way, northern Mexico is where greater changes have been taking place, eating practices changing in pair with economic and social development. This qualitative study was conducted to identify current food culture and the need for information of the key population considering the context of intervention. This information will enable the research team

to design a psycho-educational intervention that expects to respond a salutogenic vision of health promotion, and among many innovative elements, it will be based on the concrete needs concerning dietary knowledge and cooking skills of the target population.

Material and methods: As a pre-phase to the strategy design, a qualitative study with four focus groups was performed, where women ( $n = 50$ ) from marginalized communities from Saltillo, Coahuila, Mexico participated. Audiotapes of the discussions were professionally transcribed verbatim and analyzed to identify recurring trends and patterns using Atlas.ti v6 software. Results: Women from these communities still have an important role in family nutrition, therefore they become the key target for food administration. However, dietary patterns now constitute social practice with a symbolic imaginary dimension, and child and teen population are manifesting barriers to the introduction of specific foods. The identity of worried mothers concerned with their homes health has been confronted with their children's posture to what is now called modern dieting. There is an identity distancing from local food, that is often associated with "poor people's food", giving a high demand to precooked and industrial food, "if my daughter sees that the eggs are from our ranch she won't eat them" (GD1). Mothers are trying to overcome economic barriers answering to individual food likes, serving as a strategy to demonstrate a social class that has access to "modern foods". Consuming this modernity serves as a symbol for not being poor and rural.

In conclusion, we can argue that the barriers for healthy food consumption are more often associated with social dimensions than with economic dimensions. This study provides a clear framework for culturally tailoring an intervention increasing its potential to realize the desired outcome of accomplishing appropriate behavioral change in the key population.

#### PM-087

Poster

##### **Dietary and physical activity practices according adequacy of gestational weight gain.**

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Objectives: Investigate association between diet quality and physical activity levels with the adequacy of gestational weight gain.

Material and Methods: It was conducted a cross sectional study involving random sample ( $n = 212$ ) of pregnant assisted in primary health care. Information on eating habits and physical activity were obtained in the 2nd trimester, in health facilities, in prenatal care day. It was investigated the frequency of consumption of sausages, fries and soft drinks for the construction of unhealthy consumption score, assigning: 0.00 for foods never consumed; 0.05 eaten up to twice a week; 0.46 for consumed three to four days per week; 0.73 for consumed five to six days a week; and 1.00 for foods consumed daily. Score of healthy consumption was based on frequency of consumption of fruits and vegetables, punctuated in the same way as above. Level of physical activity (sedentary/lightly active, moderately active, vigorously active) was estimated by questionnaire adapted and validated for the Brazilian population. The adequacy of gestational weight gain was calculated according to the criteria of the Institute of Medicine (2009). The association of the adequacy of weight with categorical variable (physical activity level) was tested by chi-square; with continuous variables (score healthy and unhealthy) by analysis of variance. Was considered critical level of  $p < 0.05$ .

Results: Approximately half (50.5%) of the women had excessive weight gain, 29.7% adequate gain and 19.8% gained weight insufficiently, being 77.4% of the women considered sedentary/lightly active, 12.2% moderately active and 10.3% strongly active. There was no statistically significant association between adequacy of weight gain and level of physical activity ( $p = 0.680$ ). The mean score among healthy pregnant women with adequate weight gain was  $2.03 \pm 0.9$ ; with excessive gain of  $1.99 \pm 0.87$ ; and  $2.01 \pm 0.94$  among those with insufficient gain. Concerning the unhealthy score, the average among pregnant women who gained adequate weight was  $0.87 \pm 0.60$ ;  $0.90 \pm 0.50$  in women with excessive weight gain;  $0.82 \pm 0.48$  in those with insufficient gain.

Key findings: There was no statistically significant association with adequacy of weight gain and healthy and not healthy score ( $p = 0.955$  and  $p = 0.715$ , respectively). There was no association between indicators of diet quality, physical activity level and adequacy of gestational weight gain. These results suggest that the methodology used to assess the degree of physical activity and food consumption may not be the most appropriate, it is recommended to seek more accurate methods for these assessments.

#### PM-088

Poster

##### **Analysis of food advertisement based on Brazilian Law.**

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Objective: Obesity is a disease of importance in the global epidemiological scenario since become one of the greatest public health problems. Inside the etiology of obesity, the food media has become an important risk

factor, especially to children and adolescents who have spent more time watching TV (over 4 hours daily). On the other hand, there is greater availability of food with high sugar, salt and saturated and trans fat and food industry through the media has produced increasingly creative advertising campaigns. Based on the above, this study aimed to analyze the quantity and quality of food advertisements transmitted on Brazilian TV.

**Material and method:** Descriptive cross-sectional study using data from 64 hours of recording resulting four television channels open between September and October of 2012 advertisements were divided into 15 different groups, and the "foods" category was divided according to the subgroups present in the food pyramid. The analysis of each food. The advertising was done through a check list based on national legislation. The initial sample consisted of 1707 pieces, and that 81 were on food and 22 were excluded because they were considered healthy and 31 was repeated, ending 28 advertisements for analysis.

**Results:** The food advertisements accounted for only 4.7% of total hours analyzed, but the majority (43%) was represented by foods high in sugar, salt, saturated fat and trans fat, and refrigerant (25%) the most frequent. Most advertisements has a duration less than 30 seconds, sufficient time to influence the food choice of the viewer. According to Brazilian law, none of the advertisements followed the required criteria for placement.

**Key findings:** Although the participation of food advertisements was small, there was a predominance of foods considered unhealthy, which can negatively influence the desire, stimulating weight gain and possible obesity and thus impairing nutrition and health of viewers. Another fact is the lack of suitability of the food industry on the Brazilian legislation, indicating poor institutions responsible for monitoring advertising in Brazil.

#### PM-089

Poster

##### **Nutritional status of Japanese Brazilians in southern Brazil.**

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**Objective:** The Japanese-Brazilian term is used to define the citizen of Japanese ancestry or people born in Japan and living in Brazil. The Japanese-Brazilians are divided into Issei (Japanese), Nisei (children of Japanese) Sansei (grandchildren of Japanese) and yonsei (greatgrandchildren of Japanese). The Japanese immigration to Brazil began in 1900 and currently it is estimated 1.5 million Japanese-Brazilians, while Brazil is the largest Japanese community outside Japan. The Japanese are known for adequate life habits (low excess weight, smoking, alcohol consumption, sedentary lifestyle and chronic diseases), but studies show a westernization of diet, introducing high in fat and simple sugar foods, resulting in the increase of overweight. Based on the above, the aim of this study was to evaluate the nutritional status of Japanese-Brazilians.

**Materials and Methods:** A cross-sectional descriptive study, based on data collection in 142 Japanese-Brazilians (sansei and yonsei) above 18 years, the metropolitan area of Curitiba (southern Brazil). The questionnaire was prepared in Qualtrics® tool with questions on the demographic, economic profile, lifestyle habits, nutritional status, health perceptions, weight and nutrition, health care and food habits. This brief data will be presented on self reported nutritional status, as well as the perception about weight. Data were analyzed using Excel, and described the frequency of variables.

**Results:** The final sample consisted of 106 Japanese-Brazilians (sample loss of 25%), and 70% were women, 63% belonged to the upper economic class and 60% were young adults (18 to 24 years). The body mass index (range 16 to 34.8 kg/m<sup>2</sup>) and identified 20.7% of Japanese-Brazilian overweight and 5.7% obese. About weight of care, 20% of Japanese-Brazilians had weighed more than six months and 22% had never measured waist circumference, the main indicator of cardiovascular risk and. About perception of weight, 32% considered themselves overweight, perhaps influenced by the amount of women in the sample.

**Key finding:** The high prevalence of overweight in the sample shows that this population is approaching the Brazilian profile. Today, half the Brazilian population is overweight and the prevalence in Japan is less than 10%, so the Japanese-Brazilians are becoming more westernized and "Brazilian".

#### PM-090

Poster

##### **Association of whole fat dairy food intake with obesity: findings from ORISCAV-LUX study.**

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**Introduction:** Conflicting findings have been reported with regard to dairy food consumption and risk for obesity outcomes. Furthermore, few studies have examined specific dairy products, with regard to type of food and fat content, in relation to obesity.

**Objectives:** This study examined whether dairy food consumption was associated with risk for global and abdominal obesity.

**Material and methods:** Data were analyzed from 1352 participants in the Ob-

servation of Cardiovascular Risk Factors in Luxembourg (ORISCAV-LUX) survey, 2007-2008. A validated food frequency questionnaire was used to measure intakes of dairy foods. Odds for global obesity (body mass index  $\geq 30$  kg/m<sup>2</sup>) and abdominal obesity (waist circumference  $>102$  cm for men and  $>88$  cm for women) were determined based on intakes of individual low and whole fat dairy products (milk, yogurt and cheese) and total dairy food.

**Results:** Total dairy food intake was inversely associated with likelihood of global obesity (OR=0.51, 95% CI= 0.30, 0.89, P<0.05), and abdominal obesity (OR=0.51, 95% CI=0.32, 0.83, P<0.01). Participants in the highest tertile of whole fat dairy intakes (milk, cheese, yogurt) had significantly lower odds for being obese (global obesity: OR=0.45, 95% CI= 0.29, 0.72, P<0.01; abdominal obesity: OR=0.35, 95% CI=0.23, 0.54, P<0.001), compared to those in the lowest intake tertile, after full adjustment for demographic, lifestyle, dietary and cardiovascular risk factor variables.

**Conclusion:** Increasing the consumption of dairy foods may have the potential to lower the risk for global and abdominal obesity.

#### PM-091

Poster

##### **Association of whole fat dairy food intake with obesity: findings from ORISCAV-LUX study.**

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**Objective:** A lot of was heard about dioxins and dioxins-like compounds, mainly in context of nutrition affairs. Dioxins are classified as molecules carcinogenic to humans. The main source of dioxins for population is food - 90% of typical exposition, thus assessment of dioxins intake and monitoring of dioxins levels in food remains an important matter. The aim of presented work was assessment of dioxins and related compounds intake among adolescents on basis of validated semi-quantitative food frequency questionnaire.

**Material and methods:** A modified semi-quantitative food frequency questionnaire, taking under consideration products that typically contain dioxins or may contain dioxins after a specific food preparation, was conducted. 55 randomly chosen, 15 year-old, students of secondary school took part in study. For each individual dioxins exposition was calculated in pg of Toxic Equivalent (WHO-TEQ) per kilogram of body weight per day.

**Results:** The mean intake of dioxins and related compounds was: 1,71 pg WHO-TEQ/kg of body weight per day. The main contributors of dioxins intake were: 29% from fish - mainly sardines and tuna, about 25% from smoked or grilled meats, 9% from eggs. Dairy products and fats were the worst sources of dioxins and related compounds.

**Key findings:** Average intake in analyzed group was lower than Tolerable Daily Intake, set up by WHO as 2 pg WHO-TEQ/kg of body weight per day. In context of other countries Polish results remain as one of the highest in a comparable age group. Even though average intake is lower than safe threshold about 30% of adolescents exceeded the limiting value (the highest noted intake was 4,6 pg WHO-TEQ/kg body weight per day). That support the need to control and reduce dioxins and related compounds in food products.

#### PM-092

Poster

##### **Cranberry intervention in patients with localized prostate cancer prior to radical prostatectomy.**

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**Background and objectives:** Our recent publication showed an inverse association between cranberry supplementation and serum prostate-specific antigen (PSA) in patients with negative biopsy for prostate cancer (PCa) and clinically confirmed chronic nonbacterial prostatitis. In this study, we evaluated the effects of cranberry on PSA values and markers of androgen-receptor inhibition in men diagnosed with PCa before radical prostatectomy. **Methods:** In a double-blind placebo controlled trial, we evaluated the effects of 1,500 mg daily cranberry powder or placebo 21 to 42 days prior to prostatectomy. Sixty-four patients were randomized to cranberry or placebo groups. The prostate cancer biomarkers were measured in blood, urine and prostate tissue at baseline and on the day of surgery as were plasma concentration of ursolic and oleanolic acids and free/total concentrations of phenolics in urine.

**Results:** The serum PSA significantly decreased by 22.5 % in the cranberry arm (n=31, P<0.05) and increased by 0.9 % in the placebo arm (n=31, P<0.05). A trend to down-regulation of beta-microseminoprotein (MSMB) after cranberry supplementation was found. MSMB is reportedly androgen regulated.

**Conclusions:** Our results show that the commercial cranberry powder

used in this study may contain constituents that regulate the expression of androgen-responsive genes. These data support further studies to evaluate cranberry as a prophylactic against the biochemical recurrence of prostate cancer in patients after surgery.

Key words: Vaccinium macrocarpon, polyphenolics, ursolic acid, prostate cancer, placebo-controlled trial, biomarkers, urinary metabolites.

Acknowledgment: Institutional support of Palacky University is greatly acknowledged.

### PM-093

### Poster

#### Factors associated with the risk of eating disorders.

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Objectives: To analyze factors associated with the risk of eating disorders in participants between 11 and 33 years old.

Material and methods: 1342 students were randomly selected from educational centers on Gran Canaria, Spain. Risk of eating disorders was measured by EAT-40 questionnaire. Sociodemographic variables, weight status, physical activity (by Krece Plus questionnaire) and adherence to Mediterranean Diet (by Kidmed questionnaire) were also assessed. To evaluate the associated factors of EAT positive test logistic regression analyses were used, controlling for confounding variables.

Results: The prevalence of risk of eating disorder was 27.42%. The risk of suffering from eating disorder was higher among women than men (RR = 1.56; 95% CI: 1.18- 2.05) and among students who had dieted in the past year than those who had not dieted (RR = 5.13 (95% CI: 3.93-7.16), and for each year of decreasing age the risk was increased (RR = 0.89; 95% CI: 0.83-0.95). Participants who performed medium physical activity had less risk than those with good activity (RR= 0.62; 95% CI: 0.41-0.95), and participants with underweight or normal weight presented less risk than those who had excess weight (RR= 0.46; 95% CI: 0.28-0.74 and RR = 0.53; 95% CI: 0.39- 0.72, respectively).

Key findings: There are many factors associated with the risk of eating disorders. Knowing and considering them in each population can help the development of more effective treatments and prevention programs.

### PM-094

### Poster

#### Fluid intake from beverages in spanish adults: cross-sectional study.

Ferreira-Pêgo C<sup>1,2</sup>, Babio N<sup>1,2</sup>, Fernández-Alvira JP, Iglesia P, Moreno LA<sup>3</sup>, Salas-Salvadó J<sup>1,2</sup>

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Objective: to evaluate the total fluid intake from different types of beverages in spanish adults.

Methods: a total of 1,262 adults aged 18-70 years were randomly recruited from all spanish regions. The information about the quantity and quality of daily fluid intake from different types of beverages was collected using a 24h fluid-specific diary over 7 consecutive days.

Results: 50.4% of the study population had a fluid intake <80% of the European Food Safety Agency recommendations for total water intake. The odds of meeting the recommendations of total fluid intake were higher in women [OR:2.48; 95%CI:1.81-3.40], and in those with higher leisure-time physical activity (3-4 times/week [OR:1.57; 95%CI:1.01-2.46]; 5 times/week or more [OR:1.97; 95%CI:1.37-2.83]). Women consumed significantly more hot and sweet light beverages. However, men consumed significantly more sweet regular and alcoholic drinks. A significant higher percentage of young and normal/underweight subjects exceed the World Health Organization recommendations for free sugars (>10% total energy intake) from beverages alone.

Key findings: half of the adults studied do not meet the European Food Safety Agency fluid intake recommendations. Water is the main fluid consumed. Differences in the pattern of fluid consumption were observed between ages and genders. A quarter of the population studied consumes from beverages alone already more sugar than recommended from the total diet.

### PM-095

### Poster

#### A healthier lifestyle is associated with a healthier drinking profile.

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Objective: to evaluate the associations between the consumption of different types of beverages and leisure-time physical activity practise and adherence to the Mediterranean diet.

Methods: information about fluid intake from different types of beverages was collected in 1,262 men and women participants between 18 and 70 years old, using a 24h fluid-specific diary over 7 consecutive days. Leisure-time physical activity was evaluated with a self-reported questionnaire, and Mediterranean Diet adherence was assessed using a validated 14-item questionnaire.

Results: individuals with higher adherence to the Mediterranean Diet showed a higher intake of water and wine and a lower consumption of sweet regular beverages. Participants with a higher leisure-time physical activity practise consume more water, milk and derivatives, juices and wine and less sweet regular beverages. Compared to the lowest category, the odds of meeting the European Food Safety Agency recommendations of total fluid intake were higher in individuals with 8 or more points in the Mediterranean Diet adherence questionnaire [OR:1.94;95%CI:1.25-3.01], and in those that practise physical activity 3 or more times/week [OR:1.71;95%CI:1.22-2.39]. Participants with a healthier life-style had a lower risk in to exceed World Health Organization recommendations for total sugar intake (>10% total energy intake), only from beverages.

Key findings: participants with a higher adherence to the Mediterranean Diet and a higher leisure-time physical activity practise exhibits a healthier fluid intake pattern.

### PM-096

### Poster

#### Household food insecurity and nutritional status in Korea: Results from the Korea National Health and Nutrition Examination Survey, 2012.

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Objectives: We examined the prevalence of household food insecurity and compared nutritional status by food security status in a representative Korean population.

Methods: This study was based on data from the 2012 Korea National Health and Nutrition Examination Survey, firstly adopting the 18-items household food security questionnaire. A total of 3,010 households completed the questionnaire of food security and their 7,159 family members aged ≥ 1 yr participated in nutrition survey, composed of dietary habit, 1-day 24-h dietary recall, and semi-quantitative food frequency questionnaire (FFQ).

Results: In 2012, 88.4% of Korean household showed food security. The remaining 11.6% (9.5% for food insecurity without hunger, 1.6% for food insecurity with hunger) was food insecure. The prevalence of household food-insecurity was 13.6% in household with children and 10.6% in household without children. Food security status of household was related to socioeconomic status of household and householder. Mean daily intakes of energy, fiber, calcium, phosphorus, potassium, iron, vitamin A, thiamine, riboflavin, niacin, and vitamin C as well as weekly frequencies of consumption of milk and milk products, vegetables, fruits, and seaweeds were significantly lower in family members of food-insecure household compared to family members of food-secure household.

Conclusions: In conclusion, our results revealed that food-insecurity lead to a reduction in dietary intakes of the essential foods, energy, and nutrients for health and growth.

### PM-097

### Poster

#### Antioxidant capacities of the traditional fermented vegetable-based foods of Turkey.

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Fermentation is a process involving the use of microorganisms to carry out enzyme catalysed transformations of organic substances into the end-products. The production of fermented foods and beverages is one of the oldest manufacturing and preservation methods of human consumption. Fermented foods and beverages, whether of plant or animal origin, play an important role in the diet of people in many parts of the World. Fermented foods not only provide important sources of nutrients but have also great potential in maintaining health and preventing diseases. Many different types of traditional fermented fruits and vegetables are produced at household level, but it is also produced commercially on small scale, in Turkey. Tursu (Pickle) is one of the oldest products of fermentation used

by man in Anatolia. Tursu can be made from a wide variety of different vegetables and fruits. Cucumbers, cabbages, green tomatoes and green peppers are the most popular vegetables used to prepare tursu. Shalgam is a traditional lactic acid fermented beverage in which black carrot, turnip, bulgur flour, sourdough, salt, and water are used for production. It is a red coloured, cloudy and sour soft drink mainly consumed in Southern Turkey. This study investigates the antioxidant capacities of traditional Turkish lactic acid fermented beverage shalgam and fermented food tursu using several antioxidant tests.

Shalgam juice and tursu extract were analysed for their radical scavenging capacities, inhibitory activities on linoleic acid peroxidation, reductive potential,  $\beta$ -carotene bleaching effect and chelating activities. Those various antioxidant activities were compared to standard antioxidants.

The lactic acid fermented shalgam and tursu samples showed high total antioxidant and radical scavenging activities when compared to the standard antioxidants. These findings are important from a nutritional point of view, because the fermented food have evidence on the potential health benefits to human due to its high antioxidant properties, and thus may be used as a dietary supplement for the prevention of diseases.

#### PM-098

Poster

##### **Excess weight, nutritional intake and physical activity in women inmates.**

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Objectives: Overweight and obesity are a Public Health problem. The contribution of a healthy and balanced diet as well as the regular practice of physical activity are key factors in its prevention. However, despite this being a widely documented problem, several specific population groups still remain to be evaluated. The purpose of our study was to investigate overweight and its association with nutritional intake and physical activity in women inmates of a Prison in the north of Portugal.

Material and Methods: 250 women were invited to participate in this study. Accepted 60 and our sample included 47 women. We collect socio demographic and lifestyle data (age, number of children, education, criminal legal status, labour in prison, smoking, body weight and height). We calculate and categorize the body mass index according to the classification of the World Health Organization, and grouped women with overweight and obesity in a single category (overweight) for comparative analysis with the group without overweight. To assess dietary intake we used a semi-quantitative food frequency questionnaire validated for the Portuguese population, and determined the prevalence of nutritional inadequacy based on World Health Organization recommendations (2003) and Food and Nutrition Board. The evaluation of the physical activity of women was taken with accelerometers, used for 7 consecutive days, and categorized physical activity as moderate, vigorous and very vigorous.

Results: For the total energy intake, we note no differences in the amount of the total energy and the prevalence of inadequate depending on the existence of excess weight. Looked high prevalence of inadequacy for folate, pantothenic acid and vitamin E.

Key findings: All women have less than the recommended vitamins D and K intake, and molybdenum. Regarding the inmates daily physical activity, we found no significant differences between the two groups. The prevalence of overweight was high, and there were no significant differences in the groups studied for the characteristics of inadequate nutritional intake and physical activity.

#### PM-099

Poster

##### **Age at adiposity rebound - differences among overweight, normal weight and underweight children.**

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Objective: To determine the age of adiposity rebound according to weight status among children aged 2 to 10 years old of a private educational institution in the region of Leiria, Portugal.

Material and Methods: This prospective study was performed in a sample of 294 children attending a private educational institution in Leiria, between 2009 and 2013. Body height and weight were determined by standard anthropometric methods. Measurement of weight and height was performed at two different times in each school year (at the beginning and at the end of school year) to all children aged between 2 and 10 years old. We defined age at adiposity rebound by the age of lowest body mass index (BMI) between the age of two and 10. CDC cut-points were used to categorize underweight (UW), normal weight (NW) and overweight/obesity (OW/OB).

Results: This study demonstrated that from 2 to 10 years the prevalence of overweight and obesity varies between 3.6% and 25.4% in boys and

4.2% to 43.3% in girls. It was identified that adiposity rebound happens at earlier ages both in boys and girls in overweight children. While in overweight children, adiposity rebound occurs at 4 years, in children with normal weight it occurs at 5 years for both gender. In underweight children, it was not verified adiposity rebound in girls, while in boys it occur at 6 years old. Key findings: Adiposity rebound occurs at earlier ages (4 years) in overweight children while in children with normal weight it happens at 5 years. In underweight children adiposity rebound occurs at 6 years. Thus, further studies are needed to identify the factors that contribute to an earlier adiposity rebound.

#### PM-100

Poster

##### **$\beta$ -carotene status in overweight/obese children and its association with inflammatory markers.**

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Objective: Having in mind that inflammation is frequently associated with overweight and obesity and that  $\beta$ -carotene presents antioxidant properties that could reduce inflammatory markers, the aim of the study was to investigate the association between plasma  $\beta$ -carotene and inflammation markers in children with overweight/obesity.

Subjects/Methods: 564 Spanish schoolchildren between 9-12 years of age (30.5% with overweight/obesity) were studied. Plasma  $\beta$ -carotene levels were assessed in 493 children by HPLC.  $\beta$ -carotene <4.83  $\mu$ g/dL (0.09  $\mu$ mol/L) was considered deficient. Plasma tumour necrosis factor (TNF- $\alpha$ ) and interleukin-6 (IL-6) were measured by immunoenzyme assay (IEA). Serum high-sensitivity C-reactive protein (hs-PCR) was tested by immunonephelometry.

Results: 24.8% of the studied children presented  $\beta$ -carotene deficiency. IL-6 levels were higher in the overweight/obese children with deficient plasma  $\beta$ -carotene than in those with the same weight problem but whose plasma  $\beta$ -carotene levels were adequate. Plasma  $\beta$ -carotene was inversely associated with IL-6 levels in the overweight/obese children (B=0.049 $\pm$ 0.013; p<0.001). TNF- $\alpha$  and hs-PCR were not associated with plasma  $\beta$ -carotene in overweight/obese children.

Conclusion: It would be desirable to prevent  $\beta$ -carotene deficiency in schoolchildren with overweight/obesity in order to improve the elevated inflammatory status that frequently is associated with this pathology.

#### PM-101

Poster

##### **Aqueous garlic extract treatment protects against sepsis-induced pulmonary and ileal injury in rats.**

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Objectives: Sepsis is commonly associated with enhanced generation of reactive oxygen metabolites leading to multiorgan dysfunction. Based on the potent antioxidant effects of aqueous garlic extract (AGE), we investigated the putative protective role of AGE against sepsis-induced oxidative damage in pulmonary and ileal tissues.

Methods: Rats were divided into four groups; 2 control and 2 sepsis groups, containing 8 animals in each group. Sepsis was created using the cecal ligation and perforation (CLP) method. Rats were supplemented with either saline or AGE (250mg/kg/day orally) for 15 days prior to either sham operation or CLP and also immediately postoperatively.

Results: Sepsis caused decreases in platelet counts, fibrinogen and APTT while INR levels were increased. Sepsis induced significant decrease in GSH levels and SOD activities in both lung and ileal tissue samples, but AGE treatment to the rats with CLP caused significant increases in these antioxidants. As a result of CLP induction, MPO activity, MDA levels and thromboplastic activity were found to be increased in the lung and ileal tissues. AGE treatment in the CLP group decreased these values and reversed back to the control levels.

Key findings: AGE, reduces sepsis-induced pulmonary and ileal tissue injury, at least in part, through its ability to balance oxidant-antioxidant status and to inhibit neutrophil infiltration.

#### PM-102

Poster

##### **Increasing women's intake of green leafy vegetables, fruit and milk pre-conceptionally and through pregnancy increases birth weight; a randomised controlled trial in Mumbai, India (Mumbai Maternal Nutrition Project, project "SARAS").**

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**Objectives:** Low birth weight (LBW) is a major public health problem and is associated with increased infant mortality, childhood stunting, impaired cognition and risk of adult chronic disease. An earlier observational study among under-nourished rural Indian women showed that those who reported higher intakes during pregnancy of green leafy vegetables (GLVs), fruit and milk had larger newborns. Our objective was to determine the effect of a snack made from these foods, taken for at least three months before conception and until delivery, on newborn anthropometry.

**Methods:** A non-blinded, individually randomised controlled trial was conducted in Mumbai slums between 2006 and 2012. Married, non-pregnant women aged <40 years were randomised to receive a daily snack made from GLV, fruit and milk or a control snack made from vegetables of low micronutrient content, under supervision, until delivery. Trained staff measured newborns within 72 hrs of delivery.

**Results:** Of 6,513 non-pregnant women randomised, 1,826 were supplemented for >3 months prior to conception. Of these, 1,562 delivered live singleton newborns, of which 1,094 were measured. The intervention increased birth weight by 48g overall (control: 2583g, treatment: 2631g;  $p=0.046$ ). The effect increased with maternal BMI (+113g,  $p=0.008$ ; +79g,  $p=0.07$  and -8g,  $p=0.8$  in the highest, middle and lowest thirds of maternal BMI;  $p$  for interaction=0.001). Similar effects were observed for newborn chest, abdomen and mid-upper-arm circumferences and skinfolds ( $p<0.05$ ), but not length or head circumference. LBW and small-for-gestational-age births were reduced by approximately 20% (OR: 0.76, 95% CI: (0.59, 0.98),  $p=0.03$ ; and 0.78, 95% CI: (0.60, 1.03),  $p=0.07$  respectively).

**Key findings:** A daily food-based snack, consumed for at least three months pre-conceptionally and throughout pregnancy increased birthweight. This effect was comparable with, and up to double that achieved using pharmaceutical multiple micronutrients during pregnancy. Mothers require adequate macronutrients and micronutrients for optimal reproductive success.

#### PM-103

Poster

##### Apocynin attenuates testicular ischemia-reperfusion injury in rats.

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**Objective:** Apocynin (4-hydroxy-3-methoxy-acetophenone), naturally occurring methoxy-substituted catechol, extracted from the roots of Apocynum cannabinum (Canadian hemp) and Picrohiza kurroa (Scrophulariaceae) is well known an inhibitor of NADPH oxidase. This study was designed to examine the possible protective effect of apocynin, a NADPH oxidase inhibitor, against torsion-detorsion (TD) induced ischemia/reperfusion (IR) injury in testis.

**Methods:** Male Wistar albino rats were divided into sham-operated control, and either vehicle, apocynin 20 mg/kg- or apocynin 50 mg/kg-treated TD groups. In order to induce IR injury, left testis was rotated 720 degrees clockwise for 4 hours (torsion) and then allowed reperfusion (detorsion) for 4 hours. Left orchietomy was done for the measurement of tissue malondialdehyde (MDA), glutathione (GSH) levels, myeloperoxidase (MPO) activity, and luminol, lucigenin, nitric oxide (NO) and peroxynitrite chemiluminescences (CL). Testicular morphology was examined by light microscopy.

**Results:** IR caused significant increases in tissue luminol, lucigenin, nitric oxide and peroxynitrite chemiluminescence demonstrating increased reactive oxygen and nitrogen metabolites. As a result of increased oxidative stress tissue MPO activity, MDA levels were increased and antioxidant GSH was decreased. On the other hand, apocynin treatment reversed all these biochemical indices, as well as histopathological alterations that were induced by IR.

**Key findings:** Findings of the present study suggest that NADPH oxidase inhibitor apocynin by inhibiting free radical generation and increasing antioxidant defense exerts protective effects on testicular tissues against IR.

#### PM-104

Poster

##### Therapeutic potential of Myrtus communis subsp. communis extract against acetic acid-induced colonic inflammation in rats.

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Pharmacology, İstanbul, Turkey; <sup>6</sup> Haydarpaşa Numune Education and Research Hospital, Clinics of Internal Medicine, İstanbul, Turkey.

**Objectives:** Overproduction of free radicals and decreased antioxidant capacity are well-known risk factors for inflammatory bowel diseases. Myrtus communis L., Myrtaceae is a well known medicinal plant that has been used worldwide in traditional medicine. The aim of the present study is to evaluate the effect of Myrtus communis subsp communis (MC), a taxon found in Turkey, on acetic acid-induced ulcerative colitis in rats.

**Material and methods:** To prepare plant extract, leaves of the Myrtus communis subsp. communis were dried in the shade at room temperature. Powdered samples extracted with ethanol in a Soxhlet apparatus, filtered and dried. Following intracolonic administration of 5% (w/v) acetic acid, Sprague-Dawley rats were treated orally either with saline, MC extract (50 mg/kg), MC (100 mg/kg) or sulfasalazine (500 mg/kg) for three days. On the 4th day, rats were decapitated and distal colon was removed for the macroscopic and microscopic damage scoring and for the measurement of malondialdehyde (MDA) and glutathione (GSH) levels, myeloperoxidase (MPO) activity, luminol, lucigenin, nitric oxide and peroxynitrite chemiluminescences (CL).

**Results:** Colitis caused significant increases in the colonic MDA levels, MPO activity, CL values, macroscopic and microscopic damage scores along with a significant decrease in tissue GSH level. On the other hand, treatment with MC extract at both doses reversed all these biochemical indices, as well as histopathological alterations induced by AA where the protective effects are similar with that of sulphasalazine treatment.

**Key findings:** Our study shows that MC provides promising alleviating effects against colitis in rats. Thus, for the management of IBD, MC can be considered as an alternative therapeutic approach.

#### PM-105

Poster

##### Coenzyme Q10 Supplementation Reduces Oxidative Stress and Increases Antioxidant Enzyme Activity in Patients with Relapsing-Remitting Multiple Sclerosis.

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**Objectives:** Multiple sclerosis (MS) is a chronic inflammatory disease of central nervous system in which a higher oxidative stress may contribute to its pathogenesis. The aim of this study was to investigate the effect of coenzyme Q10 (CoQ10) supplementation on oxidative stress and antioxidant enzyme activity in patients with MS.

**Materials and methods:** We performed a randomized, double-blinded, placebo-controlled trial to determine the effect of CoQ10 supplement (500 mg/day, n = 24) versus placebo (controls, n = 24) for 12 weeks. Fasting blood samples were taken before and after a 12-week intervention to analyze malondialdehyde (MDA), total antioxidant capacity (TAC) and antioxidant enzymes [superoxide dismutase (SOD), glutathione peroxidase (GPx)] activity.

**Results:** Forty-five subjects with MS completed intervention study. After 12 weeks, CoQ10-treated patients had significant increase in SOD activity ( $p = 0.013$ ); and decrease in MDA levels ( $P=0.003$ ) compared with controls. Despite the significant effect of CoQ10 supplementation on plasma TAC ( $p = 0.010$ ), no significant differences were found between the two groups. CoQ10 supplementation did not affect GPx activity.

**Conclusion:** Present study suggests that CoQ10 supplements at a dose of 500 mg/day can decrease oxidative stress and increase antioxidant enzyme activity in patients with relapsing-remitting MS.

**Keywords:** coenzyme Q10, multiple sclerosis, oxidative stress, antioxidant enzyme activity, lipid peroxidation, supplementation.

#### PM-106

Poster

##### How do schoolchildren eat at the High Pyrenees and Aran Health Region? The evaluation follow up improves the quality of the menu offer.

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**Introduction:** In 2006, the Public Health Agency of Catalonia started The School Menu Revision Program, in the framework of the Integral Plan of Health Promotion through Physical Activity and Healthy Eating, in collaboration with the Department of Education. The evaluation of the food offer is based on the local guide "Alimentació saludable a l'etapa escolar" or Healthy Eating in Schools. The health region of High Pyrennes and Aran made an initial assessment in 48 schools that offer food service to 2899

children and a follow-up on the implementation and acceptance of the suggested improvements on 35 schools.

Objective: to assess compliance to previous suggested improvement recommendations.

Methods: after submitting the initial report to the school (prepared by a team of dietitians-nutritionists) a second questionnaire is sent over in order to evaluate the degree of implementation of suggested improvement recommendations. Answers are evaluated as well as the new menus.

Results: (n=35) Evaluation report: 97.2 % consider it to be a useful tool. 97.2 % think that the report will lead to improved menus. The report has been released to the direction of the center (88.6%), the head of school meals (80%), the catering company (65.7%) and the student parents associations (48.6%). Regarding the new menus, the following trends are observed in meeting the recommendations: first course detailed ingredients (11.4 %→45.7 %\*), specifying the ingredients of the salad (57.1 %→77.1 %\*), presence of fresh fruit desserts (57.1 %→77.1 %\*), presence of fresh food (74.3 %→80 %\*) presence of vegetables daily (62.9%→80%\*). \*(p<0.05)

Conclusions: the follow up has improved some key aspects of programming menus, such as the presence of fruit, vegetables and fresh foods as well as the recommended frequency. The report with suggestions for improvement is known by different stakeholders and very much appreciated. The growth and evolution of the program has been possible thanks to the involvement of different professional teams working on public health and the Department of Education.

### PM-107

Poster

#### How do schoolchildren eat at the Lleida Health Region? The evaluation follow up improves the quality of the menu offer.

Casadesús F<sup>1</sup>, Manera M<sup>1</sup>, Blanquer M<sup>1</sup>, Milà R<sup>2</sup>, Salvador G<sup>1</sup>  
<sup>1</sup>.Catalan Public Health Agency <sup>2</sup>.Unity of Biostatistics. Department of Public Health. Faculty of Medicine. University of Barcelona, Spain

Introduction: In 2006, the Public Health Agency of Catalonia started The School Menu Revision Program (PREME), in the framework of the Integral Plan of Health Promotion through Physical Activity and Healthy Eating, in collaboration with the Department of Education. The evaluation of the food offer is based on the local guide "Alimentació saludable a l'etapa escolar" or Healthy Eating in Schools. The health region of Lleida has made an initial assessment in 205 schools that offer food service to 20.173 children and a follow-up on the implementation and acceptance of the suggested improvements in 35 schools.

Objective: to assess compliance to previous suggested improvement recommendations.

Methods: after submitting the initial report to the school (prepared by a team of Dietitians-Nutritionists) a second questionnaire is sent over in order to evaluate the degree of implementation of suggested improvement recommendations. Answers are evaluated as well as the new menus.

Results: (n=142) Evaluation report: 90 % consider it to be a useful tool. 83.8 % think that the report will lead to improved menus. The report has been released to the direction of the center (81 %), the head of school meals (71.1%), the catering company (69.7%) and the student parents associations (33.8%). Regarding the new menus, the following trends are observed in meeting the recommendations: first course detailed ingredients (23.7%→55.6 %\*), specifying the ingredients of the salad (45%→78.1%\*), presence of fresh fruit desserts (32.5%→78.1 %\*), presence of fresh food (76.9%→88.8%\*) presence of vegetables daily (44.4%→97.1%\*), recommended frequency of different foods (30,8%→58,6%\*) . \*(p<0.05)

Conclusions: the follow up has improved some key aspects of programming menus, such as the presence of fruit, vegetables and fresh foods as well as the recommended frequency. The report with suggestions for improvement is known by different stakeholders and very much appreciated. The growth and evolution of the program has been possible thanks to the involvement of different professional teams working on public health and the Department of Education.

### PM-108

Poster

#### Effect of using repeated measures of dietary Glycemic Index and dietary Glycemic Load on the strength of the association with total mortality.

Gastro-Quezada I, Sánchez-Villegas A, Estruch R, Salas-Salvadó J, Corella D, Schröder H, Álvarez-Pérez J, Ruiz-López MD, Artacho R, Ros E, Bulló M, Covas MI, Ruiz-Gutiérrez V, Ruiz-Canela M, Buil-Cosiales P, Gómez-Gracia E, Lapetra J, Pintó X, Arós F, Fiol M, Lamuela-Raventós RM, Martínez-González MA, Serra-Majem L, on behalf of the PREDIMED Study Investigators. Nutrition Research Group, Research Institute of Biomedical and Health Sciences, University of Las Palmas de Gran Canaria, Spain. Ciber Obn Physiopathology of Obesity and Nutrition. Institute of Health "Carlos III". Madrid. Spain.

Objective: The objective of this study was to assess whether using baseline exposure or repeated measures during a 5-year follow-up provided simi-

lar associations between dietary Glycemic Index (GI) and dietary Glycemic Load (GL) and all-cause mortality in the PREDIMED study.

Material and methods: We followed 3,583 non-diabetic subjects at high cardiovascular risk (55-80 years). Dietary data were collected using a validated 137-item food frequency questionnaire (FFQ). We assessed baseline GI and GL values of the overall diet by a 5-step methodology, using the International Tables of Glycemic Index and Glycemic Load values. Deaths were ascertained through medical records and consultation of the National Death Index. Cox regression models were used to estimate multivariate-adjusted hazard ratios (HR) and 95% confidence intervals (95% CI) for mortality, according to baseline quartiles of GI/GL adjusting for potential confounders. To assess repeated measures of exposure, we updated GI and GL intakes from the yearly FFQs and used Cox models with time-dependent exposures.

Results: After a median of 4.7 years of follow-up, 123 mortality cases were observed. Cox regression analyses using baseline GI showed that participants in the highest quartile had an increased risk of all-cause mortality [HR= 2.22 (95% CI: 1.26 - 3.94) P for trend = 0.002] when compared to the lowest quartile. After adjustment for potential confounders this association remained statistically significant. In the repeated-measures analyses using as exposure the yearly updated information on GI, we observed a stronger association [HR= 2.69 (95% CI: 1.50 - 4.84) P for trend < 0.001]. No associations were found between dietary GL and all-cause mortality in both analyses.

Key findings: A higher risk of all-cause mortality was found for subjects in the highest quartile of dietary GI when compared to the lowest quartile. When dietary GI values were updated yearly in repeated measures analyses, similar associations between dietary GI and all-cause mortality were observed.

### PM-109

Poster

#### Association between serum 25(OH)D and insulin resistance in Brazilian adolescents.

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Objectives: The aim of this study was evaluated the relationship of the deficiency/insufficiency of vitamin D with insulin resistance among adolescents.

Material and methods: This is a cross-sectional study with 160 adolescents (eutrophic and overweight) aged between 15 and 17 years of high schools of the city of Juiz de Fora, Minas Gerais, Brazil. Nutritional status was assessed by body mass index (BMI) according to World Health Organization. Biochemical evaluation included analysis of glucose, insulin and calcidiol [25(OH)D]. Insulin resistance was calculated using HOMA-IR.

Results: The mean age was 16 years and 55.6% was male. Higher prevalence of hyperinsulinemia and insulin resistance were observed in the group of overweight (P<0.05). There was no statistical difference in glucose levels between the two groups. Deficiency of vitamin D [≤25nmol/L(≤10 ng/ml)] was observed in 1.25% of adolescents. Insufficiency of vitamin D [25-75 nmol/L(11-30 ng/ml)] was observed in 70.6% of the sample. Adolescents with insulin resistance and hyperinsulinemia showed statistically lower levels of vitamin D (P<0.05). There was an inverse correlation between serum 25(OH)D and insulin values and HOMA-IR (P<0.05).

Key findings: The prevalence of vitamin D insufficiency is high even in sunny countries like Brazil. Furthermore, the results point to extra-skeletal function of vitamin D highlighting the negative association with insulin resistance, even after adjustment for BMI. Randomized clinical trials are extremely important to test the effects of vitamin D in metabolic changes. Support: FAPEMIG (CDS APQ 01571-09)

### PM-110

Poster

#### Association between waist-to-height ratio and adiposity in Brazilian older women.

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 Federal University of Viçosa

Objectives: Evaluate the waist-to-height ratio with anthropometry and body composition in elderly women served by the Family Health Strategy in Viçosa-MG.

Material and methods: This is a cross-sectional study of 243 elderly aged 60-95 years attended by the Family Health Program in the municipality. The participants were weighed and measured using a digital electronic scale and portable stadiometer, respectively, to calculate the body mass index. Inelastic tape was used for the assessment of waist circumference. Body composition was assessed by bioelectrical impedance analysis to obtain the percentage of body fat. Data were analyzed using the STATA 9.1 software. The normality of variables was evaluated by the Shapiro-Wilk test, which were not normally distributed were transformed into log. Student's t test was used to compare means. The level of significance was 5%.

Results: The mean values of age (72.8 years), body mass index (27.6 kg/m<sup>2</sup>), waist circumference (95.5 cm) and body fat (40.9%) were observed in the elderly population. Mean of body mass index, waist circumference

and body fat were significantly higher ( $p < 0.001$ ) in the elderly with waist-to-height ratio at risk (ratio greater than 0.5).

**Key findings:** This study indicates that the waist-to-height ratio index, easy to apply and low cost, is strongly associated with adiposity in elderly women, suggesting that this may be useful as a screening instrument in this population. These indices can assist in the practice of health professionals since resources may be scarce for diagnosis.

#### PM-111

#### Poster

##### **Effects of vitamin U on valproic acid induced lung injury in rats.**

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Valproic acid (2-propyl-pentanoic acid, VPA) is an antiepileptic drug. VPA is usually well tolerated, but serious complications including hepatotoxicity, hyperammonemic encephalopathy, fatal hemorrhagic pancreatitis, teratogenicity, bone marrow suppression may occur. Certain vegetables, in particular cabbage contain a nutritional factor which was reported to have antiulcer properties. This factor, S-methyl methionine sulphonium chloride has also been called vitamin U (Vit U). In this study, we aimed to investigate the protective effects of Vit U on VPA-induced lung damage. Female Sprague Dawley rats were divided into four groups. Group I was intact control animals. Group II was control rats given Vit U (50 mg/kg/day, by gavage) for fifteen days. Group III was given only VPA (500 mg/kg/day, by intraperitoneally) for fifteen days. Group IV was given VPA+ Vit U (in same dose and time). On the 16th day of experiment, lungs were removed from rats. The tissues were used for the determination of oxidant/antioxidant parameters such as glutathione, lipid peroxidation levels and glutathione peroxidase, glutathione-S-transferase and superoxide dismutase, lactate dehydrogenase and myeloperoxidase activities. Besides, the structural alterations and some protein expressions, such as alpha-smooth muscle actin ( $\alpha$ -SMA) and nuclear factor-like 2 (NRF-2) were evaluated by microscopic and immunoblotting analysis in the rat lung tissues. Lung glutathione levels and glutathione peroxidase, glutathione-S-transferase and superoxide dismutase activities were decreased, while lipid peroxidation levels, lactate dehydrogenase and myeloperoxidase activities were increased in VPA group. Treatment with Vit U reversed these biochemical results. Also, VPA treatment resulted in the destruction of alveolar structure and increases in number of interstitial cells and collagen, cell proliferation in alveolar areas, and  $\alpha$ -SMA protein levels in the rat lung, while it was not effective on the NRF-2 protein level. Vit U treatment was regressed the extended fibrotic areas and reduced  $\alpha$ -SMA protein expression and cell proliferation in the alveolar areas of rats which have received VPA. Also, NRF-2 protein level was slightly increased in the lung of these rats. In conclusion, we can say that Vit U is a protective agent against fibrotic alterations in the VPA-mediated lung injury, probably by decreasing oxidative stress.

#### PM-112

#### Poster

##### **Estimating prevalence of inadequate nutrient intakes in children and adolescents in Greece.**

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<sup>2</sup>Institute of Preventive Medicine Environmental and Occupational Health (Prolepsis)

**Objectives:** Identifying nutrient imbalances at the population level is a recommended step in the process of establishing food-based dietary guidelines. The aim of this study was to estimate the prevalence of inadequate micronutrient intakes, in apparently healthy children (older than 5 years) and adolescents in Greece, utilizing existing information from food consumption surveys/studies.

**Materials and methods:** Studies published until June 2014 and referring to data collected from 2000 and onwards were searched using national and international databases (e.g. PubMed). Priority was given to studies based on nationally representative samples using validated dietary assessment methods. Nutrient intake data, representing usual intakes, were selected and the estimated average requirement (EAR) cut-off point method was applied in order to estimate inadequacy of intake of selected micronutrients, e.g. vitamins C, A and B12, folic acid, calcium and iron. EARs provided by the Institute of Medicine (IOM) were used as reference cut-off points.

**Results:** No survey assessing micronutrient intake based on nationally representative data for the specific age groups was found. Alternatively, one survey conducted during 2006/7, with representative data from Southern Greece (Chania, Crete) for children aged 6-7 years old (131 boys, 124 girls) and one survey conducted during 2000 with representative data from Northern Greece (Thessaloniki, Macedonia) for adolescents aged 11-14 years (268 boys, 234 girls) were identified. For boys, 6-7 years old, the percentage (%) of the population with intake below the EAR was 9.14% for vit C, 23.34% for vit A, 29.44% for vit B12, 23.53% for folate, 13.77% for calcium and 6.07% for iron. The respective percentages for girls were

8.02% for vit C, 14.67% for vit A, 9.53% for vit B12, 23.67% for folate, 17.96% for calcium and 5.08% for iron. For boys, 11-14 years old, the % below the EAR were 26.82% for vit C, 31.59% for vit A, 49.95% for folate, 33.78% for calcium and 15.18% for iron. For girls in the same age group, the percentages were 25.08% for vit C, 41.25% for vit A, 60.20% for folate, 49.73% for calcium and 21.52% for iron.

**Key findings:** Folate, Vit A and B12 were the nutrients exhibiting the highest prevalence (>20%) of inadequacy in children, while folate, vit A and calcium the ones exhibiting the highest prevalence (>30%) in adolescents. In spite of the limitations of the data, a useful estimate of micronutrient inadequacy in the Greek young population is provided.

#### PM-113

#### Poster

##### **A randomized trial investigating the effect of testosterone and a nutritional supplement on hospital admissions in under-nourished, community dwelling, older people.**

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**Objectives:** Weight loss and under-nutrition among older people are associated with poor outcomes, including increased hospital admissions and mortality rates. In a pilot study we found that one year treatment of undernourished older, community dwelling people with oral testosterone (placebo-controlled) and a nutritional supplement (no control) was associated with a significant reduction in hospitalizations. A larger, multicentre study was conducted to investigate further this exciting, potentially important finding.

**Method:** One year, randomized, placebo-controlled, double-blind, trial. Undernourished men and women, age  $\geq 65$  years, living independently in the community, were recruited in South Australia (SA), Victoria (Vic) and New South Wales (NSW). Subjects were allocated to either oral testosterone undecanoate (40 mg/day women, 160 mg/day men) and high energy oral nutritional supplement (475kcal/day) or placebo medication and low energy (50 kcal/day) oral nutritional supplementation. Hospital admissions and other variables were assessed.

**Results:** In subjects receiving testosterone and nutritional supplements ( $n=28$ ), there were 8 falls and 19 hospitalisations, whereas in the placebo group ( $n=25$ ), 16 falls and 10 hospitalisations. Mean (SE) percent tablet and supplement compliance were (placebo 86(3), 73(6) and treatment 81(5), 71(6)), respectively. There was no significant difference in the occurrence of hospitalisations ( $p > 0.995$ ) and falls ( $p = 0.719$ ). Over 12 months there was no change in weight (0.67 kg increase,  $p = 0.069$ ), mental (0.3 point increase,  $p = 0.835$ ) or physical health (2.1 point decrease,  $p = 0.075$ ) as measured by SF-36, or tablet ( $p = 0.196$ ) and supplement ( $p = 0.486$ ) compliance between placebo and active treatment groups.

**Key findings:** In undernourished older people, treatment with testosterone and a nutritional supplementation did not reduce the occurrence of hospitalisations, or improve physical and mental health.

#### PM-114

#### Poster

##### **Health professionals knowledge before and after training in nutritional counseling.**

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<sup>1</sup>Department of Public Health Nursing, School of Nursing, University of São Paulo, São Paulo, Brazil. <sup>2</sup>Department of Maternal-Child and Psychiatric Nursing, School of Nursing, University of São Paulo, São Paulo, Brazil.

**Objective:** Evaluate health professionals knowledge before and after training in nutritional counseling.

**Methods:** Subproject intervention study of type 'before-after', quantitative-qualitative approach, developed in three phases. This study refers to training in nutrition counseling (2nd phase) conducted with 53 health professionals (11 nurses, 14 nursing assistants and 28 community health workers) primary care city of São Paulo/Brazil. Four workshops (minimum hours of 16h each) with participatory strategies and focus groups among September/2013 and February/2014 were performed. We applied a knowledge test before and after training. The focus groups were recorded, transcribed and subjected to content analysis. The topics covered were the use of Child Health Handbook as a tool for health promotion; monitoring of child growth and development; monitoring of nutritional disorders; ten steps to healthy eating for children younger than 2 years old; communication techniques and nutritional advice.

**Results:** Over 90% of participants had no training in infant feeding. Only half of the nurses performed visit on childcare daily or weekly, a quarter developed educational groups in health services and only 13 professionals performed home visits every day. Two thirds of the professionals considered their knowledge on nutrition counseling as "good", but 42% used "bit" in the work routine. The knowledge test showed more correct at posttest, with emphasis on nutritional counseling approaches to be taken,

which went from 9% to 62%; nutritional assessment of 11% to 58%; nutritional counseling techniques, 11% to 48%; and communication techniques from 30% to 76%. Preliminary qualitative analysis showed that health professionals associated the infant nutritional disorders to maternal neglect and poor living conditions of the population. Showed little autonomy in health care of the child, giving the doctor and nutritionist responsibility for monitoring and nutritional counseling. After training they were able to identify that their improper practices were associated to lack of knowledge on the topic covered.

Conclusions: Whereas it the nutritional aspects represent structural axis of the health care of children in primary care, training of health professionals on nutrition counseling is essential because it contributes to increased knowledge of professionals and transform their practices into routine services.

#### PM-115

Poster

##### **Nutritional Status of Preschool Children in the Oio and Cacheu Regions in Guinea-Bissau.**

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<sup>1</sup>Global Food & Nutrition Inc. <sup>2</sup>Tufts University. <sup>3</sup>International partnership for Human Development

To date, there has been no survey of nutrition status among preschool-age children in Guinea-Bissau. To fill this gap and in preparation for a Randomized Control Trial to improve nutrition, we assessed anthropometry and anemia in 534 children in two rural areas: Cacheu and Oio. This research was funded by the United States Department of Agriculture (USDA) Micronutrient Fortified Food Aid Pilot Project and took place in preschools participating in a Food for Education program run by International Partnership for Human Development.

Methods: Student's weight in light clothing and no shoes was measured using a portable digital scale (Seca model 813) placed on a flat surface and calibrated at regular intervals. Standing height was measured without shoes using a portable stadiometer (Seca model 213). Hemoglobin was analyzed by Hemocue™ from finger stick blood samples. Weight-for-Age Z-scores (WAZ), Height-for-Age Z-scores (HAZ), Weight-for-Height Z-scores (WHZ), and Hemoglobin (Hb) concentration were assessed compared to with WHO cut-offs.

Results: Among children in preschool (255 boys and 279 girls, aged 41-77 months old), only 1 case of severe underweight and 1 case of severe anemia were found. No severe wasting nor severe stunting was found. Girls had higher rates than boys of moderate (z-scores <-2) underweight (8.6% vs. 3.5%), stunting (7.6% vs. 6.6%), and wasting (5.4% vs. 2.4%, p<0.05). Both boys and girls have similar rates of anemia (mild: 17.0%, moderate: 7.7%, severe: 0.2%). These rates signify a mild public health threat for wasting and moderate public health threat for anemia.

Conclusions: Nutrition programming, especially one addressing anemia, is needed in this population.

#### PM-116

Poster

##### **Pretreatment of chard (*Beta vulgaris L. var. cicla*) extract decreases liver injury induced by antiarrhythmic agent, Amiodarone.**

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Amiodarone is a cationic amphiphilic drug and belongs to benzofuran class III. This drug is an antiarrhythmic agent and is used to treat various arrhythmic diseases such as cardiac dysrhythmia, ventricular tachycardia, ventricular and atrial fibrillation. Amiodarone is extensively metabolized in the liver and has a lot of side effects to this organ. Its action mechanism is very complex and has been poorly understood yet. Chard (*Beta vulgaris L. var. cicla*) is one of plants commonly used because of its antioxidant and hypoglycemic properties in Turkey. The aim of this study was to investigate the possible protective effects of the chard extract against amiodarone induced hepatotoxicity through morphological and biochemical methods. In this study, 7-9 months old Sprague-Dawley male rats were randomly divided into four groups. Group I; control animals receiving corn oil for 7 days. Group II; animals receiving chard extract (500 mg/kg) for 7 days. Group III; animals receiving amiodarone (100 mg/kg) for 7 days. Group IV; animals receiving chard extract (500 mg/kg) for 7 days 1 h prior to the administration of amiodarone. Amiodarone and chard extract were administered by gavage to rats. On the 8th day, all the animals which were fastened night over were sacrificed, and liver tissues were taken under anesthesia for histopathological and biochemical studies.

Liver lipid peroxidation levels and superoxide dismutase, adenosine desaminase, xanthine oxidase, lactate dehydrogenase activities were increased, while glutathione level was decreased in amiodarone group. The mild degenerative changes such as centrilobular necrotic cells and areas, hepatocytes which has picnotic nuclei and dark eosinophilic reaction, dilation in

sinusoids, rupturing in epithelium of central vein and hyperemia were seen in amiodarone-treated rats. Administration of chard extract prevented these effects in amiodarone group. In conclusion, pretreatment with chard extract may decrease liver injury induced with amiodarone treatment.

#### PM-117

Poster

##### **The effects of combined treatment of amiodarone and chard, on gingival and salivary gland biochemical parameters of rats.**

Alev B.<sup>1</sup>, Burcu Turkyilmaz I.<sup>2</sup>, Kaya S.<sup>3</sup>, Akyuz S.<sup>3</sup>, Yanardag R.<sup>2</sup>, Yarat A.<sup>1</sup>

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Chard (*Beta vulgaris L. var. cicla*) is a popular vegetable, known for a long time for its beneficial health effects. This plant is a member of the Chenopodiaceae. The plant is more robust and easier to grow than spinach and celery. Chard is reported to have antioxidant, antiacetylcholinesterase, antidiabetic, antitumor and hepatoprotective effects. Moreover, chard exhibits mineralizing, antiseptic and choleric activities as well as it contributes to the reinforcement of the gastric mucosa. Phytochemical screenings of *Beta vulgaris* varieties have revealed the presence of some fatty acids (palmitic, stearic, oleic, linoleic and linolenic acids), phospholipids, glycolipids, polysaccharides, ascorbic acid, folic acid, pectin, saponins, flavonoids, phenolic acids, betalains and apigenin. Chard leaves are a good source of Vitamin A, E, C, B<sup>5</sup>, B<sup>9</sup> and minerals such as, calcium, potassium, magnesium, iron and phosphorus. Amiodarone, which is used for the treatment of arrhythmias, causes many side effects in all organs. Chard may protect against amiodarone's oxidative side effects. In the literature there is no study which focuses on the effects of these substances on oral tissues. Male Sprague-Dawley rats were randomly divided into four groups as follows: corn oil given group; chard extract (500 mg/kg/day) given group; amiodarone (100 mg/kg/day) given group; amiodarone+chard given group (in same dose and time). All substances were given for seven days. Chard extract (500 mg/kg) was given 1 h prior to the application of amiodarone. Amiodarone and chard extract were fed by gavage to rats. All animals were fasted overnight and on the 8<sup>th</sup> day they were sacrificed under anesthesia. Gingiva and salivary gland samples were taken from animals and homogenized in saline. Results were evaluated statistically and discussed.

#### PM-118

Poster

##### **The effect of Myrtus communis L. extract on the small intestine in experimental thermal burn injury.**

Kuruca B., Sen A.<sup>2</sup>, Alev B.<sup>1</sup>, Ipekci H.<sup>1</sup>, Ustundag U.V., Koc Ozturk L.<sup>1</sup> Emekli Alturfan E.<sup>1</sup>, Tunali Akbay T.<sup>1</sup>, Sener G.<sup>3</sup>, Yarat A.<sup>1</sup>

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Thermal trauma may cause damage to organs distant from the original burn wound and may lead to multiple organ dysfunction. Following burn injury all tissues are subject to ischemia and consequently resuscitation and reperfusion occurs during burn shock. *Myrtus communis L.*, Myrtaceae is well known medicinal plant and has been shown to have antioxidant properties. The aim of this study was to investigate the effects of oral *Myrtus communis* subs. *communis* (MC) on burn-induced oxidative tissue injury. Wistar Albino rats were divided into three groups as follows: control group, burn group, MC extract (100 mg/kg/day, oral) given burn group. Burn group rats were exposed to 90 °C bath for 10 s to induce burn. Rats were then decapitated 48 h after injury. Small intestine samples were taken from animals and homogenized in saline. Oxidant-antioxidant biochemical parameters were determined in homogenized intestine samples. Results were evaluated statistically and discussed.

#### PM-119

Poster

##### **Effects of chard (*Beta vulgaris L. var. cicla*) on cardiac damage in valproic acid induced toxicity.**

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Valproic acid (VPA) is an antiepileptic drug used for the treatment of seizures in children and adults. Moreover in recent years VPA has been shown to be effective in various cancers and Alzheimer disease. The side effects of VPA were shown in many studies. Chard (*Beta vulgaris L. var. cicla*) is a herbaceous biennial leafy vegetable cultivated in many parts of the world, low cost plant and widespread use in many traditional dishes. It has been demonstrated that chard has antioxidant, antiacetylcholinesterase, antidiabetic, antitumor and hepatoprotective effects. The aim of this study is to evaluate whether VPA might interfere with oxidative me-

tabolism in heart and whether chard ameliorates these effects. Female rats were divided into four groups as intact control animals, VPA (0.5 g/kg/day, i.p.), chard (100 mg/kg/day, gavage) and VPA+chard (in same dose and time) given groups for seven days. Chard extract were given 1 h prior to the administration of VPA. On the 8th day the animals were sacrificed under anesthesia and hearts were homogenized in saline. Oxidant-antioxidant biochemical parameters were determined in homogenized heart samples. Results were evaluated statistically and discussed.

#### PM-120

Poster

##### Functional properties of the traditional Turkish fermented milk products: kefir and yoghurt .

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Fermented milk products are well known for their health benefits. Multiple reports have described their health benefits on gastrointestinal infections, antimicrobial activity, improvement in lactose metabolism, reduction in serum cholesterol, immune system stimulation, antimutagenic, anti-carcinogenic, and anti-diarrheal properties, improvement in inflammatory bowel disease and suppression of *Helicobacter pylori* infection. Kefir is a fermented dairy product produced by incubating milk with the microflora of kefir grains. It differs from other fermented milk products in that it is produced with a mixture of bacteria and yeast confined to a matrix of discrete kefir grains recovered after fermentation. Traditionally kefir grains have been used for centuries in many countries, as the natural starter in the production of the unique self-carbonated dairy beverage. Yoghurt is obtained through the lactic acid fermentation. Lactic acid bacteria play the predominant role in the manufacturing of traditional dairy products. The purpose of this study is to determine the antioxidant properties of kefir and yoghurt which is traditional fermented product with positive effects on health.

Antioxidative features such as reducing power,  $\beta$ -carotene bleaching effect, ferrous ion chelating ability, total antioxidant activity, nitric oxide (NO) scavenging effect, 2,2'-azino-bis-3-ethylbenzothiazoline-6-sulfonic acid (ABTS) and N,N-dimethyl-p-phenylenediamine dihydrochloride (DMPD) radical scavenging activities of kefir and yoghurt samples were investigated and the results were compared to standard antioxidants (BHA, BHT, ascorbic acid, Trolox,  $\beta$ -tocopherol and epicatechin).

Results obtained from this study showed that kefir and yoghurt, especially in low concentrations, demonstrated higher total antioxidant and DMPD radical scavenging activities than many other standard antioxidants. Kefir and yoghurt have a powerful antioxidant properties at various antioxidant systems. The antioxidative activities of traditional fermented kefir and yoghurt may be attributed to their proton-donating ability, their reducing power, radical scavenging and lipid peroxidative inhibition results. Consume of kefir and yoghurt may act as a nutritional supplement with antioxidant activity.

#### PM-121

Poster

##### A prudent dietary pattern is associated with a lower risk of Gestational diabetes mellitus.

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<sup>1</sup>Unit for Nutrition Research, National University Hospital and Faculty of Food Science and Nutrition, University of Iceland.

<sup>2</sup>Department of Obstetrics and Gynecology, Women's Clinic, National University Hospital, Reykjavik, Iceland

Objective: To investigate the association between maternal dietary pattern and GDM.

Material and methods: A prospective observational study including 168 pregnant Icelandic women aged 18-40 years. These were recruited at routine 20 week ultrasound at Landspítali/National-University Hospital in Iceland. All participants kept a four day weighed food record as soon as possible following recruitment (gestational weeks 19 - 24). Data on dietary intake was recorded into the ICEFOOD calculating program based on the Icelandic food database (ISGEM). Principal component analysis was used to extract dietary patterns from 29 food groups. All women underwent an oral glucose tolerance test in weeks 23 - 28.

Results: One clear dietary pattern (eigenvalue 2.4) was extracted comprising of seafood; eggs; vegetables; fruits and berries; vegetable oils; nuts and seeds; pasta; breakfast cereals; coffee and tea with a negative correlation with intake of soft drinks and french fries. Variance explained was 8.2%. The prevalence of GDM was 2.3% among women of normal weight before pregnancy and 18.3% among overweight/obese women. The pattern was associated with lower risk of GDM (OR: 0.54 95% CI: 0.30, 0.98). When adjusting for age, parity, pre-pregnancy weight, energy intake, weekly weight gain and physical activity the association remained (OR: 0.36 95% CI: 0.14, 0.94).

Key findings: Adhering to a prudent dietary pattern in pregnancy may be

beneficial in preventing GDM, especially among women already at higher risk due to pre-pregnancy overweight or obesity.

#### PM-122

Poster

##### Antioxidants and mortality in the PREDIMED study.

Henríquez-Sánchez P, Sánchez-Villegas A, Ruano-Rodríguez C, Gea A, Schröder H, Lamuela-Raventós RM, Estruch R, Salas-Salvadó J, Covas I, Corella D, Gómez-Gracia E, Lapetra J, Pintó X, Arós F, Fiol M, Ruiz-Gutiérrez V, Ros E, Martínez-González MA, Serra-Majem L on behalf of the PREDIMED Study Investigators.

Nutrition Research Group, Research Institute of Biomedical and Health Sciences, University of Las Palmas de Gran Canaria, Spain.

Ciber Obn Physiopathology of Obesity and Nutrition. Institute of Health "Carlos III". Madrid. Spain

Objectives: A high intake of antioxidants has been associated with a protective effect on health. The aim of the present study was to assess the association between the total dietary antioxidant capacity, the dietary intake of different antioxidants vitamins and mortality in a Mediterranean population at high cardiovascular disease risk.

Material and Methods: This study was conducted within the frame of the PREDIMED study (Prevención con Dieta Mediterránea); multicenter, parallel-group, randomized controlled clinical trial that aimed to assess the effects of a Mediterranean-type diet on clinical cardiovascular effects. A total of 7.447 subjects between 55 and 80 years were included in this study. Different antioxidants vitamins intake and total dietary antioxidant capacity were calculated from a validated 137 item food frequency questionnaire at baseline. Information on mortality was ascertained by an end-point adjudication committee unaware of the dietary habits of participants after they had reviewed medical records and linked up to the National Death Index. Cox regression model were used to assess the relationship between the dietary of antioxidants and the mortality.

Results: A total of 292 deaths took places along a median follow-up of 4.3 years. Subjects belonging to the upper quartile of antioxidant capacity were younger, with high educational level, more active and had less caloric intake and high alcohol intake.

Multivariate-adjusted models revealed no statistically significant difference between mortality and total antioxidant capacity (Q4 HR=0.91; 95% CI 0.65-1.27 vs Q1 ref) and the intake of most of the vitamins studied. Subjects in the upper quartile of lutein intake (HR 0.62; 95 CI 0.43-0.90) and selenium intake (HR 0.70; 95 CI 0.48-1.02) showed a lower mortality. Key findings: No statistically significant association was found between antioxidant capacity and mortality in elderly subjects at high cardiovascular risk.

#### PM-123

Poster

##### Association between cereal consumption and metabolic syndrome: the PREDIMED study.

Bautista-Castaño I, Ruano-Rodríguez C, Sánchez-Villegas A, Toledo E Estruch R, Salas-Salvadó J, Covas I, Corella D, Alvarez-Pérez J, Gómez-Gracia E, Lapetra J, Pintó X, Arós F, Fiol M, Lamuela-Raventós RM, Ruiz-Gutiérrez V, Ros E, Martínez-González MA, Serra-Majem L, on behalf of the PREDIMED Study Investigators.

Nutrition Research Group, Research Institute of Biomedical and Health Sciences, University of Las Palmas de Gran Canaria, Las Palmas de Gran Canaria, Spain.

Ciber Obn Physiopathology of Obesity and Nutrition. Institute of Health "Carlos III". Madrid. Spain.

Objectives: The metabolic syndrome and its individual components are associated with increased cardiovascular disease risk. Among non pharmacological treatments, diet is the cornerstone of strategies for cardiovascular risk reduction. Our aim was to analyze, the association between baseline cereal consumption and risk of metabolic syndrome after 1 year of follow-up in the PREDIMED study.

Material and Methods: Cross-sectional analyses were carried out at baseline and after follow-up for 1 year and longitudinal analysis were conducted in a cohort of individuals at high risk of cardiovascular disease from the PREDIMED study. A 137-item validated semi-quantitative food frequency questionnaire, anthropometric measurements, fasting plasma glucose and lipid profile were obtained at baseline and after 1-year follow-up. Odds ratio and 95% confidence intervals (95%CI) of metabolic syndrome were calculated across quartiles of total cereal consumption. The metabolic syndrome was defined in accordance with the updated Adult Treatment Panel III (ATP III) criteria.

Results: Subjects in the top quartile of total cereal consumption had an increase risk of metabolic syndrome at baseline (OR=1.23; 95% CI= 1.03-1.47); p for trend= 0.010) compared with those in the lowest quartile after adjusting for potential confounders.

Longitudinal analyses showed that individuals in the top quartile of total cereal consumption at baseline had an increased risk of incident metabolic syndrome at one year (OR=1.42; 95% CI=1.52-1.03; p for trend= 0.027) compared to those in the bottom quartile. Participants in the third and top quartile of cereal consumption had an increase risk of incident impaired glucose tolerance (OR: 1.79; 95% CI: 1.22-2.64; OR: 1.52; 95% CI: 1.02-2.28, respectively; p for trend=0.021) when compared to the bottom quartile. Key findings: Higher cereal consumption is associated with a significantly higher prevalence and incident metabolic syndrome and impaired glucose tolerance in individuals at high risk of cardiovascular disease.

#### PM-124

Poster

##### **Eating away-from-home meals and quality of dietary carbohydrate and fat intake in the SUN Project.**

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Objective: To investigate the association of eating meals away-from-home with a) the quality of dietary carbohydrate intake and b) the quality of fat intake.

Material and methods: We assessed 19,371 participants in the SUN cohort who completed a validated 136-item semi-quantitative food frequency questionnaire at baseline. The Carbohydrate Quality Index (CQI) was defined as the sum of quintiles for: 1) dietary fiber intake (g/d); 2) glycemic index; 3) ratio whole grains/total grains; and 4) ratio solid carbohydrates/total carbohydrates. The Fat Quality Index (FQI) was calculated using the ratio MUFA+PUFA/SFA+TFA. Thus, the ranges of the calculated CQI and FQI were 4 to 20, and 0.6 to 5.9, respectively. Subjects were classified into four groups according to their frequency of eating out (never/almost never, 1-3 times/month, 1 time/ week and  $\geq 2$  more times/week). Multiple linear regression models were fitted to determine the association between frequency of eating away-from-home meals and both indexes. A poor CQI or FQI was defined as a value lower than the 25th percentile for both scores. Logistic regression analyses were used to assess the association between the frequency of eating out and a poor index after controlling for potential confounders.

Results: Participants showed an average CQI and FQI of 11.3 (SD 3.2) and 1.7 (0.5), respectively. A higher frequency of eating away from home ( $\geq 2$  more times/week) was associated with a lower CQI and a lower FQI in comparison with low frequency of eating out (never/almost never). For CQI, the adjusted mean difference was -0.29, 95%CI: -0.41, -0.17 (P for trend <0.001), and for FQI it was -0.02, 95%CI: -0.03, -0.001 (P for trend 0.023). Participants with a highest frequency ( $\geq 2$  more times/week) of meals eaten out of home compared to those with the lowest frequency had higher adjusted risk of a poorer CQI, (adjusted OR 1.31, 95%CI 1.17, 1.46, P for trend <0.001), but unrelated to FQI (adjusted OR 0.92, 95%CI: 0.82, 1.02, P for trend 0.190).

Key findings: A higher frequency of eating-away-from-home meals was associated with a lower quality of dietary carbohydrate or dietary fat. These findings highlight the importance of nutritional education addressed to eating-out consumers.

Funding: The SUN Study has received funding from the Instituto de Salud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/02658, PI10/02293, PI13/00615, RD06/0045, G03/140 and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra."

#### PM-125

Poster

##### **Alarming increase in prevalence in obesity by educational level and age in early pregnancy in Spain, 1993-2012.**

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Objectives: The prevalence of overweight increased in absolute terms by more than 10% in Spain, from 1987 to 2006/2007. However although women who start pregnancy are a target group to prevent excessive weight gain during pregnancy, to date, there have been no national or regional population-based studies of pre-pregnancy obesity trends.

To explore trends in a larger Spanish population, we examined obesity prevalence over a 20-year period at first stage of pregnancy among women

who delivered live-born infants in Gran Canaria, a Spanish community where obesity prevalence exceeds the national average.

Material and Methods: A population-based retrospective cohort study of all the pregnant women having delivered at the Maternal & Child University Hospital of Gran Canaria (HUMIGC) from 1993 through 2012, summing up 140,630 women, has been performed. A number of 4,728 participants without or with incorrect data and participants with a multiple pregnancy have been excluded. Finally, 135,902 participants were included in this study. Data on maternal characteristics were retrieved from the clinical registries made at the Gynaecologic and Obstetrics HUMIGC Service.

Weight and height were measured during the first visit of women at their medical center, the patients were lightly clothed and without shoes. Obesity was defined as BMI 30 kg/m<sup>2</sup>. Socio-cultural status was obtained through educational level (low: primary school studies or no formal education; middle: secondary school education; high: university education or equivalent). Age was segregated into four groups: 24 years, 25-29 years, 30-34 years and 35 years.

Results: The prevalence of obesity has increased from 8.3% in 1993 to 18.6% in 2012. This increase occurred for all age groups and all socioeconomic levels. At low socioeconomic level, the prevalence increased in absolute terms by 13.6%, in middle level by 14.3 and at high level the increase was 8.2%.

Key findings: During the past twenty years the prevalence of pre-pregnancy obesity has been increasing among women from Gran Canaria in all age groups and sociocultural levels. This trend has important implications for all stages of reproductive health care.

Maternal pregravid weight status is thus important both clinically, for the health care professional, and from a public health perspective due to the intergenerational nature of obesity.

#### PM-126

Poster

##### **Adherence to the Mediterranean diet and QT interval duration: The PREDIMED Study.**

Ruano-Rodríguez C, Diaz-Benitez E, Maldonado I, Salas-Salvadó J, Sanchez-Villegas A, Alvarez-Perez J, Pintó X, Fiol M, Arós F, Corella D, Martínez-González MA, Estruch R, Serra-Majem L  
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Objectives: The heart rate corrected QTc interval has been proposed as a relevant proxy for arrhythmia risk. Studies conducted in the general population have revealed that a longer QTc interval correlates well with a greater mortality risk. Our aim was to examine the association between heart-rate corrected QT prolongation and the adherence to a Mediterranean dietary pattern in subjects at high cardiovascular risk from the PREDIMED study.

Material and Methods: Participants were randomly assigned to 1 of 3 diets: Mediterranean diet supplemented with extra-virgin olive oil, Mediterranean diet supplemented with mixed nuts, or advice to follow a low-fat diet (control group). We analyzed 520 subjects from Reus and Canary Island centers who had available ECG data for analyses. Generalized Linear Models were fitted to assess the adjusted differences (regression coefficients [b] and their 95% confidence intervals [95%CI]) in the average change in the magnitude of the QTc interval (Difference: QTc (2 year follow-up) - QTc baseline) and percentage QTc (2 year follow-up)-QTc baseline/QTc (2 year follow-up)\*100), between each of the 2 Mediterranean diet intervention groups and the control group.

Results: Multivariate adjusted models revealed a statistically significant association between the average change in the QTc interval and the intervention (b= 0.007, 95% CI=0.003 to 0.115) for the Mediterranean diet supplemented with mixed nuts when compared to the control group. For the Mediterranean diet with extra-virgin olive oil the association was not significant (b= 0.002, 95% CI= -0.003 to 0.006). We did not find any significant difference in the analyses conducted according to categories of actually observed adherence to the Mediterranean diet, with b=0.68 (95% CI=-4.34 to -5.63) for the highest versus the lowest category of adherence and b= 0.24 (2.78 to -2.29) for the moderate versus the lowest adherence.

Key findings: Among persons at high cardiovascular risk we found a significant but not clinically relevant difference in the magnitude of the QTc interval after two year of nutritional intervention with Mediterranean diet supplemented with mixed nuts. No significant differences were found between the three interventions in the average change expressed in percentage. Further studies are needed to clarify these associations.

#### PM-127

Poster

##### **Chard extract reduces glycoprotein components and advanced oxidation protein products in experimental diabetic liver tissues.**

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Diabetes mellitus is a serious health problem affecting major populations worldwide. Treatment of diabetes mellitus and its complications in the recent context has focused on the usage of plant extracts and their constituents. Chard (*Beta vulgaris* L. var. *cicla*: Chenopodiaceae) is a herbaceous biennial leafy vegetable cultivated in throughout the world. The leaves can be used in salads or cooked like spinach. In the present study, the protective effect of chard on glycoprotein components and advanced oxidation protein products (AOPP) levels which are altered in diabetes, was examined in the liver tissue of streptozotocin (STZ) – induced diabetic rats. Male, Sprague Dawley rats were used in the study. Rats were randomly divided into three groups. Group I; Control animals given citrate buffer, Group II; Diabetic animals treated with STZ, Group III; STZ-diabetic animals given chard extract. Hyperglycemia was induced by a single dose STZ (60 mg/kg), intraperitoneally. The chard extract was administered by gavage technique to rats at a dose of 2 g/kg/day for 45 days, 15 days after animals were made diabetic. On day 60, livers were removed from rats and used for the analysis of glycoprotein components and AOPP levels. Glycoprotein components such as hexose, hexosamine, fucose and sialic acid, and AOPP levels were significantly increased in liver tissues of diabetic rats. Administration of chard significantly decreased glycoprotein components and AOPP levels in the diabetic group, indicating that chard possess a significant beneficial effect on these parameters. These results suggested that chard might have a significant role in alleviating liver damage in STZ diabetic rats.

**PM-128****Poster****Changes in food consumption and nutrient intake after 10 years of follow-up in a Mediterranean cohort: the SUN project.**

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Objectives: To evaluate within-subject longitudinal changes in food consumption and nutrient intake after 10 years of follow-up in a Mediterranean cohort.

Material and methods: The SUN (Seguimiento Universidad de Navarra) project is a prospective Spanish cohort study with continually-open recruitment. We followed-up our first participants, 3,036 Spanish university graduates (58% women) during 10 years. Dietary intake at baseline and after 10 years was assessed using a semi-quantitative 136-item food-frequency questionnaire, previously validated in Spain.

Results: After 10 years of follow-up participants showed a significant ( $p < 0.001$ ) increase in the consumption of fruits (21 g/day), vegetables (40 g/day), low-fat dairy products (59 g/day), fish (3 g/day), lean meat (5 g/day), whole grains (5 g/day), and tree nuts (3 g/day). We also observed reductions in the consumption of legumes (-2 g/day), whole-fat dairy products (-101 g/day), red meat (-15 g/day), sugared drinks (-29 g/day), and wine (-4 g/day).

With respect to nutrients, the most relevant changes were found in a higher proportion of energy from carbohydrates (2% E), increased fiber intake (2 g/day), and a decrease in total energy intake (-62 kcal/day), total fat proportion (-2% E) and dietary cholesterol intake (-39 mg/day).

Key findings: In this Mediterranean cohort study, beneficial changes in food consumption and macronutrient intake were observed after 10 years of follow-up, which may be partially attributed to the participation in a prospective cohort study with frequent repeated contact with participants to inquire about their dietary habits.

Funding: The SUN Project has received funding from the Instituto de Salud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/02658, PI10/02293, PI13/00615, RD06/0045, G03/140 and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra.

**PM-129****Poster****Credits4Health: Girona Pilot Nudge innovation platform for promoting healthy eating and physical activity.**

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Credits4Health (C4H) is an FP7-EC funded project (#602386) inspired in the "nudge" concept for health promotion. Using a web platform, it aims to stimulate users to increase their physical activity and adopt healthy

Mediterranean-based eating habits via personalized paths derived from existing behaviours, enhancing motivation, and further reinforcing motivation through an incentive system. The preventive care prototype will be iteratively tested in Greece, Italy, and Spain. This presentation focuses on the first pilot study in Girona, Spain.

Objectives Girona Pilot 1: To evaluate changes in participants' physical activity and eating habits, and to assess the utilisation and effectiveness of the personalised paths delivered through the web platform.

Material and Methods: 150 subjects aged 18-65 meeting inclusion criteria and providing informed consent will be recruited from healthy adults residing in Girona. Health and anthropometric data will be collected, an accelerometer will be provided, and three online baseline questionnaires on motivation, nutrition and physical activity will be completed. The user will select 2-3 goals from a list of identified nutritional issues, and set physical activity goals by planning weekly sessions; and will continue with step-wise selection of new goals once the initial set are met. Personalised interactive algorithms will be provided for 2 months of intervention with one month follow-up period. The final assessment consisting of motivation, nutrition and physical activity questionnaires and anthropometric measures will be conducted post-intervention.

Results: Data will provide insight into reasons for drop outs and into user characteristics (motivation, social support, etc.) and web platform components (activity type, format and timing of contents, messages etc) associated with increased compliance to dietary and physical activity recommendations.

Key-Findings: This study will provide evidence-based results on critical components for incentive-based health promotion interventions targeting nutrition and physical activity. As such C4H will deepen our understanding of the right mix of incentives (rewards, information, and personalised paths) that enable participants to achieve healthier lifestyles.

**PM-130****Poster****Brief theory web-based intervention targeting health professionals aiming to increase their intention on performing nutritional screening in the elderly.**

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Introduction: The World Health Organization defines malnutrition as one of the most serious threats to public health worldwide. The elderly are affected by this phenomenon due to a multitude of risk factors that favor the development of malnutrition and its non-early detection can lead to serious health problems. Objective: This study aimed to develop and evaluate a concise educational intervention program, based on the Theory of Planned Behaviour for the detection of malnutrition in the elderly. The program involved health professionals (doctors, nurses, health visitors, psychologists, etc.) from various health service structures (e.g. Hospitals, Health Care Centres, etc.). The objectives of this study were to increase the participants' intention and to improve the positive attitudes, the perceived social pressure (subjective norms) and the perception about their ability (perceived control) to use nutritional screening tools in the elderly. Material and Method: A pretest-posttest non-equivalent groups design was used. The intervention group consisted of 20 health professionals and the comparison group of 19 health professionals from various health care facilities. The intervention was web-based and applied online. The intervention group received a digitalized educational manual, videos and a scientific paper to target the key concepts of the Theory of Planned Behaviour. The comparison group received no intervention. A Theory of Planned Behaviour questionnaire was constructed and validated for the evaluation of the program. Within and between groups differences on the Theory of Planned Behaviour variables were considered.

Results: The evaluation of the program showed a statistically significant increase in the intervention group regarding the intention on using nutritional risk screening tools in the elderly as compared to the comparison group after the implementation of the intervention ( $p = 0,049$ ), as well as statistically significant improvement in the subjective norms of the intervention group as compared to the comparison group ( $p = 0,012$ )

Key findings: Achieving increase of intention and improvement of the perceived social pressure (subjective norms) on the use of nutritional screening tools for the detection of malnutrition in the elderly suggest that this educational intervention program could be a component of a broader, multi-faceted and multi-level educational program aiming to train health care professionals in detecting malnutrition in the elderly.

**PM-131****Poster****Household socioeconomic status, maternal diet and infant and young child feeding (IYCF) practices in rural Chittagong, Bangladesh.**

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Objectives: Household socioeconomic status (SES) is a major determinant

of maternal and child undernourishment. This study aimed to evaluate associations between household SES with quality of maternal diet and maternal BMI, current IYCF practices and infant and young children's nutritional status in a rural area in Chittagong, Bangladesh.

**Material and methods:** Cross sectional interviews were conducted among 113 mother-infant pairs with infants and young children aged <24m in different contiguous villages. Principle component analysis (PCA) was used to categorize household SES levels, into four quartiles from low to high. Multivariate logistic regression was performed to check associations and identify confounders.

**Results:** Households with higher SES were more likely to have mothers taking calcium and vitamin tablets on a regular basis ( $p < 0.05$ ). In terms of maternal BMI status, the lowest SES quartile had the highest proportion (25%) of underweight (BMI < 18.5) mothers, while the highest SES quartile had the highest proportion (32%) of overweight and obese (BMI > 25) mothers ( $p = 0.002$ ). However, maternal diets, which were only risky and fair, showed no statistically significant association with household SES level ( $p = 0.19$ ). Higher levels of maternal education (12-15y) were correlated with exclusive breastfeeding for the first 6 months ( $p = 0.03$ ) and achievement of minimum dietary diversity ( $p = 0.05$ ). The prevalence of wasting among the infants and young children was more common in lower than higher SES households (57% vs. 18%;  $p = 0.012$ ). The responsive feeding behaviors were poor for all infant and young child age groups, with more than 50% of mothers using negative verbal methods and actions to encourage their infants and young children to eat.

**Key findings:** The study found that the quality of maternal diets and IYCF practices were relatively poor in the studied Chittagong villages. To improve the situation, awareness programs and community-based interventions are needed targeting mothers irrespective of household SES level, especially those who live in rural setting with lower socioeconomic status.

### PM-132

Poster

#### Effect of zinc intake on growth in infants: A meta-analysis.

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**Objectives:** A systematic review and meta-analysis of available randomised controlled trials (RCTs) was conducted to evaluate the effect of zinc (Zn) intake on growth in infants.

**Material and methods:** Out of 5500 studies identified through electronic searches and reference lists, 19 RCTs were selected after applying the exclusion/inclusion criteria. The influence of Zn intake on growth was considered in the overall meta-analysis. Other variables were also taken into account as possible effect modifiers: doses of Zn intake, intervention duration, nutritional status and risk of bias. From each select growth study, final measures of Weight, Length, Mid upper arm circumference (MUAC), Head circumference, Weight for age z-score (WAZ), Length for age z-score (LAZ) and Weight for Length z-score (WLZ) were assessed. Pooled  $\beta$  and 95% confidence interval (CI) were calculated. Additionally we carried out a sensitivity analysis.

**Results:** Zn intake was not associated to Weight, Length, MUAC, Head Circumference and LAZ in the pooled analyses. However, Zn intake had a positive and statistically effect on WAZ ( $\beta = 0.06$ ; 95%CI 0.02 to 0.10) and WLZ ( $\beta = 0.05$ ; 95%CI 0.01 to 0.08). The dose response relationship between Zn intake and these parameters indicated that a doubling of Zn intake increased WAZ and WLZ by approximately 4%. Substantial heterogeneity was present only in Length analyses. ( $I^2 = 45\%$ ;  $p = 0.03$ ). Zn intake was positively associated with length values at short time (4 to 20 weeks) ( $\beta = 0.01$ ; CI 95% 0 to 0.02) and at medium doses of Zn (4.1 to 8 mg/day) ( $\beta = 0.003$ ; CI 95% 0 to 0.01). Nevertheless, the effect magnitude was small.

**Key findings:** Our results indicate that Zn intake increases growth parameters of infants. Nonetheless, interpretation of these results should be carefully considered.

### PM-133

Poster

#### Contribution of foods to energy intake according to local of consumption among adolescents.

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**Objectives:** The objective of the present study was to describe food intake and their contribution to energy intake according to the local of consump-

tion among adolescents of public schools in a low income city in Brazil. **Methods:** Data are from baseline of a randomized community trial conducted among 5th graders of 20 public schools in the city of Duque de Caxias, a low income city in Brazil, in 2010. The students completed one 24-h recall on baseline and all foods reported were grouped into 29 food groups, according to their nutritional content and the way they are commonly consumed. Food intake and contribution of food to energy intake (%) were estimated according to the local of consumption (home, school or away from home).

**Results:** A total of 458 students were evaluated and 50.4% were male. The mean of age was 11.1 years old. The five food groups with higher percentage of contribution to energy intake away from home were unhealthy, including 'sweets and candies' (10.7%), 'sweetened beverages' (10.2%), 'snacks' (9.9%), 'soft drinks' (8.4%) and 'cakes and cookies' (7.9%). At home, the contribution of 'sweets and candies' and 'sweetened beverages' are also high (10.7% and 10.2%, respectively). The contribution of 'beans' (14.3%), a healthy food marker, was higher in school than at the other places.

**Key findings:** These findings might indicate that away from home the consumption of food is unhealthy and in school, despite the provision of meals with healthy food marker, the consumption of unhealthy items remains high.

### PM-134

Poster

#### Antioxidant effect of a low-fat diet supplemented with Lemon verbena extracts on biochemical markers of multiple sclerosis long-term care residents.

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**Introduction:** Multiple sclerosis (MS) treatment options are primarily limited to immunomodulatory therapies in MS non-progressive forms. Nutritional interventions can be considered a very promising approach to complement conventional MS treatments. Studies on the role of diet and dietary supplements such as polyunsaturated fatty acids (PUFA), vitamins, micronutrients and antioxidants in MS process suggest that diet may be considered as a complementary treatment to control disease progression, improve wellness and ameliorate symptoms of MS patients.

**Objectives:** In this study we present a nutritional intervention on MS patients from a long term care facility consisting on reducing dietary fat content. The aim of the study was the investigation of the effectiveness of a low fat-diet on biochemical markers of patients with progressive forms of multiple sclerosis.

**Methods:** A randomized prospective placebo-controlled study involving 9 participants, 5 of them assigned to the intervention group (low-fat diet) and the other 4 to the placebo group. The effect of the dietary intervention, involving diet modification, was examined for 42 days by measuring anthropometric, biochemical parameters and oxidative stress markers in blood at baseline (day 0), intermediate (day 15) and end(day 42) stages of the treatment.

**Results:** The assessment of oxidative and inflammatory markers in urine and serum samples show a significant decrease in 8-iso-PGF2  $\alpha$  and IL-6 levels after dietary intervention. Catalase activity was also affected by increasing serum levels after the reduction of fat content on the diet. C reactive protein values diminished significantly in the intervention group after antioxidant supplementation. No significant differences were observed in other oxidative stress markers.

**Key findings:** The results suggest that diet and dietary supplements are involved in cell metabolism modulation and MS-related inflammatory processes. Consequently, low fat diets and antioxidant supplements may be used as complementary therapies for treatment of multiple sclerosis. The influence of fat consumption and dietary supplements on the activity and progression of multiple sclerosis is still under discussion. Therefore, further studies are needed to confirm the effect of nutritional interventions in multiple sclerosis.

### PM-135

Poster

#### Adequacy of muscular mass estimations provided by bioimpedance analysis for the assessment of body composition in subjects over 55 years.

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**Objectives:** Body composition assessment in the elderly is important due to age-related changes. Bioimpedance analysis (BIA) instruments perform assessments of the body composition based on a 2-compartment model (fat mass and fat-free mass) of the human body. They also provide an estimation of the muscular mass, thus including a third compartment, which could be more suitable for comparisons with other methods, like the dual-energy X-ray absorptiometry (DXA), which is considered the gold standard on body composition measurement. The aim of this study was to evaluate the accuracy of the two estimation procedures that the BIA offers, when compared with the DXA results.

**Material and method:** BIA (TANITA Corp, BC-418MA) and DXA (GE/Lunar-PRODIGY, GEHealthCare, Wisconsin, USA) were applied to a sub-sample of the FIS P111/01791 study (48 men and 57 women, 55-82 years old). The variables analysed were fat-free mass percentage and muscular mass percentage. Waist and hip circumferences were obtained by a trained ISAK anthropometrist using an anthropometric tape (Rosscraft SRL Mercosur). Waist-to-hip ratio was calculated from these measures.

**Results:** Outcomes of muscular mass measures with DXA, 2-compartment model of BIA and 3-compartment model of BIA were respectively 71.0% (CI 95%: 68.9-73.1), 74.9% (CI 95%: 73.4-76.4) and 71.6% (CI 95%: 70.2-73.0) for men and 57.6% (CI 95%: 56.0-59.3), 64.4% (CI 95%: 62.7-66.2) and 61.2% (CI 95%: 59.6-62.9) for women. There were significant differences ( $p < 0.001$ ) between all the measurements for both genders except for the values obtained by DXA and 3-compartment model in men. However, there were significant differences ( $p < 0.01$ ) between these two methods for men with a waist-to-hip ratio over 0.90 or a waist circumference over 102 cm.

**Key findings:** The estimation of the muscular mass provided by BIA might be adequate when evaluating men over 55 years. While there are significant differences between the three fat-free mass measures for women, it can be concluded that 3-compartment estimation provides a better approximation to DXA values. Better estimations were found for men with reduced waist circumference and waist-to-hip ratio.

Supported by Instituto Salud Carlos III (PI11/01791). ImFINE and NUCOX are members of the EXERNET research network.

#### PM-136

Poster

##### Consumo de alcohol y factores asociados a consumo no-moderado de alcohol en población universitaria.

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<sup>1</sup> Universidad Miguel Hernández. <sup>2</sup> CIBERESP

**Objetivos:** El consumo de alcohol es un problema relevante en Salud Pública a nivel mundial, debido a su alta prevalencia y su estrecha relación con diferentes enfermedades. La población joven es un colectivo vulnerable al consumo elevado de alcohol. Por ello, el objetivo de este estudio es describir el consumo de alcohol y analizar los factores asociados a un consumo alto de alcohol (>10g/día) frente a un consumo moderado de alcohol (>0-10g/día) para el total de bebidas alcohólicas y para el consumo de cerveza y vinos en población universitaria.

**Material y Métodos:** Se analizaron de forma transversal los datos basales del proyecto DiSA-UMH incluyendo a 1141 participantes de 17-35 años de ambos sexos. La ingesta dietética y el consumo de alcohol se midieron mediante un cuestionario de frecuencia alimentaria validado. Se estimó los gramos de alcohol diarios y se clasificó en tres categorías (no bebedores, bebedores moderados (>0-10g/día) y bebedores no-moderados (>10g/día)). También se recogieron variables socio-demográficas, estilos de vida, de salud y antropométricas en el cuestionario basal. Para explorar los factores asociados al consumo no moderado comparado con el consumo moderado se excluyeron a los no bebedores y se utilizó regresión logística múltiple.

**Resultados:** El 19.6, 68.8 y el 11.6% de los participantes se clasificaron como no bebedores, bebedores moderados y bebedores no-moderados. La media del consumo de alcohol de los bebedores moderados fue 3.5 g/día (DE: 2.5) y la de los bebedores no-moderados 18.7 (DE: 14.2). El alcohol ingerido provino en su mayoría del consumo de cerveza, vinos y bebidas espirituosas. Los factores asociados a un consumo no-moderado de alcohol en general fueron: ser hombre (OR: 2.60; IC95%: 1.65-4.10), la edad (OR para tener un año más: 1.10; IC95%: 1.03-1.16) y ser fumador (OR: 3.41; IC95%: 2.24-5.19). Los resultados fueron similares cuando exploramos los factores asociados a un consumo no-moderado de alcohol de cerveza y vinos.

**Hallazgos Claves:** El consumo de bebidas alcohólicas en población joven universitaria de nuestro estudio es mayoritariamente bajo-moderado. Los hombres, una mayor edad y el consumo de tabaco se asociaron a un mayor consumo de alcohol en general y de cerveza y vino en particular. Estos resultados pueden ser utilizados para dirigir programas de prevención y educación para la salud al colectivo de universitarios.

#### PM-137

Poster

##### In vitro inhibitory effect of Aloe vera (L.) Burm. f. leaf extracts on the activity of some enzymes.

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Aloe vera L. Burm. f. (=Aloe barbadensis Miller; Aloeaceae) "The miraculous plant" possess succulent leaves which gel or whole extracts are commercially used in cosmetic industry for its skin care properties and also as food supplement for its vitamins, enzymes, glycoproteins and multiple health benefits. The whole leaf or the separate inner gel are used topically for various skin problems. Numerous internal uses of A. vera leaf juice are reported in India, Africa, the Caribbean, Central and South America. Medical usage and applications of Aloe, deal with skin disorders, diabetes, gastrointestinal disorders, cancer and the effects are mainly attributed to immunomodulatory or antioxidant activities. Compounds responsible for these activities were sometimes isolated and identified but some authors prefer to declare that the synergistic effects of the compounds are responsible for the beneficial effect of the plant.

Research for medicines based on the inhibition mechanism of enzymes is a promising topic. In this study three different enzymes were chosen: Elastase, neuraminidase and  $\alpha$ -amylase. Elastase inhibition is important for cosmetics and may be correlated with the burn healing effect of the gel. Neuraminidase plays an important role in viral proliferation is a drug target for the prevention of the spread of influenza infection and may be correlated with the wound healing effect of the gel.  $\alpha$ -Amylase, operating in the breakdown of starch, may be correlated with the well documented hypoglycemic effect of the leaves.

A. vera leaves were collected from the plant which is cultivated in the greenhouse of Istanbul University Alfred Heilbronn Botanical Garden. The leaves were washed and cut from the middle, the gel was separated by scratching with a spoon. The leaf gel was homogenized in phosphate buffered saline, filtered through cloth and lyophilized. The leaves without the gel (leaf skin) were cut in small pieces, homogenized with PBS and filtered through cloth. The filtrate was centrifuged and the supernatant was lyophilized. Appropriate dilutions were made before use.

The leaf skin and gel extracts were examined separately for their elastase, neuraminidase and  $\alpha$ -amylase inhibitory activities. Among the three enzymes, A. vera leaf gel and skin extracts showed the best inhibition for elastase and  $\alpha$ -amylase and moderate inhibitory activity for neuraminidase. The enzyme inhibitory activities of the extracts were increasing in a dose-dependent manner. The results were in accordance with the wound healing and the antidiabetic activities of A. vera leaves documented by scientific research.

#### PM-138

Poster

##### In vitro inhibitory potential of Amaranthus lividus L. on some enzymes.

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Amaranthus plants (Amaranthaceae) are widely distributed throughout the world and they are able to produce grains and leafy vegetables. Amaranthus lividus L. (= A. blitum) locally known as "dari mançari" is used as popular vegetable in West Black Sea Region of Turkey. The leaves of amaranth constitute an inexpensive and rich source of protein, carotenoid, vitamin C, and dietary fiber, minerals like calcium, iron, zinc, magnesium, oxalic acid, nitrate, and phosphorus. In vitro antioxidant potential and hepatoprotective effect of A. lividus has been investigated in our earlier studies. Enzyme inhibitory effects of some plants are very important for the treatment of some diseases such as diabetes and Alzheimer's disease etc. In this study, in vitro enzyme inhibition potential of A. lividus for  $\alpha$ -glucosidase,  $\alpha$ -amylase, neuraminidase, elastase and acetylcholinesterase was investigated. The stems with leaves and flowers of A. lividus were collected in August from Bartın, Turkey. A voucher specimen was deposited in the herbarium of the Faculty of Pharmacy, Istanbul University (ISTE); herbarium code number: ISTE 83401. The stems with leaves and flowers were washed with distilled water and dried at room temperature. The aqueous extract was prepared by heating powdered A. lividus (10 g) with 100 mL distilled water for 30 min. The extract was filtered and evaporated in a rotary evaporator. The inhibition of  $\alpha$ -glucosidase,  $\alpha$ -amylase, neuraminidase, elastase and acetylcholinesterase activities were determined by spectrophotometric assays. A. lividus aqueous extract strongly inhibited  $\alpha$ -glucosidase,  $\alpha$ -amylase and elastase activities and moderately inhibited the other enzymes examined. The inhibition of all of enzymes were increased with increasing extract concentrations. Therefore, Amaranthus lividus may be considered as an important plant in food industry, cosmetic industry and medicine.

#### PM-139

Poster

##### Fluid intake, biomarkers and body composition differences between physically active and non-active elderly people.

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**Objectives:** The physiological changes related to age lead to an increased risk of dehydration in the elderly and many of them do not reach their recommended daily fluid intake. The optimal amount of fluid intake in older people depends on many factors, including health status, and life style. Creatinine and osmolality have been proposed as easy-to-use hydration biomarkers, but their effectiveness remains controversial. The aim of this study was to analyze the relationship among total fluid intake with these biomarkers and body composition in physically active and non-active elderly people.

**Material and methods:** 87 elderly were selected for this study (52 men, mean age 67.4 ± 7.18 yr and 35 women, mean age 70 ± 6.5 yr) divided in two groups, physically active (A) and non-active (N). Fluid intake was obtained by means of a specific hydration questionnaire developed by ImFINE research group. Body composition was measured by a Bioelectrical Impedance Analysis (BIA) technology using Tanita® BC-418MA (Tanita Corp., Tokyo, Japan). Serum creatinine and osmolality were analyzed by routine laboratory methods.

**Results:** Median intake of daily total fluid in the A group was 1950 mL, while in the N group it was 1498 mL. According to DACH (2008) beverage recommendations for elderly, 90% of A subjects reached the recommendations, while 40% of N did not reach this minimum recommendations and are at risk of an inadequate fluid intake. Blood osmolality was significantly higher ( $p < 0.05$ ) in N, but values were within the reference range in both groups.

There were not significant differences between groups for Total Body Water (TBW) and Fat Free mass (FFM). % of Fat was significantly higher ( $p < 0.05$ ) in N. Significant correlations were found between TBW and liquid intake ( $r = 0.279$ ;  $p = 0.010$ ), but not between TBW and osmolality. Otherwise, there were significant correlations between FFM and creatinine ( $r = 0.367$ ;  $p = 0.001$ ) and between TBW and creatinine ( $r = 0.367$   $p = 0.001$ ).

**Key finding:** Non-active subjects had higher risk of dehydration than active subjects, based on DACH 2008 recommendations for elderly. However, even if osmolality was higher in N, all subjects were within the reference range. Osmolality seems not to be an effective biomarker for hydration status, at least in our sample. TBW correlated positively with both total fluid intake and creatinine.

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#### PM-140

Poster

##### Changes in inadequate intake after 10 years of follow-up in a Mediterranean cohort: the SUN Project.

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**Objective:** To evaluate prospectively the increase or decrease of inadequate intake of nutrients after 10 years of follow-up in a Mediterranean cohort. **Material and methods:** The SUN (Seguimiento Universidad de Navarra) project is a prospective Spanish cohort study. We followed-up 3,036 Spanish university graduates (58 % women) during 10 years. Dietary habits at baseline and after 10 years were assessed using a semi-quantitative 136-item food-frequency questionnaire, previously validated in Spain.

The prevalence of inadequate intake of nutrients was studied according to national nutritional objectives or Estimated Average Requirement (vitamins or minerals) at baseline and after 10 years of follow-up. Odds Ratios (OR) (95% CI) were calculated for each nutrient's inadequate intake using the baseline data as the reference category.

**Results:** A higher risk of inadequate intake according to national nutritional objectives or Estimated Average Requirement after 10 years of follow-up was observed for iodine [OR=1.5 (1.2 to 1.9)], selenium [OR= 1.4 (1.1 to 1.9)], calcium [OR= 1.2 (1.1 to 1.4)], vitamin E [OR= 4.5 (3.7 to 5.5)], n3 [OR= 1.5 (1.3 to 1.7)], n6 [OR= 2.6 (2 to 3.1)], and monounsaturated fatty acids [OR= 1.4 (1.1 to 1.6)]. Whereas the risk of inadequate intake was lower for vitamin C [OR= 0.6 (0.4 to 0.9)], total carbohydrates [OR= 0.6 (0.5 to 0.7)], fiber [OR= 0.7 (0.6-0.8)], total fat [OR= 0.8 (0.7-0.9)], saturated [OR= 0.4 (0.3-0.5)] and polyunsaturated fatty acids [OR= 0.4 (0.3-0.4)], and cholesterol [OR= 0.5 (0.4-0.5)].

**Key findings:** Although participants in this Mediterranean cohort are more likely to follow healthy dietary patterns, our results suggest that even among university graduates nutritional education is needed to adequate to Spanish nutritional requirements.

**Funding:** The SUN Project has received funding from the Instituto de Sa-

lud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/02658, PI10/02293, PI13/00615, RD06/0045, G03/140 and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra.

#### PM-141

Poster

##### Validation of 24-hour recall and the food record applied in a Brazilian national individual dietary survey: comparison with doubly labeled water energy expenditure estimate.

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**Background:** The 24-hour recall (24h-R) and the food record (FR) are the most used dietary assessment, but few studies have measured their accuracy in Brazil which is important for improving the estimators on diet and disease association. The double label water (DLW) is the gold-standard to estimate energy expenditure and has been used in the validation of dietary assessment methods.

**Objective:** To compare the deattenuated mean energy intake (EI) estimated from two FR and three 24h-R means with total energy expenditure (TEE) assessed by doubly labeled water (DLW).

**Methods:** The studied group included 84 adults between 20 - 60 years of age who were recruited from a population-based sample. EE was estimated using the DLW method during a ten-day period. Energy intake was estimated by de-attenuated means of two FR and three 24h-R in non-consecutive days along a three week period, before DLW procedures. Nutritional status was assessed using BMI and the WHO cut-off limits. The Wilcoxon signed-rank test and a box plot of proportional differences were used to assess the differences between energy intake and expenditure, while the Pearson coefficient correlation, the Bland-Altman and Survival-Agreement plots assessed the agreement between the estimates. **Results:** The reported energy intake was lower than the EE, according to the two dietary assessment methods (FR: -763kcal; 24h-R: -810kcal,  $p < 0.01$ ). The mean underreport of energy intake among men was 27% and the highest differences (EI - TEE) were observed for 24h-R (FR: -726kcal; 24h-R: -968kcal). Mean underreport among women was 27%, and was higher for the FR (FR: -786kcal; 24h-R: -711kcal). The CC between EI and TEE was significant only for the FR of normal weight participants (0.46;  $p < 0.05$ ). Limits of agreement estimated according to Bland-Altman method were similar for FR and 24h-R (FR: 38% - 122%; 35%-128%). According to the S-A plot, the food record was the method with more agreement proportions.

**Key findings:** Energy intake estimated using de-attenuated means of both methods was underreported. Nonetheless, the 24h-R yielded distributions of the differences between energy intake and expenditure with greater dispersion than the FR and this method presented the best agreement with EE.

#### PM-142

Poster

##### Consumption of plant food supplements in Spain: summary of usage patterns and consumer characteristics.

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**Objectives:** To present an overview of the main characteristics and usage patterns of plant food supplements (PFS) consumers in Spain.

**Material and Methods:** Data from the Spanish subsample of the PlantLIBRA PFS Consumer Survey 2011-2012 were analyzed (PlantLIBRA: is a FP7-EC funded project n°245199). A cross-sectional, retrospective (12 months) survey of adult PFS consumers using a self-reported frequency-of-PFS-usage questionnaire, was conducted simultaneously in six European countries (Finland, Germany, Italy, Romania, Spain and United Kingdom), from May 2011 to September 2012. Survey respondents were recruited to fixed quotas for age and gender. A final Spanish sample of 402 adult PFS consumers (174 males and 228 females) were interviewed (from 1743 screened individuals recruited in four cities spread across Spain).

**Results:** 63.7% and 13.4% of Spanish consumers had a medium and a high educational level respectively, and 22% used other types of supplements (other than PFS e.g. vitamins). Analysis of PFS consumption is summarized as follows: 284 different products, from 97 manufacturers, containing 218 different botanicals (with a maximum number of ingredients per product of 30). 85.8% of consumers, in the previous 12 months,

consumed one product (mainly a single-botanical), 11.9% two and 2.2% more than two. The total number of products consumed was 465. The main dose forms used were capsules and pills/tablets/lozenges. The five most frequently reported botanicals were: *Cynara scolymus* (artichoke), *Valeriana officinalis* (valeriana), *Equisetum arvense* (horsetail), *Foeniculum vulgare* (fennel), and *Passiflora incarnata* (purple passionflower). Key findings: This study presents the first data on actual consumption of PFS in Spain that can be compared with other European countries. Given the rise in PFS consumption, and the few existing studies, it is recommended that nutritional studies include assessment of these type of supplements to allow for gaining insight into the risks and benefits of their consumption.

**PM-143**

Poster

**Anthropometric indicators of obesity as predictors of cardiovascular risk in the elderly.**

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Universidade Federal de Viçosa, Brazil

Objective: Evaluate the predictive capacity of anthropometric measurements in identifying cardiovascular risk in elderly patients at the Family Health Strategy of Viçosa-MG.

Material and methods: This was a cross-sectional epidemiological study with 349 elderly persons. Cardiovascular risk was calculated using the ratio of triglyceride levels with HDL-cholesterol (TG/HDL-C) levels. The anthropometric variables measured were waist circumference, body mass index, waist-to-height ratio, and conicity index. A biochemical assessment of triglycerides and HDL-cholesterol was performed. The anthropometric measurements were also related to cardiovascular risk using Receiver Operating Characteristic (ROC) curves.

Results: The observed results suggest that all these anthropometric indexes can be used to predict cardiovascular risk in males. However, in females, only BMI showed predictive capacity. The cutoff points identified appeared very close to the cutoffs recommended and recognized in other studies, with the exception of waist circumference measured at the midpoint between the last rib and the iliac crest, which showed a considerable difference.

Key findings: All anthropometric indices can be used to predict cardiovascular risk in males and females. Waist circumference at the midpoint between the last rib and the iliac crest was the best anthropometric measure to predict cardiovascular risk in males and smaller waist circumference and waist-height were the best anthropometric measures in females.

**PM-144**

Poster

**Hemoglobin levels during the first trimester of pregnancy and risk of abortion.**

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Objective: Iron deficiency in early pregnancy has been associated with increased incidence of abortions, however there is no evidence on the effect of high levels of iron. Therefore, the objective was to evaluate the incidence of abortions in a population of Spanish pregnant women and its relationship with different hemoglobin levels during the first trimester of pregnancy, adjusting for other risk factors.

Material and methods: Longitudinal study conducted on 9488 pregnant women who followed up their pregnancy in primary care from 2007 to 2012 in a Mediterranean area. The age of pregnant women, body mass index (BMI), number of previous abortions, tobacco habit and first trimester hemoglobin levels (Hb), were collected from the computerized clinical records. Pregnant women were grouped into 6 groups according to their levels of hemoglobin: Hb <100 g/L, Hb: 100 to 109.9 g/L, Hb: 110 to 119.9 g/L, Hb: 120-129.9 g/L, Hb: 130 to 139.9 g/L, Hb> 140 g/L. Statistical analyzes were performed using SPSS version 20.0.

Results: Pregnant women were 30.0 ± 5.5 years old, 43.6% were primiparous and 18.4% reported being smokers during pregnancy. A 3.9% of pregnant women started pregnancy with anemia (Hb <110 g/L) and 13.2% with Hb above 140 g/L. The incidence of abortions was 5.9%, with a mean gestational age of 13.2 ± 5.9 weeks. This incidence was significantly higher in the group with anemia (9.4%) and in the one with high levels of Hb (10.2%). Abortion risk is increased by having ≥ 35 years (OR: 2.0, 95%CI: 1.7-2.5), presenting Hb levels below 110 g/L (OR Hb <100 g/L: 2.6 95%CI: 1.3-5.5; OR Hb 100-109.9 g/L: 2.2 95%CI: 1.3-

3.7) or above 140 g/L (OR: 1.9, 95%CI: 1.3-2.9). The risk of abortion did not increase by the number of previous abortions, smoking or BMI of the mother.

Key findings: The incidence of abortions is higher not only in presence of anemia but also in presence of hemoglobin values above 140 g/L during the first trimester. Besides controlling low hemoglobin levels at the beginning of pregnancy, it is important to highlight the importance of early detection of high hemoglobin levels to prevent the risk of abortion by avoiding iron supplementation.

**PM-145**

Poster

**Comparison of functional autonomy and associated factors in elderly patients with or without metabolic syndrome.**

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<sup>1</sup>Universidade Federal de Viçosa, Brazil. <sup>2</sup>Universidade Federal do Estado de Rio de Janeiro, Brazil

Objective: The aim of this study was to compare the autonomy and its associated factors in elderly patients with or without metabolic syndrome. Material and methods: This study was a cross-sectional study comprising 402 subjects aged 60 years or older, of both sexes, attended at the Family Health Program, in Viçosa / MG. The metabolic syndrome was classified according to the criteria of the International Diabetes Federation. Autonomy was classified according to the protocol GDLM. The independent variables of the study were gender, age, marital status, education, physical activity, sedentary behavior, number of chronic diseases, depressive symptomatology and cognition level. A multiple linear regression model was used to estimate associations between the variables and autonomy in older adults with and without metabolic syndrome.

Results: In the elderly group without metabolic syndrome, autonomy was associated with increasing age, sedentary behavior, and depressive symptomatology. In the presence of metabolic syndrome, in addition to these factors, the lowest level of education, being insufficiently active in physical activities, and have at least one chronic disease is not transmissible, also correlated with worse autonomy.

Key findings: It was concluded that the presence of metabolic syndrome, negatively interfered with worse functional autonomy of the elderly.

**PM-146**

Poster

**Depressive symptoms in elderly patients with metabolic syndrome: a case-control study.**

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<sup>1</sup>Universidade Federal de Viçosa, Brazil. <sup>2</sup>Faculdade Atenas-Paracatu, Brazil

Objective: The objective was to identify factors associated with depressive symptoms in elderly with metabolic syndrome.

Material and methods: It was a case-control study to check sociodemographic and lifestyle influencing depressive symptoms in elderly patients with metabolic syndrome. The cases were attended in Family Health Strategy, classified as having metabolic syndrome and depressive symptoms and the control group consisted of individuals with metabolic syndrome who didn't have depressive symptoms. It was used as a measure of association, odds ratio (OR) with confidence interval of 95% and p-value, obtained by conditional logistic regression model.

Results: It was observed that of the 242 seniors who presented metabolic syndrome, 60 (24.79%) were cases presenting depressive symptoms and 182 (75.21%) were controls, with no significant depressive symptoms. Males were represented by 12 cases and 43 controls for females there were 48 cases and 139 controls. The mean age of cases was 74.03 (sd = 7.22) and of the controls was 71.74 (sd = 6.62). Most individuals belonging to the cases and controls were married, currently working, had 1-4 years of schooling and were white or latino. Among the sociodemographic variables, only age was significantly associated with the presence of depressive symptoms. Among the cases, there were higher chances of developing stress (OR = 8.10), compromised mental cognition (OR = 1.83), worse health perception (OR = 5.76), dependent according to the ADL (OR = 2.05) and being in mourning (OR = 2.49) compared to the controls. The intake of nutrients vitamin B6, vitamin B9, vitamin B12, selenium and zinc and sedentary behavior were presented quantitatively. Nutrients were adjusted per calorie intake and sedentary behavior analyzed in hours sitting and/or lying. Consumption of vitamin B6, vitamin B9, vitamin B12, selenium and zinc, as well as sedentary behavior, showed no statistically significant difference between cases and controls.

Key findings: We concluded that elderly individuals considered stressed, grieving, older than 80, with poor self-perceived health and cognitive impairment were, respectively, 13.95, 3.68, 6.39, 8.02 and 3.00 times more likely to present depressive symptoms than individuals without these characteristics.

**PM-147****Poster****Perceptions and attitudes on healthy nutrition of parents and children, participating in a school-based feeding program in disadvantaged areas in Greece: A qualitative study.**

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**Objectives:** With the aim of reducing the rates of food insecurity and promoting healthy eating, we designed and implemented the Program on Food Aid and Promotion of Healthy Nutrition, a school-based intervention program including the daily free provision of a healthy mid-day meal, in disadvantaged areas in Greece. We conducted focus groups, in order to explore parents' attitudes towards healthy eating and the provision of a daily school meal and their children's approach.

**Material and Methods:** Eligible participants included elementary and junior high school students and their parents, who participated in the intervention program. Twenty focus groups were conducted (January - February 2013), 6 with parents and 14 with students from participating schools in Athens (Greece) selected randomly. Sample consisted of 44 parents and 98 children. Two discussion guides were developed respectively, in relation to, among others, perceptions regarding healthy eating and barriers, parental practices for promoting children's healthy eating and attitudes towards the program.

**Results:** Analysis of the transcripts was done using the Krueger's method. Parents consider the Mediterranean diet as the healthy, traditional dietary pattern. Mothers appear to have the dominant nurturing role in the family. Nearly all parents understand their role-model effect and comment on the benefits of family meals. As part of their parenting role, they use various methods to promote a healthy diet. The most reported barriers include taste and preference for sweets. Working mothers referred, also, to the lack of time. Most of the children's responses mirrored those given by their parents. Still, some younger children mentioned strict parental practices concerning the consumption of healthy family meals. Concerning the free provision of the mid - day meal in the school setting on a daily basis, most parents believed that it is an important step towards the promotion of healthy eating. Others emphasized the social benefits of the program for the families in need. Students also perceived the program mainly as health promoting.

**Key findings:** The results of the present study improved our understanding on the perceptions about healthy eating of parents and children living in socioeconomic disadvantaged areas, as well as their views towards a school food aid program that included the daily, free provision of a healthy mid-day meal. The findings of this research allowed us to design and implement tailored-made activities for the promotion of healthy eating targeting people living in these areas.

**PM-148****Poster****Are infants in the Western Highlands of Guatemala meeting major and trace mineral requirements from breast milk during early and later lactation periods?**

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**Objectives:** To compare adequacy of daily infant intake of major and trace minerals from early and later breast milk of rural Mam-Mayan mothers with international recommendations.

**Materials and Methods:** Using Inductively Coupled Plasma Mass Spectrometry, concentrations of 11 minerals (Na, K, Ca, Mg, Mn, Zn, Cu, Cr, Se, Fe, P) were measured in breast milk samples during both early (<45d, n=52) and later (4-6mo, n=37) lactation periods. To calculate daily infant intake of minerals, a three-step process was used. First, energy requirement was calculated by multiplying infant weight (kg) by age-adjusted FAO/WHO/UNU energy needs for breastfed infants. This value was then divided by the assumed 0.67 kcal/mL of breast milk to estimate the daily volume of milk consumed. Finally, mineral concentrations were multiplied by volume of milk to obtain total within-day mineral intake. These were compared to the international recommendations. An in-depth questionnaire recorded infant feeding practices including feeding frequency (FF). Statistical significance was established at p ≤ 0.05.

**Results:** As expected, infants in early lactation consumed significantly less breast milk compared to later lactation (529 vs 800 mL/day, p ≤ 0.05). Median intakes of Na, K, Ca, Zn, P were below the international recommendations at both stages of lactation. Of these inadequately consumed minerals, Ca and Mg intakes in early lactation were the most deficient,

with 98% of daily infant intakes falling below recommendations. In later lactation, Ca and Zn intakes were the most deficient, with 94% of daily infant intakes falling below recommendations. Median intakes exceeded the recommendations for Fe in early lactation only and for Mg in later lactation only. Cr, Mn, Cu and Se were adequate in both periods. In general, mothers met FF recommendations, although 10% in early and 14% in later lactation periods failed to breastfeed > 8 times/24 hours. Despite this, there were no differences in mineral intakes in either early or later lactation based on FF.

**Key Findings:** Low mineral concentrations exist in breast milk from Mam-Mayan mothers, resulting in inadequate daily intakes by full breastfed infants in early and later lactation periods. Our results show that most infants are consuming inadequate intakes of K, Mg, and Ca during early and Ca and Zn during later lactation periods. Moreover, volume of milk differs between early and later lactation periods, suggesting that the universal assumption of breast milk intake of 780 mL/day is not appropriate for our population.

**PM-149****Poster****High prevalence of intestinal fructose malabsorption in patients with chronic abdominal pain.**

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**Objectives:** chronic abdominal pain is a disease with high prevalence in children. It is very significantly associated to anxiety in the patient and the family environment as well as to high demand for health resources, being an entity of difficult treatment. Increased consumption and utilization of fructose lead us to consider the role of malabsorption and fructose intolerance as a cause of chronic abdominal pain.

**Material and methods:** a prospective study in which hydrogen / methane (H<sub>2</sub>/CH<sub>4</sub>) breath test is made after fructose overload in children and adolescents with abdominal pain of long duration (more than 6 months), etiological study with no abnormal results and lack of response to standard measures. The selected patients are given a dose of fructose 1g/kg (maximum 20g). H<sub>2</sub>/CH<sub>4</sub> baseline measurement and determinations every 25 minutes during 175 minutes were performed. It is considered positive when the concentration of H<sub>2</sub> is higher than 20ppm and / or the concentration of CH<sub>4</sub> is higher than 12ppm. Patients with a positive test are given low in fructose - sorbitol diet with subsequent clinical management in the query. **Results:** 23 patients (13 men/10 women) with a mean age of 8.64 years were included. All patients had chronic abdominal pain, associating other symptoms in varying degrees (diarrhea 43%, 35% bloating, abdominal distension 9%). The H<sub>2</sub>/CH<sub>4</sub> breath test after fructose overload was positive in 86% of patients. In 18 of the 23 patients were also conducted throughout the study hydrogen breath test after lactose overload, but it was only positive in 17% of patients. The patients with positive fructose test which dietary treatment was prescribed improve in a large percentage, but many are awaiting clinical control.

**Key findings:** children and adolescents with chronic abdominal pain of long duration in our study have a high percentage of intestinal fructose malabsorption. Fructose - sorbitol restricted diet may be an effective treatment in these cases.

**PM-150****Poster****Integrating malaria, nutrition and early child development in Mali: impact on child health, nutrition and development.**

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**Objectives:** To reduce the prevalence of malaria, anemia and stunting and to improve cognitive function (capacity to learn) and school readiness in children aged 0-5 years, by integrating seasonal malaria chemoprevention with home fortification with micronutrient powders delivered through community based preschools in Sikasso, Mali

**Material and methods:** A cluster randomized trial was conducted in 60 communities with community-run preschools supported by Save the Children between May 2013 to September 2014. All children under 5 years in the intervention communities received two rounds of malaria treatment during the peak malaria transmission season, followed by up to four months of daily home fortification with micronutrient powders and nutrition education. A cross sectional survey is currently being conducted in all 60 communities targeting 1,200 children aged three and five years, randomly sampled from each of the 60 communities to assess children's cognitive function, school readiness, height for age z score, hemoglobin levels and malaria parasitemia. Parental interviews are also conducted for each child to identify other home and parenting factors related to child development.

Results: Preliminary results will be available in September 2014 and will compare the prevalence of malaria, anemia, stunting, cognitive function and school readiness for children aged 3 years and 5 years in the intervention and comparison communities to assess the impact of seasonal malaria chemoprevention and home fortification with micronutrient supplementation and the feasibility of delivering these through community based preschools.

Key findings: There have been no previous studies examining the combined impact of these two malaria and nutrition interventions in early childhood, nor their benefits for child development. This evidence is very timely for Mali and the sub region as they begin scaling up seasonal malaria chemoprevention (as recommended by WHO in June 2013 for Sahel countries), early childhood development and nutrition and are looking for models to integrate the different sectors to maximize impact.

#### PM-151

Poster

##### **Association between changes in weight status and sociodemographic data in three years follow-up of Brazilian adolescents from Rio de Janeiro, Brazil - ELANA Project.**

Veiga GV, Moraes MM, Dias AS.

Institute of Nutrition Josué de Castro, Federal University of Rio de Janeiro

Objectives: Evaluate the changes in weight status between 2010 and 2012 and its relation with sociodemographic data in Brazilian adolescents. Materials and methods: Data are from the Longitudinal Study of Adolescent Nutritional Assessment – ELANA Project, which consists in a cohort of adolescents from four private and two public schools of the metropolitan area of Rio de Janeiro that were on sixth grade of middle school in 2010. Body mass index (weight/height<sup>2</sup>) was obtained in baseline and after two years. Weight status was classified by the sex-and-age specific body mass index cut-offs based on World Health Organization criterion. "Change in weight status" variable was categorized in three levels: "no change", "overweight changed to normal weight" and "normal weight changed to overweight". Sociodemographic data were gender, type of school (private or public) and skin color, obtained by applying a self-administered questionnaire. The relations between these variables were assessed by the chi-square test and  $p < 0.05$  was considered for statistical significance. Results: Five hundred twenty-seven adolescent (52.6% boys), with mean age of 11.6 year (SD = 0.84) were analyzed in 2010 and in 2012. After two years, 88% of the students did not change their weight status; 8.7% (9.0% for boys and 8.4% for girls) were overweight changed to normal weight and 3.2% were normal weight changed to overweight. According to type of school, 88.6% from public and 87.8% from private schools showed no change in weight status after two years; 9.6% of students from public and 8.3% from private schools that were overweight changed to normal weight and 1.8% and 3.9% from these respective schools were normal weight changed to overweight. Among skin color groups, 87.9% of whites and 88.1% of non-whites showed no change in weight status after two years; 8.5% of whites and 9.0% of non-whites were overweight changed to normal weight, and 3.6% of whites and 2.9% of non-whites were normal weight changed to overweight. All analysis were adjusted by self-reported sexual maturation, according to Tanner stages. There were no statistically significant differences between gender, school or skin color groups on change in weight status.

Key findings: Higher proportion of adolescents changed from overweight to normal weight than changed from normal weight to overweight in period of three years, suggesting that growth spurt could favor the appropriate weight. Changes in weight status were unrelated to gender, type of school or skin color.

#### PM-152

Poster

##### **Association between changes in weight status and meal consumption patterns in three years follow-up of Brazilian adolescents from Rio de Janeiro, Brazil - ELANA Project.**

Veiga GV, Moraes MM, Dias AS

Institute of Nutrition Josué de Castro, Federal University of Rio de Janeiro

Objectives: Evaluate the changes in weight status between 2010 and 2012 and its relation with meal consumption in Brazilian adolescents.

Materials and methods: Data are from the Longitudinal Study of Adolescent Nutritional Assessment – ELANA Project, which consists in a cohort of adolescents from four private and two public schools of the metropolitan area of Rio de Janeiro that were on sixth grade of middle school in 2010. Weight status was classified based on sex-and age-specific body mass index cut-offs in baseline and after three years. The variable "Change in weight status" was categorized in three levels: "no change", "overweight changed to normal weight" and "normal weight changed to overweight". Information about frequency of meals (breakfast; lunch; snacks instead of lunch; dinner; snacks instead of dinner) were obtained by applying a self-administered questionnaire. The consumption of each meal was assessed in three categories "five to six times a week", "three to four times a week" and "two times a week or less. The frequencies of changes in weight status and meal consumption were estimated, and the relation

between these variables were assessed by the chi-square test;  $p < 0.05$  was considered for statistical significance.

Results: Five hundred twenty-seven adolescent (52.6% boys), with mean age of 11.6 year (SD = 0.84) were analyzed in 2010 and in 2012. After three years, 88% of adolescents did not change their weight status; 8.7% that were overweight changed to normal weight; 3.2% that were normal weight changed to overweight. From all meals, only frequency of breakfast showed significant relationship with change in weight status, as 14.2% of adolescents who had breakfast twice a week or less that were overweight in 2010 changed to normal weight in 2012 ( $p = 0.020$ ), and 13.0% of adolescents who had breakfast 3 or 4 times a week that were normal weight in baseline changed to overweight three years later ( $p = 0.018$ ). Analysis were adjusted by self-reported sexual maturation.

Key findings: Changes in weight status were related to omission of breakfast in two different ways: weight gain was related to having breakfast three to four times a week, while weight loss was related to having breakfast twice or less a week. Although known to be unhealthy, omitting breakfast seems to be a strategy used by adolescents to lose weight.

#### PM-153

Poster

##### **Healthy food as protective factor from depression postpartum.**

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<sup>3</sup>Department of Paediatrics, School of Medicine, University of Granada, Spain.

Objectives: The aim of this study was to assess the relationship between the prevalence of postpartum depression (DPP) in healthy normoweight, overweight, obese and diabetic pregnant women according to their eating and self-rated health habits.

Material and methods: We selected 84 participants in the PREOBE Study\* ([www.ClinicalTrials.gov](http://www.ClinicalTrials.gov) NCT01634464) which were divided into two groups: DPP group according to the Edinburgh Scale criteria for postpartum depression diagnosis at 6 weeks postpartum and non DPP (NDPP) group. Energy and nutrients dietary intake were assessed analyzing the declared nutritional intake during 7 days at 34 weeks of gestation using the validated "Spanish Food Tables" included in the CESNID software. Maternal age, pre-conceptional body mass index (BMI), type of birth, marital status, educational level, employment status and area of residence were included in the statistical analysis as confounder factors. One way ANOVA and Kruskal Wallis test were performed using the IBM SPSS Statistics version 21.0.

Results: 16.66% of the studied participants had DPP at 6 weeks postpartum. The DPP was independent of all confounders analyzed. The dietary intake of fiber, potassium, magnesium, iron, zinc and vitamins B1, B6 and niacin was significantly lower in the risk group DPP versus NDPP group ( $P < 0.049$ ). The daily intakes of B2 vitamin, iron and folic acid tended to be lower in the risk DPP group, although these differences did not result statistically significant ( $P = 0.06$ ).

Key findings: Our data suggests that deficient dietary intake of various nutrients during pregnancy could be associated to a higher risk of postpartum depression. These results highlight the role of micronutrients supplementation which doesn't disregard the importance of individualized dietary control throughout pregnancy. The results suggest also that healthy food daily intake and self-rated during pregnancy could be a protective factor for developing postpartum depression.

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#### PM-154

Poster

##### **Nutrimetry: the scoring of Height and BMI.**

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Objectives: To present a simple method that could be used as an epidemiological instrument that can help survey the malnutrition.

Material and methods: The calculi of Nutrimetry (Nutrimetría) are based on the Z-scores of Height-for-age (HAZ) and BMI-for-age (BAZ) after the World Health Organization references. Each child will sum 1 for HAZ $\leq$ -2, 5 for HAZ $\geq$ 2, and 3 for the rest. Also will sum 0 for BAZ $\leq$ -1, 6 for BAZ $\geq$ 1, and 3 for the rest. After summing the points from both variables, all the possible scores are 1, 3, 4, 5, 6, 7, 8, 9, and 11. The prevalence values for each category will be arranged on a 3x3 square. From left to right, the upper row will contain: 5, 8, 11; the middle row: 3, 6, 9; the bottom row: 1, 4, 7. Even numbers reflect healthy weight, while odd numbers reflect thinness (small numbers) or overweight/obesity (large numbers).

We measured the weight and height of 4701 boys and 4509 girls aged 5

to 11 years from public schools of the State of Yucatan. We calculated the HAZ and BAZ, and applied the Nutrimetry procedures.

Results: The prevalence values by code for the male sample were the following: upper row: code\_5=0.0%, code\_8=0.1%, and code\_11=0.4%; middle row: code\_3=5.3%, code\_6=33.3%, and code\_9=41.7%; bottom row: code\_1=2.0%, code\_4=12.1%, and code\_7=5.3%. And for the female sample: upper row: code\_5=0.1%, code\_8=0.0%, and code\_11=0.2%; middle row: code\_3=5.9%, code\_6=37.7%, and code\_9=36.5%; bottom row: code\_1=2.6%, code\_4=12.4%, and code\_7=4.4%.

Key findings: These results are consistent with the official data from the National Health and Nutrition Survey, adding a new point of view to face the assessment of nutritional status. After our experience, there are some advantages in this instrument. First, in clinical attention it facilitates the communication with the patient, especially with children or adolescents. Second, the easy understanding and flexibility for adding colors or reinforcing the score with appropriate sentences, makes possible its use at school for preventive purposes. Third, using numbers we avoid the stigmatization that might be caused from words such as 'obese' or 'thin', and we convert even numbers in goals instead.

#### PM-155

Poster

##### **Analysis of food consumption as an element of vulnerability in an indigenous community in the state of San Luis Potosi, Mexico.**

Rodriguez-Ramos F., Aradillas-Garcia C., Diaz-Barriga F.

Coordination for Innovation and Application of Science and Technology (CIACYT)

Objective: Analyze the nutritional status, caloric intake and frequency of food consumption on a site with an indigenous population with toxic exposure problems in the state of San Luis Potosi, Mexico.

Materials and Methods: A cross-sectional study with school children between 6 and 10 years. The community is located in the Huasteca region of the state, 6 hours far from the capital, where there is constant exposure to toxic waste predispositions of pesticides used in agriculture, HAP's by wood smoke in homes and pollution by defecation outdoors.

Weight measurements (P), size (T), age (E) to assess the nutritional status according to WHO standards were considered. Also, weight for age (P / E), BMI-for-age (BMI / E) and Height for age (H / E) was evaluated. Dietary assessment was performed by applying Consumption Frequency Questionnaire (SNUT) validated by the National Institute of Public Health, which consists on 112 reagents comprising the different food groups.

Results: The nutritional status of children in the community has a prevalence of chronic undernutrition of 20.5%, which is above average for the state in rural areas (14.3%) according to the ENSANUT 2012. Nevertheless, the prevalence of Overweight is minimal (3%) compared to the average for the same population (11.5%). (Table 1).

The average caloric intake is appropriate for the age range, however there is an increased consumption of carbohydrates. The frequency analysis shows that the nutrient intake comes primarily from cereals and legumes. Besides, there is a significant consumption of energy-dense products. The animal products consumption resulted from low to moderate, indicating a deficient intake of animal protein as well as iron and calcium. The results show that the population has a high prevalence of chronic undernutrition, coupled with poor intake of high importance minerals for both physical and intellectual development, a protective factor against environmental threats and as a way to strengthen the immune system. Interventions are needed in the community to reduce environmental threats and risk factors for vulnerable groups.

#### PM-156

Poster

##### **High capacity of clays for the mycotoxin detoxication in food and feed .**

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Mycotoxins are secondary metabolites produced by fungi that may contaminate all stages of food chain. The contamination of food and feed with mycotoxins represents an important risk factor for human and animal health. In order to avoid mycotoxicosis, several strategies have been investigated which can be divided into pre- and post-harvest technologies and into biological, chemical and physical methods. The physical methods are focused on the removal of mycotoxins by different adsorbents added to mycotoxin-contaminated diets with the hope of being effective in the gastro-intestinal tract more in a prophylactic rather than in a therapeutic manner. At present, the utilization of mycotoxin-binding adsorbents is the most applied way of protecting against the harmful effects of contaminated food and feed. The aim of the present work is to evaluate the capacity of the Green and Montmorillonite clays as adsorbents against mycoto-

xins-induced cytotoxicity on Caco-2 cells. Cytotoxicity was investigated by using different mycotoxins, ochratoxin, fumonisin B1, and aflatoxin B1 at increasing concentrations (1-100 µM). MTT and LDH assays were used to test cell viability in presence or not of Green and Montmorillonite clays (0.1 mg/ml). Cell barrier integrity was also evaluated measuring the trans-epithelial electrical resistance (TEER) during 21 days with a Millicell-ERS Voltohmmeter. Our results demonstrated a statistically significant decrease of cell viability in a concentration dependent-manner following 24 h incubation with the mycotoxins tested. Both clays at the concentration range of 1-0.01 mg/ml did not produce any statistically significant decrease on cell viability. After a 24 h co-incubation period with mycotoxins and both clays, Green clay at 0.1 mg/ml was more effective than Montmorillonite clay reducing the toxicity induced by mycotoxins in Caco-2 cells. We also demonstrated that in intestinal epithelial cell lines from human (Caco-2) origin, aflatoxin B1, fumonisin B1 and ochratoxin significantly decreased TEER (40%). Co-incubation of both clays with mycotoxins significantly reverted barrier function of the intestinal epithelium to almost control levels. In conclusion, the present study allowed identifying the adsorption capacity of Green and Montmorillonite clays against mycotoxins commonly found in food and feed. The utilization of these adsorbents mixed with the food and feed can provide a versatile tool of preventing mycotoxicosis.

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## PT-001

## Poster

**Nutrientes lipídicos en la protista marina *Schizochytrium* sp.**

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Objetivos: Abordar el estudio de los nutrientes aportados por el organismo heterotrófico *Schizochytrium* sp., el cual se obtiene industrialmente por fermentación. Se pretendía analizar químicamente las fracciones liposolubles en orden a confirmar las estructuras descritas en la literatura e identificar nuevas sustancias biológicamente activas que puedan llegar a ser importantes nutrientes en alimentaria. También se pretendía elucidar la aplicación de este microorganismo como fuente de grasa insaturada.

Material y métodos: Por maceración del polvo de *Schizochytrium* sp. con diclorometano y metanol seguido de filtración y concentración en rotavapor se obtuvo el extracto bruto del organismo. Por cromatografía en columna eluyendo con n-hexano/ acetato de etilo con cantidades incrementales del último se obtuvieron sucesivas fracciones que se monitorizaron por cromatografía en capa fina (TLC), aislándose varias fracciones que se analizaron por <sup>1</sup>H-NMR, <sup>13</sup>C-NMR y GC-MS.

Resultados: Se identificaron 49 compuestos que se clasificaron en 24 tipos de compuestos orgánicos pertenecientes a los n-alcános, 1-alcenos, 1-alcóhanos, ácidos grasos libres, ésteres metílicos y etílicos de ácidos grasos saturados e insaturados-, mono-, di- y triglicéridos -saturados e insaturados-, ceras, esteroides, triterpenos, monoterpenos y sesquiterpenos. Conclusiones: *Schizochytrium* sp. produce gran cantidad de lípidos, incluyendo componentes con ácidos grasos insaturados, lo que lo habilita como un microorganismo aplicable en nutrición funcional.

## PT-002

## Poster

**Seasonal food variety and dietary diversity in relation to the nutritional status of women in a rural community in KwaZulu Natal in South Africa.**

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The aim of the study was to determine the effect of seasonal food variety, dietary diversity and nutrient adequacy on the nutritional status of women in a rural area.

A hundred adult women in a rural KwaZulu Natal farming village in South Africa were weighed and measured and BMI determined and classified according to the WHO cut-off points for BMI. Waist circumference was measured in order to determine the waist-to-height ratio. Twenty four hour recall questionnaires were used to determine actual intake compared to dietary reference intake (DRIs). Food Frequency Questionnaires for a period of seven days were completed, captured and analysed for descriptive statistics in order to determine Dietary Diversity and Food Variety. Seasonal food consumption patterns and dietary intake behaviour were assessed over the four seasons.

Food production from crops differs in different seasons. The community is more food secure in winter and spring due to the high number of food items harvested from crops. Anthropometric measurements indicated that 41.2% of women between 31 and 50 and 49% of women between 51 and 70 years of age had a BMI of 30 and above. About 44% of total women are obese and 29% are pre-obese. Only 26% had a normal weight. The 24 hour recall analysis indicates that the high level of obesity could be due to the fact that a high number of participants consuming large amounts of carbohydrates every day and the low consumption of fruit and vegetables in all seasons but more specifically in summer and autumn. The overall nutrient intake of the women is poor since most respondents consumed less than 100% of DRIs in most nutrients especially protein, zinc, vitamin A and calcium.

Overall results in this study indicated that this rural community is food insecure, but more so during summer and autumn, which leads to the consumption of undiversified diets. The women are malnourished and obese with a risk of metabolic syndrome. The information obtained in this study can be used to formulate strategies to develop interventions that can be used to access sufficient food in rural areas in order to improve food insecurity, dietary diversity and, therefore, nutrient adequacy.

## PT-003

## Poster

**Affect of personal preference in food and beverages to decrease the sense of taste in Japanese student.**

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Objetivos: Food preferences in humans are determined by sensory responses to the taste, smell, and texture of foods and beverages. Of these sensory responses, taste is considered the major determinant of food

and beverages choice behavior. Of the primary taste stimuli, sweet taste generally signals a pleasurable experience. However, this desire for sweet-tasting foods may contribute to metabolic syndrome and obesity, hypertension, diabetes and dental caries. Taste preferences for sweetness show age-related differences, and these preferences may be influenced by genetics, race and ethnicity, or nutrient deficiencies. The purpose of this study was to evaluate relation of affect intake junk food between the sensory threshold amount of sweet, salty and acid taste for the preferences in Japanese student.

Material and methods: There were participated in this study 260 Japanese students (male:118, female:142). It was applied the mainly 2 question items (frequency intake the junk food and snacks). After these questionnaire interview, it was experiment of sensory evaluation for sweet(acid taste), salty and acid taste(citric sodium) of threshold level for three different concentrations, 1%, 2% and 3% intake the watery solutions, respectively. All subjects were sensory evaluation for response 6 pattern of analog scale in sensory evaluation, for example very very sweet, very sweet, sweet, not easily sweet, not sweet and completely insensible. It was analyzed cross table between question item of daily foods variation and sensory evaluation of preference in watery solutions.

Results: There was no significant difference between questioned of dietary habit and acid taste performance of sensory evaluation test. However there were significant difference between frequency of junk food and salty/sweet sensory evaluation tests. It was showed the connection between diet and personal preference of taste sensation in childhood and young periods.

Key findings: Due to this sweet treat in daily life habit, they have a strong desire for sweet-tasting foods. It was finding out the nutritional education was one of the most important in proper taste behavior for prevention diseases associated with adult lifestyle habits.

## PT-004

## Poster

**Detection of overweight, obesity and / or hypertension in women 30 to 60 years of age in the city of Puebla, Mexico, attending Health Clinic No. 1.**

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Objetivos: According to information of the Mexican Social Security Institute (IMSS), 78 beneficiaries die daily for causes associated with obesity, which is the immediate antecedent to the development of diabetes. The focus of this ultimate evil and its complications represent an investment of 54 million pesos per day in the three levels of care in this institution. With regard to the numbers in Mexico, adult women top the list of obesity and overweight, 29% of them versus 19% of men, this problem is compounded because Mexicans have a perception that having a few extra kilos without symptoms is healthy hence they don't consider taking preventive actions, so it is necessary to identify overweight and obesity and its possible correlation with hypertension especially among women.

Material and methods: The participation of women filling the following requirements were requested: Assist the Health Center No. 1, voluntary and with full consent, aged between 30 and 60, apparently healthy. It was performed measurements of weight, height, waist and blood pressure to the women participants. Finally we proceeded to detect possible cases of overweight or obese and their possible correlation with central obesity and / or hypertension. The data were coded and processed with the R-sigma statistical Babel package for their analysis.

Results: 133 women participated, 52 between 30 and 40 years old, 34 between 40 and 50 and 47 women over 50 years old. Of the women, only 25% had a healthy weight, 42% overweight and 33% obese. The average percentage of body fat was 39.6%, waist circumference of 94.4 cm and BMI of 28.6. With regard to blood pressure values of the 27 women who reported suffering from hypertension, only 6 (4.5%) gave values of pressure at the time of measurement. In contrast, two women who reported not suffer from hypertension, had higher values at the time of measurement. Only one woman reported underweight.

Key findings: No correlation between age and BMI, waist circumference, body fat or hypertension was found, however alarming that only 25% of the studied population had adequate anthropometric values, since the percentage of overweight in the population was 42% and 33% obese. Although 27% reported suffering from hypertension at the time of measurement was detected only 6% with high blood pressure values, indicating that close follow-up of overweight or obese should be done regardless of suffer from the disease or not.

## PT-005

## Poster

**Food Habits in the population of a slum in Iquitos (Peruvian Amazon).**

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**Objective:** To identify the nutritional content of the diet usually followed by these people, focused on identifying the excesses and deficiencies of nutrients which could be related to the high prevalence of malnutrition in this area (one of the highest in the country).

**Material and methods:** A prevalence study was carried out between June and November of 2012. A random stratified by age and gender sampling was conducted, getting 217 individuals sample size. We took anthropometric measures (height, weight, BMI, body, perimeters and folds) to assess nutritional status. Data on eating habits were also collected through interviews, observation of preparing meals and 80 of them completed three 24-hour recalls, 2 from weekdays and one more from weekend.

**Results:** 24-hours recalls show an imbalance in the supply of micronutrients with a high intake of protein and fat, but low in carbohydrate (except in the youngest group where is offset) resulting in a low caloric intake. As for inorganic elements we found low levels for iron (except in some age groups men), calcium and potassium. However the ingested sodium was very high, all groups exceeding the maximum recommended. Some vitamins are suitably provided (vitamin C and B12). On the other hand the ingestion levels of vitamin D, B9, B1 and B6 are really low, and vitamin A levels are very lower (less than 50%) than the recommended percentage of the RDA.

**Main Findings:** This type of study may be useful to assess the intake of the indigenous population that migrates to the city (situation very widespread throughout the Amazon that also is taking place in Brazil and Bolivia) where the migrants are involved in a state of transition between the life in the jungle and in the city. This transition is characterized by forgetfulness about eating habits of their ancestors who lived in balance with the food resources of the forest. Unfortunately is being lost, which threatens the nutritional status of these communities.

#### PT-006

Poster

##### **Prevalence of overweight and obesity among adult population in a Mexican-USA border city.**

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**Objective:** Assess the prevalence of overweight (OW) and Obesity (O) among ≥18 year old Mexicans living in Tijuana, Mexico.

**Material and methods:** Total adult population greater than or equal to 18 years is 1 247 746 subjects, from which a representative sample of 1072 subjects (≥18 years of age) was obtained (95% confidence level). We measured weight (kg), height (m), and waist circumference (cm) according to standard procedures. The body mass index (kg/m<sup>2</sup>) (BMI) was calculated and the WHO (2000) cut-off point's criteria for BMI status (OW≥25.00 kg/m<sup>2</sup>, O≥30.00 kg/m<sup>2</sup>) was used. To assess abdominal obesity (AO) the WHO cut-off points (WC >94 cm in males and >80 cm in females), and the Mexican Health Minister cut-off points (WC >90 cm in males and >80 cm in females) were used. Subjects with disabilities and pregnant women were excluded.

**Results:** The study population age ranged from 18-86 years (39.5±15.4 y). Females were 59.6% (n=639). Mean BMI was 28.6 ± 5.2 kg/m<sup>2</sup>. The prevalence of overweight and obesity was 74.1% (39.9% and 34.2% respectively). The prevalence of overweight in females was 36.2% and of obesity was 38.2%. In males the prevalence of overweight and obesity were 45.5% and 28.2% respectively. According to the Mexican cut-off points criteria in women greater prevalence of AO (89.5% vs 71.36%) was found. According to WHO cut off points, AO was 10.8 percentage points lower in males (60.28%).

**Key findings:** The prevalence of overweight and obesity in Tijuana was higher (74.1%) than the reported by the National Survey of Nutrition (2012). The prevalence of OW, O and AO are alarmingly high and make this problem in the City and in the nation the highest public health priority. For international comparison we recommend using the WHO cut-off points.

Efforts to prevent obesity and AO including pre-gestational, pre and post-natal periods, and changes in all the contingencies which increases this pandemic are the highest priority.

#### PT-007

Poster

##### **Scoping the National Agreement for Health (ANSA) in children (9-11 years old) at Puebla, México.**

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**Objectives:** Today Mexico is in first place in the world of childhood obesity. Considering that our country has a large population of infants, the federal government has developed strategies to counter problems projecting the future, same that are aimed at reducing the obese population, focusing on the highest priority to children who are most affected at present. The-

refore, the objective of this study was to evaluate the scope of the National Agreement for Food Safety (ANSA) in children of 9-11 year old at a school of Zacatlán, Puebla through their anthropometric measures before and after the entry into force of the cited agreement.

**Material and methods:** An anthropometric study was conducted in the town of Zacatlán, located in the northern part of Puebla to 121 km from the state capital. The study was approved by the school principal and parents to meet the criteria of ethics. The sample consisted of 461 children with an average age of 10.03 ± 0.89 years. Three anthropometric measurements (weight, height, and BMI) over a six-month intervals from the beginning and a questionnaire on habits of children and parental nutritional knowledge was applied.

**Results:** Towards the end of the study, it was observed that the percentage of those with lower height for age was reduced, confirming the observation that changes during the study are mainly due to the effect of normal growth. The measurements along the study showed an overall decrease of low birth weight (0.9% to 0.2%), an increase of overweight (17.8% to 19.5%) and an increase in obesity (from 3.3% to 4.6%), although these differences are not significant, they do show a trend toward weight gain. Regarding habits, parents need nutritional advice and healthy habits because children know what is desirable to eat, but not implemented due to lack of supervision.

**Key findings:** Although monitoring the impact of ANSA on overweight and / or obesity in children should be evaluated in the long term, yet no positive changes are observed in children in the six months of the study it is recommended conduct annual monitoring, and seek measures to help avoid eating sweets and foods that provide excess fat and simple carbohydrates, not only within the school but also in the family.

#### PT-008

Poster

##### **Z-Score Anthropometric Indicators Derived from NCHS-1977, CDC-2000 and WHO-2006 in 32 to 60 month-old Children in Central Area of Peru.**

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**Objectives.** To Identify and analyze the distribution of Z-scores of anthropometric indices of children between 36-60 months of age in the province of Huancaayo-Peru, calculated based on the NCHS-1977, CDC -2000 and WHO-2006 references. Weight-for-height, height-for-age, weight-for-age and body mass index are understood using the Z-score classification system with the three standards.

**Material and methods.** We analyzed a database of 2640 children (1268 males and 1372 females) collected between 1992-2007 in 25 of 28 districts of Huancaayo province (3250-3500 MASL). The Z-scores were determined using the Anthro V.3.0 and the EpiInfo 6.04. Data were divided into four chronological periods: 1. 1992 with 532 data; 2. 1993-1997 with 370 data; 3. 1998-2002 with 494 data; 4. 2003-2007 with 1244 data. Benchmarking was considered for the Z-scores of weight-for-age, height-for-age, weight-for-height and body mass index (BMI), established in NCHS-1977, CDC-2000 and WHO-2006. Movements of population curves and Z-scores variation graphs for each benchmark used were analyzed using SPSS V15, Minitab V.15 and Excel.

**Results.** The Z- scores were different with each assessment standard. The mean±SD of the weight-for-age, height-for-age, weight-for-height and BMI Z-scores with NCHS were -0.85±0.88, -1.29±1.07, -0.04±0.84 and 0.05±1.05 respectively, with CDC the values were -0.79±0.95, -1.08±1.05, -0.12±1.00 and 0.05±0.91 and with WHO the values were -0.75±0.84, -1.40±1.02, 0.15±0.91 and 0.21±0.91, correspondingly. Considering that the Z-scores average describes the nutritional status of the entire population, this study shows in the case of height/age, that the average Z-scores (-1.40) of children in the central highlands moves further from the WHO median and is closer to the NCHS median (-1.29). These results support the assumptions of WHO, noting that the stunting evaluation in children under the age of 5 years with the NCHS standard was not the most appropriate.

**Key findings.** The distribution of the weight-for-age, height-for-age, weight-for-height and body mass index Z-scores were different when using NCHS-1977, CDC-2000 and WHO-2006 references, noting that all distributions are shifted either to the left or right, which allowed to describe the nutritional status of the entire population without resorting to conventionally established cut-off points. With the new WHO standard it was obtained lower Z-scores of height-for-age than with NCHS, being the farthest curve from the median. The new WHO standard would be the most accurate and realistic standard used to determine the Z-scores, and it should be officially adopted for the nutritional assessment in children under 5 years in Peru.

#### PT-009

Poster

##### **Sweetened, energy, alcoholic, and milk beverages, and calorie intake among Mexican college students .**

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**Objectives:** To determine whether there are differences in sweetened, energy and alcoholic beverages intake, milk consumption and calorie intake according to BMI status, age, sex, and waist circumference among Mexican college students.

**Material and methods:** Second and third year college students from five schools at the Autonomous University of Baja California, México were assessed. Weight, height, and waist circumference (WC) were measured, and a validated beverages frequency questionnaire was administered. The questionnaire applied was a previously designed and validated among college student in Virginia Tech. The questionnaire was developed to estimate mean daily intake of 19 beverage categories. BMI was calculated and weight status was classified according to WHO. Abdominal obesity was considered when the WC was  $\geq 80$  cm in women and  $\geq 94$  in men. Rank differences of drinks and calorie consumption by sex, age, BMI and WC were calculated using the Mann-Whitney test. Differences in beverage consumption by discipline of study was conducted by 1-way ANOVA Kruskal-Wallis analysis.

**Results:** 1138, 17 to 30yo students were assessed (50% female). The prevalence of overweight, obesity and abdominal obesity in women was 25, 12 and 33% respectively, and in men 30, 14 and 17% respectively. Men consumed more milliliters and kilocalories per week of sugar sweetened, milk, alcoholic and energy beverages than women ( $p = 0.0001$ ). People <21yo consumed more milliliters and kilocalories per week of milk drinks than  $\geq 21$ yo ( $p = 0.02$  and  $0.03$  respectively). Older than 21yo consumed more alcoholic drinks in milliliters and kilocalories per week ( $p=0.012$  and  $0.044$  respectively), than younger. People with BMI <25 kg/m<sup>2</sup>, consumed less milliliters of unsweetened beverages ( $p=0.007$ ) and total kilocalories per week ( $p=0.046$ ) than those with a BMI  $\geq 25$  kg/m<sup>2</sup>. People with abdominal obesity reported lower consumption of sugar sweetened beverages, alcoholic beverages and total calories than people with normal WC ( $p=0.046$ ,  $0.025$  y  $0.002$  respectively).

**Key Findings:** Men consumed more sugar sweetened, milk, alcoholic and energy beverages than women. People older than 21yo consumed more kilocalories of alcohol than younger. People who were overweight or obese consume more kilocalories per week than normal weight. People with abdominal obesity consumed less sugar sweetened beverages, alcoholic beverages and total calories than people with normal WC.

#### PT-010

Poster

##### **Effect of menopause and perimenopause on lipid profile and inflammatory markers.**

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**Objectives:** Perimenopausal and postmenopausal women are more susceptible to cardiometabolic disease related to declining estrogen concentrations. It has been found that estrogen may be responsible for the protective effects seen amongst younger women. Inflammation has been proposed to be a fundamental promoter of cardiometabolic disease, interacting with many pathophysiologic pathways to lead to vascular damage. The aim of this study was to evaluate the effect of menopause and perimenopause on lipid profile and inflammatory markers in Algerian women. **Patients and Methods:** This cross-sectional study enrolled 114 women who were classified as perimenopausal ( $n = 44$ ), postmenopausal ( $n = 40$ ) or non menopausal ( $n=30$ ) women. In serum, we analysed total cholesterol (TC) and triacylglycerols (TG) by enzymatic colorimetric methods. HDL-C was analysed after precipitation (Kit Biocon, Germany). LDL-C was calculated using the formula of Friedewald. Albumin and total proteins were measured by enzymatic colorimetric method (kit Biolabo, France). Tumor Necrosis Factor- $\alpha$  (TNF- $\alpha$ ), Interleukin-1 $\alpha$  (IL-1 $\alpha$ ) and C-reactive protein (CRP) analysis were performed by immunoassay (Cayman Chemical's ACETM EIA kit).

**Results:** Total Cholesterol (TC) was significantly higher in perimenopausal ( $p < 0.01$ ) and postmenopausal women ( $p < 0.05$ ), compared to non menopausal women, while serum TG levels were similar in all women. LDL-C was increased in perimenopausal and postmenopausal women compared to non menopausal women ( $p < 0.01$ ), while HDL-C concentrations were decreased in perimenopausal and postmenopausal women ( $p < 0.001$ ) compared to non menopausal women. TC/HDL-C and C-LDL/C-HDL ratio were significantly increased in perimenopausal ( $6.09 \pm 4.26$ ,  $6.41 \pm 2.50$ ) and postmenopausal women ( $6.47 \pm 3.68$ ,  $7.61 \pm 4.40$ ) compared to non menopausal women ( $3.58 \pm 1.71$ ,  $3.48 \pm 0.98$ ) ( $p < 0.001$ ). TNF- $\alpha$  and IL-1 $\alpha$  levels were respectively more elevated in postmenopausal ( $8.9 \pm 5.7$  pg/mL,  $9.06 \pm 6.59$  pg/mL) than non menopausal women ( $5.2 \pm 2$  pg/mL,  $4.54 \pm 2.36$  pg/mL) ( $p < 0,05$ ). Moreover, increase in C-reactive protein was noted in perimenopausal and postmenopausal women compared to

non menopausal women ( $p < 0,05$ ).

Values of albumin were similar in all groups. However, proteins concentrations were decreased in postmenopausal compared to perimenopausal women ( $p < 0.01$ ).

**Conclusion:** This study demonstrates that dyslipidemia and high cytokines and CRP are prevalent in perimenopausal and postmenopausal women which leads to an increase in the spread of inflammation and risk of cardiometabolic disease.

#### PT-011

Poster

##### **Overweight in childhood and adulthood, nutrition and cardiovascular risk: Kaunas cohort study.**

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**Objectives.** To date, the contribution of childhood body mass index (BMI) to long-term cardiovascular risk has not been clearly established. Moreover, little is known how well BMI change from childhood to adulthood predicts adult cardiovascular disease (CVD). The aim of the study was to establish the role of childhood BMI and gain of BMI in prediction of CVD risk factors in adults.

**Material and methods.** Kaunas cohort study started in 1977. A random sample of Kaunas schoolchildren born in 1964 ( $n=1082$ ) was examined in the first cross-sectional survey. In 2012, a total of 507 subjects (63.9% of eligible sample) participated in the 35-year follow-up survey being 48-49 years old. Health examination involved measurements of blood pressure (BP), anthropometric and biochemical parameters, and interview about health behaviours. 24-hour recall was used for evaluation of dietary habits. For the definition of childhood overweight and obesity, IOTF criteria were used. In adulthood, BMI >25 kg/m<sup>2</sup> was considered as overweight. The participants were categorized into three groups: 1) normal BMI or overweight in childhood and normal BMI in adults; 2) overweight in childhood and in adulthood, and 3) normal BMI in childhood and overweight as adults. Multiple logistic regression analysis was used to calculate the odds ratios of CVD risk factors in the second and the third group compared to the first group.

**Results.** Childhood overweight was a predictor of obesity (OR=7.6; 95% CI: 4.3-13.6), metabolic syndrome (OR=2.3; 95% CI: 1.3-4.0), hyperglycemia and type 2 diabetes (OR=2.2; 95% CI: 1.2-3.9) in adulthood. Subjects with overweight in childhood and in adulthood had the highest odds of CVD risk factors: OR for hypertension was 3.2 (95% CI: 1.7-6.2), OR for metabolic syndrome - 44.8 (95% CI: 14.3-79.9), and OR for low HDL cholesterol - 13.2 (95% CI: 1.3-12.0). Those with normal BMI in childhood and overweight in adulthood also had significantly higher odds of CVD risk factors compared to the first group. Dietary habits of the subjects with overweight in childhood and adulthood were the most unhealthy. The intake of sugar was the highest (18.4+7.6% of energy) and the intake of dietary fiber was the lowest (17.7+8.1 g) compared to other two groups. **Key findings.** Overweight in childhood and adulthood was associated with the highest risk of CVD. From a public health perspective, identification of high-risk individuals earlier in the life course would be very important for diseases prevention.

#### PT-012

Poster

##### **Anaemia and related factors in school-aged children living in Libo Kemkem and Fogera, Amhara Regional State, Ethiopia, May-December 2009**

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**Background and aims:** Anemia is a major health problem worldwide. It is a critical children's health concern because it affects growth and energy levels adversely. The etiology of anemia is one of multiple and interacting causes; common causes include nutritional deficiencies of iron, vitamin B12 and folic acid, but also malaria, intestinal parasites and secondary chronic disorders. The etiology of anemia in school-aged children from North-west Ethiopia is uncertain. Therefore, the present study aims to estimate the prevalence of anaemia and its associated factors in the study area.

**Methods:** A cross-sectional population-based study, involving 764 children aged 4-15 years old, was carried out in Libo Kemkem and Fogera districts in May-December 2009. Socio-demographic characteristics, health status and diet habits information were obtained through a questionnaire and a 24 hour recall, respectively and blood samples were collected. Levels of micronutrients in serum and cell blood count were determined. Anaemia was assessed by haemoglobin levels adjusted by altitude and age according to World Health Organization (WHO) standards. Descriptive, bivariate and backward stepwise multivariable logistic analyses were performed. **Results:** The prevalence of anaemia was 30.9% (95%CI: 27.7-34.2). The

mean serum levels of folate, vit B12 and ferritin were  $17.1 \pm 7.4$  (nmol/L),  $405.4 \pm 166.4$  (pmol/L) and  $64.4 \pm 51.8$  ( $\mu\text{g/L}$ ), respectively. The mean corpuscular volume (MCV) in the study population was  $82.85$  fL (sd:  $5.57$ ) and the  $65.3\%$  of anaemia cases were microcytic. After adjustment, anaemia was found to be more prevalent in urban setting and among those children who had splenomegaly (OR:  $1.67$  (CI95%:  $1.01$ - $2.78$ ) and OR:  $4.91$  (CI95%:  $2.47$ - $9.75$ ), respectively). The consumption of oil was a protective factor against anaemia (OR:  $0.58$  (CI95%:  $0.35$ - $0.95$ )). No significant associations were found for serum concentrations of vitamin B12 and folate, while higher serum ferritin level was positively associated with anaemia ( $p < 0.001$ ).

**Key findings:** The magnitude of anaemia determined in this study ( $30.9\%$ ) is considered as a moderate public health problem according to WHO standards. We found high prevalence of microcytic anaemia and adequate iron store, being higher serum ferritin level positively correlated to the presence of anaemia. Widespread infection or inflammation in the study area may explain these results. Further studies targeting the presence of infectious diseases in the study population and/or measuring modulators of acute inflammation such as normal C-reactive protein and/or  $\alpha$ 1-acid-glycoprotein (AGP), are needed to reach conclusions.

#### PT-013

Poster

##### **Low-carbohydrate diet attenuates efficiently inflammatory response and oxidative stress in obese rat.**

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**Objectives.** The inflammatory response triggered by obesity involves many components of the classical inflammatory response to pathogens and includes systemic increases in circulating inflammatory cytokines. Calorie restriction reduces the levels of multiple inflammation aspects, suggesting a link between energy status and inflammation. The aim of this study was to see if different hypocaloric diets can reduce lipid peroxidation and inflammation markers in obese rat.

**Material and methods.** Five weeks old male Wistar rats were kept in individual cages on a 12 h day/night cycle at  $24^\circ\text{C}$  and fed with a high fat diet during 10 weeks. At  $405 \pm 14\text{g}$ , obese rats ( $n=18$ ) were randomly divided into three groups and consumed a low-carbohydrate diet ( $1.16\text{MJ}$ ), a calorie restricted diet ( $40\%$  of the standard diet energy,  $0.96\text{MJ}$ ) or a normocaloric diet ( $1.60\text{MJ}$ ), for 4 weeks. At day 28, glycemic homeostasis (glycemia, insulinemia and glycosylated hemoglobin) was estimated. Serum lipid peroxidation markers (thiobarbituric acid reactive substances, hydroperoxydes and isoprostanes) and inflammatory adipokines concentrations (leptin, adiponectin and tumor necrosis factor alpha) were determined.

**Results.** In low-carbohydrate and calorie restricted diets versus normocaloric diet, glycemia ( $-38\%$  and  $-32\%$ , respectively), insulinemia ( $-75\%$  and  $-67\%$ , respectively) and glycosylated hemoglobin ( $-55\%$  and  $-23\%$ , respectively) were decreased. Also, serum thiobarbituric acid reactive substances ( $-34\%$  and  $-37\%$ ), hydroperoxydes ( $-38\%$  and  $-35\%$ ), isoprostanes ( $-45\%$  and  $-42\%$ ), leptin ( $-13\%$  and  $-23\%$ ) and tumor necrosis factor alpha ( $-26\%$  and  $-24\%$ ) concentrations were reduced. However, adiponectin values were increased ( $+34\%$  and  $+32\%$ , respectively). Moreover, leptin and tumor necrosis factor alpha levels were lower with low-carbohydrate diet compared to calorie restricted diet ( $-22\%$  and  $-26\%$ , respectively).

**Key findings.** Low-carbohydrate diet compared with calorie restriction was more effective in reducing the cardiometabolic risk associated with obesity by attenuating lipid peroxidation and inflammatory profiles.

#### PT-014

Poster

##### **Substitution of sardine oil by margarine increased adipose tissue enzymatic antioxidant defense in obese rats.**

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**Objectives.** The diet-heart hypothesis refers to the link between dietary fat consumption, blood cholesterol and risk of cardiovascular disease. Intake of trans fatty acids unfavorably affects blood lipids and lipoproteins. As margarines are a major source of trans, claims for the advantages of margarines over butter or others fats need to be scrutinized. The impact of replacing two fats of different origin (natural or industrial) was studied on dyslipidemia, lipid peroxidation and enzymatic antioxidant defense in high fat diet-induced obese rats.

**Material and methods.** Obese male rats, 6 weeks old and weighing  $400 \pm 10\text{g}$  were divided into two 2 groups ( $n=24$ ) and consumed during 1 month (d30)  $20\%$  margarine or sardine oil. At d30, 6 rats from each group were sacrificed and the remaining rats were then subjected to a change in diet for 1 month (d60): margarine was replaced by sardine oil and inversely. At days 30 and 60, the cholesterolemia and triglyceridemia were estimated. In adipose tissue, the lipid peroxidation markers (thiobarbituric acid reactive substances and hydroperoxydes) and enzymatic antioxidant defense (superoxide dismutase, glutathione peroxidase and glutathione reductase) activities were measured.

**Results:** Cholesterolemia and triglyceridemia did not change significantly

when sardine oil was replaced by margarine. In contrast, the substitution of margarine by sardine oil, reduced cholesterol and triacylglycerols levels ( $-35\%$  and  $-57\%$ , respectively). In adipose tissue, thiobarbituric acid reactive substances levels were reduced by  $14\%$  when sardine oil was replaced by margarine and by  $18\%$  when margarine was substituted by sardine oil. The replacement of sardine oil by margarine decreased hydroperoxydes levels ( $-59\%$ ). However, these values were increased ( $+23\%$ ) when margarine was replaced by sardine oil. Superoxide dismutase and glutathione reductase activities were enhanced ( $+54\%$  and  $+46\%$ , respectively) when sardine oil was substituted by margarine. In contrast, glutathione peroxidase activity was reduced ( $-56\%$ ). Moreover, the replacement of margarine by sardine oil reduced superoxide dismutase ( $-11\%$ ) and glutathione peroxidase ( $-18\%$ ) activities, while it elevated glutathione reductase activity ( $+45\%$ ).

**Key findings.** In obese rats, the substitution of sardine oil by margarine does not modulate the dyslipidemia, but it decreases lipid peroxidation in adipose tissue by enhancing antioxidant defense and seems efficient in adipose tissue against the cytotoxic action and the oxidative stress induced by a fat enriched diet.

#### PT-015

Poster

##### **Influence of dietary nitrate supplementation on the autonomic nervous system activity.**

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**Objectives:** The aim of the research was to investigate the effect of dietary nitrate supplementation (DNS) (beetroot juice containing  $0.4$  grams of dietary nitrate) on parameters of heart rate variability.

**Material and Methods:** 10 healthy men ( $21 - 41$  y.) attended four-week double-blind experiment (nitrates/placebo) and they strictly followed the instructions of physical activity and diet. Each subject underwent a ramp incremental exercise test in *vita maxima* conditions, 8 six-minutes tests on the standardized intensities ( $5\%$  below the anaerobic threshold), 8 measurements of spectral analysis of heart rate variability (SA HRV), 2 measurements of body composition, and 8 collections of venous blood samples.

**Results:** Analysis of plasma nitrates and nitrites significantly demonstrated increase in average level of nitrates in DNS in comparison to placebo ( $4.52 \pm 5.93 \mu\text{M}$  in placebo vs.  $38.32 \pm 9.80 \mu\text{M}$  in DNS,  $p = 0.0000$ ). Preliminary evaluation of results of our experiment has shown that there is significant decrease in averages of complex index of vagal activity ( $-0.199 \pm 1.201$  standard points - pts. - vs.  $-0.973 \pm 1.504$  pts.,  $p = 0.0059$ ) and total score ( $-0.217 \pm 1.235$  pts. vs.  $-0.784 \pm 1.474$  pts.,  $p = 0.0389$ ). Decrease in complex index of sympathovagal balance was nonsignificant ( $0.206 \pm 1.814$  pts. vs.  $-0.397 \pm 1.841$  pts.,  $p = 0.0587$ ). These changes in complex indices of SA HRV resulted in a significant increase in heart rate at rest ( $53.63 \pm 7.82$  min $^{-1}$  vs.  $57.70 \pm 9.39$  min $^{-1}$ ,  $p = 0.0008$ ) and during standardized submaximal load ( $147.87 \pm 11.06$  min $^{-1}$  vs.  $152.33 \pm 8.67$  min $^{-1}$ ,  $p = 0.0000$ ). In our subjects also occurred an insignificant increase in blood pressure in the conditions of DNS ( $147.87 \pm 10.94$  mmHg vs.  $121.70 \pm 8.67$ ,  $p = 0.1587$ ). Significant increase in respiratory quotient during submaximal test ( $0.9476 \pm 0.0417$  vs.  $0.9625 \pm 0.1087$ ,  $p = 0.0000$ ) corresponds to a significant increase in ratio of maximal heart rate reserve ( $75.59 \pm 5.46\%$  vs.  $78.02 \pm 4.76\%$ ,  $p = 0.0000$ ).

**Key findings:** These results point to the dominating negative effect of changes in autonomic nervous system activity which can inhibit the effect of nitrates on the formation of endothelial NO (with all circulatory and metabolic consequences).

#### PT-016

Poster

##### **Is Alcohol Drinking Associated with Renal Impairment in the General Population of South Korea?**

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**Background:** We examined relationships between the average amount of daily alcohol intake, drinking patterns, and renal dysfunction among South Korean adults aged  $\geq 20$  years.

**Methods:** The analysis used data from the Korean National Health and Nutrition Examination Survey (KNHANES), a cross-sectional survey of Korean civilians, conducted from January to December 2011. In this study, a sample of  $5,251$  participants was analysed.

**Results:** Compared with abstinence, the odds ratio for a decrease in estimated glomerular filtration rate (eGFR) was  $0.14$  (95% CI:  $0.01$ - $0.91$ ) among heavy drinkers, and  $0.42$  (95% CI:  $0.17$ - $0.98$ ) among binge drinkers and the association between the amount of mean daily alcohol intake, binge-drinking status and a likelihood of reduced eGFR value showed significant trends ( $p = 0.041$  and  $p = 0.038$ , respectively), after adjusting for age, smoking status, amount of physical activity, morbid hypertension, diabetes, dyslipidaemia, anaemia and body mass index. There was no significant association between alcohol consumption and the urine albumin to creatinine ratio in men, or between alcohol consumption and renal dysfunction in women.

Conclusions: Alcohol consumption was inversely associated with a reduction in eGFR in Korean men. However, these findings should be interpreted cautiously, given the other harmful effects related to alcohol consumption, especially heavy and binge drinking.

#### PT-017

Poster

##### **Relationship between skinfold thickness and distance from the place of residence to the city among children and youth aged 7-15 inhabiting rural areas: A repeated 30-year cross-sectional study.**

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Objectives: Increasing rates of childhood obesity all over the world are a cause for serious public health concern. Neighbourhood and community environments are thought to play a contributing role in the development of obesity among youth, but it is not well understood which types of physical environment characteristics have the most potential to influence obesity outcomes. Available literature analysing the impact of various environmental factors upon physical development of children and adolescents delivers only limited data addressing relations between the place of residence and distance or time necessary to commute to city (cultural centre).

Material and methods: Children (n 9201; 4544 boys and 4657 girls) aged 7-15 years inhabiting rural areas in Pomerania Region, Poland and attending to regional schools participated in a cross-sectional study. None urban transport between any place of abode and big city was available. Three-stage data collection was conducted in time-points: 1976-1984, 1988-1992 and 1998-2002. The driving distance between each child's residence and the city was determined with geographic information systems providing data both on the distance and the driving time. Statistical relevance of differences in mean standardised of three skinfolds thickness: triceps skinfold (TSF), subscapular (SCSF) and abdominal (ASF), as well as skinfolds thickness in total (z-score) depending on the distance to the city, was assessed with t-test.

Results: Regardless the gender, all stages reported lower skinfold thickness average in participants living farther off the city (over 30 km) when compared to those whose place of abode was within 15 km. The differences were statistically significant in girls in the years 1988 – 1992 (TSF P <0.0001; SCSF P<0.0001; ASF P=0.002), and in boys at all periods (P-value from 0.003 to 0.0001). Our study uncovered that both groups specified by proximity to the city were characterised by similar socio-economic status (parents' educational status and occupation, population density, distance to school and household crowding). Simultaneously no statistically significant differences in children residing over 30 km from the city were observed when juxtaposing phases 1st vs. 2nd, 1st vs. 3rd and 2nd vs. 3rd. And in children whose domicile was within 15 km distance only comparison of stages 1976-1984 vs. 1988-1992 revealed statistically significant differences in skinfold thickness.

Key findings: Within the population of rural children overweight was associated with proximity to the city and revealed that along with the increase in the distance the tendency to overweight measured by skinfold thickness decreased.

#### PT-018

Poster

##### **Iodine deficiency prevention affected by salt reduction policies.**

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Micronutrient malnutrition disorders should be examined within the whole context of the national socio-economic milieu. Iodine, is an essential component required for the production of thyroid hormones that humans need for many metabolic functions of the human body, its insufficiency intake impair mental and physical development that cannot be reversed by nutrition interventions. The importance go beyond the goiter as the only manifestation of deficiency, but also include awareness of the impact during pregnancy and infancy that may impair growth and neurodevelopment of the offspring and increase infant mortality. Deficiency during childhood reduces somatic growth, and cognitive and motor functions. Iodine sources in foodstuff, such as marine and dairy products, eggplant, radish and jumil forest bug are not available to all population. The only source and intake that people recognize is the iodized salt. The aim of this study is to investigate the population knowledge of the iodine disorders that might be produced by salt reduction, and to inform them the importance of the disorders produced by iodine deficiency. A survey to a total of 284 individuals, were provided, all identified

iodine in salt, they did not know the problems produced by iodine deficiency, all include salt in meals, 23 of them agree to reduce salt but not void it from their diet. The Thyroid hormone, regulate many physiologic processes, including reproductive functions, growth and development. In the developing brain, influences cell growth and migration; promotes growth and maturation of peripheral tissues and skeleton; increases energy metabolism in most tissues and it raises the basal metabolic rate. Iodine deficiency produce goiter at all ages, but the most adverse effect is the damage to the brain from the second trimester of pregnancy to the third year after birth that thyroid hormone are required for neuronal migration and myelination of the central nervous system termed as cretinism. Iodine deficiency cannot be reversed by nutrition interventions. Salt excess intake is associated with hypertension but it can be medical control. In conclusion salt consumption should be adequate but not void because sodium is an essential mineral in the balance of body fluids and iodine to prevent goiter and cretinism.

#### PT-019

Poster

##### **Predictors of Change in Weight and Waist Circumference: 15-year Longitudinal Study in Australian Adults.**

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Objectives: This study examines which socio-demographic and lifestyle characteristics are associated with weight and waist circumference (WC) change in a cohort of Australian adults over a 15-year period (1992 to 2007). Further, it tests the effect of period of birth (birth cohort) on mean weight and WC at two time points 15 years apart.

Material and methods: Up to three repeated measures of weight (n=1437) and WC (n=1317) were used. Self-reported data on socio-demographic and lifestyle characteristics were derived from repeated questionnaires. Applying generalised estimating equation (GEE), concurrent changes in predictors and outcomes were used for the analyses. Multivariable models, stratified by sex, were adjusted for potential confounders.

Results: Participants born more recently were heavier, on average, than those in the same age group 15 years earlier, but there was no such secular trend in WC. Age at baseline was associated with change in weight and WC, but the pattern was different: participants gained weight up to age 55 years, while WC gain continued to 65 years. In women, higher level of recreational physical activity was associated with lower WC gain. Women categorised as sedentary had a 2.7 times larger yearly increase in WC than women with high recreational physical activity level: 0.51 (0.34, 0.67) vs. 0.19 (-0.04, 0.43) cm/year, P = 0.01. Parity was also associated with WC change in women, with an upward trend in average WC gain for women with up to 3 children but lower average increases for those with more than 3 children (all P <0.05).

Conclusions: This study confirms a birth cohort effect on body weight, with later-born cohorts being heavier. Our findings add longitudinal evidence to the knowledge that gain in anthropometric measures is a widespread problem affecting both sexes. In both men and women, age is the most important factor affecting change in weight and WC. However, engaging in recreational physical activity can prevent WC gain, especially in women.

#### PT-020

Poster

##### **What works (and why) in community nutrition education interventions directed at low-resource audiences.**

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Objective: Nutrition education designed to prevent or reduce obesity in limited-resources populations in the US is funded through various programs administered by the U.S. Department of Agriculture. The purpose of this study was to assess the effectiveness of seven model nutrition education programs in promoting behavior change related to increased fruit and vegetable consumption and consuming low-fat dairy products. These model programs were conducted in seven different states.

Materials and Methods: Two of the interventions were conducted in child care settings and three were conducted in schools, and included a classroom component with take-home materials for parents. One intervention evaluated the impact of a web-based curriculum for women, and the final intervention was conducted with older adults (65-80). All projects used different evidence-based interventions. Process evaluation was used to examine if the programs were implemented as intended, and examine factors that both facilitated or challenged their ability to achieve results. The process evaluation included key informant interviews with project

staff and partners, focus groups with clients, observations of service delivery, and examination of administrative data. An impact evaluation was used to assess the impact of each intervention on participants' nutrition behaviors, including consumption of fruit and vegetables (FV) and use of fat-free/low-fat milk (instead of regular or reduced-fat milk). The impact evaluations used an experimental or quasi-experimental design with self-reported data collected on participant's nutrition behaviors using a food frequency questionnaire at pre- and post-intervention.

Results: The more highly-refined interventions showed statistically significant impacts on primary outcomes. One of the two childcare interventions showed a significant impact on at-home consumption of vegetables and use of fat-free/low-fat milk. One of the three school-based interventions had significant impacts on FV consumption and use of fat-free/low-fat milk. The intervention targeted to older adults showed a significant impact on FV consumption. None of the other four showed significant behavioral impact, mostly due to the ability of the agency to implement the intervention as intended or manage logistical challenges. Lack of parental involvement also affected the school and childcare sites' ability to promote behavior change.

Key findings: The study findings suggest that well-planned and effectively implemented community nutrition interventions can improve nutrition behaviors of both young and the old in populations with limited financial resources. For interventions targeted to children, more work is needed to strengthen parent engagement to positively affect children's dietary behaviors.

#### PT-021

Poster

##### **The use of the pile sort method to understand food beliefs and classification systems in adolescents in peri-urban Lima, Peru.**

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Objective: The aim of this study was to understand food classification systems and beliefs about food in adolescents in periurban Lima, Peru.

Methods: Unconstrained pile sorts with 30 cards with food images were conducted with 10 males and females ages 15–17 years. Respondents were asked to name each pile and explain their groupings. In addition, they were asked to order the foods pictured from least to most healthy and to identify any other foods they considered healthy or unhealthy. Multidimensional scaling and hierarchical clustering analysis was completed with pile sort data. A team-based analysis approach was used to analyze descriptions of the card piles and healthy/unhealthy foods using a coding schema.

Results: The multidimensional scaling and hierarchical clustering analysis revealed six main food item clusters. The following labels and descriptors were used most often to describe the main groupings identified: 1) junk food (non-nutritive, tasty, expensive, chemical); 2) grains and legumes (healthy, tasty, lunch foods); 3) vegetables (prevent disease, natural); 4) meat (favorite, fatty, contain hormones); 5) dairy/breakfast foods (consumed daily, contain protein); 6) fruit (prevent disease, contain vitamins). While participants often grouped foods based on 'type', such as grains or vegetables, they also categorized foods based on likes/dislikes, frequency of consumption, eating occasion, taste, price and effect on health. In describing the categories, the importance of moderate consumption emerged as well as consumption of nutrient-dense foods. When asked to rank foods from least to most healthy, items such as beer and hot pepper were generally placed first, followed by processed foods such as chocolates, soda, and potato chips. 'Whole' foods such as fruit, vegetables, legumes, meat and dairy were often placed toward the end of the list, with 'quinoa' listed last in several cases. Foods often mentioned as healthy but not pictured included other legumes such as green split peas, whole grains such as kiwicha, and other fruits; unhealthy foods not pictured included high-sugar processed foods such as cookies and candy.

Key findings: Adolescents' food groupings generally reflected the current food guide, while comments revealed a host of factors affecting food choices. Nutrition education messages for adolescents should consider the cultural perceptions and importance of particular foods, taking into account the diverse factors that influence eating behaviors.

#### PT-022

Poster

##### **Puffer fish and tetrodotoxin: The doubt between eating or not to eat.**

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Materials and Methods: Puffer fish is a traditional delicacy in Japan, where it is named fugu. His fame and commercial importance have been spreading to other countries like United States of America, where its consumption has been increasing over the years.

Tetrodotoxin and puffer fish have been studied as a result of intoxications that occurred and still occur, and to deepen understanding this neurotoxin

and its intoxication form, as well as the resistance mechanism of puffer fish. The first intoxication was reported in 1959 in Japan, and beside the efforts to prevent further poisoning, intoxications still occur worldwide. There is no treatment for this neurotoxin poisoning, so prevention is the key to avoid certain risks or even death.

The aim of this study is to review recent researches about puffer fish and tetrodotoxin, the production of tetrodotoxin and its accumulation process on puffer fish, and realize if there are any reasons to limit its consumption. Several studies were selected according to risk relevance associated with puffer fish consumption, as well as its economic and social impact.

Results: Evidences showed that some puffer fish species are more toxic than others, depending on the part of the fish, presenting the highest toxicity in liver and ovaries, followed by gut, skin and muscle. Some cooking processes decrease the tetrodotoxin amount, reducing the risks associated with its consumption. Tetrodotoxin is produced by marine bacteria and reaches puffer fish by food chain. However, it can also be produced by the fish resulting of an external stimulus, being puffer fish unaffected by tetrodotoxin produced by itself because it developed a resistant mechanism. Key findings: In the past five years, 432 cases of intoxication and 52 deaths correlated with puffer fish has been reported. Puffer fish has immigrated due to human activities and global warming reaching other places, which caused a negative environmental impact, because it changed the ecosystem. Furthermore, implies the development of epidemiologic analysis of fish specimens, changes in fishing techniques and enforcement of rules and laws to protect people. Besides that, foodborne illnesses present negative economic impacts, as costs associated with investigation of foodborne outbreaks, treatment costs, employer costs and food industry losses, resulting from low sales and lower stock prices. According to the reasons mentioned above, the consumption of puffer fish should be limited but despite that, it remains very popular in various locations.

#### PT-023

Poster

##### **Osmolality and osmotic constituents in 24-hour urine samples from Guatemalan preschoolers consuming a common dietary offering.**

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Objective: Given the fact that the osmotic load in the urine is derived, in part, from elements in the diet either in their original form such as the sodium and chloride of salt or as metabolites of organic substances such as protein and that urinary volume is determined by beverages, water in food, and water generated by oxidation of macronutrients, we undertook a study with the objective to examine the relationship of selected analytes in the urine with urinary osmolality (Uosm) in preschool children attending day-care centres offering a common menu fare in Guatemala.

Materials and Methods: 24-h urine collections were conducted in 64 preschoolers among three daycare centers of the SOSEP system in Guatemala. Uosm was measured on a Gonotec, Osmomat 030 osmometer (Berlin, Germany). The following characteristics/analytes of the urine were measured by standard, clinical-laboratory methods: uric acid (UA); urea (NCO); sodium (Na); potassium (K); calcium (Ca) and magnesium (Mg). A probability value of <0.05 was considered statistically significant for Spearman correlation coefficients.

Results: Uosm median value was 397 mosm/kg of urine, with a range of 115 – 774 mosm/kg. The respective median values for the analytes measured were: 15.6 mg/dL (UA); 100 mg/dL (NCO); 1791 mg/L (Na); 1124 mg/L (K); 59.4 mg/L (Ca) and 49.6 mg/L (Mg). The Spearman correlation coefficients (r values) for the within-sample associations of Uosm with the analytes, in descending order of strength of correlation were: 0.836 (Na, p<0.0001); 0.771 (Mg, p<0.0001); -0.742 (NCO, p<0.0001); 0.580 (K, p<0.0001); 0.289 (Ca, p=0.005) and 0.024 (UA, p=0.417).

Key findings: We confirm that the content of four minerals (Na, K, Ca, Mg) are directly associated with Uosm, whereas another organic constituent (NCO) in urine is strongly – but negatively – associated. Not unsurprisingly, urinary Na had the strongest association with Uosm, followed interestingly by Mg, and thirdly (inversely) by NCO. The emergence of these anticipated relationships provides a certain degree of internal validation for the analytical accuracy of the principal osmotically-active constituents measured.

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#### PT-024

Poster

##### **Bone mineralization status of soldiers doing military service in different types of Polish Army units.**

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For proper construction and functioning of human skeletal system a very important thing is adequate supply of calcium, which content in daily rations, in addition to genetics, degree of physical activity and level of sex steroids, is an essential factor influencing on bone mass.

**Aim of the work:** The aim of the work was to assess bone mineral status of regular soldiers doing military service in different types of Polish military units.

**Method:** An assessment of bones calcification and protein-energy nutritional status of 1913 men, soldiers doing military service in different types of military units, was made.

Body height and body mass were determined by standard methods using a scales and a height-meter. Bone mineral density was measured by DEXA densitometry on forearm bone of non-prevailing arm, using the EXA 3000 apparatus.

**Results:** Results of densitometry showed that 1594 soldiers, that is 83.3% of subjects had standard bone calcification. Bone mineralization characteristic of osteopenia was found among 304 people, that is 15.9% of examined, while 15 subjects (0.8%) revealed changes characteristic of osteoporosis.

**Conclusion:** Bone mineral density of 16.7% of examined soldiers serving in different types of military units indicates presence of abnormalities in bone calcification with varying degrees of severity. It is advisable to take among soldiers an extensive health promotion regarding dietary health education aimed at nutritional prevention of bone mineralization disorders.

#### PT-025

Poster

##### **A comparative study of nutritional problems in preschool aged children in Nepal.**

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**Introduction and Objectives:** This paper explores diversity of cultural beliefs, knowledge and habits about food and nutrition that have affected health in positive and negative ways. The main objective is to measure the level of knowledge, attitudes and beliefs about 'nutritious' food for children amongst poor mothers in Nepal.

**Materials and methods:** A mixed-methods study was conducted in an urban and rural area of Nepal.

**Sample:** A questionnaire study was conducted with 524 mothers of 3-5 year old children as well as and seven Focus Group Discussions (FGD), consisting of Pharmacists, Auxiliary Nurse Midwives, Health workers, Social workers, Mothers, Spiritual healers and policy makers.

**Data collection:** Data collection took place in three successive phases: coordination, field management, piloting and survey from 25 June to 27 September 2012.

**Analysis:** Quantitative data was analyzed using SPSS (v20.0) reporting mothers' knowledge, attitudes and beliefs in respect of their children's nutrition. Results are presented in cross-tabulated form. A thematic analysis was used in the qualitative data analysis. Ethical approval has been obtained from the Nepal Health Research Council and Bournemouth University.

**Result:** The study included more urban mothers (56%) than rural ones (44%). Major barriers to recommending nutritious foods included: lack of knowledge (15%); high prices (19%); and culture/ beliefs (6%). The study showed nearly 55% children were provided with fruits once in week. Almost 15% of mothers never gave salad to their children and 6% of mothers could not choose nutritious food from the grocery store, 12% of the respondents lacked food. The majority of children (57%) had been taken at least once to a spiritual healer for treatment and 16% more than once. 20% of mothers believed eating green leafy vegetables and fruits during illness affected child health. Only 8% of the respondents provided meat, fish, egg and milk during times of illness to their children. Green leafy vegetables were rarely given to their children. Alike, children occasionally received other vegetables and fruits. Social worker (FGD) said that the mothers' beliefs that green vegetables and fruits cause common cold, diarrhoea and stomach-ache in children. According the Pharmacists (FGD) poor communities believed that nutritious foods are luxurious/ unaffordable and family conflict. Mothers (FGD) thought that if a pregnant woman eats more, she will have a bigger baby and a difficult delivery.

#### PT-026

Poster

##### **Physical activity in preschool children measured with acti-heart monitors.**

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**Background and main objective:** There are scarce records of physical activity in children of developing countries.

**Methods:** With this objective, 77 preschoolers (5.9 y of age, 37 girls, 40 boys) were evaluated according to WHO growth standards; total daily energy expenditure (TEE) was measured by Actiheart monitors, each 15 seconds during two week-days and 1 week-end-day, values were weighed for a week, and cleaned with the software of the University La Plata, Argentina.

**Results:** Boys with similar age and BMI, showed higher TEE values than girls (1489 vs. 1372 kcal/d;  $p=0.03$ ), and also per kg body weight (68.5 vs. 59;  $p=0.04$ ). As a consequence of the boys' higher BMR (1013 vs. 944 kcal/d;  $p=0.014$ ), the PAL values of boys and girls were low (1.44 and 1.45) and not different ( $p=0.87$ ). Normal vs. overweight boys showed higher TEE (72 vs. 57 kcal/kg,  $p=0.000005$ ) in spite of the higher BMR of the overweight ones (1195 vs 957,  $p=0.00000$ ). Overweight boys expended less time than the normal ones in moderate+heavy physical activity (35 vs. 101 min/d,  $p=0.011$ ) and showed lower values of energy expended in physical activity (AEE, 16 vs. 23 kcal/kg/d,  $p=0.03$ ), and similar Physical Activity Level (PAL, 1.40 vs. 1.47,  $p=0.42$ ); but not girls (58 vs. 94 min/d,  $p=0.19$ ) (AEE, 17.2 vs. 17.9 kcal/kg/d,  $p=0.75$ ) (PAL, 1.49 vs. 1.38,  $p=0.23$ ).

**Conclusion:** Cuban preschool children showed all a low physical activity level; half of them did not accomplish the daily physical activity recommendation.

#### PT-027

Poster

##### **Reduced acid load of the macrobiotic ma-pi diet improves glycaemic control and cardiovascular risk factor in type 2 diabetes.**

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**Background/Aims:** The diet acid load has been associated to inflammation, insulin resistance, and cardiovascular risk. Main purpose of this study was to evaluate the impact of the lower acid load of the macrobiotic vegetarian Ma-Pi diet (70% carbohydrate as whole cereals, 12% vegetable protein, 18% fat) on this association.

**Methods:** A prospective 21 days dietary intervention was carried out in 24 adults with type 2 diabetes (15 men, 9 women;  $60.3 \pm 6.4$  y of age). Cases were selected from diabetic patients afferent to the Preventive Medicine Centre of IPA, Rome. Subjects were submitted to anthropometric, body composition, biochemical, and blood pressure records. Data at onset and termination were compared.

**Results:** The lower diet acid load was evidenced by the 7% increase in urinary pH ( $p=0.0027$ ) and 10% in blood bicarbonate ( $p=0.0014$ ), together with a 27% reduction of the serum anion Gap ( $p=0.0006$ ). Significantly also decreased: leucocytes, 18% ( $p=0.0000$ ); glycemia, 35% ( $p=0.0000$ ); insulinemia, 68% ( $p=0.0000$ ); HOMA2-IR, 69% ( $p=0.0000$ ), total cholesterol, 23% ( $p=0.0000$ ); LDLc, 24% ( $p=0.0000$ ); LDLc/HDLc, 17% ( $p=0.0013$ ); triglycerides, 53% ( $p=0.0000$ ); urea, 45% ( $p=0.0000$ ); homocysteine, 17% ( $p=0.0002$ ); microalbuminuria, 81% ( $p=0.0000$ ); systolic blood pressure, 8,3% ( $p=0.0000$ ); and diastolic blood pressure, 7,5% ( $p=0.0000$ ).

**Conclusions:** The macrobiotic Ma-Pi diet improved, at short term, insulin resistance and decreased the cardiovascular risk in type 2 diabetic patients. The reduced lower acid load was evidenced.

#### PT-028

Poster

##### **Anthropometric status of under-five children in orphanages of Federal Capital Territory, Abuja, Nigeria.**

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**Objective:** The objective of the study was to assess the nutritional status of under-five children in orphanages of Federal Capital Territory, Abuja, Nigeria using anthropometric parameters of weight, length/height and upper arm circumference.

**Material and Methods:** The study was conducted using 200 orphans (96 males and 104 females) aged between 0-59 months living in ten orphanages in Abuja, Nigeria. Anthropometric indices of the children were assessed using length/height, weight and upper arm circumference. The weight of each child was measured using a Seca 88 IU (UNIS scale). The length measurement of children 0-2 years was taken lying down (recumbent length) with portable (crown-heel) length measuring board. Heightometer was used to measure the height of children 25-59 months. The upper arm circumference was determined using a Shakir's strip (arm circumference non-stretch tape) marked in appropriate colours (green, yellow and red) to the nearest 0.1cm. The anthropometric data was analysed using anthropometric Z scores [3] and categorized using WHO Anthro software version 3.2.2 [4], designed for application of the WHO child's growth standard in individuals and population 0-60 months.

**Result:** The result showed that 45.5% of the orphans were underweight, 63.5% were stunted while 47.5% were wasted. Further categorization showed that 9.5% of the orphans were severely underweight while 36.0% were moderately underweight; 26.0% were severely stunted while 37.5% were moderately stunted; 10.0% were severely wasted while 37.5% were moderately wasted. Using the mid-upper arm circumference, 29.5% of the children were moderately malnourished while 9.5% were severely malnourished. The high percentage of the orphans who were stunted, wasted and

underweight indicates that many children in the orphanages were malnourished. Stunting shows long term growth faltering. This could have adverse effect on intellectual, cognitive and physical development of a child. The child will not be able to achieve his potentials to contribute positively to the economic and social development of nations.

Key findings: The anthropometric indices showed that more than half of the children in the orphanages were malnourished. This calls for urgent need for nutritional interventions in the orphanages like Severe Acute Malnutrition (SAM) Management and nutrition education for caregivers.

#### PT-029

Poster

##### **Association of bullying with the nutritional condition in teenagers between 11 to 13 years in Mexico City.**

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One of the principal problems that is taking summit inside our society is the topic of the bullying. This phenomenon is a product of the visualization of the violence that penetrates all the areas, including the school.

The adolescence is a period in which the identity development is particularly important and depends of the social environment. In agreement with the empirical evidence, bullying has a negative effect in the teenager development. The research on student violence and victimization indicates that the implied teenagers suffer, in many occasions, serious psychosocial consequences. The bullying brings with it immediate consequences like the autoconcept and selfesteem deterioration of both principally involved actors, the victim and the aggressor.

The aim of the present study was to determine if bullying influences the nutritional state of the teenagers in the secondary public schools in Mexico City. There was obtained a sample of 135 teenagers of the first degree of secondary of the morning and evening shifts, corresponding 67.4 % to the first one and 32.6 % to the second one, of which 46.7 % is women and 53.3% remaining men. By means of the application of CURMIC-S questionnaire and the use of Who Anthro Plus program, obtained the diagnosis of bullying and the nutritional state respectively. There was a overweight prevalence of 25.9 % (23.8 % for women and 27.8 % for men), the obesity prevalence was 14.1 % (12.7 % for women and 15.3 % for men). 36.3 % of the total of the teens recount to have presented some type of bullying at least in one occasion, while the remaining one 63.7 % refer never have presented some situation of school harassment. Analyzing the presence of bullying for school shift the teenagers on the morning shift have major probability of suffering some type of bullying (41.8 %), in comparison with teenagers in the evening shift (25.0 %) nevertheless the difference is not statistically significant ( $p = 0.05$ ).

On having related the existence of bullying to relation to the sex, one thought that women present major probability of suffering some type of school harassment (46.0 %), in comparison with men (27.8 %), being the statistically significant difference ( $p = 0.05$ ). The teenagers who have thinness and overweight present major probability of suffering bullying (50% and 45.7 % respectively), in comparison with teens with normal weight (32.5 %), nevertheless, one did not find statistically significant difference ( $p = 0.05$ ). In conclusion we did not find a direct correlation among bullying with the nutritional state of the teenagers.

#### PT-030

Poster

##### **Nutritional status and school environment of 1-st grade schoolchildren in Bulgaria, 2013.**

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Objectives: Obesity of children is an important health problem in Bulgaria. The first national survey was carried out in 2008, in 2013 the second survey on representative sample of 1st grade schoolchildren was conducted in the same schools. The aims are to measure the trends in overweight and obesity in primary schoolchildren and to assess the school environment.

Material and methods: The survey followed the protocol of the WHO European Childhood Obesity Surveillance Initiative, which was jointly developed by the WHO Regional Office for Europe and the participating Member States. The national representative sample included 185 schools; a total 3353 of 7-years old schoolchildren were enrolled. The weight and height were measured with standardized anthropometric equipment and methods. Overweight and obesity were assessed by BMI, WHO growth reference for school-age children and adolescent, 2007 are applied. The school masters filled-in the school record form.

Results: The data from 2013 presents the high prevalence of overweight and obesity, the rate of overweight (including obesity) among boys is 32.4% and in girls – 28.6%, obesity levels are – 15.7% among boys and

12.2% for girls. The data shows negative trends in overweight and obesity in schoolchildren, the prevalence of obesity is increasing between 2008 (in 2008 the rate among boys is 12.8% and 11.8% for girls) and 2013 years, especially in studied boys. After entering into force of national regulation of healthy nutrition of schoolchildren in 2009, there are some positive changes in school environment: nutrition education is included in school curriculum of 85, 7% of studied schools in 2013 vs. 67.4% in 2008; there are positive changes in foods in school cafeteria: in 2008 years 73.7% of schools offered chips and salted snacks; 76.5% - candy, sweet snacks, 68.2% - soft drinks with sugar, 36.9% - fresh fruits, 30, 7% - milk. In 2013 pupils can obtain in: 19 % of schools – chips and salted snacks; 54,4 % - candy, sweet snacks, 27,8% - soft drinks with sugar, 85,9% - fresh fruits, 44,4% - milk. Key findings: Overweight and obesity among 7-year-old children in Bulgaria is still a serious public health concern. The reviled trends in school environment will be the base for future improvement of nutritional status of school children.

#### PT-031

Poster

##### **Too much or too little? Survey among healthcare professionals related to hydration.**

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Hungarian Dietetic Association

Objectives: Water plays many important roles within the body, and hydration refers simply to the amount of water present. Good hydration is essential for health and wellness. Attitudes of healthcare professionals to the importance of hydration for health, wellness and performance were evaluated.

Material and methods: Computer-aided web or telephone interviews among doctors and dietitians in 2013. The interviews assessed attitudes to the importance of hydration, how commonly they assess the hydration status of patients, and knowledge about recommended water intakes, sources of water for consumption and contribution from different beverages.

Results: In the survey 303 doctors and 113 dietitians were participated.

All responders considered hydration an important issue and there was little difference in opinion between different healthcare providers. Dietitians rated hydration more importantly than physicians; however doctors reflected in the higher frequency that they assess the hydration status of patients. It was demonstrated by 85-90 percentages of responders citing the necessity of optimal hydration for physical performance. The contribution of an appropriate hydration status to mental health was relatively poorly recognized, with 51% of dietitians but 72% of doctors. Healthcare professionals were reasonably knowledgeable about European Food Safety Authority adequate intakes for water for men and women but overestimated the contribution from food and underestimated that from beverages.

Key findings: The data highlight opportunities for education and improved clinical practice, especially in respect to the effects of hydration status on mental wellbeing and performance and the contribution of foods and beverages to total water intake.

#### PT-032

Poster

##### **Calcium and vitamin D dietary intake in US children: an analysis of National Health and Nutrition Examination Survey 2007-2010.**

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Objectives, Material and Method: Calcium and vitamin D are important nutrients for child growth. To assess the dietary intake of these two micronutrients in children between 2 to 12 years old, data from 4265 children in the National Health and Nutrition Examination Survey 2007-2010 were analyzed.

Results: For calcium intake, we found that the percentage of children below their respective estimated average requirement increased with age, from 3.2% in age group 2-3y to 28.1% in age group 4-6y, and further increased to 61.5% in age group 8-12y. This trend might reflect the change of dietary habits in these ages. Among different ethnic groups, the highest percentage of children below estimated average requirement was in Non-Hispanic Blacks. No difference was found when comparing different income groups using the poverty income ratio as an indicator. In general, more girls were below the estimated average requirement than boys within the same age, ethnic and income group. Most children in this study had inadequate vitamin D intake; approximately 80% of them were below the estimated average requirement. The percentage was higher in Non-Hispanic Blacks (92.8%) than Non-Hispanic Whites (84.0%) and Hispanics (85.9%). Like calcium intake, no difference was found across different income groups for vitamin D. Supplements played a role in vitamin D intake, but did not contribute much to calcium intake. Dietary intake data with supplements showed that the percentage of children below estimated average requirement of vitamin D decreased to 81.9%, 63.5% and 76.9% in Non-Hispanic Black, Non-Hispanic White and Hispanic groups respectively. Similar supplement effects were also observed in different income groups, and higher income groups had fewer children below the requirement.

Key findings: These results suggest that it is still a big challenge for US children to meet the requirements for calcium and especially for vitamin D. Girls and Non-Hispanic Blacks are more likely to have inadequate dietary intake of calcium and vitamin D. Food sources of these micronutrients need to be promoted.

#### PT-033

Poster

##### **The role of household salt in iodine deficiency prophylaxis in Poland.**

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Objectives: Polish territory has been classified as an iodine-deficient area. In 1997 the national programme of obligatory iodisation of household salt was implemented. Household salt should contain potassium iodide ( $30 \pm 10$  mg KI/kg of salt) or potassium iodate ( $39 \pm 13$  mg KIO<sub>3</sub>/kg of salt) which corresponds to  $2.3 \pm 0.77$  mg of iodine/100g of salt. The aim of the study was to access the iodine content in daily diets of Polish pupils and the role of household salt as a source of iodine.

Material and methods: The study was carried out in 2006, 2008, 2009, 2010 and 2011 among 981 girls and boys aged 9-13 years with the use of one-day dietary recall. The data of iodine content in food products was based on the National Food Composition Tables. The results of iodine intake were compared to the Estimated Average Requirements (EAR). In daily diets the share of iodine (%) from food products including iodised salt was performed.

Results: The mean total daily iodine intake in the group of pupils was 99 µg and ranged from 96 µg (girls) to 102 µg (boys). The comparison of individual iodine intake to EAR values showed that 62.4% diets were above EAR. Household salt was the most significant source of iodine (68%) in diets of studied pupils. The mean iodine intake from household iodised salt was 67 µg. The others important sources of iodine were milk and milk products (12%).

Key findings: The model of iodine deficiency prophylaxis based on obligatory iodisation of household salt is effective. Household salt is the main source of iodine in daily diets of Polish pupils. The results of this study show the need of household salt iodisation in Poland.

#### PT-034

Poster

##### **A multi-stakeholder approach to explore commitment and capacity to address infant and young child feeding practices in the Breede Valley District, Western Cape, South Africa.**

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Background and objective: The Community Nutrition Security Project (CNSP) baseline research investigated the food-security situation in vulnerable communities in the Breede Valley, Western Cape, South Africa; the site for Stellenbosch University's rural campus. Nutritional assessments indicated, among other, poor infant and young child feeding (IYCF) practices and high levels of stunted growth in children. Phase 2 of CNSP, reported here, applies a systematic approach to identify and engage with many different stakeholders that can impact IYCF practices at the district level. The research explores the perspectives, commitment and capacity of key stakeholders, the relationships among them and their relative power and influence with regard to the IYCF situation.

Materials and methods: A strategically selected group identified key stakeholders in IYCF followed by individual in-depth interviews with particular stakeholders. Hereafter, stakeholders were engaged in a workshop through a participatory research method ("NetMap") that defines relationships among stakeholders as well as their priorities and powers.

Results: Interview-data showed that stakeholders displayed a good understanding of the link between IYCF and development, but appropriate IYCF practices were not well known. Factors influencing IYCF practices in the district were identified as poor knowledge, poverty, unemployment, misuse of social-security grants, teenage pregnancies, child neglect, gangsterism, drug abuse and HIV. A disjunction between the various government entities was highlighted as a contributing factor to sub-optimal service delivery and poor community response. The "NetMap" process revealed a significant flow of financial support from National Treasury towards services focused on young children. This allocation of funds is commensurate with rigid command/authority. Local jobs are under pressure, because of external issues and individual employer responses to national policy changes. Information flow on IYCF is sketchy and advocacy on the topic is almost non-existent at the implementation level. Yet, commitment is displayed and solutions were proposed. Residents are ready to engage and joint solutions can be developed in the existing liaison group comprising Departments of Health, Education, Social Services and Community Development and Planning and with the local Business forum. In addition, the University can act as a partner for advocacy and knowledge generation.

Key findings: Factors that impact IYCF at the district level are very complicated. A range of issues are connected in a complex network that transcends

time and scale. Issues far away affect those close-by. A multi-stakeholder process revealed some collective capacity that could be unlocked to address IYCF at the district level in the Breede Valley.

#### PT-035

Poster

##### **Opinion of Polish consumers about genetically modified food on the basis of surveys.**

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Objective: the assessment of knowledge and opinions of Poles about the GMO.

Material and methods: a survey based on an original questionnaire conducted in the years 2001-2012 with the approval of the Bioethics Committee. The study included 1002 adults. Data were collected via Internet.

Results: nearly 45% of the respondents claimed that GM crops will allow for reducing the amount of insecticides used, and 43.5% believe that GM foods will contribute to solving the problem of hunger in the poorest countries. At the same time more than 40% of the respondents believe that the risks associated with the consumption of the genetically modified food outweigh the benefits. Over 80% of the respondents do not agree with the opinion that the GM organisms have been proven in the scientific studies and are safe. Almost 1/3 of the respondents claim that the GMOs are harmful to humans. 58.7% of the respondents indicated that the GMO disturb the natural balance in nature, and 35% of them indicated that people have no right to interfere with nature. More than 2/3 of the respondents, regardless of their education, age and place of residence would not recommend such foods to anyone. Almost all the respondents (97%) expect labeling of the GM food.

Key findings: the negative opinions on the GMOs dominated in the researched population. The concerns of the respondents are associated with the potential adverse effects of GMOs both on human health as well as on the environment. Even the perceived potential advantages do not change the opinion of over 50% respondents about the fact that the GM products disturb the natural balance in nature and are detrimental to human health.

#### PT-036

Poster

##### **Nutrition Education and Curricular changes.**

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Introduction: Nutrition Education is an important activity for the nutritionist because of the population healthcare needs. The process of formation of this professional was triggered by social, political and educational factors.

Objective: Evaluate the process and context of curricular changes in a Nutrition Course of a public school and the impact on the content related to nutrition education.

Methods: Case study through a literature and documentary review on the history of the nutritionist profession in Brazil.

Results: It appears that the initial process of setting up the nutritionist course was due to technical and scientific assistance in the healthcare area. The first graduates seek the strengthening of profession, throughout the recognition of these courses as higher education course and through professional regulations that occurred in the 1960s. During that period, the nutritionist education based on physiological, pathological and biochemical aspects of nutrition, the composition and the culinary use of food. External factors to the University, in 1970s, such as the requirement of the minimum curriculum and the opening of employment opportunities, resulted in changes in the curriculum. The strengthening of the higher education, considering the university autonomy, the creation of departmental and the implementation of post graduation, diversifies the grounds of the course, by the insertion of new content and the inclusion of internships. Pedagogical of healthcare education, agricultural, sociology and anthropology appeared into the curriculum. In 1980s, the Food Education is present as a discipline of Public Health Nutrition. In order to meet the demands of teaching, due to the new minimum curriculum, it broadens the number of subjects and consequent fragmentation of content. After that, it creates the discipline Nutrition Education. University's changes altered the responsibility for the course. The course has a major restructuring with the modification in the duration and period. Disciplines as Agricultural Education, Health Education and Pedagogy disappear, giving place to Health Promotion. The humanities, such as sociology, become "Applied Nutrition". In the early 21st Century, the approximation of the healthcare and education sectors for the establishment of the curriculum guidelines for changes in healthcare courses, reflected in changes.

Conclusions: The reformulation was a complex process that involves various stakeholders and the development of several writing and synthesis activities. There have been changes in the structure, resulting from health and education public policies. For that reason, this subjects need to be included in the curricula.

## PT-037

**The association between obesity/overweight and lipid profile in a sample of 6-7 year olds.**Omidvar N.<sup>1</sup>, Narmcheshm S.<sup>1</sup>, Kalantari N.<sup>1</sup>, Salehi F.<sup>2</sup>, Amiri P.<sup>3</sup>, Eslamian G.<sup>1</sup>, Sobhani R.<sup>1</sup>, Yarparvar AH.<sup>1</sup><sup>1</sup>Department of community Nutrition, Faculty of Nutrition & Food Technology, National Research Institute of Nutrition and Food Technology, Shahid Beheshti University of Medical Sciences & Health Services, Tehran, Iran. <sup>2</sup> Nutrition Department, Ministry Of Health and Medical Education. <sup>3</sup> Obesity Research Center, Shahid Beheshti University of Medical Sciences & Health Services. <sup>4</sup> Unicef, Tehran, Iran

Objectives: Childhood obesity contributes to several complications, including increased risk of type 2 diabetes, hypertension, cancers and psychological disorders. The aim of this study was to evaluate the association of overweight and obesity among Iranian 6-7 year old children with lipid profile, as adverse cardiovascular risk factor.

Material and methods: This study was conducted as the baseline analysis of a Primary health care-base trial on 171 overweight/obese first grade students, aged 6-7 years in the city of Tehran. Body weight and height were measured and body mass index (BMI) was calculated. Z-scores of BMI for age were calculated by WHO AnthroPlus software. Blood samples were drawn and total cholesterol, high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), and triglycerides were measured. Normal range of lipid profile was evaluated based on National Cholesterol Education Program (NCEP) Expert Panel on Cholesterol Levels in Children.

Results: The sample included 77 (45%) boys and 94 (55%) girls, with mean age of 80.75±4.1 months. Of the total sample, 20.5% were overweight (z-score BMI for age ≥ 1 to 2) and 79.5% obese (z-score BMI for age ≥ 2). Mean±SD BMI z-score of the sample was 2.70±0.94. Elevated levels of TG (≥75 mg/dl) and Cholesterol (≥170 mg/dl) were observed in 62.6% and 29.8 % of children, respectively. Only 29.8 % of children had normal HDL-C level (>45 mg/dl) and 74.3% of children had acceptable level of LDL-C. The Spearman correlation coefficient between z-score indicated a positive significant association with triglycerides (r=0.316), LDL-C to HDL-C ratio (r=0.23) and a significant negative association with HDL-C (r=-0.3), only in girls. No significant association was observed between BMI z-score and total cholesterol and LDL-C in both sexes.

Key findings: The results show that overweight and obese children are at increased risk of cardiovascular disease. This calls the need for proper interventions to prevent and control overweight and obesity in primary school children. The study sample are now under a pilot weight management program.

Poster

Key findings: Subjects with obesity have characteristic dietary patterns that differ from typical patterns in overall population, especially in men.

## PT-039

**In Vitro digestion-assisted development of b-cryptoxanthin-rich functional foods.**Granado-Lorencio, F.<sup>1,2</sup>; Blanco-Navarro, I.<sup>1,2</sup>; Pérez-Sacristán, ; Hernandez, Elena, B.<sup>2</sup>; Donoso-Navarro, E.<sup>1</sup>; Silvestre-Mardomingo, RA.<sup>1</sup>.<sup>1</sup>Servicio de Bioquímica Clínica. <sup>2</sup>Unidad de Vitaminas. Hospital Universitario Puerta de Hierro-Majadahonda, Madrid. Spain.

Poster

Introduction: Consumer demand for natural products favours the development of foods containing bioactive ingredients with health benefits. β-Cryptoxanthin (β-Cx) is a major dietary provitamin A carotenoid mostly provided by citrus fruit that displays antiatherogenic and bone anabolic effects.

Bioavailability is a critical point on assessing the role of bioactive compounds in human health. In this context, in vitro models based on human physiology have been developed as simple, inexpensive and reproducible tools to study digestive stability, hydrolysis, micellarization and intestinal transport, and to predict the bioavailability of food components (i.e. β-Cx). Objective: To assess the effect of lipid emulsions on the bioaccessibility of β-Cx.

Methods: Experimental beverages; Three identical β-Cx-enriched milk-based fruit beverages were developed except for the present of different lipid components; A) soy lecithin, B) milk fat plus emulsifier, C) olive oil plus soy lecithin.

In vitro bioaccessibility; Stability (recovery), the degree of β-cryptoxanthin esters hydrolysis and the incorporation into aqueous-micellar phase of total and free β-cryptoxanthin were assessed using a previously tested in vitro gastrointestinal model. Analysis of β-cryptoxanthin was performed in aliquots collected in duplicate at different time points during the in vitro digestion (food, duodenal phase and micellar). Aliquots were extracted (with and without saponification) and analysed by HPLC.

Results: Initial total content of β-Cx in the beverages ranged between 148-178 ug/dl while free β-Cx was similar in all of them, accounting for 21%. At duodenal phase, free β-Cx was also very similar in all the beverages, ranging between 55-59 ug/dl and accounts for 31-40% at this stage. Thus, the degree of ester hydrolysis (duodenal/ initial) varied between 48% (beverage A) and 65% (beverage C). In the micellar phase, free β-Cx ranged between 34 ug/dl (beverages B and C) and 53 ug/dl (beverage A) indicating that between 96% (beverage A) and 57-58% (beverage B and C) of the free β-Cx present in the duodenal phase was finally available for absorption (micellar phase). However, the total β-Cx (saponified) recovered in the micellar phase ranged between 81% (beverage B) and 100% (beverage C) of that initially present in the food.

Conclusion: Our results support the suitability of in vitro models to provide relevant information to assess the effect of food matrix modifications on the bioaccessibility of bioactive components. Thus, in vitro digestion-assisted approach may be useful in the design and evaluation of functional foods.

## PT-038

**Traditional dietary patterns and obesity: a population-based study in Córdoba, Argentina.**Abalay L.R.<sup>1</sup>; Pou S.A.<sup>1,2</sup>; De La Quintana A.G.<sup>3</sup>; Forte C.A.<sup>1</sup>; Díaz M.P.<sup>1</sup><sup>1</sup>Cátedra de Estadística y Bioestadística, Escuela de Nutrición, Facultad de Ciencias Médicas, Universidad Nacional de Córdoba. Córdoba, Argentina.<sup>2</sup>Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET). Córdoba, Argentina. <sup>3</sup>SeCyT-UNC, Escuela de Nutrición, Facultad de Ciencias Médicas, Universidad Nacional de Córdoba. Córdoba, Argentina.

Poster

Obesity is a chronic, complex, multifactorial disease which has sharply increased in prevalence in both developed and developing countries. According to the second National Risk Factor Survey, 18% of adult population of Argentina was obese in 2009.

Factor analysis has an intuitive appeal in nutritional epidemiology as it offers a means of factoring intakes of a variety of foods reflecting underlying eating patterns.

Objectives: a) To identify traditional dietary patterns from adult population of Córdoba city by sexes; b) To describe the dietary patterns emerging specifically from population with obesity. Material and methods: This work included 4327 subjects (2495 women and 1832 men) from a population-base study performed in Córdoba city (Argentina) in 2009 to 2012. To assess dietary intake, a food frequency questionnaire was used. A posteriori dietary patterns were identified through principal component factor analysis (varimax rotation) carried out on a selected set of 15 major food groups.

Results: We identified four major dietary patterns in male population named "sugar and starch- rich foods", "western pattern" (meat, eggs, meat products, alcohol), "prudent pattern" (fruit, nonstarchy vegetables, dairy foods) and "high-sugar drinks pattern". Among the male population with obesity (16,7%) emerged two specific patterns characterized by strong factor loadings on meat products and alcohol, and snacks and high-sugar drinks, respectively.

In women, the dietary patterns identified were labelled as "starch-rich foods" (cereals products and nonstarchy vegetables), "fruit and vegetables", "meat products" and "high-sugar drinks". The dietary patterns for female population with obesity (17,2%) were similar to the overall population, although a new pattern emerged with snacks, dairy foods and cheeses as dominant groups.

## PT-040

**The LUNCHES study: nutrient composition of elementary school students' home packed lunches comparing two school schedules in Ontario, Canada.**Macaskill LA.<sup>1</sup>, Martin LJ.<sup>1</sup>, Luk JMH.<sup>1</sup>, Salvadori MP.<sup>2,3</sup>, Seabrook JA.<sup>2,3</sup>, PDworatzek PDN.<sup>1,4</sup><sup>1</sup>Division of Food and Nutritional Sciences, Brescia University College at Western University, London, ON N6G 1H2, Canada. <sup>2</sup>Department of Paediatrics, Schulich School of Medicine and Dentistry, Western University, London, ON N6A 3K6, Canada. <sup>3</sup>Children's Health Research Institute, London, ON N6C 2V5, Canada. <sup>4</sup>Schulich Interfaculty Program in Public Health, Schulich School of Medicine and Dentistry, Western University, London, ON N6A 3K6, Canada.

Poster

Background: The Balanced School Day schedule was created in a Canadian elementary school as an alternative way to structure the school day in contrast to the well-established Traditional Schedule in North American schools. The change to a Balanced Day is cited as an enhancement to the school-learning environment by providing three 100-minute blocks of uninterrupted instructional time. Students also receive two 20-minute eating periods, rather than the single 20-minute break dedicated to eating in the Traditional schedule. Widespread implementation of the Balanced School Day schedule has occurred across Ontario, Canada with limited systematic evaluation of the potential health outcomes.

Objective: To compare caloric and nutrient value of packed lunch contents and consumption in the Balanced School Day schedule versus the Traditional schedule by direct observation in a classroom setting.

Materials and methods: Observers recorded all visible food and beverage items packed and consumed by students during all eating periods, including portion sizes, and items traded, spilled, or discarded. Differences in caloric and nutrient values packed and consumed between schedules were assessed using the Mann-Whitney U test.

Setting and subjects: A total of 321 grade 3 and 4 students, ages 7-10 years, were observed during all eating periods of a school day. Data was collected in 19 elementary schools in Southwestern Ontario, 9 following the Balanced School Day (n=153) and 10 adhering to the Traditional Schedule (n=168).

Results: Packed lunch contents in the Balanced Day were significantly higher than the Traditional Schedule in energy (3128.1±1100.4 vs. 2659.0±951.3 kJ, p<0.001, respectively). Similarly, carbohydrates, total sugar, protein, fat, saturated fatty acids, folate, riboflavin, iron, and sodium were significantly higher in the Balanced Day versus Traditional schedule packed lunches. Correspondingly, students in the Balanced Day consumed significantly more energy (2541.9±987.2 vs. 2318.1±827.3 kJ, p=0.03), carbohydrates (95.3±37.1 vs. 86.1±32.7 g, p=0.02), total sugar (46.9±24.4 vs. 37.7±19.8 g, p=0.001), and iron (4.0±2.3 vs. 3.6±2.1 mg, p=0.04) compared to the Traditional schedule, respectively.

Key findings: Lunches brought by students in the Balanced School Day schedule provided more energy across all macronutrients, with only a few micronutrients showing increased amounts. These findings suggest two 20-minute eating opportunities could contribute to excess caloric intake during school, which could ultimately lead to weight gain and contribute to the already high childhood overweight and obesity rates in Canada. School food guidelines should promote the packing and consumption of nutrient dense whole foods in students' lunches. (Supported by CIHR grant to Dworatzek.)

#### PT-041

Poster

##### Compliance of the Dietary Reference Intakes (DRI) for Spanish Population-2010 among Menorcan elderly people.

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Objectives. The aim was to study the compliance of the Dietary Reference Intakes for Spanish population and the percentage of the population below 2/3 and 1/3 of the DRI.

Material and Methods. The population of interest comprised 402 participants (187 men and 215 women) aged between 65 and 94 years from Menorca Island. The questionnaire included more than 35 questions related to socioeconomic and anthropometric data, food and lifestyle habits and physical activity. Energy and nutrients intake was derived from the average daily food consumption reporter in two non-consecutive 24-hour diet recalls. The proportion of individuals with intakes below 2/3 and 1/3 of the DRI was the criterion used to estimate the risk and high risk to inadequate intake. Descriptive analysis was used means and SD. The unpaired Student T test was used to test difference between gender means. Analyses were performed with SPSS version 21.0.

Results. Energy intake was significantly lower than DRI in men and women. Non significant differences were found between thiamine, riboflavin, niacin, pyridoxine, folic acid and zinc mean intake and DRI value in men (p>0.05) while women had significantly lower or higher intakes than DRI for all nutrients, except for niacin and folic acid (p>0.05). Energy, thiamine, riboflavin, pyridoxine and zinc intakes were more frequently below 2/3 DRI in men than in women (p<0.05); however, vitamin B12, C, A, iron and selenium intakes were more frequently below 2/3 DRI in women than men (p<0.05). Less than 7% of the participants had high risk of deficient intake for all nutrients except to vitamin D, retinol and vitamin E in men and women. It did not exist gender differences in the proportion of participants below 1/3 DRI for all analysed nutrients. In conclusion, considering the DRI for Spanish population, consumption of vitamin E, vitamin A and vitamin D should be increased in the Menorcan elderly people.

Key findings: Compliance of the Dietary Reference Intakes (DRI) for Spanish Population-2010.

Percentage of the population above 2/3 and 1/3 of the DRI.

Vitamin E, vitamin A and vitamin D should be increased in the Menorcan elderly people.

#### PT-042

Poster

##### Metabolic syndrome prevalence among Northern Mexican adult population.

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Objectives. The aim was to examine the prevalence of metabolic syndrome and associated risk factors in Northern Mexican adults aged ≥16 years.

Material and Methods. The study was a population-based cross-sectional nutritional survey carried out in the State of Nuevo León, Mexico. The

study included a sub-sample of 1,200 subjects aged 16 and over who took part in the State Survey of Nutrition and Health-Nuevo León 2011/2012. Results. Anthropometric measurements, physical activity, blood pressure and fasting blood tests for biochemical analysis were obtained from all subjects. The prevalence of metabolic syndrome in Mexican adults aged ≥16 years was 54.8%, reaching 73.8% in obese subjects. This prevalence was higher in women (60.4%) than in men (48.9%) and increased with age in both genders. Multivariate analyses showed no evident relation between metabolic syndrome components and the level of physical activity. The increasing prevalence of metabolic syndrome highlights the need for developing strategies for its early detection and prevention.

Key findings: Metabolic syndrome prevalence among Northern Mexican adult population.

Obese Mexican adults, mainly women, are particularly at risk of developing metabolic syndrome.

The metabolic syndrome prevalence was higher in Mexican women than in men and increased with age in both genders.

#### PT-043

Poster

##### Zinc intake and status in Portuguese women living in Lisbon area.

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Zinc is an essential micronutrient, especially in relation to its impact on immune function, bone mass, cognitive function and oxidative stress. Inadequate intakes of micronutrients negatively affect the nutritional status. Data are scarce on zinc intake and status in Portuguese women. In this study the intake and status of zinc in women living in Lisbon area were assessed. Dietary intakes were collected using the 4-day recall-record method. Status of zinc values were obtained from blood samples. Seventeen subjects completed the study. All were Caucasian women with a mean age 52.3 ± 7.3 years and mean body mass index 24.29 ± 2.19 kg/m<sup>2</sup>. Estimated mean daily zinc intakes were 6.8 ± 2.1 mg and 1.2 ± 0.4 mg/MJ. Mean serum zinc concentration were 10.4 ± 1.9 µmol/L and 47% participants showed values <10.7 µmol/L. The relationships between indices of zinc nutritive status were not significantly correlated. In relation to the zinc Dietary Reference Intakes, zinc intakes were inadequate. The results showed a zinc deficiency in this women group living in Lisbon area.

#### PT-044

Poster

##### Prevalence of Overweight Among HIV-infected Adults in Panama.

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Background: Overweight is an important risk factor for cardiovascular disease and is of increasing concern among people with HIV on antiretroviral therapy.

Objective: To estimate overweight prevalence among Panamanian HIV-infected adults.

Methods: A cross-sectional study was conducted from November 2013 to March 2014 in 2 HIV care centers in La Chorrera and Colon, Panama. The sample included 80 adults (53% men) with mean age 42±9 years. Body mass index (BMI) was calculated from measured height and weight. Overweight was defined by: BMI >24.9 kg/m<sup>2</sup>; percentage body fat (%BF) >25% for men and >33% for women; waist circumference (WC) >102cm for men and >88cm for women.

Results: Mean ± SD for BMI was 23.6±4.1 kg/m<sup>2</sup> among men and 24.9±5.6 kg/m<sup>2</sup> among women (t-test, p=NS). Prevalence of overweight by BMI was 38% among men and 50% among women (Chi2, p=NS). Mean ± SD of %BF was 20.6±7.1% among men and 31.3±8.6% among women (ttest, p<0.05). Prevalence of overweight by %BF was 21% among men and 53% among women, (Chi2, p<0.05). Mean ± SD of WC was 83.7±10.8 cm among men and 83.1±14.4 cm among women (ttest, p=NS). Prevalence of overweight by WC was 7% among men and 39% among women (Chi2, p<0.05).

Conclusion: Overweight is a substantial problem among Panamanian HIV-infected adults, especially among women, and has important clinical and public health implications. Monitoring of nutritional status of HIV-infected adults is necessary to identify those who may benefit from interventions designed to address overweight among this population.

#### PT-045

Poster

##### Young athletes and their dietary habits.

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Introduction: Sport gymnastics is a demanding power discipline. Good quality performance and trainings require supply of macronutrients and micronutrients. In a junior category, the demand for quality nutrients is even higher owing to growing organism in youths.

Currently, diet in inseparable part of training programs of sporting children. Composition of dietary regime became crucial, as it must contain balanced amount of basic nutrients, vitamins, and minerals, along with supplementary plans and individual forms of supplements. All must correspond with training seasons and present requirements.

The demands in juniors for quality and quantity of nutrients are, of course, bigger than the ones of adults. Insufficient, even temporary absence of nutritive supplies may result in damage to health, in better scenario the outcome is merely inferior performance or training.

Methodology and results: We carried out a research into 33 members of gymnastic teams. There were 13 boys and 20 girls. The average age was 15 years. The average age of boys was 15,5 yrs, the average age of girls was 14,5 yrs. The average height/weight ratio of boys was 170 cm/62 kg. The average height/weight ratio of girls was 155cm/48 kg.

We applied a method of dietary habits analysis through 24 hour recall, a standard questionnaire for dietary habits in sporting and non-sporting population, in a four days course; i.e. 3 working days and one weekend day. This weekend day was chosen due to presumed differences in the training program. The evaluation of dietary habits was carried out by SW program, which is used in Czech hospitals and other health-care institutions. Furthermore, we analyzed the body posture through Inbody 230 machine, performing on a principle of bio-electric impedance. A consequent measurement was passed through Cortex machine based on indirect calorimetry.

The measurements were carried out in the morning on an empty stomach, without training, the probands having been instructed. The measurements took place twice a day in three consequent days. The results gave the consequent average figures.

The average energetic intake of all probands in four days was 7000 kJ a day, consisting of 250 g of carbohydrates, 60 g of fat and 60 g of proteins a day. The energetic intake of probands was irregular, they suffer from vitamins and mineral insufficiency and the diet is rather monotonous. The recommended intake of nutrients for this age group and sports performance is at least 350 g of saccharides 80-90 g of proteins and, similarly, 80-90 g of fat a day. The absence of basic nutrients is apparent. Their long-term insufficiency will result in weariness, worse sports performance, injury, decrease in cognitive functions and development.

Conclusion: Our analysis of dietary habits showed lack of information on the importance of nutrition in demanding training in sport gymnastics. It revealed the necessity of immediate intervention, education and intense cooperation with trainers, parents and probands. From the long-term point of view, this type of diet will result in injuries, weariness, insufficient development and growth in youths.

#### PT-046

Poster

#### Body Composition children to study the chronic disease risk and management of obesity.

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Background: Childhood obesity is related to affective deprivation (child abuse) that adversely affects growth and potential development. This social condition, educational and family environment, creates vulnerability to health and wellness for this stage of life, together with the presence of chronic malnutrition, dehydration and chronic disease risk.

The body composition study in children give the opportunity to learn the changes in this stages and to know the disease family history.

Objective: Recognize the social, environmental and health factors related to development of childhood obesity in vulnerable populations and the relation with the main body composition components.

Methods: Cohort study, included 49 children (7-12 years old), 58% male and 42% female. We performed anthropometric assessment (Weight, height), body composition using multifrequency bioelectrical impedance (team QuadScan 4000) and applied a questionnaire to determine the composition of the household and family ties. Include a intervention program "to vulnerable community to self sustentability community" with background of ten years ago. Include questionnaire to determine the health community diagnosis and identification of cognitive performance.

Results: 60% of the population suffered familial dysfunctions, specially emotional deprivation, and the main reason is that each father have two families in 27% of cases. In this population we found the following conditions: obesity, 31%; malnutrition, 58%; stunning, 47%; malnutrition, low stature, 74%, with body water below normal values for age. 80% have family history of obesity, diabetes type 2, hypertension. 90% no eat breakfast before to go to school, and the cognitive performance in mathematics and reading is deficient in 20%. The support for this children is through of to play and integration of nutritional information oriented to mathematics and reading.

Conclusions: The children included in this study showed high vulnerability

resulting from family dysfunction. The body composition assessment include some methods to identify the risk in children. This population have high risk of malnutrition, decreased lean mass and body water. They are at risk of developing obesity with associated comorbidities, such as diabetes and hypertension, given the family history of obesity and hypertension. The intervention programs give a good results when are applicable in the familiar nucleus. When the children have activities that given security and apprenticeship, is a time to modify the disease risk and obesity.

#### PT-047

Poster

#### Comparison of nutritional status and associated factors of patients in a public hospital and other private.

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Introduction: The malnutrition prevalence on admission to Latinoamerican Hospital affects over 50% of patients, increasing health costs, without discrimination between public and private institutions. Detzky Subjective Global Assessment (SGA) is a nutritional screening tool that can identify individuals according to risk of malnutrition, providing valuable data on its causes.

Objectives: To compare the differences in nutritional status and associated factors in admission patients to Buenos Aires Autonomous City public and private hospital, Argentina.

Materials and Methods: A comparative cross-sectional study. During Period April 2013, 210 patients were assessed at admission within 72 hours to Medical Clinic rooms by hospital nutritionist using SGA; 90 belonging German Private Hospital (GH), and 120 belonging to Ramos Mejia Public Hospital (RMH) Data were analyzed with STAT and EPIDAT VCC- 3.1

Results: Similar gender distribution; mean age 61.2 years (+15.6).

Nutritional Status: GH: 73.3% (95% CI 62.9-82.1) had no malnutrition risk (NMR); 25.5% (95% CI 16.9-34.6) had moderate malnutrition risk (MMR) and 1.2% had severe malnutrition risk (SMR); for RMH: 25% (95% CI 16.8-34.6) had NMR; 35.9% (95% CI 25.7-45.2) had MMR and 39.1% (95% CI 29.4-49.3) had SMR being found statistically significant differences ( $p < 0.000001$ ) in NMR and SMR.

Percentage of weight loss (WL): 66.6% (95% CI 55.8-65.2) had no WL in the GH and 33% (95% CI 23.9-43.1) in the RMH, and 16.6% (95% CI 9.4-24.7) had severe WL in the GH and 30% (95% CI 21.2-40) in the RMH, both statistically significant ( $p < 0.00001$  and  $p = 0.0387$ , respectively) Intake changes in the last month: mainly associated with hypoxia: 35% (95% CI 25.7-45.2) in the GH and 65% (95% CI 54.8-74.3) in the HRM; statistically significant difference ( $p < 0.00001$ ). Decreased functional capacity: 25% (95% CI 16.8-34.7) in the GH and 93.3% (95% CI 86-97.1) in RMH; statistically significant difference ( $p < 0.00001$ ).

Fat loss and lean mass: GH: Lossless 72.2% and 71.1% respectively and RMH similar percentage (21-28%) for each category: lossless mild loss, moderate loss, severe loss of both compartments. Statistically significant differences ( $p < 0.005$ ) were found in the categories without loss and in severe and moderate loss of both compartments.

Deficiency signs: 23.3% (95% CI 15.1-32.5) of GH and 60.8% (95% CI 49.7-69.7) of HRM, statistically significant differences ( $p < 0.00001$ )

Conclusions: Patients in public hospitals are more likely to enter malnourished than patients in private hospitals, a condition probably produced by reduced access to food and health care.

#### PT-048

Poster

#### Effect of vitamin D supplementation on ethylene glycol-induced nephrolithiasis in rats.

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Objective: To evaluate the effects of vitamin D supplementation on urinary tract stones in a model of induced calcium oxalate nephrolithiasis in rats. Material and Methods: 30 adult male Sprague - Dawley rats, distributed in four groups: Group I (clinical control, n = 10); Group II (0.5% Glycol mM + 0.5 Vitamin D3 dissolved in 1 ml of oil administered by gavage once daily, n = 10 Ethylene); Group III (Ethylene Glycol 1.25%, n = 10). Five animals from each group were euthanized after 7 days of follow-up (Moment M1), and the other at the end of 28 days (Moment M2). All animals underwent metabolic study dosage in 24h urine to analyze calcium oxalate, uric acid, citrate, in addition to serum creatinine. Histology and histomorphometry were performed with Image J program after staining with hematoxylin-eosin. Calcium renal parenchyma was quantified by the technique PIXE (Proton Induced X-ray emission). Results: There was a statistically significant difference in hyperoxaluria in GII and GIII, in both moments (M1 and M2). There was no significant difference in other urinary parameters at M1 and M2. Histomorphometric analysis demonstrated nephrolithiasis significantly higher in GII ( $p < 0.01$ ) compared to the others. The quantification of calcium deposits in the renal parenchyma was about

10 to 100 times higher in GII compared to other groups at M1 and M2, respectively. Key findings: The best model to induce nephrolithiasis in rats was 0.5 % Ethylene Glycol combined with vitamin D3 (GII), which acted as a catalyst for this induction process by increasing the calcification and kidney damage.

#### PT-049

Poster

##### **Dietary variety among women of distinct socio-demographic origins in western Guatemalan.**

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**Objective:** To compare dietary variety and general characteristics of the diet of Guatemalan women of reproductive age from 4 selected socio-geographic settings.

**Materials and methods:** 171 women, aged 18-45 y and neither pregnant nor lactating, were recruited across 4 socio-geographic sectors in the departments of Quetzaltenango and Retalhuleu in western Guatemala. The samples were as follows: a rural, low-income group living in the department of Quetzaltenango (n=51, QRL), an urban, low-income group living Quetzaltenango City (n=40, QUL), an urban, middle-income group living Quetzaltenango City (n=40, QUM) and an urban, middle-income class living in Retalhuleu (n=40, RUM). Previous-day dietary recalls were collected. Home-made mixed dishes were disaggregated to basic ingredients; portion sizes were not taken into account. Individual dietary variety was determined by counting the number of different food and beverage items consumed in a single 24-h period. Dietary variety was compared between groups using Chi-square.

**Results:** A total of 199 different food and beverage items were reported amongst 171 female participants. The dietary variety was the highest for the QUM sample (n=141), followed by the RUM sample (n=133), the QUL sample (n=122), and the lowest for the QRL sample (n=85) (p<0.001). 56 items were reported in all 4 areas. 10 food items were only mentioned by QRL, 9 by QUL, 24 by QUM and 13 by RUM. The 10 most commonly consumed items were ordinary ingredients of recipes (sugar, oil, salt and water) and traditional foods (tortillas, black beans, bread, tomato, onion, coffee). Of these, only sugar, salt, water, tortillas, tomato and onion were reported across all 4 areas. Oil and bread were only mentioned in the urban areas, whereas typical corn products such as pinol (grounded corn), tamalito (made of corn dough) and minced corn, were only mentioned in the rural setting.

**Key findings:** Dietary variety, which has been shown to be associated with dietary adequacy, varied between socio-demographic areas examined. Strategies associated with dietary and health improvement for Guatemala should consider socio-demography, food culture and local foods.

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#### PT-050

Poster

##### **Using intervention mapping to develop the nutrition education strategy component of a randomised trial promoting healthy food and beverage purchases in Australian remote Indigenous communities.**

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**Background:** Nutrition education can raise individual knowledge and self-efficacy to positively influence healthy food intake. There is limited evidence available on the development, implementation or effects of nutrition promotion activities in remote Aboriginal communities in Australia. There is also a lack of information on the elements of nutrition interventions that are most effective in shifting behaviour and on detail of specific intervention development processes. An Intervention Mapping framework was applied to the development and proposed process evaluation of the in-store nutrition education component of a randomised controlled trial examining the impact of a price discount intervention and a combined price discount and in-store nutrition education intervention for promoting purchase of fruit, vegetables, water and diet soft-drinks among remote Indigenous communities.

**Methodology:** The intervention mapping comprised six steps: (1) Needs assessment, (2) Preparing matrices of change objectives, (3) Selecting theory-informed intervention methods and practical applications, (4) Producing program components and materials; (5) Planning program adoption, implementation and sustainability; and (6) Planning for evaluation to assess the level of implementation achieved including five elements: i) fidelity; ii) dose delivered; iii) dose received; iv) reach; and v) context. All determinants included in the matrices for each program objective were listed and matched with methods derived from the Social Cognitive Theory. Theoretical parameters and characteristics of the context were checked and the selected method was translated into a nutrition education strategy.

**Results:** A 6-month nutrition education strategy was developed comprising four interactive activities (taste-testing [2], cooking demonstration and su-

gar-in-drinks display) and three non-interactive activities (monthly posters and activity sheets and shelf-talkers displayed during the entire intervention period). Six data collection instruments were developed for the process evaluation.

**Conclusion:** This paper contributes insight into the development of nutrition promoting interventions that consider theory together with multiple sources of evidence, expert opinion and context. Given this, the design of this intervention involved the development of a detailed process evaluation strategy to collect data on delivery, reach and fidelity of the planned activities. This information will serve to further inform the development and evaluation of nutrition promotion activities. The process evaluation will inform an assessment of the extent to which implementation of an intervention in a real-life setting impacts on food and beverage purchasing among Indigenous Australians.

#### PT-051

Poster

##### **Differences in selected dietary habits between lower and upper secondary school students.**

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**Objective:** To explore differences in meal pattern and artificially sweetened beverage (ASB) and sugary sweetened beverage (SSB) patterns between lower and upper secondary school students.

**Material and methods:** First grade students from all upper secondary schools in the two Norwegian counties of Aust-Agder and Vest-Agder (mean age: 16 years) and 8th grade students in four selected lower secondary schools in Vest-Agder (mean age: 14 years) were invited to participate, in 2012 and 2010 respectively. In total 2132 adolescents, 1650 16-year olds and 482 14-year olds filled in the same food frequency questionnaire regarding beverage and meal frequency. Having artificially sweetened beverages or sugary sweetened beverages 3 times a week or more often was categorized as often. Meal pattern was dichotomized into having a meal often (6 times/week or daily) or seldom (5 times/week or less). Differences were tested with Pearson's chi-squared test.

**Results:** There was a significantly higher proportion of 14-year olds who had sugary sweetened beverages often (47% vs. 42%, p=0.033) compared to 16-year olds. However there was a significantly lower proportion of 14-year-olds having ASB often (16% vs. 27%) compared to 16-year olds. There were fewer 14-year olds having lunch often than 16-year-olds (58% vs. 65%, p=0.008). Further, there were no significant differences in proportions having breakfast (71% vs. 67%, p=0.055), dinner (87% vs. 85%) and supper (58% vs. 53%, p=0.056) often between 14-year olds and 16-year olds, respectively.

**Key findings:** With higher age fewer students consumed sugary sweetened beverages often, however there were more who consumed artificially sweetened beverages often with higher age. The eldest also had lunch more often than the youngest students. The transition from lower to upper secondary school is an important time for public health initiatives, and more descriptive data are important for such initiatives.

#### PT-052

Poster

##### **Perception of body image in urban adult female population of Valladolid.**

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**Introducción:** Body image has been defined as a multidimensional structure that differ in two underlying dimensions, the first refers to the perceptual aspects of body size estimation and the second includes the emotions or feelings that the individual has associated with his physical appearance and cognitive assessments that makes of its own body. Having a negative body image can affect health. When this happens there is a greater predisposition to more disturbances such as anxiety, depression, low self-esteem, anorexia, bulimia, and many others that can have serious consequences.

Women have a greater vulnerability in light of these disorders due to the strong social pressure on their own appearance and socialization processes that emphasize aspects of appearance.

**Objectives:** Set the perception of body image in a representative healthy adult women of Valladolid (Spain) collective.

**Material and methods:** Cross sectional study; sample of 500 women aged 40 to 60 years, mean age 51.16, urban area of the city of Valladolid, intermediate between the Spanish cities, which guarantees that the probability of error will not exceed 5%.

We used a self-designed questionnaire formed by questions that assess anthropometric and attitudinal variables. This questionnaire takes as a reference: Body Image Questionnaire Questionnaire by Cooper and Attitude towards food by Gardner.

Results: From estimates of height and weight data we obtain a mean body mass index (BMI) of 24.43, within normal parameters. 87.5% of women are concerned about their body weight, between of them the 78% of the cases are concerned due to a combination of aesthetic and health reasons. The 57.14%, have tried to hide their silhouette with clothes and if we calculate the index body set (IBS), it gives a score of 108.11 listed as moderate over estimation of weight. In the perception of body image, estimated by using models, we find that the 37.49% believe that the model that represent them has overweight or obesity.

Conclusion: The women in our study have a normal mean BMI estimate. They are concerned about their weight, which overestimate moderately. They try to hide their silhouette and consider that their image corresponds to overweight in a high percentage of cases.

#### PT-053

Poster

##### **Water Balance Index: the development of a new instrument.**

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Objectives: To develop a subjective instrument estimating water balance, the Water Balance Index (WBI), with applications both in research and in public health, and to assess its behaviour by quasi-field testing.

Materials & Methods: We developed the WBI following a formative model mirroring essentially EFSA's recommendations on Dietary Reference Values for water. We targeted the adult general population (ages 18-65y). We included items of varying difficulty, e.g. glasses of water -easy- as well as yogurt -difficult-, aiming not only to an evaluative but also to a discriminative function for the instrument.

Following the development, we applied the WBI on epidemiological data, scoring the participants (n=828) of the evaluation study of the Water Balance Questionnaire (a more meticulous instrument with similar goals). Field testing included statistical description of the WBI and its items on the above mentioned sample. Examination of the dimensionality of the construct using Factor Analysis. Evaluation of WBI's internal consistency by calculating inter-item and item-total Spearman  $\rho$  correlations as well as the Cronbach's  $\alpha$ .

Results: The WBI consists of two parts, the preamble, logging weather conditions, age and gender, and the main part with 12 items recording consumption and loss of water. The main items are divided in three sections: water intake from beverages, water intake from solid foods and water loss from urination and perspiration. All 12 items are modeled as categorical variables with 5 response options, scored from 1 to 5 as water intake increases for the consumption items and from 5 to 1 as water loss increases for the urination/perspiration items. This results to a theoretical range of 12 to 60.

The WBI scores' distribution is centrosymmetric with a mean value of 26 and standard deviation of 3.2 units for both sexes indicating good discriminative characteristics and absence of floor and ceiling effects. Factor Analysis reveals that multiple factors contribute to the WBI and the inter-item and item-total correlations as well as the Cronbach's  $\alpha$  confirm the non-redundancy of the items included, thus a truly minimum instrument. Key Findings: A short subjective instrument, the Water Balance Index, measuring water balance by assessing water consumption and water loss from the body.

#### PT-054

Poster

##### **Association of feeding regimen with mucosal colonisation and prevalence of sepsis and necrotizing enterocolitis in preterm neonates admitted to neonatal intensive care unit (NICU).**

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Background: Feeding regimen may influence gut colonisation and development of necrotising enterocolitis (NEC) and late onset sepsis (LOS).

Objectives: To characterize influence of feeding regimen on mucosal colonisation and development of LOS and/or NEC in severely ill preterm neonates.

Material and methods: A prospective open label two centre cluster randomised study. We recruited 159 neonates aged  $\leq 72$ h with risk factors of early onset sepsis and collected rectal swabs on admission and then twice a week. Feeding regimen was recorded for the first 7 days and categorized into total parenteral nutrition (TPN) and oral feeding - breast milk containing regimen (BMCR), when breast milk constituted at least 11% of enteral feeds, or formula.

Results: Altogether 70 received formula, 48 BMCR and 41 TPN; 73 cases in 50 neonates of LOS and 15 cases of NEC were observed. On multiple logistic regression analysis, formula and BMCR as compared to TPN were associated with 4 to 5 times increased colonisation by Gram-negative (GN) (OR=4.52; 1.87-10.95 and OR=4.95; 1.90-12.87, respectively) and 5 to 9

times increased odds (OR=5.75; 1.89-16.72 and OR=8.61; 2.52-29.36, respectively) by Gram-positive (GP) microorganisms. The only independent difference between BMCR and other feeding groups was the lower colonization with *S. haemolyticus* (formula - OR=6.24; 1.73-22.50; TPN - OR=2.75; 1.08-6.97). In comparison to BMCR, TPN was associated with increased odds of LOS (OR 3.04; 1.02-9.07) and to formula feeding with increased odds of NICU-death (19.75; 3.64-107.12), the route or character of feeding did not affect the development of NEC.

Key findings: Formula and BMCR had similar effect on gut colonisation by aerobic opportunistic organisms. Although BMCR promoted colonisation by opportunistic organisms, overall enteral feeding regimens in comparison to TPN prevented development of LOS.

#### PT-055

Poster

##### **Role of dietary lipids on growth, sexual maturation and breast cancer risk.**

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Work center: Medicine School, Universitat Autònoma de Barcelona, Bellaterra, Spain.

Objectives: Based on the importance of early-life events, including nutrition, in breast cancer risk, we have investigated the effects of high fat diets on maturation, mammary gland development and its susceptibility to transformation.

Material and methods: Female Sprague-Dawley rats were fed three different experimental diets: a low fat diet (LF) from weaning (control group), a high corn oil diet from weaning (HCO group) or from induction (LF-HCO group), and a high extra-virgin olive oil diet from weaning (HEVOO group) or from induction (LF-HEVOO group). Animals were gavaged with 7,12-dimethylbenz(a)anthracene (DMBA) and were euthanized at 24, 36, 51, 100 and 246 days.

Results: The results showed that the administration of the HCO diet, but not the HEVOO diet, increased the body weight evolution and the mass index of the animals. Both high fat diets increased hepatic expression of lipid metabolism genes, but only the HEVOO diet increased UCP-2 expression. Vaginal opening was advanced in both high-fat groups, especially in the HCO group. Such group had also increased body weight around puberty, higher number of corporea lutea at post-puberty, and tended to have higher mRNA levels of kisspeptin in hypothalamus. We observed little changes in the mRNA expression of hormone receptors by the effect of dietary lipids. Both high-fat diets induced subtle changes in the morphology of the mammary gland at post-puberty.  $\beta$ -casein mRNA increased over the time in the mammary glands of all groups and it correlated with glandular density at the end of the study. The HCO diet had a clear stimulating effect on mammary carcinogenesis, whereas the HEVOO diet seemed to have a weak enhancing effect, since the clinical parameters of the animals fed that diet were more similar to the control group.

Key findings: High corn oil and high olive oil exert a different influence on the initiation of puberty onset and breast differentiation, what may be one of the mechanisms of their differential modulatory effects on mammary tumorigenesis. Our data highlight the transcendence that dietetic factors may have on health and the importance of establishing healthy dietetic habits from childhood.

#### PT-056

Poster

##### **Advances in public health nutrition research in Central and Eastern Europe and Balkan countries using the Balkan food platform and dietary tools.**

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Objectives To support pioneering public health nutrition (PHN) research in Central and Eastern European and Balkan Countries (CEE&BC) we aimed at development of harmonized/standardized food and nutrition Research infrastructure (RI) such as food composition (FCDB) and consumption databases and dietary assessment tools.

Material and methods Forming and implementing the Balkan Food Platform (BFP): signing the Memorandum of Understanding (MoUs) with nutrition stakeholders from CEE&BC; Identification of the challenges: FCDB status, tools for FCDBs management, dietary surveys and FCDBs used to conduct them, gaps and training needs; Design of the nutritional tools: web-based EuroFIR harmonized software Food Composition Data Management (FCDM) for FCDB creation and DIET&ASSESS&PLAN; Development of the 1st online regional FCDB for BC; Capacity Development (CD) activities: workshops, trainings and compilation of the foods and recipes information from CEE&BC.

Results During EuroFIR Nexus project BFP was established by signing of the MoUs among EuroFIR AISBL, Institute for Medical Research Belgrade, Capacity Development Network in Nutrition in Central and Eastern Europe-CAPNUTRA and research organisations from Federation of Bosnia &

Herzegovina, Cyprus, Croatia, Republic of Macedonia, Republic of Moldova, Montenegro, Russia, Serbia and Ukraine. Lack of harmonized and standardized FCDBs and dietary tools was identified. Further, identified priority training needs in FCDB production were: data base management systems, quality and reviewing of existing data, food nomenclature, recipe calculation and the application of harmonised methodologies, software tools and dietary intake assessment methods. The 1st online regional FCDB was created using the FCDM. It contains 2080 foods and 160 traditional recipes with everlasting growth. The DIET&ASSESS & PLAN tool for comprehensive nutritional assessment and planning, that can embed any FCDB from EuroFIR Database Platform and nutrition recommendations was presented to Network members. CD activities included: two workshops, trainings and compilation of foods and recipes information.

Key findings FCDB status and training needs survey observably show that there is substantial necessity for harmonized establishment of national/regional surveillance systems for nutrient intake, nutritional status, food availability and consumption of population in CEE&BC. Therefore the proposal is to integrate harmonized Balkan regional FCDB and the standardized tools for dietary intake monitoring and evaluation with EuroFIR Food Composition Exchange Platform and with it give essential contribution to European monitoring and evaluation of nutrient and food intake relevant to harmonizing and strengthening public health nutrition strategies across Europe.

#### PT-057

Poster

#### Lifestyle and epigenetic changes in healthy volunteers and breast cancer patients.

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Objectives: Breast cancer is the most frequent malignant neoplasia among women worldwide. In addition to genetic, epigenetic and endocrine factors, the environment, and specifically nutritional factors, plays a key role in its etiology. In this study we aimed to determine if lifestyle and dietetic habits in relation to fat intake have an influence on breast cancer through epigenetic modifications on DNA.

Material and Methods: The methylation pattern of genes with a role in the hallmarks of cancer have been characterized by methylation-specific PCR (MSP) in blood of healthy volunteers and in samples of blood, mammary gland and tumor of locally advanced breast cancer patients. The studied genes were: BRCA1, p16, RAR2, ESR1, PRB, REH3P21, NES1, CDH1, TWIST, HLA-A, CXCL12 and Maspin. Moreover, we quantitatively analyzed some of these genes by COmbined Bisulfite Restriction Assay (COBRA) and bisulfite pyrosequencing. Furthermore, dietetic markers of erythrocyte membrane phospholipid fatty acids in peripheral blood were analyzed by gas chromatography. Additionally, lifestyle has been characterized through questionnaires (Food Frequency, Adherence to Mediterranean Diet and Physical Activity).

Results: Methylation frequency in mammary tumor was higher compared to that in mammary gland for all analyzed genes. Using quantitative techniques we observed changes in DNA methylation according, in the majority of cases, to the results obtained previously by MSP. The analysis of dietetic markers showed a significantly increased in Omega-6 and Omega-3 fatty acids, and a significantly decreased in monounsaturated fatty acids, in erythrocyte membrane phospholipid of breast cancer patients compared to healthy volunteers. First results for Food Frequency, Adherence to Mediterranean Diet and Physical Activity questionnaires indicated some differences between healthy volunteers and breast cancer patients, such as higher values in patients for body mass index, alcohol and meat intake, adherence to Mediterranean diet, and lower rates of physical activity. However, those results may be influenced by the different mean age of the populations.

Key findings: This work shows the influence of epigenetic alterations, especially methylation of DNA, in the etiology of human breast cancer. We found some differences in gene methylation in peripheral blood between healthy volunteers and breast cancer patients. The methylation profile of some genes is compatible with that of a molecular cancer marker. Moreover, results showed changes in lifestyle and dietetic habits between healthy volunteers and breast cancer patients.

#### PT-058

Poster

#### Wild edible plants traditionally used in the countryside of El Jadida, coastal area in the center of Morocco.

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Objectives: This project aims to investigate the diversity of wild edible plants in the rural area of El Jadida as well as the knowledge and traditional food practices related to their use, and to study the importance of these plants for the local population.

Material and methods: Fifty native people aged around 54 were surveyed using a semi-structured questionnaire. The sample size was determined by a non-probability sampling method. No special criteria have been used for the sample selection. The data collected for each plant focused on the local name, the consumed part, consumption frequency, preparation method, preservation method and season of harvest. The conversation was photographed or recorded by video when allowed. A reference Herbarium was also established during the investigation. Scientific identification is carried out on the samples with the help of a botanist.

Results: Sixty-two species have been recorded from 18 different families. Most represented families are: Astraceae, Lamiaceae and the Apiaceae. Among the plant inventoried, *Lavatera cretica* is consumed by 98% of the sample population. It is consumed mainly cooked as the main ingredient of a dish very much appreciated by the local population called "beqoula". The second plant is *Ajuga iva* used in the traditional recipe of bread. This plant is also known for its hypoglycemic medicinal properties. In the edible plants identified, the leaves and the upper part are the most consumed (41%) followed by the roots (27%) that are used in traditional local dishes raw or dried as spices.

Key findings: the investigation data show that wild edible plants continue to be part of food habits among local populations especially in winter. They are eaten added or as complements to cultivated food plants. However, there is a decline in transmitting the knowledge and the practices held by parents to younger generations. The data suggest an urgent need to enlarge the study to include other parts of the country, in the aim to safeguard this heritage before its disappearance. Also, it would be interesting to investigate the nutritional potential of these plants and to promote and encourage the sustainable consumption of the underutilized traditional products.

#### PT-059

Poster

#### Vitamin D status is associated with interleukin-6 levels in overweight/obese children.

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Objective: Obesity has been associated with vitamin D deficiency and increased oxidative stress, which can lead to the dysregulation of adipokines and inflammation. The aim of the present work was to examine the influence of vitamin D status [25(OH)D] on inflammation in overweight/obese children.

Material and Methods: 137 Spanish schoolchildren between 9-12 years of age (31.4% with overweight/obesity) were studied. Serum 25(OH)D levels were measured by chemiluminiscent assay. Plasma tumour necrosis factor (TNF- $\alpha$ ) and interleukin-6 (IL-6) were measured by immunoassay (IEA). Serum adiponectin was determined using ELISA kit. Serum high-sensitivity C-reactive protein (hs-PCR) was tested by immunonephelometry.

Results: IL-6 levels were higher in the overweight/obese children with deficient serum 25(OH)D (<20 ng/mL) than in those with the same weight problem but whose serum 25(OH)D levels were adequate ( $\geq$ 20 ng/mL). Serum 25(OH)D was inversely associated with IL-6 levels in the overweight/obese subjects taking into account different covariables; thus, for every 1 ng/mL rise in the former, the latter fell by 0.160 pg/mL ( $B=-0.160\pm 0.068$ ;  $R^2=0.131$ ;  $p=0.023$ ). TNF- $\alpha$  and hs-PCR were not associated with 25(OH)D in overweight/obese children.

Key findings: It would be desirable to monitor for serum 25(OH)D deficiency in schoolchildren to prevent an elevated inflammatory status and associated health problems.

#### PT-060

Poster

#### Educación Física, Estado Nutricional y Escuelas: Conglomerados desiguales para la Región Metropolitana en Chile.

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Introducción: El sistema educativo chileno es uno de los más desiguales del mundo. El 44% de los niños de 8o básico presentan obesidad y la mayoría posee una mala condición física. Estudiar cuales son las diferencias entre las escuelas chilenas respecto al tipo de resultados físicos ayuda a comprender las políticas necesarias para superar estas desigualdades.

Objetivo: Estudiar que tipos de escuelas se expresan a partir de los datos del sistema de evaluación de la calidad de la educación física (SIMCE EF 2011) de la región metropolitana (RM).

Metodología: A partir de datos muestrales secundarios del SIMCE EF 2011, se realizó un análisis de clúster de escuelas de la RM. Se analizaron 6 pruebas físicas y 2 de estado nutricional, mediante un análisis de clúster. Se complementaron las bases de datos con datos de NSE, IVE, mixtura de género, número de estudiantes, resultados en otras pruebas de calidad educativa. Durante el 2013, se seleccionaron 6.964 casos de la región metropolitana

(RM) de la base SIMCE educación física 2011, correspondiente al 34,9% del universo nacional (19.929). Dichos casos, se encontraron agrupados en 187 escuelas de 46 comunas (88% de la RM). Del total de escuelas, el 87% correspondieron a escuelas municipalizadas y el 13% a escuelas particulares y particulares subvencionadas. La muestra se constituyó de un 53,7 % de niños y un 46,3 % de niñas. Se probaron 10 modelos para definir los conglomerados y se determinó que el mejor modelo se ajustó de manera significativa a las variables IMC y Navette.

Resultados: Las medias de IMC de escuelas muestran una alta variabilidad entre las comunas alrededor del promedio, ubicándose la mayoría 22,16 kg/mt<sup>2</sup>. El modelo ajustado por IMC y Navette, generó tres grupos de escuelas para sus puntajes estandarizados: Un grupo de alto IMC- Bajo Navette (C1=78), uno de bajo IMC y bajo Navette (C2=31) y otro de bajo IMC y alto Navette (C3=70). Los C1 y C2 están constituidas principalmente por escuelas municipalizadas (89,7 y 94,9 %), en comparación con las escuelas C1 (75,7%) (p=0,02).

Conclusiones: Los resultados muestran diferencias entre los grupos de escuelas respecto a Navette e IMC, variables que producen mayor homogeneización interna y distinción externa de escuelas. Análisis post-hoc muestran que el fenómeno de la desigualdad nutricional y de condición física se muestran conectados a los resultados de otras pruebas de calidad educativa.

#### PT-061

Poster

##### Toddlers Are Bigger Than Their Mothers Think.

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Objective: To assess maternal perception of the actual weight of the child and what she considers ideal.

Material and Methods: Cross-sectional study conducted in a small municipality of Southeastern Brazil. We analyzed a sample of 136 mother-child pairs enrolled in primary health care facilities from February to May 2013. Children were 1-3 years old. To assess maternal perception of the real and ideal nutritional status, we used a scale with 7 silhouettes with body images (very low/high weight, low/high weight, low risk/high and normal weight). We adopted z-score of the Body Mass Index-for-age to classify the nutritional status: underweight (<-2 z-score), normal weight (≥ -2 to +1 z-score) and excess weight (> +1 z-score). We compared maternal perception of the actual child's weight with the nutritional status and then checked with the perception considered ideal. Analyses were done with Anthro and STATA 13.1.

Results: For 73.5% of mothers, perception of their child's weight coincided with the recorded weight. However, 36.2% of mothers of overweight children underestimated the actual weight, while 28.6% of mothers of children with low weight, overestimated it (p < 0.01). As for the weight considered ideal, or the weight mothers would like their children to have, 49.4% would like them to be fatter if they children were normal weight. Among overweight children, 27.6% of their mothers would like them to look like even fatter (p < 0.01).

Key findings: Although the perception of almost three-quarters of mothers coincide with the actual child's weight, the high proportion of mothers who considers their children should have more weight, even among those with normal weight, calls attention. Thus, actions to prevent and control overweight should consider the fact that, for most mothers, ideal weight is greater than the one children display.

#### PT-062

Poster

##### Estimation of nutrient intake using results from the Canadian Health Measures Survey (CHMS) Food Frequency data based on the parameters from 24 hour food recall data.

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Objective The food frequency questionnaire has been shown to demonstrate good relative validity in the estimation intake of some of the major nutrients in dietary intervention trials and was proved to be a reasonably valid tool in assessing overall food and/or food group intake. At the individual level, moderate to high degrees of correlation existed between the food frequency questionnaire and the reference method for most of the food and food groups. The objectives of this study were to 1) explore a method on estimating nutrient intakes based on food frequency questionnaire data and parameters generated from the 24 hour dietary recall data, and 2) to assess the correlations of estimated nutrient intakes (folate) and blood folate measurement.

Materials and Methods This study used data from the Canadian Community Health Survey, Cycle 2.2's 24-hour dietary recall component (N=32776)

to generate the parameters for folate intake from foods. The method for estimating relative folate intake took into account the food consumed as well as the fact that that intake will vary by person. The parameters were then applied to estimate the folate intakes based on food frequency questionnaire data from the Canadian Health Measures Survey (N=5600). Results Using the parameters generated from adjusted regression models (based on 24 hour food recall data), we estimated that folate intake based on food frequency questionnaire data is much lower than the estimates based on 24 hour food recall data, 147 micrograms for females and 224 micrograms for males > 20 year versus 405 and 520 micrograms, respectively. Further analysis is currently being conducted by adjusting the food groups to generate more detailed parameters and assess the correlations between estimated folate intake and blood folate level.

Key Findings Parameters generated from 24 hour food recall data can be used to estimate folate intakes based on the food frequency questionnaire by adjusting detailed food groups and food culture practice. Folate intake patterns are necessary to clarify the relationship between folate intake and folate status.

#### PT-063

Poster

##### Lipid peroxidation and antioxidant defense in menopausal and postmenopausal Algerian women.

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Introduction: Menopausal transition is a period in women's live characterized by decreasing ovarian function; it is often accompanied by increase of cardiovascular risk factors such as dyslipidemia and oxidative stress. In this study we evaluated the effect of menopause and perimenopause on lipid profile, lipid peroxidation and antioxidant defense in Algerian women.

Subjects and Methods: This cross-sectional study enrolled 114 women who were classified as perimenopausal (n = 44), postmenopausal (n = 40) or non menopausal (n=30) women. In serum, we analysed total cholesterol (TC) and triacylglycerols (TG) by enzymatic colorimetric methods. HDL-C was analysed after precipitation (Kit Biocon, Germany). LDL-C was calculated using the formula of Friedewald. Lipid peroxidation was estimated by measuring thiobarbituric acid reactive substances (TBARS) according to the method of (Quintanilha et al., 1982) using tetraethoxypropane (Prolabo) as precursor of malondialdehyde (MDA). Antioxidant defense was performed by analysis of superoxide dismutase (SOD) and catalase (CAT) activities on serum. The SOD activity was determined with Sigma Chemical kits (cat. no. 19160) by measuring the dismutation of superoxide radicals generated by xanthine oxidase and hypoxanthine. Catalase activity was measured by the method of Bergmeyer (1974). CAT is involved in the detoxification of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>).

Results: Total Cholesterol (TC) was significantly higher in perimenopausal (p < 0.01) and postmenopausal women (p < 0.05), compared to non menopausal women, while serum TG levels were similar in all women. LDL-C was increased in perimenopausal and postmenopausal women compared to non menopausal women (p < 0.01), while HDL-C concentrations were decreased in perimenopausal and postmenopausal women (p < 0.001) compared to non menopausal women. Levels of lipid oxidative product (TBARS) were significantly increased in perimenopausal women and post-menopausal women compared to non menopausal women (p < 0.05). SOD activity was decreased significantly in postmenopausal women (52.4±22.4 U/ml) compared to non menopausal women (67.1±12.3) (p < 0.05). Similar values of CAT activity were noted in all groups. Superoxide dismutase and catalase activities were respectively more elevated in perimenopausal (81.9±25.7 U/mL, 104.5 ± 62.0 U/mL) compared to non menopausal women (67.1±12.3 U/mL, 68.1±27.0 U/mL).

Conclusion: This study demonstrates that dyslipidemia, lipid peroxidation and low antioxidant defense activity were prevalent in perimenopausal and postmenopausal women which leads to an increase in the oxidative stress leading for cardiometabolic disease.

#### PT-064

Poster

##### An island of Ireland childhood obesity campaign - focus groups with parents changed the campaign course from recognition to practical solutions.

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 safefood, The Food Safety Promotion Board.

Background: One in four children on the island of Ireland is overweight or obese. At the outset of campaign planning peer reviewed data indicated the campaign focus on the poor parental recognition of excess weight in their own children. Campaign concepts were developed based on raising awareness among parents of 1-12 year olds on the health challenges of excess weight in childhood and to help them recognize whether their own child/children are 'at risk' of excess weight.

Objectives: To gain an understanding from parents on (1) how they identify if their children are at risk of excess weight and (2) to evaluate the campaign concepts to ascertain whether they helped parents in recognising if their own children are 'at risk'.

Materials and methods: 9 focus groups (n= 72) with parents of 1-12 year olds across the island of Ireland were conducted in both urban and rural locations in Republic of Ireland and Northern Ireland in July 2014. Groups were male, female or mixed and participants were aged from 20-30 or 31-45 years. Parents had identified their children as at risk of excess weight after completing a questionnaire. Seven focus groups consisted of parents from lower socio-economic backgrounds. All focus groups were conducted by a qualitative market research agency on behalf of safefood, were recorded, transcribed and major themes identified.

Results: Two major themes emerged on awareness and excuses. Although existing literature indicated that 'lack of awareness' among parents that childhood obesity could affect them was an issue it emerged that parents were aware of this important public health issue. However, they perceived an absence of solutions which in turn lead to a lack of engagement on the issue. Parents reported many excuses to addressing family lifestyle behaviours but as the focus groups progressed the facilitator began to confront the excuses directly and parents began to dismiss the excuses also.

Key Findings: Parents were unlikely to engage with a campaign that focused on raising awareness of the extent and consequences of childhood obesity. Instead they indicated that they wanted solutions that are credible, practical and relevant.

The campaign development continued and focused on six practical solutions – give child size portions, not adult size; give more water and less sugary drinks; less 'treat' foods; be more physically active; have less screen time and adequate sleep. The three year campaign was launched in October 2014.

#### PT-065

Poster

##### **Trends in prevalence of overweight in adolescents from a low socioeconomic neighborhood in the metropolitan area of Rio de Janeiro, Brazil.**

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Objective: To investigate changes in the prevalence of overweight and association with demographic and socioeconomic factors among adolescents from a low-income area in the metropolitan region of Rio de Janeiro, Brazil.

Material and methods: Were analyzed data from two population-based cross-sectional surveys conducted through household interviews with 511 adolescents in 2005 and 314 adolescents in 2010, aged 12–18 years old, selected by a three-stage cluster sample. Overweight were classified by the sex- and age- specific body mass index cut-offs (weight/height<sup>2</sup>) based on World Health Organization criterion (>1 z-score). The chi-square test was used to compare the prevalence of overweight between the two studies and to examine the changes according to socioeconomic and demographic variables (gender, range age: 12- 14 and 15-18 years, skin color: white and black/ brown, per capita household income: lower and higher than 1/2 minimum wage). A p-value <0.05 was adopted for statistical significance.

Results: Overweight increased from 23.4% to 31% (p = 0.03) in period between the two surveys. The increase was higher in boys (22.3% to 34.7%, p = 0.02) than in girls (24.6% to 27.1% p>0.05) and in those aged 12-14 years (24.1% to 40.2%, p = 0.02). In 2010, the prevalence of overweight in adolescents aged 12-14 years old was higher than in those who were between 15-18 years (40.2% vs 22%, p = 0.01). Overweight was not associated with skin color and per capita household income in the two studies.

Key findings: Overweight in Brazilian adolescents from a low-income area increased significantly at 5 years between the two studies and the boys, especially the younger ones, are the most vulnerable group for whom intervention should be addressed urgently seeking prevention and control of obesity.

#### PT-066

Poster

##### **Mechanism of action of the peptide of soybean on skeletal muscle atrophy suppressed.**

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Objectives: We reported that skeletal muscle atrophy is suppressed by ingesting soy peptide (AM) in mouse. In particular, the intake of the soy peptide was effective in reducing slow muscle atrophy. We observed the effect of soy peptide on inhibition of muscle cell atrophy and the intake of the soy peptide also suppressed a decrease of the muscle protein. Therefore, in this study, we investigated the gene expression of IGF-1 in order to elucidate the mechanism of action of the peptide of soybean on skeletal muscle atrophy suppressed.

Material and Methods: Mice were purchased from SLC Japan. They were individually housed in stainless steel cages in a temperature, humidity and light controlled room (24°, 60%, 12hr light /dark cycle). All mice were fed the MF (Oriental Yeast Co., Ltd.) for 7 days. The mice were divided into four groups consisting of given a control (water) group (W), suspension (water + tail suspension) group (WTS), an AM drink (175 mg/l in water) group (AM) and an AM drink (175 mg/l in water + tail suspension) group (AMTS).

#### RT-PCR Analysis

Animals were anesthetized with pentobarbital and sacrificed. Soleus and plantaris muscles were flash frozen in liquid nitrogen. Total RNA was extracted with miRNA easy Mini Kit (QUIAGEN). One µg RNA was retro-transcribed using the cDNA Archive kit (Applied Biosystems) following manufacturer's instructions. Gene expression was measured by quantitative real-time PCR using ABI 7000 Sequence Detector System (Applied Biosystems). Specific assays on demand for IGF-1 and IGF-1 receptor were from Applied Biosystems. The level of each transcript was measured with the threshold cycle (Ct) method using as endogenous controls β-actin mRNA from mouse tissues.

#### ELISA

IGF-1 concentration in skeletal muscle was determined by immunoassay. Results: Results of this experiment, the soy peptide intake inhibited the atrophy of skeletal muscles. IGF-1 and IGF-1 gene expression were significantly increased by the soy peptide intake. Also IGF-1 receptor increased in skeletal muscle. The results of this experiment, the soybean peptide AM intake increases the gene expression of IGF-1, thereby suppressing the skeletal muscle atrophy have been suggested.

Key findings: soybean intake, skeletal muscle atrophy, IGF-1 gene, IGF-1 receptor

#### PT-067

Poster

##### **Experience and description of the process of human milk extraction of lactating mothers from the public health center of Quetzaltenango and its relation with the volume of the samples.**

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Objective: To describe the methodology and experiences during the human milk extraction process. To compare the population's characteristics with the methods and the milk volume of the samples.

Material and methods: 44 lactating mothers of infants aged 5 to 7 mo were recruited at the Public Health Center in Quetzaltenango. A trained, female researcher extracted a single sample of human milk from a single breast using a standard technique of "whole breast extraction". A manual extracting pump was used. The mother was asked not to feed the baby from the breast used for extraction for at least 1 hour. The infant was allowed to feed from the other breast ad libitum. All the samples were obtained during the morning, between 8:00 and 12:00.

Results: The median volume of breastmilk extracted was 25 ml. The distribution of extracted morning milk volumes across the 44 volunteers was: <25 mL (n=17, 38.6%); 25-49.9 mL (n=18; 40.9%); 50.0 – 74.9 mL (n=6; 13.6%); and >75 mL (n=3; 6.8%). A single mother had a volume <10 ml and a further 3 <20ml; this mothers reported feeling anxious at the time of collection. The age of the mothers ranged between 16 and 41 y; 14% were Mayan indigenous and the 86% were Ladinás and 82% were housewives. The median breastmilk volume by age of the infants was: 25 ml at 5 mo (n=13); 30 ml at 6 mo (n=16); and 25 ml at 7 mo (n=11). The median volume by level of schooling was: "none" 57.5 ml (n=2), "primary" 30.0 ml (n=13), "secondary" 27.0 ml (n=26) and higher 20 ml (n=3). Only 18 mothers restrained from breastfeeding from the breast used for extraction for at least 1 hour. The volume extracted, according to the time waited was: <15 min 22.5 ml (n=10); 15-29 min 27.0 ml (n=8); 30-60 min 35.0 ml (n=8); and >60 min 27.5 ml (n=18). The median volume of breastmilk was 30 ml for the 7 mothers that latched the infant to the other breastmilk during collection; and 25 ml for the remaining 37 mothers.

Key findings: When following the "whole breast extraction" procedures it is possible to collect at least 20 ml of breastmilk for most mothers, which is usually the minimum volume required for analysis. The time waited between extraction and the last breastfeeding episode is essential for adequate collections. Latching the baby to the other breast seems to be helpful in relaxing the mother, getting the milk flowing and providing sufficient volumes of milk.

Funded by: Sight and Life of Basel, Switzerland

#### PT-068

Poster

##### **Study on the knowledge of infant and young child feeding practices in Labé, Guinea Conakry.**

Rivero E, Sanchez M  
Acción Contra el Hambre

Objectives: In 2012, according to a health and nutritional survey in Guinea, it was found that the region of Labé had the most alarming rates of child

malnutrition. Of special interest, it was pointed that inappropriate young child feeding practices might be the responsible factor for the precarious nutritional status among this children population. Therefore, the current study sheds light on the cultural and scientific knowledge held by women and health workers respectively about child's nutrition and breast-feeding. This would identify the causes of mediocre child feeding practices and most frequent obstacles that prevent optimal ones from happening.

**Material and methods:** Focus group discussions and semi-structured interviews were conducted on five health centers of Labe. The study population includes breast-feeding women, grandmothers and health workers. These groups were asked to report their common knowledge and attitudes about young child feeding practices and child nutrition. In addition, the grandmothers' interview also targets displayed behaviours in regards to breast-feeding of new-borns given birth at home.

**Results:** On overall it was found that breast-feeding women have mediocre child feeding practices. Of special interest, they delay breast-feeding after giving birth and this practice is eliminated very early in the life of the young child. The prevalent obstacles for optimal child feeding practices mentioned were their occupation and the role of culture. In the same vein, health workers report the same impediments and add the role of grandmothers on nourishing and breast-feeding the child as a crucial factor that leads to malnourishing the young child. However, only 50% of those health workers know about the advantages of breast-feeding practices following the delivery.

**Key findings:** The core finding for the current study suggest that the lack of knowledge and information provided by health workers and grandmothers about breast-feeding practice and its exclusiveness might be associated with child malnutrition. In fact, women who give birth at home follow grandmother's traditions which lead them to acquire mediocre feeding practices. On the other hand, women who give birth on health centers report being told information related to breast-feeding practices however they barely remember it. This might mean that the information provided at health centers is not clearly transmitted nor is given at the appropriate moment. Therefore, these findings suggest that adequate knowledge about child's breast-feeding and nutrition has to be reinforced in two levels, on household and health centers.

#### PT-069

Poster

##### **Latina mothers' child feeding practices and styles related to weight status and the development of child obesity.**

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**Background:** A growing literature points out to the importance of maternal feeding practices and children's eating behavior in the development of childhood obesity.

**Objective:** The purpose of this study was to examine Latino mothers' child feeding practices and its influence in the development of childhood obesity. **Methods:** One hundred forty-two low-income Latino mothers and their preschool children (2-5 years of age) participated in this cross-sectional study. Mothers completed questionnaires assessing maternal feeding practices using two previously validated instruments (Birch et al., 2001; Hughes et al., 2005), health literacy, social and cultural factors, and mother's and child's weight status.

**Results and Key Findings:** Preliminary data analysis revealed a number of child feeding practices used by Latino mothers to be correlated with their preschool child's weight status. The implications of these results for understanding the development of childhood obesity are considered including the use of education and interventions that incorporate "culturally mediated" pathways to address mothers' feeding practices are essential for the prevention and control of childhood overweight among low-income Latinos. Health care professionals should be aware of the social and cultural influences on Latina mothers' beliefs and practices related to weight status and feeding practices and address these in their education approaches to prevent childhood overweight and obesity with this population group.

#### PT-070

Poster

##### **Relationship between resting metabolic rate, anthropometric and oxidative stress parameters in newly diagnosed type 2 diabetes mellitus patients.**

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**Background and Aim.** Resting metabolic rate (RMR) is an important parameter to assess the nutritional status of both healthy subjects and type 2 diabetes mellitus patients. Moreover, information on resting energy con-

sumption is necessary to establish an individualized diet for a person newly diagnosed with type 2 diabetes mellitus (ND-T2D). The aim of our study was to measure RMR (determined (RMRd) and predicted (RMRp)) and to analyze the relationship with anthropometric, biochemical, hormonal and oxidative stress parameters.

**Subjects and methods.** The study included 118 ND-T2D and 48 healthy age and sex-matched nondiabetic subjects. The diabetic group was divided into 2 subgroups according to their body mass index (BMI): group 1-overweight patients (BMI: 25-29.9kg/m<sup>2</sup>) and group 2-obese patients (BMI: 30-40kg/m<sup>2</sup>). All participants were evaluated for anthropometrical parameters and RMR was measured by indirect calorimetry (continuous VO<sub>2</sub>, VCO<sub>2</sub>). Routine biochemical tests, ELISA measurement of serum insulin, proinsulin, C-peptide, leptin and adiponectin levels and oxidative stress parameters (respiratory burst of isolated peripheral blood mononuclear cells (PBMC), serum total antioxidant capacity (TEAC) and fructosamine levels) were also monitored.

**Results.** Determined RMR was significantly higher in ND-T2D (1657±57 Kcal/day vs 1449±50 Kcal/day in controls, p<0.05) and in men (p<0.001) in all groups. The differences between RMRd and RMRp were significantly higher in women (p<0.05) and in the obese group (p<0.001). RMRd decreased slightly with age in both men and women. In the diabetic group, RMRd correlated positively with obesity anthropometric markers (weight, BMI, WC; r 0.47, p<0.001) with respiratory burst (r 0.35; p<0.05), serum proinsulin levels (r 0.39, p<0.05) and negatively with the values for HDL-c (r -0.29; p<0.05). Moreover, the obese group had significantly higher levels for respiratory burst (0.0506±0.01 vs 0.0232±0.02RLU, p<0.05), insulin, proinsulin, C-peptide and leptin (p<0.05) while adiponectin levels were lower (p<0.05). **Conclusion.** Measured RMR is associated to the obesity degree and oxidative stress status and could be an important tool in the initial dietary treatment of the metabolic disorders associated with atherosclerosis in obese patients with diabetes mellitus.

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#### PT-071

Poster

##### **Relation of maternal feeding attitudes and childrens body composition in Yucatán: a pilot study.**

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**Objectives:** The Body Mass Index (BMI), percent of fat mass, and percent of lean mass have been linked to cardiometabolic risk. The aim of this study was to determine how these indicators might be influenced by parental attitudes and feeding practices.

**Material and methods:** 91 students, aged 4 to 17 years, and their mothers (who were in charge of their feeding) participated in a survey. The sample was randomly selected, stratified by residence area, age and sex. We assessed skinfolds (triceps, calf, and abdomen), circumferences (waist, biceps, and thigh), and we calculated BMI, lean body mass (LBM), and body fat (BF). The mothers answered the Comprehensive Feeding Practices Questionnaire (CFPQ), which is composed of five scales: healthy eating guidance, monitoring, parent pressure, restriction, and child control. We calculated partial correlation for each pair of variables, controlling the age. We estimated multiple linear regressions for each anthropometric variable.

**Results:** The majority of anthropometric variables (with exception of LBM) showed significant correlations. LBM did not correlate with muscle circumferences, nor BMI did. BF correlated negatively with healthy eating guidance and pressure; whereas it correlated positively with restriction and child control. Healthy eating guidance was negatively correlated with %BF, %LBM, BMI and FMI. We found two significant equations: IMC=25-1.2•CFPQ(Guidance), R<sup>2</sup>=0.10, p=0.005; e IMG=24.4-1.2•CFPQ(Pressure), R<sup>2</sup>=0.15, p=0.048.

**Key findings:** Assuming that obesity is the result of a complex interaction of multiple variables, our results suggest that healthy eating guidance attitudes of parents should be potentiated as a public health policy in Yucatán. We suggest to increase the sample size in future studies in order to improve the statistical power.

#### PT-072

Poster

##### **Prevalence of nutritional inadequacy in children 1-3 years of age: EPACI Portugal 2012.**

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Medicina da Universidade do Porto. <sup>3</sup> Centro de Biotecnologia e Química Fina, Escola Superior de Biotecnologia, Universidade Católica Portuguesa. <sup>4</sup> Departamento de Pediatria. CINTESIS. Faculdade de Medicina da Universidade do Porto. <sup>5</sup> CCA – Hospital CUF Porto.

**Objectives:** To assess the nutritional intake and its adequacy, and to identify the main food sources for specific nutrients in Portuguese children aged 12-36 months.

**Material and methods:** A subsample (n=945; participation ratio: 42%) of a representative study of children aged 12-36 months was evaluated – Project EPACI Portugal 2012. Information on food intake was assessed through 3-days food diaries, filled out by parents/caregivers. Usual nutrient intake was evaluated, applying a Box-Cox transformation and considering the adjustment for intra-individual variability. Estimated Average Requirements (EAR) cut-points method for estimating the prevalence of nutritional inadequacy was used, applying the cut-points for each age group (G1: 12-23 months and G2: 24-36 months), using American recommendations (DRIs).

**Results:** The mean daily energy intake was 1153 kcal in G1 and 1286 kcal in G2 – 34% (95%CI: 29%; 38%) of children in G1 and 70% (95%CI: 66%; 75%) of children in G2 had a consumption higher than 1200 kcal. The prevalence of protein inadequacy by excess (>20% kcal) was 21% (95%CI: 17%; 24%) in G1 and 23% (95% CI: 19%; 27%) in G2. 6% (95%CI: 4%; 9%) of children ate less than the recommended carbohydrate fraction (45-65% kcal) and 43% (95%CI: 39%; 48%) in G1 and 45% (95%CI: 40%; 50%) in G2 consumed less fat than recommended (30-40% kcal). The average protein intake was 4.5g/kg/day and most protein intake came from meat/fish/egg (40%) and dairy products (36%). Both G1 and G2 children had a low prevalence of micronutrient inadequacy, except for vitamin E, with an inadequacy of 88% in both age groups (95%CI: 80%; 90%), and folate in G1 – 20% (95%CI: 17%; 24%). The foods that most contributed to folate intake were vegetables (21%), breakfast cereals (13%) and bread (11%). Regarding sodium intake, 83% (95%CI: 80%; 87%) in G1 and 93% (95%CI: 90%; 95%) in G2 were above the maximum tolerable level (1500 mg/day), soup being the major contributor for their intake (44%).

**Key findings:** High inadequacy prevalence of protein (by excess) and fat (by deficit) were found among Portuguese children aged 12-36 months. Low micronutrients inadequacy was observed except for vitamin E, folate and sodium. The excess of sodium intake justify health policies development.

#### PT-073

Poster

##### Assessment of adolescents' diet quality according to saturated fat, trans fat, and added sugar intake.

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**Objectives:** To assess differences in adolescents' diet quality, considering the gradient of consumption of SoFAS foods (high in solid fat and added sugar) and to suggest a simplified indicator for the assessment of diet quality.

**Material and methods:** A nationwide representative sample (n=7,425) of adolescents (10-19 years old) completed one day of food record in the first National Dietary Survey conducted in 2008-2009. The ROC curve method was applied to define the cut-off limit indicating excessive SoFAS foods consumption, consequently diets with low nutritional quality. The analysis explored the association between sociodemographic and dietary characteristics with the categories of SoFAS foods consumption: moderate and high. Sample weights and the study design effect were considered in the analysis. **Results:** The cut-off limit that defined diets high in SoFAS foods was 40% of total daily energy intake. In average, SoFAS foods provided 53% of total daily energy intake. Moreover, 72% of adolescents reported excessive SoFAS foods consumption (≥40% of daily energy intake). The contribution of SoFAS foods to the daily energy intake varied according to the quartile of monthly family income for both moderate (23% in the first quartile and 29% in the highest quartile) and high (60% in the first quartile and 69% in the highest quartile) SoFAS foods consumption. Adolescents with high intake of SoFAS had greater consumption of candies & chocolates, burgers, pizza, breakfast cereals, sandwiches & savory baked goods, salad dressings, cheeses, yogurt, cookies & cakes, milk, juices, sugar sweetened beverages, snacks & chips, and processed meats when compared to adolescents with moderate consumption of SoFAS foods (<40% of daily energy intake). On the other hand, adolescents with moderate consumption of SoFAS presented higher consumption of rice, beans, coffee or tea, bread, fish, poultry, roots, and corn than those with high consumption of SoFAS.

**Key findings:** Significant proportion of Brazilian adolescents reported having low quality diets with high consumption of SoFAS foods and low consumption of fish, poultry, roots, and corn. The assessment of foods high in saturated fat, trans fat and added sugar consumption can be considered a good indicator of the diet quality.

#### PT-074

Poster

##### Dietary energy density in Brazil: results from the first nationwide food consumption survey, 2008-2009.

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<sup>1</sup>Instituto de Nutrição Josué de Castro, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil <sup>2</sup>Instituto de Saúde da Comunidade, Universidade Federal Fluminense, Niterói, Brazil. <sup>3</sup>Instituto de Medicina Social, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Brazil

**Objectives:** This study aimed to evaluate dietary energy density in Brazil.

**Material and methods:** Data were obtained in the first National Dietary Survey (2008-2009). Food consumption was estimated based on one-day of food record obtained from a probabilistic sample of individuals ≥10 years old (n=34,003). Dietary energy density (DED) was estimated as the ratio between total energy intake (kcal) and total amount of food consumed (grams). Beverages were excluded. Statistical analyses considered sample weights and study design effect.

**Results:** Mean DED was 1.69 kcal/g (95% CI=1.67; 1.70). Adolescents (1.83 kcal/g) presented higher DED than adults (1.68 kcal/g) and elderly (1.54 kcal/g) [p<0.01]. Non-overweight individuals had higher DED than overweight individuals (1.70 vs. 1.67 kcal/g; p<0.01). On average, DED was higher on weekends than on weekdays (1.79 vs. 1.67 kcal/g; p<0.01). There was a decrease in DED with age (r= -0.20; p<0.01) and BMI (r= -0.08; p<0.01) increasing. Top food groups contributing to DED were pizza (β=0.10), hamburger (β=0.08), sandwiches (β=0.07), and sweets and desserts (β=0.05).

**Key findings:** The consumption of high energy-dense foods possibly plays a role in the increased obesity prevalence in Brazil. DED is high in Brazil and should be addressed by interventions promoting healthy eating, especially those targeting adolescents.

#### PT-075

Poster

##### Preventissimo - health assessment and counselling with e-health.

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**Objectives:** The Preventissimo project (GOP-1.1.1-09/1-2010-0104) aimed to develop an evidence-based, preventive and interventive tool for health assessment and counselling, using e-Health methods.

**Materials and Methods:** We have developed an internet-based application that focuses on the prevention of the most common non-infectious chronic diseases. The application uses questionnaires to get a picture of the client's disease risks. This is followed by a personalized counselling, based upon the individual's answers. Currently the project deals with the main non-communicable diseases: cardiovascular diseases; type 2 diabetes; the most common cancers: breast, prostate, colorectal and lung; chronic pulmonary disease (COPD); dementia; glaucoma; cataracts; macular degeneration). The various questionnaires assess diseases running in the family, already existing abnormalities and various lifestyle factors including nutrition, physical activity, mental health and smoking. For risk assessment we use some well-established calculators (SCORE, FINDRISC), but we also analyse the effect of the individual factors. The counselling algorithm takes into account not only the risk factors, but also personal preferences and existing disorders, allergies.

**Results:** Preventissimo has been developed through the co-operation of medical doctors, dieticians, physiotherapists, psychologists and IT specialists. It is constantly evolving to make it always up to date and cutting edge. The project was published online: [www.preventissimo.hu](http://www.preventissimo.hu)

The questionnaires contain 266 questions, 19 sub-questionnaires, 24 generated data, 308 risk and protective factor descriptions and 294 advices. There is an evidence based knowledge base on the site with more than 250 articles with topics in lifestyle, diseases, diet, stress-management, physical activity. In the spring of 2012, a pilot study was carried out, during which 1000 clients from 6 general practices tested the system and gave useful feedbacks for further refinement.

From the autumn of 2012, the application was used in practice based learning, as part of the Prevention subject at the Semmelweis University.

**Key Findings:** When using Preventissimo (filling out the questionnaires) the user can download the results and health plan and can e-mail them to their doctor or any other healthcare provider for further input if needed. This helps assessing risk in a community, and can help planning preventative strategy.

#### PT-076

Poster

##### Importance and challenges of implementing Quality Management and Safety Systems in the Food Irradiation Process.

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**Objectives:** There are several food treatment processes such as refrigeration, freezing and heat treatment. Irradiation is one more, often referred as cold pasteurization because the whole process takes place at room temperature. During this treatment, the food is controllably exposed to gamma rays over a certain time, depending on the dose to be applied. This technique allows safety food with high levels of quality, decreasing the microorganisms responsible for food spoilage as well the risk of foodborne diseases by destroying pathogenic microorganisms and it is considered a control measure in the production in several types of raw and minimally processed foods.

The aim of this study is to highlight the importance and challenges of ensuring food safety and quality of foodstuffs treated by irradiation through the implementation of quality management and HACCP-based systems according to international normative references.

**Material and methods:** It were applied an NP EN ISO 9001:2008 quality management system and an EN ISO 14470:2011 food safety HACCP-based system for food irradiation in our Radiation Technologies Unit. The requirements of these standards impose the implementation of control systems, monitoring and traceability process. For that, it is necessary to develop procedures, documentation and measure all the steps of the process, including the information provided to the consumer on food treated with ionizing radiation.

**Results:** From our experience, implementing an NP EN ISO 9001 quality management system and an EN ISO 14470 food safety HACCP-based system improves quality and efficiency and ensures food safety. Food treated with irradiation shows that the nutritional value and digestibility undergo minimal changes and the microbiological reduction obtained with this technology is difficult to match with other types of treatment.

The macronutrients were well studied and even for doses above 10kGy there were no significant changes. The same happens with minerals and vitamins, despite vitamins have different levels of sensitivity to gamma radiation.

**Key findings:** Each food has its own characteristics, so it is essential to validate the applied technology before the irradiation. This way it is possible to reach the target and set the dose to be applied.

The application of this treatment is advantageous in different aspects such as: disinfection, inhibition of germination, sterilization, increasing the shelf time of fresh fruit and minimally processed vegetables, as well as meals for immunodepressed people.

The implementation of the quality management system is essential to identify, control and monitoring all the important parameters, ensuring their traceability.

#### PT-077

Poster

##### **Association of hypertension and nutritional status in a Brazilian adult population in 2012.**

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**Objectives:** Associate the occurrence of hypertension nutritional status of adults, according to its distribution per Unit of Federation.

**Material and methods:** This is an ecological study using national data from the year of 2012 pertaining to the "Sistema de Vigilância Alimentar Nutricional" for the nutritional status of adults, using Body Mass Index, and "Vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico" for hypertension data. First, a descriptive analysis was performed for the variables of interest and we noticed the adhesion of these variables to the normality curve. An analysis of regression was performed to test the linear association of hypertension as the dependent variable, and malnutrition, normal weight, overweight, obesity and excess weight (overweight and obesity), as explanatory variables. Subsequently the Global Moran's I test was applied to test spatial dependence between variables.

**Results:** An association was found between hypertension and obesity ( $p < 0.03$ ), and was also identified spatial dependence between these two variables ( $p < 0.001$ ). These results show that the states with higher prevalence of hypertension are those with the highest concentration of obese adults. The relationship of these data show that it is necessary to formulate strategies and guidelines that provide prevention and control for the appearance of these comorbidities, and thus ensure a healthier life style.

#### PT-078

Poster

##### **Prevalence of the metabolic syndrome in trained professionals and in formation in health sciences in Asunción Paraguay.**

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This research is part of the Multicenter Study LATINMETS.

**Objective:** To determine prevalence of metabolic syndrome (MS), in health professionals (doctors, nurses, nutritionists) and final year students of these careers, in the National University of Asuncion.

**Material and Methods:** A descriptive cross-sectional, observational study. Data on weight, height, body mass index (BMI), waist circumference, blood pressure, biochemical tests: Glycemia, triglycerides and HDL cholesterol, were collected.

**Results:** we included 132 volunteers, ages 18 to 65. Data were collected from July to November 2012 - 2013 The prevalence of metabolic syndrome was determined by the presence of three or more of the five criteria recently harmonized by the International Diabetes Federation IDF, American Heart Association, National Heart, Lung and Blood Institute. 60.6% (80) were female. The mean age was 30.8 + 11.2, ranging between 19-65 years. 19.7% (26) physicians, 9.1% (12) nurses, 10.6% (14) Nutritionists, 57.6% (76) medical students, 1.52% (2) nursing students and 1,52% (2) nutrition. The average weight was 70.5 + 19.9 (42-180). 46.2% had normal weight (61), 30.3% overweight (40), 22% obesity (29), 1.5% underweight (2). 28.9% (38) had waist circumference > 90 cm in men and 26.5% (35) > 80 cm in women. The average blood glucose level was 89.3 + 7.7, HDL cholesterol 42.7 + 11.3, triglycerides 109.8 + 79.7. Metabolic syndrome was diagnosed in 19.7% (26), of which 73.1% (19) were male, 26.9% (7) women, 73.1% (19) were under 40 years. 19.3% (10) of the 52 professionals and 20% (16) of the 80 students were diagnosed with metabolic syndrome. Those diagnosed with metabolic syndrome had abdominal obesity (AO) 96.2% (25), low HDL cholesterol, 92.3% (24), triglycerides >150 84.6% (22), hypertension 46.1% (12), blood glucose >100 mg / dl 19.2% (5).

**Conclusions:** Metabolic syndrome was diagnosed more frequently in men under 40 years and students. The most frequent components of the metabolic syndrome were OA, followed by low HDL cholesterol and increased triglycerides.

#### PT-079

Poster

##### **Phthalates Presence in Mexican beverages.**

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Phthalates are chemical substances widely used worldwide because of its plastic properties, its wide presence in the environment suggests the exposition to products that can be part of the human food chain, that is the reason why it is important to study it due to the security nourishing, since some of these compounds are considered endocrinal disruptors and they have been associated with resistance to the insulin and central obesity among other health affectations. **Objectives:** Determine the presence of Di(2-ethylhexil) phthalate (DEHP), Dimethyl Phthalate, Diethyl phthalate, Dibutyl Phthalate, Butyl benzyl phthalate and Dioctyl Phthalate in beverages acquired in the State of Mexico. **Material and Methods:** Based on the list of food included in the Mexican basic basket, they were acquired under certain self-consuming criteria, samples of bottled water, industrialized juice and sodas of major consuming brands, they were analyzed using a liquid-liquid extraction and quantified by its chromatographic linked gases. **Results:** All the analyzed beverages were detected with Di(2-ethylhexil) phthalate whose major concentration was of 11.02 mg/kg detected in the juice sample, three of the juice samples were detected with the three deferent compounds, being Dimethyl Phthalate the mayor concentration was (26.843 mg/kg). The soda tests were detected with Di(2-ethylhexil) phthalate, in this group the mayor concentration was 8.708 mg/kg. Based on the found concentrations considering the exposition form by ingestion calculated for an adult are not exceeded in the Ingestion Daily Ingestion Rate, however, the present work shows the necessity of other food groups and their relation to other health issues.

#### PT-080

Poster

##### **Case of Community-Based Program Addressing Underlying Determinants of Undernutrition in Bukoba Rural, Republic of Tanzania.**

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The United Republic of Tanzania has abundant land, livestock, and natural resources, which could enable it to achieve faster and more diversified agricultural growth and to raise household income through increased production of both food and cash crops thereby creating economic sustainability. In spite of this potential, malnutrition among children and mothers, especially in rural areas, is a common phenomenon. Evidence-based strategies for nutrition intervention mainly address direct determinants such as food/nutrient intake, whereas community-based intervention tends to have higher efficacy when combined with other proximal determinants such as women's economic and social empowerment.

**Objectives 1)** To increase knowledge about the nutritional benefits of soy consumption to various population groups (women, children and population with HIV-AIDS) by offering workshops and local technical assistance to the Bukoba Women's Empowerment Association (BUWEA) members; 2)

To increase soy consumption in the diets of the BUWEA members, thereby decreasing protein calorie malnutrition and improving overall health status; 3) To provide adequate technical assistance and training to the BUWEA members on the cultivation, expansion and commercialization (micro-enterprise) of the soybean in order to improve malnutrition, health and economic sustainability; 4) To increase the soybean crop yield for further expansion of the cultivation project for economic sustainability; and finally 5) To implement soy-processing machines to increase consumption of soy and creating long-term sustainable economic activity for the BUWEA members and their families.

**Material and Methods** – Initially, focus group of 42 women representing 220 members (1400 indirect beneficiaries) of the Bukoba Women's Empowerment Association (BUWEA) was conducted to share the Tanzania Mainland Nutrition Survey findings to assess local diet and nutritional knowledge of commonly consumed foods. The focus group's outcome led to a bottom-up solution: creating an infrastructure to cultivate soybean to improve the quality of the existing diet and create economic sustainability among the members of the cooperative.

**Results** – Bi-yearly workshops were provided to BUWEA members on the topics of health, processing soybean, packaging soybean, marketing, accounting, and grant writing, technical assistance from local horticultural/extension specialist, and working with different local organizations for expansion of the micro-enterprise. The ongoing workshops on soybean cultivation and educating the BUWEA women's group regarding the benefits of the crop offer a real chance of improving the nutritional status and economic sustainability.

**Key Findings** – Approaching the problem of undernutrition should address underlying causes to create sustainable solutions with replicability and continuity, as in the case of Bukoba Rural, Republic of Tanzania.

#### PT-081

Poster

##### **Problem diagrams as a community's empowerment instrument in improving health conditions.**

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**Objectives:** Present results of actions stimulating social control and participation performed with the eastern region health unit council of Goiania's municipality, Goiás, Brazil.

**Materials and Methods:** Diagnosis data collected through quick participative estimative (ERP) provided for a workshop in which local health council members defined by vote an important, solvable problem of the region. For identifying the causes, consequences, coping and solving proposals, the problem diagram methodology was used.

**Results:** 18 persons participated. The main identified problem was lack of basic sanitation structure and stormwater drainage in the Family Health Center's coverage area. Intervention actions were sketched using the problem diagram method, sanitation lack figuring as core problem in the tree's "trunk". The causes, or roots, were lack of public interest, community's inertia and bureaucracy, and as consequences, at the tree's top, were identified diseases, lack of hygiene, filthiness, pollution, pests and neighborhood conflicts. The method allowed the identification of intervention measures to address the community's inertia and to raise the public sector's awareness to the problem. An event involving the entire community – schoolchildren, social, commercial establishments and related institutions, aiming at raising awareness to the lack of sanitation was proposed, labelled "The Day D", in which 700 signatures were collected in a petition to the installation of a sewage and stormwater drainage network. In the occasion, many health promotion activities were carried out with Universities' and other organizations partnership. This event has outspread into the petition's delivery and the scheduling of a public forum for discussing the problem.

**Key findings:** Quick participative estimative has been found to be a relevant instrument for diagnosing health condition problems. The problematization of health risk factors and the use of a planning tool with the population was a relevant communal empowerment strategy for health promotion and diseases prevention, as described in the public health directives, which mention the importance of social mobilization as means of health promotion.

#### PT-082

Poster

##### **Absorption of heme iron from grasshoppers vs non heme iron from spinach leaves.**

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Iron deficiency anemia is a major nutritional problem in vulnerable population groups worldwide, because it can lead to negative changes in psychomotor end mental development, which may be irreversible. Animal food provide heme iron ready to be absorb, non heme iron from plant sources is less absorbable. Iron absorption is influenced by the iron dietary content, availability and amount of storage in the body. Non heme iron and heme

iron are absorbed from the diet by different mechanisms. Iron from the spinach leaves is in the inorganic form as salts not solubilized, inhibited by phytates, poliphenols and tannins among others and can be immobilized when bind up with other molecules. Heme iron from in grasshoppers, edible insects is in the organic form, bind up with amino acids or proteins and without electronic charge. This study was conducted to assess the heme and not heme iron from grasshoppers *Sphenarium purpurascens* Ch, edible insects and spinach leaves *Spinacea oleracea*. Iron in ash samples was determined by atomic absorption spectrophotometry, data obtained was: in grasshoppers, 6.45 mg/100g; and in spinach leaves, 2.89 mg/100g. The heme iron from animal sources has the molecule bound within porphyrin ring structure, is soluble in an alkaline environment, thus no binding proteins are needed for its luminal absorption. Non heme iron in the lumen of the gut has variable solubility depending of the iron binding compounds. Spinach leaves contain less iron than grasshoppers, and in a regular diet is absorbed with an efficiency of 5% to 10%, and heme iron from grasshoppers has an efficiency of absorption of nearly 40%. Grasshoppers are intake and well accepted by population therefore are a good option to prevent anemia.

#### PT-083

Poster

##### **Training of clinical team about the quality indicators in enteral therapy.**

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**Objectives:** The enteral therapy is a therapeutic alternative for patients with nutritional risk and reduced oral intake, if properly prescribed and infused. Based on the above, this study aimed to analyze the profile of prescriptions and infusions hospitalized patients in a public hospital in southern Brazil with the intention of promoting interventions in clinical team.

**Material and method:** Descriptive cross-sectional study with collection conducted between March and May of 2013 through the records of patients in exclusive enteral therapy, involving quality indicators (infusion prescription and energy needs) and personal data. Data were analyzed in software SPSS®.

**Results:** The final sample consisted of 64 patients, mostly men (51.6%), elderly (70.3%) and underweight (45.3%). Caloric goal (468 cal), prescription (890 cal) and infusion (621 cal) have shown significant differences (p <0.05) on the first day, with 48.4% of infusions did not follow the prescription. Considering the results, a training course was proposed, with the participation of 25% of the clinical team of the hospital. This course were showed the results as a form of sensitization, also were discussed the reasons for non infusion (failure to record, death, transfer) and terminated with corrective actions involving the registration of the infusion and improved communication.

**Key findings:** The absence of registration in the medical records of the infusion may be the cause of differences between the indicators, impairing patient monitoring. The formation and performance of a Multidisciplinary Team Nutrition Therapy is essential to show improvement in clinical status of hospitalized patients.

#### PT-084

Poster

##### **The new time eating: perceptions and changes in eating behavior.**

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<sup>2</sup>Verakis

**Objectives:** Economic growth and the acceleration of production overlapped with time, at a rate that significantly change the speed day by day. Thus, various rituals that were previously complied, have been modified over the decades. Therefore, to understand the reasons that lead individuals to the actions buying, preparing and eating food was the main objective of this research.

**Material and methods:** Qualitative research done by semi-structured interviews were applied to men and women, about the rituals and importance to eat, what you eat, time of consumption. Data were grouped by category of information. For this study were surveyed individuals between 18 and 85 years old, residents of large and small cities in Brazil, resulting in 30 individuals.

**Results:** In the age group 18-50 years, women prepare their daily meals small and family, spending little time in this preparation. The food in the home during the week is much more focused on practicality and "do not spend time" and focuses on dinner. During the weekends dedication to preparation intensifies within the home environment. Lunch always done away from home, with work colleagues or solitary. Individuals with higher age group 50 years and who were present and experienced the economic, social and political transitions that took place in Brazil tend to keep food traditions and look for healthier food. The Brazilians who were born during or after the 70s, realize eat away as great option for their lives, because the facilities of projected consumption. These generations work out and eat away from home almost daily. And the Brazilians who were born after the

1990s, and today are young adults, are the ones who consume fast food and snacks because prioritize "can not lose lifetime eating because you have to live intensely." These do not buy, do not know the food and eat what is offered to them.

Key finding: Understanding acquisition actions, ritual preparation and consumption, time spent feeding is essential for us to achieve identifications and interpretations of food in history and current habits.

#### PT-085

Poster

##### **Eating out and "pleasure" reinvented: A temporal focus between 1970 and 2007 in the restaurants of autonomous consumption in Curitiba/Brazil.**

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Objective: Eating out has shown a continuous process in the new society, generating economic, social, cultural and nutritional consequences. Recognize historical and sociological reasons for eating out is fundamental, besides being a health guarantee for nutritional science. Based on the above, this study aimed to demonstrate how changes in eating habits have been observed in recent decades, revealing the complexity of the models of consumption and its determinants in Curitiba, Brazil.

Material and methods: For this research applied a multidisciplinary and comparative approach between the various aspects of feeding: economic, social, political, cultural and nutritional. The contributions of different areas of knowledge were analyzed, the food situation were studied and discussed the focuses of the issue at the national and municipal levels context, through semi-structured interviews with 10 entrepreneurs the area of food and 30 customers of these establishments.

Results: The eating out, really is permeated with symbolism that change and alternate according to the different regions of Brazil, reiterating that the food is directly related to the cultural and social code in which subjects are involved. It could be observed that the market supply and income of the population, given the economic and political processes, caused great difficulties in household access to food, making eating out an easy and affordable alternative financially. The presence of different restaurants in Brazil occurred also stimulated by self-employment. With different economic programs occurred over decades, the opening of borders and import and export systems in Brazil, there was a mass of unemployed and the need for new job opportunities and income with this significant increase in developments in the area of feeding. The need of the industries offering food workers also enabled greater access to eating out, causing many businesses open their doors and consolidate.

Key finding: In Curitiba, the restaurants were raided by the elderly (in pursuit for practicality and company), the children and their parents (in pursuit of health, family sociability and empowerment), by adolescents (in pursuit of vitality and quickly) and all those who need to eat as well as possible during their working hours, demonstrating that eating migrated from home environment for business and health actions should be carried out so that there is consumer protection.

#### PT-086

Poster

##### **Multidisciplinary protocol for clinical assistance and research in feeding difficulties.**

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Objectives: To develop and implement a multidisciplinary protocol for clinical assistance and research in feeding difficulties in childhood and adolescence.

Methods: Protocol is designed for outpatient assistance directed to children and adolescents with feeding difficulties not psychiatrically diagnosed with eating disorders. The multidisciplinary service is structured in a triple flow, so that the patient is evaluated by a pediatrician, feeding therapist and registered dietitian in the same appointment, which will be recorded and observed by the team in a mirrored room. Parents will be instructed to bring one meal and utensils commonly used, so feeding is observed and evaluated. A feedback session is scheduled for diagnosis and multidisciplinary treatment plan explanation. Further appointments are scheduled for the implementation of suggested therapies and follow up.

Results: The first appointment consists in obtaining personal and socio-economic data, school records and personal/family history, followed by medical, nutritional and feeding therapist's evaluations. Medical evaluation assesses a detailed anamnesis, physical examination (with pubertal assessment, according to Tanner), height and weight (World Health Organization indexes, 2007), head circumference, biochemical analysis and bone age, presence of associated diseases and specific diagnostic tests, if necessary. Nutritional assessment consists in full evaluation of nutritional history and dietary intake (obtained from three-day-food-records) of calories, macro and micronutrients, dietary fiber and water intake, compared to Dietary Reference Intakes. Body composition is assessed by body mass index, circumferences (arm, neck and waist) and triceps skinfold. The feeding therapist evaluation

investigates aspects related to breastfeeding, oral habits, speech and language development, feeding behaviors, sensorial and motor aspects, tonus and mobility of oral structures, and interaction between child and caregiver. Patients are categorized according to type of feeding difficulty and parental styles to define specific therapies (nutritional education activities, medications, re-establishment of oral functions or referrals to other professionals). Conclusion: The proposed assistance model enables a global assessment of patients with feeding difficulties, thus enhancing chances of treatment success. Its implementation should also allow validation as a theoretical and practical model of assistance, enabling expertise of other professionals and stimulating investigation of possible lines of research on the subject.

Keywords: picky eater, feeding behavior, children, Interdisciplinary research, nutritional support.

#### PT-087

Poster

##### **Dairy product intake and risk of type 2 diabetes in an elderly Spanish Mediterranean population at high cardiovascular risk.**

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Background and objective: The possible effects of dairy product consumption on diabetes risk remain controversial. The aim of this study was to longitudinally investigate the association between total dairy product consumption and their subtypes, and the risk of new-onset type 2 diabetes (T2D) in an elderly Mediterranean population at high cardiovascular risk.

Material and methods: We prospectively followed 3,454 individuals from the PREDIMED study who were free of diabetes at baseline. Dietary intake was assessed yearly using a 137-item validated food-frequency questionnaire. Dairy product consumption was categorized into total, low-fat, non reduced-fat, and subgroups: milk, yogurt, cheeses, and fermented dairy products. Hazard ratios (HRs) were calculated using multivariable-adjusted Cox regression.

Results: During a median of 4.1 years of follow-up, we documented 270 newly diagnosed cases of T2D. After adjustment for age, sex, BMI, lifestyle, and the consumption of food other groups, the HR of diabetes between the highest and the lowest tertile of overall dairy product consumption was 0.67 (95% CI, 0.46-0.97; P for trend=0.044). This association appeared to be mainly due to low-fat dairy products; the multivariate-adjusted HRs between the highest and the lowest tertile of consumption were 0.65 (0.45-0.94) for low-fat dairy products and 0.67 (0.46-0.95) for low-fat milk (P for trend, both < 0.04). Total yogurt intake was inversely associated with T2D risk (HR: 0.60 [0.42-0.86]; P for trend=0.002). We estimated that substitutions of one serving of a combination of biscuits and chocolate, or whole-grain biscuits per day for one serving of yogurt per day was associated with a 40% and 45% lower risk of diabetes, respectively. With respect to the consumption of fermented dairy products (merging yogurt and cheese in a single group), the risk of diabetes was lower in the second than in the first tertile. Consumption of non reduced-fat dairy products, total and non reduced-fat milk, and cheese showed no consistent associations with the risk of T2D.

Conclusion: A healthy dietary pattern incorporating a high intake of dairy products, particularly low-fat dairy and fermented dairy products, specifically yogurt, may be protective against diabetes.

#### PT-088

Poster

##### **Candidate items for fortification within a novel, alternative strategy of "total fortifiable energy": A model from Guatemala.**

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Objectives: To generate a profile of potentially fortifiable foods from a specific sub-population of Guatemalan women in order to visualize and project the feasibility of an alternative approach to public health fortification as proposed by Omar Dary. This is called the "total fortifiable energy" approach. This alternative looks to avoid the fortification of a single, staple food item, such as salt or sugar, but rather distributes lower levels of the deficient nutrients across as many of the commonly-eaten processed items as practicable.

Materials and Methods: Previous-day dietary recall interviews, enumerating items eaten, disaggregating the ingredients in recipes and interrogating the quantities consumed in grams, in 234 women provided the data. They were recruited and interviewed in an urban context from the clinic population of a government health post (n=121) or in a series of 8 rural villages of Mam-speaking Maya-indigenous residents (n=113) in the Quetzaltenango Province in the Western Highlands of Guatemala. They varied in their reproductive phase (pregnant or lactating) and were classified by site and

status as either pregnant (n = 116) or lactating (n = 118). A total of 189 different beverage or food items, including ingredients, were catalogued. We further classified these items into three exclusive categories: not-fortifiable (NF), i.e. non-processed natural foods; already fortified (AF) i.e. retailed with the specified addition of one or more micronutrients; and potentially fortifiable (PF) i.e. centrally-processed commercial foods not yet containing a micronutrient(s) additive.

Results: Of the 189 foods, 122 (65%) were classified as NF, 18 (9%) as AF, and 49 (26%) as PF. The categories in the potentially-fortifiable class include pastas and whole cereal-grain products, packaged desserts, snacks, processed meats, and dry cheeses among others. Although condiments and sauces do not contain much intrinsic energy, they are added in somewhat fixed amounts to recipes and side dishes, both of which satisfy an estimable quantity of usual energy intake.

Key findings: Over half of the items consumed in this population would never lend themselves to industrial fortification, although biofortification could conceivably enrich some of them with additional micronutrients. Of those 49 items that undergo some commercial processing, less than half have been exploited for fortifying and represent leverage for improving access to dietary micronutrients.

## PT-089

### Poster

#### Independent associations of moderate, vigorous and recreational physical activity with pre-morbid metabolic syndrome.

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Objectives. Metabolic syndrome (MS) increases the risk of all-cause mortality. Lifestyle interventions are key to prevent metabolic disorder associates to MS. The aim of this study was to examine associations between principal physical activities (PA) and MS in adults.

Material and methods. The CDC study was a cross-sectional, probabilistic and multistage random sample of 6729 adults (18-75 years old) from the Canary Islands (Spain, 2004). Anthropometric and clinical tests were performed. For each participant, the 3 most important PAs were assessed by validated questionnaire. Data of 18,479 PAs was registered and classified according to intensity, leisure time context, walking and total energy expenditure. Each component of MS was measured with standardized clinical protocols. Participants were classified into three levels of MS: No MS, pre-morbid MS and morbid MS. Participants with diabetes or with antecedents of cardiovascular events and  $\geq 3$  components of MS were classified as "morbid MS". Multinomial logistic regression was used to analyze associations between five PA dimensions and MS. The influence of 1) socio-demographic factors (age, gender, education, social class, occupation, smoking habit, ancestry, marital status), 2) family antecedents (paternal and maternal antecedents of diabetes, hypertension and cardiovascular events) and 3) number of obesity criteria (IMC, waist-height ratio and abdominal circumference) on potential associations of PA with MS was examined by step-wise analysis.

Results. Without adjustment, all PA variables were associated with both MS levels, except for active transport. Adjustments for socio-demographic factors showed a weakening of associations between PA and MS, though significant associations remained for light, moderate, vigorous and recreational PA, as well as for recommended PA level with pre-morbid MS. For morbid MS, only vigorous and recommended PA levels remained associated. When family antecedents were included, morbid MS was not associated with PA, whilst pre-morbid MS showed associations for each increment of 1 MET/h/week in: moderate PA (OR=0.93,  $p < 0.01$ ), vigorous PA (OR=0.95,  $p < 0.05$ ) and recreational PA (OR=0.94,  $p < 0.01$ ), as well as for recommended PA level (OR= 1.19,  $p < 0.05$ ). The contribution of the analyzed factors to explain variability in MS was: R2 socio-demographic = 0.20; R2 PA = 0.05, R2 family antecedents = 0.03 and R2 sum of obesity criteria = 0.37. Intensity was the most important PA dimension to explain MS.

Key findings. Energy expenditure in recreational PA and moderate to vigorous PA was independently associated with pre-morbid MS. Inequalities of gender, education, social-class and some occupations were observed for the risk of both morbid and pre-morbid MS. The best predictors of MS were age and the sum of obesity criteria. Physical activity reduced the risk of age and obesity for pre-morbid MS.

## PT-090

### Poster

#### Physical activity profiles among Canary adult population and metabolic syndrome.

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tal "La Candelaria". Tenerife. Spain; <sup>4</sup>University Hospital Dr. Negrín. Las Palmas. Spain; <sup>5</sup>Department of Preventive Medicine and Public Health, University of La Laguna. Spain.

Objectives. Physical activity (PA) is important to increase energy expenditure and prevent metabolic disorders and obesity. Not much is known about PA in the Canary adult population and its relationship with metabolic syndrome (MS). The aim of this study was: 1) to determine the principal leisure time PAs in the Canary population, 2.) to examine socio-demographic patterns in several dimensions of PA and 3.) to estimate differences in energy expenditure in population with and without MS.

Material and methods. The CDC study was a cross-sectional, probabilistic and multistage random sample of 6729 adults (18-75 years old, 2004) from the Canary Islands. Anthropometric and clinical tests were performed. For each participant, the 3 most important PAs were assessed by validated questionnaire. Data of 18,479 PAs was registered and classified according to intensity, leisure time context, walking and total energy expenditure. Information of age, gender, education, index of social class, occupation, marital status, smoking and ancestry were obtained with standardized questionnaire. Each component of MS was measured with clinical protocols. Participants were classified into three levels of MS: No MS, pre-morbid MS and morbid MS. Those with diabetes or with antecedents of cardiovascular events and  $\geq 3$  components of MS were classified as "morbid MS". Socio-demographic differences among context, intensities and total PA were analyzed by ANOVA and Bonferroni post-hoc test.

Results. Domestic was the dominant context (30.6%), whilst light PA (43%) was the dominant intensity among the three principal PAs. Moderate and vigorous PAs represented 29.5% and 5% respectively. Population energy expenditure (mean $\pm$ 95% CI) in moderate-to-vigorous PA was 3.0 $\pm$ 0.6 Met-h/day, and 2.9 $\pm$ 0.07 in light PAs. Recreational and domestic energy expenditure were also balanced (2.5 $\pm$ 0.07 vs. 2.7 $\pm$ 0.08). Energy expenditure in light PA was higher ( $p < 0.05$ ) in women (4.0 $\pm$ 0.07 vs. 1.5 $\pm$ 0.08 men), older than 45 years old (3.3 $\pm$ 0.12), primary education (3.3 $\pm$ 0.09), low and medium social-classes (3.2 $\pm$ 0.15), housekeeper (4.7 $\pm$ 0.14), and BMI $>$ 30 kg/m<sup>2</sup> (3.2 $\pm$ 0.13). These groups also showed a greater energy expenditure in domestic and walking PAs. There were no substantial differences in total energy expenditure between sociodemographic groups. Morbid and pre-morbid MS groups had a lower energy expenditure ( $p < 0.05$ ) in total, moderate, vigorous and recreational PA, and higher in light, domestic and walking PAs compared with the no MS group. Prevalence of recommended PA level was higher in the no MS group (31.7 $\pm$ 1.4%) compared with pre-morbid MS (20.2 $\pm$ 1.9%) and morbid MS (15.8 $\pm$ 2.8%).

Key findings. Energy expenditure in moderate, vigorous and recreational PA decreases with age, women, lower education, lower and medium social class and obese, whilst light and domestic PA increases in these groups. Lower total energy expenditure and substitution of moderate and recreational PA with light and domestic PA characterized pre-morbid and morbid MS.

## PT-091

### Poster

#### Antioxidants consumption in the diet of Krakow inhabitants, assessed on the basis of Dietary Antioxidant Index.

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Objectives: Total antioxidant capacity (TAC), which is the cumulative capacity of food components to scavenge free radicals is reported to be inversely related to the risk for oxidative stress-induced diseases. FFQ-based TAC values are used in nutritional epidemiology to assess antioxidant intake from food, what is usually treated as Dietary Antioxidant Index (DAI).

The aim of the study was to estimate the daily intake of antioxidants among the inhabitants of the city and area of Krakow, on the basis of DAI. Material and methods: Dietary antioxidant index was investigated on the basis of food frequency questionnaire (FFQ). In the FFQ 145 food items were classified into groups such as fruit and dried fruits, vegetables and vegetable oils, sweets, grains and cereal-based products, mixed dishes, fresh herbs and spices and beverages. Participants reported how often they ate each food in the past month. Medium serving size was shown as a reference. In order to calculate DAI for each participant, previously published databases from United States and Italy, containing the most commonly consumed foods were used. The ferric-reducing antioxidant power (FRAP) measuring the ferric-reducing ability of plasma was chosen as a method of estimation of total antioxidant capacity of food supplied in the daily diet. Three hundred and fifty healthy volunteer subjects (180 women and 170 men) were enrolled in the study. They were 21 to 60 years old (mean age was 42,3  $\pm$  SD 14,1 years). They were not smokers. The DAI values were compared in female and male groups using Tukey's test.

Results: The mean value of DAI of all examined persons was 52.84 $\pm$  26.1 mMol/l. The values of DAI were significantly higher in women (63.91 $\pm$ 25.58 mMol/l) than in men (49.36 $\pm$  22.75 mMol/l),  $p < 0.05$ . Fruits had the biggest contribution in total DAI values, next beverages (especially coffee) and nuts. All examined persons used to eat too rarely the food with high

antioxidant activities such as spinach and Brussels sprouts, berries, almond, kiwi, hazel nut and soybeans oil. The men nearly did not use fresh herbs and spices, especially marjoram and rosemary.

Key findings: The recommendation for Polish people (on the basis of our study) is to increase the consumption of food rich in antioxidants and it should have favourable outcome for prophylaxis of chronic diseases, especially cancer and heart diseases.

The dietary modification towards higher consumption of antioxidants should be implemented as one of the public health strategies.

#### PT-092

Poster

##### **Fat intake and types of dietary fats among elderly people with cardiovascular disease.**

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Objective: In Poland, like in other European countries, together with population ageing number of people suffering from nutritional disorders and related diseases as e.g. cardiovascular illnesses is growing. Proper diet can be treated as an effective complement for pharmacotherapy. In case of cardiovascular diseases fats, both quality and quantity, seem to play a crucial role in dietetic intervention. The main objective of presented study was analysis of fats' type and amount, and cholesterol content in food rations of elderly people with cardiovascular disease.

Material and methods: 128 individuals (66 women and 62 men), hospitalized in I Clinic of Cardiology and Hypertension JUMC in Krakow, took part in the study (average age 73.2±6.9). Daily intake of energy, fat content, fatty acid composition and cholesterol were estimated using a 24-hour dietary recall method, repeated three times for each individual (2 week-days and 1 feast-day). Results for each patient were compared with norms published by National Food and Nutrition Institute in Warsaw and guidelines elaborated by Polish Forum for Prevention of Cardiovascular Diseases. "Statistica for Windows" ver.7.1.pl was used for statistical analysis. Mann-Whitney test was used for evaluation of differences between men and women groups. Results: Men's diet and women's diet were significantly different in terms of higher intake of fat: 50.2g among men and 18.1g among women (p=0.004). Percentage of energy from saturated fatty acids in diets was higher than dietary recommendations (10.6% of Daily Nutritional Ratio (DNR) vs. <7% in recommendations), while intake of monounsaturated fatty acids was in accordance with dietary guidelines. Percentage share of polyunsaturated fatty acids was low: 4.6% of energy of DNR among men and 4.1% among women (p=0.04). Proper percentage share of omega-6 linoleic acid according to norms should reach 4% while in examined population was 3.37% of DNR for men and 3.04% for women. Guidelines, for people with lipid disorders, indicate 200 mg of cholesterol per day as a safe threshold while in examined population subsequent values were determined: 235.7mg/day for men and 229,04mg/day for women.

Key findings: Despite all patients being under the care of a clinic dietitian, the majority of them were making nutrition mistakes, mainly in terms of fat quantity. Repeating nutrition mistakes can accelerate development of already existing disorders. In order to improve nutrition a 10-day balanced menu, adjusted to their health condition and individual preferences, were constructed for each patient.

#### PT-093

Poster

##### **Variables predictive of adherence to a Mediterranean hypocaloric diet in the treatment of obesity and overweight, in a group subjects living in Lanzarote.**

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Objectives: To assess the factors that could predict a successful completion of a weight loss program.

Material and methods: A single-centered, cross-sectional, prospective study conducted over 4 years. Data were obtained on 500 overweight subjects (428 women, 72 men) aged 18–81 years (mean 41.7) and body mass index (BMI) of 31.44 (range 25.09–51.33) seeking help to lose weight at a specialist obesity clinic. A program involving a hypocaloric, Mediterranean diet was prescribed plus recommendations for free-time exercise and day-to-day activity. Follow-up was weekly until the desired weight loss was achieved ('successful completion') or the patient dropped-out of the program ('failure'). Cox's regression analysis was used to evaluate success and the variables included were compliance with the program, age, gender, initial BMI, percentage of fat mass, physical activity, alcohol consumption, smoking habit, previous dietary programs, age at which excessive weight was first noted and hypothyroid disease. Results: Factors predictive of completion were: gender (males responded better), previous dietary programs (predictive of dropout), initial percentage

of fat mass (higher percentage, lower completion), age (younger age, poorer outcome) and hypothyroid disease (predictive of dropout).

Key findings: In a standard weight reduction program the recommendations of dietary restriction and moderate exercise seems less effective for women, persons with high percentage of fat mass, younger age groups and those who have had other attempts at weight loss. Poorest outcomes applied to those subjects with hypothyroid disease.

#### PT-094

Poster

##### **Newborn anthropometric assessment using photographic images: Preliminary testing with inanimate (cut-out and doll) models: Inter-rater correspondence of estimates.**

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Objectives: Insofar as the gold-standard measurement of newborn length has questionable accuracy, is uncomfortable for the infant and may be unsafe in its forced extension of the skeleton and nerve-network, our aim was to develop a photographic image approach to newborn length assessment using simulations with inanimate models and evaluate inter-rater correspondence.

Materials and Methods: Three observers (A,B, and C) used each different digital cameras to take pictures of 3 two-dimensional cardboard figures and 2 soft-body baby dolls, both sets of the approximate overall length of a human newborn. In sagittal exposure photography, we produced an image in the "fetal position." We sustained the head-to-trunk posture to maintain a "Frankfort plane" gaze, while the sole of the foot was positioned to form a 90o angle at the ankle. A reference-length of either 5 or 10 cm was affixed to the model. Pictures were printed out and each observer used a metric ruler, precise to the nearest mm, to measure each of three linear components of the body: the trunk segment (TS); upper-leg segment (ULS); and lower-leg segment (LLS). The TS corresponded to the distance from the crown of the head to the hip joint; the ULS was the distance from the hip joint to the knee joint; and the LLS was estimated by measuring the length from the knee joint to the sole of the foot. The estimated total composite length was calculated by adding up the TS, ULS and LLS in mm, and correcting the final dimension in cm, applying the correction-factor from the 5 or 10 cm reference length in the image.

Results: For all cardboard-figure measurements from photographs (n=24), the Pearson correlation of observers A vs B was r=0.77 and the Spearman rank-order correlation was r=0.76; for A vs C, the respective values were r=0.89 and r=0.90, and for B vs C, r=0.84 and r=0.80. For all doll measurements from photographs (n=32), the respective correlations of A vs B were r=0.37 and r=0.66; for A vs C, r=0.54 and r=0.76; and for B vs C, r=0.84 and r=0.81. All r values were significant from p<0.0001 to p=0.004.

Key findings: When using this new approach of photographic images to assess newborn length in inanimate models, we find a generally highly-significant inter-rater correspondence.

#### PT-095

Poster

##### **Optimally accepted salt reduction across cultures - By using naturally brewed soy sauce as a salt replacer and maximizing its' potential with "Overall Taste Intensity-based approach"**

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Objectives: High salt intake could increase a risk of hypertension and is directly related to the development of cardiovascular disease. Since World Health Organization published recommendations to reduce salt intake in 1990, lots of researches were carried out in this field. However, most of them were demonstrated in one country. A cross-cultural study is still quite rare. This could be one of the reasons that the previous outcomes have not been applied into practice.

The aim of this study is to propose an optimal salt reduction approach based on "Overall Taste Intensity" with using naturally brewed soy sauce, and demonstrate it in three countries (Netherlands, Singapore and Japan) to understand whether it can be used global or not.

Material and methods: In each country (Netherlands, Singapore and Japan), approximately 60 local consumers were recruited. In all three countries the age range was 18-60 years and male and female participation was nearly equal. Three types of foods (salad dressing, soup, and stir-fried pork) were investigated whether it would be possible to reduce the NaCl content with naturally brewed soy sauce. In the first step, an exchange rate (ER) by which NaCl can be replaced with soy sauce without a significant change in the overall taste intensity was established per product type, by means of alternative forced choice tests. In the second step, the same consumers evaluated five samples per product type with varying NaCl and/or soy sauce content on pleasantness and several sensory attributes.

Results: The acceptable percentages of salt reduction in the Netherlands, Japan, and Singapore were respectively 32%, 34%, and 35%, averaged over three products. Although cultural difference can be seen in each food, the overall average of salt reduction percentage was similar. The correlation between pleasantness and overall taste intensity was always higher than the correlation between pleasantness and saltiness in all three countries and in all three recipes. It indicates that overall taste intensity was the main driver for acceptance.

Key findings: Regardless of a familiarity toward naturally brewed soy sauce, it globally works as a salt replacer. Soy sauce does not only compensate saltiness, but enhances overall taste with Umami substance. It can be said that a frequently used "saltiness-based approach" might miss and/or underestimate its feasibility as a salt replacer. Thus, we propose that "Overall Taste Intensity-based approach" is more suitable for non-saltiness compensating salt replacers.

#### PT-096

Poster

#### Comparison of dietary diversity according to the stature-ponderal status and gender among the rural middle school children in the northwest of Morocco.

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Objectives: this study compares the dietary diversity scores according to the stature-ponderal status and gender among the rural middle school children in the northwest of Morocco.

Material and methods: a sample of 300 was observed in a rural school in the northwest of Morocco. The dietary diversity scores are calculated by counting the number of the 11 food groups consumed by the middle school children interviewed during a period of 7 days. The stature-ponderal status is determined by height for age and Body Mass Index (BMI) for age. Results: the sample consists of 102 girls (34%) and 198 boys (66%). The average age is  $15.45 \pm 1.64$  years, ranging from 12.3 to 19.74 years. Stunting and thinness are respectively 9.7% and 10%. The comparison by Mann-Whitney test with a risk  $\alpha = 5\%$  shows that there was no significant difference in dietary diversity scores between the normal group ( $N = 271$ ) and the group with stunting ( $N = 29$ ): ( $u = 3046, p = 0, 051 > 0.05$ ), same thing between normal group ( $N = 270$ ) and the group with thinness ( $N = 30$ ): ( $u = 3566; p = 0,26 > 0,05$ ). Also between girls and boys ( $u = 9588.5, p = 0.46 > 0.05$ ).

Key findings: It seems that dietary diversity is not affected by the stature-ponderal status or gender, but instead the socio-economic conditions of the environment.

#### PT-097

Poster

#### Body composition and dietary protein intake of geriatric patients.

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Background: Old, frail people, especially institutionalized geriatric patients, are at a very high risk for ingesting not enough protein. Insufficient protein intake could lead to an accelerating loss of lean body mass despite a constant Body Mass Index (BMI).

Objective: Therefore we examined whether the current uptake of protein- and energy of institutionalized geriatric patients is adequate for avoiding a loss of lean body mass?

Design: We observed changes in body weight and composition during a one year period in 51 women (86.4%) and 8 men (13.6%) aged  $83.2 \pm 9.6$  years. Whole-body lean mass and fat mass were measured by using BIA (a bioelectrical impedance analysis with Bodystat 1500@MDD in a multi-frequency (5/50kHz) technique on the right side of the body in supine position). We assessed the protein- and energy intake with the help of a 3-days weighing record at the beginning of the observation time. For statistical evaluation we used the non-parametric Friedman-Rang-Test and T-Test. We considered a p-value  $< 0.05$  statistically significant. For finding correlations we used the Pearson-test.

Results: During observation time weight could be kept constant ( $p = 0.255$ ). In contrast lean body mass decreased significantly ( $p < 0.001/p < 0.001$ ) and fat mass increased significantly ( $p < 0.001$ ). Mean protein intake was  $0.68 (\pm 0.20) \text{ g/kgBW/d}$  which was significantly below the reference intake of  $0.8 \text{ g/kgBW/d}$ . Mean energy intake was  $1250.4 (\pm 06.6) \text{ kcal/d}$ . Protein and energy intake ( $\text{g/kgBW/d}$ ) correlates significantly ( $p < 0.01/p < 0.05$ ) with lean body mass ( $r = 0.37/r = 0.29$ ).

Conclusion: In the line with published data we could show that BMI stability in older individuals does not imply body composition stability. As the protein intake of the geriatric patients was significantly below the recommended daily intake of  $0.8 \text{ g/kgBW/d}$  and correlated significantly with lean body mass (LBM) we concluded that there must be a causal relationship between

the protein intake and the loss of lean body mass of the geriatric patients. The assessed protein- and energy intake was not adequate for avoiding a loss of lean body mass. As the LBM loss was masked by a constant BMI it is obvious that the BMI is not a good assessment tool for identifying geriatric patients with a poor nutritional status. For avoiding loss of LBM through a low protein intake further efforts should be made for finding the optimal dietary protein intake of geriatric patients.

#### PT-098

Poster

#### The School Fruit Scheme's impact on children's barriers to eating vegetable and fruits.

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Objectives: Surveys indicate that a large percentage of the school-aged children population does not consume the recommended intake of fruits and vegetables. The aim of the study was to analyze The School Fruit Scheme's impact on children's barriers to fruit and vegetable consumption.

Material and methods: The study was conducted in the school year 2010/2011 in 38 primary schools in Poland among students aged 9 years on the basis of anonymous questionnaires in two types of schools: participating in the School Fruit Scheme and control group. The study was carried out in two stages: before launching the distribution of free fruit and vegetables (October 2010) and at the end of the fruit and vegetables distribution period (May-June 2011).

Results: 33 % of the children participating in the program reported that there is at least one barrier to eating fruit. In the first stage 27.5% responded that the barrier is too short breaks, 30.5 % prefer to eat something sweet, 18.8% do not eat fruit because their friends do not eat and for 15.3% it takes too much time. In the second stage of the study showed significantly less response " I do not eat because colleagues do not eat " and " I prefer to eat something sweet " ( $p < 0.00001$ ) in the intervention group than in the control (10.5 % vs 17.4% and 19 % and 27.6 %, respectively). 28.1 % of the children reported that there is at least one barrier to eating vegetables. In the first stage 30.7% answered that the reason they are too short breaks , 34.4 % prefer to eat something sweet, 20.1% do not eat vegetables because their friends do not eat and for 15.3% it takes too much time. In the second stage of the study showed significantly less response " I do not eat because colleagues do not eat " as much as 10.9%.

Conclusions: The Scheme proved to have an influence on lowering the barrier of f/v consumption. The fact that f/v were readily accessible at school as well as their consumption by schoolmates made eating f/v more attractive for those children who had not consumed them for various reasons.

#### PT-099

Poster

#### The '40-Something' program improved fruit intake and nutrient density of the diet in premenopausal mid-age women at 12-months.

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Objectives: Mid-age women commonly experience an increase in weight and visceral fat and a reduction in lean muscle mass during the menopause transition. Their nutritional requirements also change post-menopause with a need for better diet quality as energy requirements reduce and micronutrient requirements increase. Mid-age is a key time to prevent obesity-related adverse health problems and nutritional deficiencies later in life. The 40-Something Randomised Controlled Trial (RCT) (ACTRN12611000064909) aimed to determine if a 12-month health professional-led intervention, based on motivational interviewing principles, could improve dietary intake, increase physical activity and prevent weight gain in mid-age, healthy weight and overweight premenopausal women.

Material and methods: Women (mean (SD) age =  $47.3 (1.8)$  years, weight =  $68.7 (7.9) \text{ kg}$ ) were randomly allocated to the motivational interviewing (MI) group ( $n=28$ ) (4 x 60 minute dietitian consultations and 1 x 60 minute exercise physiologist consultation delivered over 12 months), or a self-directed (SDI) group ( $n=26$ ) who received written information only. Participants completed 4-day weighed food records and physical activity diaries at baseline ( $n=53$ ), three months ( $n=49$ ) and 12 months ( $n=35$ ). Nutrient intakes were compared to Australian nutrient reference values and converted to nutrient densities. Linear Mixed Model analyses adjusting for baseline and 3-month behaviours, covariates (age, socioeconomic status, baseline body mass index) and interactions were used to test for between-group differences by group and between participants who did and did not meet weight control goals.

Results: MI women had diets significantly more nutrient dense for iron ( $0.33 \text{ g/MJ}$ ,  $p=0.01$ ) and potassium ( $89.87 \text{ mg/MJ}$ ,  $p=0.04$ ), and consumed more

fruit (0.71 serves/d,  $p=0.02$ ) than SDI women at 12 months. No significant group-by-time effects were found for energy (-397.94 kJ/d,  $p=0.21$ ), fat (-7.52g/d,  $p=0.26$ ), protein (-3.33g/d,  $p=0.20$ ) and carbohydrate intake (-6.47,  $p=0.38$ ), or for minutes of physical activity (46.04 mins/d,  $p=0.13$ ), pedometer-measured steps (504.49 steps/d,  $p=0.81$ ) and sitting time (32.61 mins/d,  $p=0.77$ ). Women who achieved weight control goals consumed significantly more fruit (+0.76 serves/day,  $p=0.02$ ) and less meat/meat alternatives (-0.34 serves/day,  $p<0.01$ ) servings than women who did not. Key findings: The findings demonstrate the effectiveness of the 40-Something RCT in improving nutrient density and fruit intake in premenopausal women. The lack of physical activity and sedentary behaviour change indicate that future interventions with this group may need to more strongly emphasise physical activity, which may be achieved by allowing women to tailor health professional support by choosing follow-up consultations with a dietitian or exercise physiologist.

**PT-100**

Poster

**Relationship between Environmental Factors and Nutrition Status of Children Under Five Years Old in Mindi Village, Porong-Indonesia on October–November 2012.**Sugiharto C.<sup>1</sup>, Idana F.2, Mufarikhah I.<sup>2</sup>, Adha Agus P.U.<sup>2</sup>, Dwi P.B.N.<sup>2</sup><sup>1</sup>Department of Public Health, Faculty of Medicine Wijaya Kusuma University, Surabaya-Indonesia. <sup>2</sup>Graduate Program of Faculty of Medicine Wijaya Kusuma University, Surabaya-Indonesia

Objectives: Nutrition status is one of the important parameter for measuring the child's growth and development. Malnutrition, which associated to bad nutrition status, especially in children under five causes impairment in physical growth and health. The prevalence of malnutrition in children is one of the indicator in Millennium Development Goals (MDGs). Nutrition status is related to some factors, included environmental factor of the children. This study aimed to analyze the relationship between environmental factors and the nutrition status of children under five years old in Mindi Village, Porong-Indonesia on October–November 2012.

Materials and Methods: This was an observational cross-sectional analytic study conducted in Mindi Village, Porong-Indonesia on October to November 2012. Sample 19 respondents of 257 in population. Observed variables were nutrition status of children under five years old as dependent variable and environmental factors as independent variable, which were smoking habit in the family, house ventilation, residential density, and floor type. Fisher's exact test was performed for analyzing the relationship between the environmental factors and the nutrition status of children under five years old.

Results: Characteristic of the respondent was: having female children under five years old (63.16%), bad nutrition status (73.68%), smoking habit in the family (73.68%), inadequate house ventilation (57.89%), adequate residential density (94.74%), good floor type (89.47%). The result showed that environmental factors related to the nutrition status of children under five years old were: smoking habit in the family with  $p = 0.001 < \alpha (0.05)$  and house ventilation  $p = 0.04 < \alpha (0.05)$ . Efforts should be focused in changing the environmental factors, especially the smoking habit in the family and house ventilation to reduce the amount of bad nutrition of children under five years old.

Key findings: Nutrition status, smoking habit, house ventilation, residential density, floor type.

**PT-101**

Poster

**Breastfeeding perceptions and practices among African immigrant mothers in Helsinki metropolitan area.**

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Background: Breastfeeding, especially when done exclusively for the first six months, is the recommended infant feeding method. Through breastfeeding, nutrients needed by young infants, for healthy growth and development, are made available to them. Despite various benefits of breastfeeding, there are low rates of it globally. Exclusive breastfeeding in particular has been very low, even in Africa where breastfeeding is believed to be nearly universal. Based on the fact that breastfeeding as a practice is impacted by the surrounding culture, the trend of breastfeeding among a particular group of people can be understood by studying their perceptions about its practices.

Objectives: The aim of the study was to examine perceptions about breastfeeding and the factors that are associated with breastfeeding practices among African immigrant mothers in Finland.

Material and methods: The study made use of qualitative method involving thematic semi-structured in-depth interviews. The interviews were conducted from March to June 2011 among 10 African immigrant mothers. The women were recruited using Snowball sampling technique. Inclusion criteria include; living in Helsinki Metropolitan Area, having giving birth in Finland to a child whose age was between 1-3 years, and being able to

speak and understand English language. All interviews were audio-recorded, transcribed verbatim and analysed using content analysis.

Results: Seven major themes emerged from this study; (1) general perception of breastfeeding; (2) perceived advantages and disadvantages of breastfeeding; (3) breastfeeding practices and levels of commitment; (4) breastfeeding decision and social influences; (5) attitude towards breastfeeding; (6) sources of awareness and information (7) perceptions about formula feeding.

Mothers' perceptions about breastfeeding included it being beneficial for both mother and infant, maternal-infant bonding, and for reducing the risk of breast cancer, among others. Positive perceptions and attitudes about breastfeeding were found in association with high rate of breastfeeding practices both in terms of initiation and duration. Breastfeeding decision and practices were generally influenced by indigenous culture, encouragement from social network, and information about the importance of breastfeeding. Despite the high level of commitment towards breastfeeding, the rate of exclusive breastfeeding was lower than globally recommended.

Conclusion: African immigrant mothers in Finland had strong and positive perceptions about breastfeeding. This study recommends that breastfeeding promoting educational programmes are very important especially for improvement in exclusive breastfeeding.

**PT-102**

Poster

**Effect of micronutrient intake on the immune system of people living with HIV/AIDS.**

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Background and objectives: HIV/AIDS is one of the most raging global epidemic with its resultant death effect. The number of people infected with this disease increases every year. The increased energy expenditure and tissue breakdown associated with HIV infection are thought to increase the requirements of micronutrients. There is urgent need for nutritional intervention to halt its continued spread and to improve the quality of those already infected and living with it. This study aims at assessing the effect of micronutrient intake on the immune system of people with HIV/AIDS by their consumption of some known fruits and vegetables.

Methods: Five (5) HIV Volunteers comprising of 4 females and 1 male in the age range 26-40 years were recruited in the heart to heart unit of the Catholic Mission Hospital Emekuke Owerri, Imo State of Nigeria. Five known fruits in season (Orange, carrot, Tomatoes, Pineapple and watermelon) were bought, washed, peeled and cut in pieces for blending. The undiluted fruit juices were separately collected in clean sterilized containers and kept in a cool place for further use. Two doses (50cl) of the undiluted fruit juices were served to them in the mornings and in the evenings for a period of seven days. The CD4 (Cluster of Differentiation 4) counts of the individual respondents were determined using the CD4 reagents and the patec cyflow machine. The micronutrient content of the fruits were chemically analyzed using modern methods of AOAC.

Results: Result showed that four out of the five respondents used in this study had higher CD4 count after the intervention period of seven days and only one had a reduced CD4 count after the intervention period.

There were higher increase of Vit A, Vit B1, Vit. B2, & Carotene in carrot, Niacin and Vit E was highest in tomatoes, while orange had highest level of Vit C compared to other fruits.

Conclusion: Fruits have been found to contain remarkable quantities of micronutrients (vitamins and minerals) especially the antioxidants. This finding is very important in boosting the immune system of HIV positive people. Micronutrient intake over a week range had considerable effect on the CD4 count and could do more if given for a longer period.

There is need therefore to incorporate fruit based micronutrients in the diets of HIV/AIDS patients.

**PT-103**

Poster

**Abscess infections and malnutrition – a cross-sectional study of polydrug addicts in Oslo, Norway.**Saeland M<sup>1</sup>, Wandel M<sup>2</sup>, Bö Hmer T<sup>3</sup>, Haugen M<sup>4</sup><sup>1</sup>Oslo and Akershus University College, Oslo; <sup>2</sup>Department of Nutrition, Institute of Basic Medical Sciences, University of Oslo; <sup>3</sup>Nutritional Laboratory, Department of Medical Biochemistry, Oslo University Hospital, Aker; <sup>4</sup>Division of Environmental Medicine, Norwegian Institute of Public Health, Oslo, Norway.

Background: Injection drug use and malnutrition are widespread among polydrug addicts in Oslo, Norway, but little is known about the frequency of abscess infections and possible relations to malnutrition. Objectives . To assess the prevalence of abscess infections, and differences in nutritional status between drug addicts with or without abscess infections. Design . A cross-sectional study of 195 polydrug addicts encompassing interview of demographics, dietary recall, anthropometric measurements and biochemical analyses. All respondents were under the influence of illicit drugs and were not participating in any drug treatment or rehabilitation program at the time of investigation. Results . Abscess infections were reported by

25% of the respondents, 19% of the men and 33% of the women ( $p < 0.025$ ). Underweight (BMI  $18.5 \text{ kg/m}^2$ ) was significantly more prevalent in the abscess infected than in the non-abscess-infected group ( $p < 0.001$ ). The abscess-infected addicts reported fewer meals, lower intakes of fruits and vegetables, lower energy percentage (E%) from protein and higher E% from sugar. They also had lower total intakes of vitamins D, B<sub>1</sub>, B<sub>6</sub>, B<sub>12</sub>, folic acid and vitamin C than the non-abscess-infected group. The two groups differed significantly with respect to S-C-peptide ( $p < 0.042$ ) and B-HbA1c ( $p < 0.012$ ), and the prevalence of hyperhomocysteinemia (P-THCY  $15 \mu\text{mol/L}$ ) was 73% in the abscess-infected group and 41% in the non-abscess-infected group ( $p < 0.001$ ). The concentrations of S-25-hydroxy-vitamin D<sub>3</sub> was very low. Conclusion. The prevalence of abscess infections was 25% among the examined polydrug addicts. Dietary, anthropometric and biochemical assessment indicated a relation between abscess infections and malnutrition.

#### PT-104

Poster

#### Correlations between body mass index and elevated parameters of lipid metabolism in Austrian adults.

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**Objectives:** The aim of the presented study was to illustrate the correlations between an increased body mass index (BMI) and elevated plasma total cholesterol, LDL-cholesterol and triglycerides as well as lowered HDL-cholesterol in Austrian adults, which were identified in numerous studies.

**Material and methods:** The presented data were collected within the framework of the "Austrian study on nutritional status 2010/12". Altogether, 313 Austrian adults (18-64 years) were examined. Body height and body weight were measured according to standardized procedures. Blood lipid profile was analyzed photometrically using a Vitros 250 autoanalyser. To classify the individuals as underweight, normal weight, overweight or obese BMI was calculated as body weight in kilograms divided by body height in meters squared. According to the World Health Organization overweight was defined as  $\text{BMI} \geq 25 \text{ kg/m}^2$  and obesity as  $\text{BMI} \geq 30 \text{ kg/m}^2$ .

**Results:** Plasma total cholesterol, LDL-cholesterol and triglycerides were increased whereas HDL-cholesterol was decreased significantly with increasing BMI. Thus, the mean ratio of total- to HDL-cholesterol was increased with increasing BMI, too. Overweight and obese individuals had significantly higher mean total cholesterol (5.4 vs. 5.7 mmol/L,  $p < 0.05$ ), LDL-cholesterol (3.2 vs. 3.7 mmol/L,  $p < 0.001$ ) and triglyceride levels (1.1 vs. 1.5 mmol/L,  $p < 0.001$ ) than normal weight individuals, whereas HDL-cholesterol was significantly lower (1.7 vs. 1.3 mmol/L,  $p < 0.001$ ). 74.3% of overweight and obese adults and only 61.5% of normal weight persons revealed total cholesterol above the threshold of 5 mmol/L ( $p < 0.05$ ). Moreover, the percentage of overweight and obese adults with triglycerides, LDL-cholesterol and ratio of total- to HDL-cholesterol above the corresponding reference values (1.7 mmol/L, 3.0 mmol/L and 5) was significantly higher than the percentage of normal weight individuals with altered blood lipid profile. Recommended HDL-cholesterol ( $> 1.2 \text{ mmol/L}$ ) were reached in 88.7% of normal weight and only 53.4% of overweight and obese adults ( $p < 0.001$ ).

**Key findings:** The presented results confirm the correlations between an elevated BMI and cardiovascular risk factors. Therefore, overweight and obesity remain an important public health issue in Austria. Programs and interventions need to be developed or enhanced.

#### PT-105

Poster

#### Association between supplementation of vitamin C and E for one year and serum $\alpha$ -tocopherol concentration in elderly Iranian patients with MCI.

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**Background and objectives:** Elderly patients with MCI (Mild Cognitive Impairment) show different levels of vitamin E status, serum  $\alpha$ -tocopherol content also in the elderly may be influenced by different factors. Only insufficient data are available about the influence of supplementation with antioxidants on the vitamin E status. In this study the impact of one year intervention with vitamin E and C on the content of serum  $\alpha$ -tocopherol was assessed.

**Methods:** A 12-month, double-blinded, placebo-controlled trial was conducted in 180 elderly Iranian individuals with MCI aged between 60-75 years (90 women and 90 men). Divided into two main groups, the intervention group included 90 persons who were given a daily dose of 300 mg vitamin E (Alpha-tocopheryl acetate) and 400 mg vitamin C (Ascorbic acid), and the other 90 persons (Control group) received specially designed placebo. All patients were not taking any drugs that might interfere with the supplements. Serum  $\alpha$ -tocopherol contents were assessed in all patients at base line, 6 and 12 months of intervention using HPLC.

**Results:** Results show there was a significant difference between females in the control and supplemented group at six months and at the end of intervention (Females, control/supplemented  $29.76 \pm 10.67$ ;  $35.1 \pm 10.67 \mu\text{mol/L}$ ,  $p < 0.043$ ) and (Females, control/supplemented  $27.61 \pm 11.07$ ;  $36.5 \pm 11.07$

$\mu\text{mol/L}$ ,  $p < 0.0008$ ) respectively. At the end of the intervention there was a significant difference between males in control and supplemented group (Males, control/supplemented  $26.13 \pm 7.55$ ;  $32.3 \pm 14.55 \mu\text{mol/L}$ ,  $p < 0.012$ ), but there was no significant difference between males at six months in control and supplemented group (Males, control/supplemented  $27.76 \pm 8.04$ ;  $30.1 \pm 14.56 \mu\text{mol/L}$ ,  $p < 0.34$ ).

**Conclusions:** One year of antioxidants supplementation with vitamin E and C in elderly subjects with MCI lead to significant increase in the serum  $\alpha$ -tocopherol levels.

#### PT-106

Poster

#### Snacking between main meals is associated with a higher risk of metabolic syndrome in a Mediterranean cohort: the SUN (Seguimiento Universidad de Navarra) Project.

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**Objectives:** To evaluate the association of snacking between main meals with the risk of developing Metabolic Syndrome (MetS).

**Material and methods:** Data from a dynamic prospective cohort study, the SUN Project (Seguimiento Universidad de Navarra) was used. Snack consumption was evaluated, using the following question: 'Do you have the habit of snacking between main meals?' MetS was defined according to the updated harmonizing criteria. We estimated multivariable-adjusted Relative Risks (RR) of MetS and their 95% Confidence Intervals (95% CI), using Poisson regression models. An exploratory factor analysis was also used to identify patterns of snacking.

The study included 6,851 university graduates, initially free of MetS, and followed-up for a median of 8.3 years.

**Results:** Among our participants, 34.6% reported usual snacking between main meals. The cumulative incidence of MetS was 5.1% (9.5% among men and 2.8% among women). Snacking between main meals was significantly associated with a higher risk of developing MetS after multivariable adjustment (RR = 1.30; 95% CI = 1.06-1.60). A higher adherence to an "unhealthy snacking pattern" was also independently associated with increased incidence of MetS (RR for the 4th quartile of adherence compared to non-snacking: RR = 1.55; 95% CI = 1.05 - 2.04; P for trend = 0.012).

**Key findings:** Our findings suggest that avoidance of snacking between main meals can be included among the preventive approaches to reduce the risk of MetS development, especially when snacks contain foods of poor nutritional quality. Further longitudinal studies in general population should be conducted to corroborate this relationship.

**Funding:** The SUN Study has received funding from the Instituto de Salud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/02658, PI10/02293, PI13/00615, RD06/0045, G03/140 and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra.

#### PT-107

Poster

#### Standardization of Nutritional Equivalency of Food Composition Database in Latin American Survey of Nutrition and Health (ELANS).

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**Objectives:** To describe the methodological concepts and procedures involved in the standardization of nutritional equivalency of food composition database across the 8 Latin American countries participating in the Latin American Survey of Nutrition and Health Study / Estudio Latinoamericano de Nutrición y Salud (ELANS).

**Material and methods:** The data for this study will be originated from an ongoing multinational cross-sectional study in a representative urban sample (15 to 65 years of age, both genders and from 3 socioeconomic strata) of 8 Latin American countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Peru and Venezuela). A standard study protocol was design to investigate nutritional intake pattern in all countries enrolled. Two 24-hour recalls using Multiple Pass Method, will be applied among the individuals of all countries. Quality of the acquired information will be checked, and the quantification of food and beverages intake will be conducted using national published data concerning the quantities of household measures and recipes. The data from the 24-hour dietary recall will be entered into the Nutrition Data System for Research program (NDS-R, version 2013, Nutrition

Coordinating Center, University of Minnesota). A food matching standardized procedure will be strictly conducted by the countries. This procedure involves a nutritional equivalency of local food items (food, beverages, and recipes) reported by the study subjects of each country to foods available in NDS-R database. A concordance rate between 80 and 120% for energy and macronutrient content will be considered to establish food selection from this database. Regional food preparations will be provided by national publications and will be entered into the software as standard recipes.

Results: Using this method of standardization and documentation at the food and nutrient levels will likely minimize systematic and random errors in nutrient intake estimations and allow comparisons between these Latin American countries. This is an important initiative for harmonization of dietary assessment that could be applied in a standardized manner in different populations and could therefore generate comparable dietary data in multicentre epidemiological studies.

#### PT-108

Poster

##### **The Amed Certification enables to follow a healthy eating diet outside the house for more than 51,000 people per day in Catalonia.**

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Background. Cardiovascular disease, caused mainly by physical inactivity and poor food habits, are among Catalonia's population main cause of death. The Mediterranean diet is well known for being one of the healthiest diets, with cardiovascular protective effects. Since 31% of the Catalan population eats out at least once a week (Monday to Friday), the Catalan Public Health Agency designed in 2007 the Amed Certification in order to identify and certify Mediterranean diet promoting establishments, whilst improving their food offer. This pioneer project in Spain is addressed to restaurants, food chains and dinners, especially in labour surroundings. Nowadays, there have been 322 certified establishments, in 87 municipalities, reaching more than 51,000 people per day. Objective. To evaluate the improvements in the use of selected typical Mediterranean foods, observed within the applicants, before and after the certification since 2012.

Material and methods. Food offer is collected with an online questionnaire through Amed's website. Later, the data is confirmed by telephone or by a personal visit of a certified Dietitian-Nutricionist. Following the Amed criteria, a descriptive analysis has been applied to obtain the improvement percentage of the food offer within the applicants (olive oil, vegetables and pulses, whole grain products, fresh fruit and low fat dairy desserts).

Results. From 2012 to May 2014, a total of 159 establishments have been certified for offering Mediterranean meals to 25,725 people/day. The improvements are an increase of 69% in the use of high-oleic-acid sunflower oil for frying, 33% in the incorporation of whole grain products (bread, pasta and rice), 24% in the use of olive oil or high-oleic-acid sunflower oil for cooking, 23% of low fat dairy products for dessert, 10% in the offer of more vegetables and pulses in the first course, 33% in the offer of fresh fruit for dessert and 3% in the offer of lean meats and fishes in the second courses. Olive oil was already been used as the main salad dressing by all applicants.

Key findings. The Amed certification guaranteed food improvements within the certified establishments, mainly concerning the change of common vegetal oil for high-oleic-acid sunflower oil for cooking and/or frying. It also increased the use of whole grain products, mainly bread, and fresh fruit and low fat dairy products for dessert.

#### PT-110

Poster

##### **Physical activity between Brazilian adult consumers and non-consumers of yogurt.**

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Objective: The aim of this cross-section population-based study was to evaluate the association between yogurt consumption and level of physical activity in a sample of adults living in São Paulo, Brazil.

Material and Methods: The data come from a cross-sectional population-based survey entitled 'Lifestyle of adults consumers and non consumers of yogurt living in São Paulo, Brazil', in which a total of 2.610 adults were allocated and divided in equal number to the yogurt consumers or non-consumers group according to their yogurt consumption frequency (more than or equal to 4 times a week in the last year or less than 1 time a week, respectively) and matched according to sex, age and socioeconomic status. Additional inclusion criteria were: individuals between 18 and 59 years old and belonging to A, B and C socioeconomic classes. In the present study, data were available from 2581 individuals. Trained interviewers collected data between February and March 2014 through face-to-face household interviews. The interview consisted of two phases, selecting and recruiting and final interview, both on the same day. In the first phase, a questionnaire

was applied to obtain data about yogurt intake frequency, demographic (age, sex, pregnancy) and socioeconomic classification. Individuals who met the inclusion criteria went on to the second phase of interview, in which data about lifestyle characteristics, including physical activity, were obtained. The International Physical Activity Questionnaire (IPAQ) long version was used to assess levels of physical activity. Individuals were categorized into two groups according to the physical activity score: very active (moderate-intensity activity and/or walking for a minimum of 30 min on five days each week or vigorous-intensity activity for a minimum of 20 min on three days each week) or not very active. Moreover, individuals were categorized into active or not active according to their leisure-time physical activity.

Results: The overall prevalence of very physically active individuals was 37.0%. Compared with non-consumers, yogurt consumers presented higher prevalence of individuals categorized as very active (39.17% v 34.89%;  $p = 0.0248$ ) and higher proportion of individuals physically active during leisure-time (17.70% v 14.40%;  $p = 0.0230$ ).

Key findings: It was concluded that yogurt consumption is associated with higher level of physical activity and lower prevalence of inactivity during leisure-time.

#### PT-111

Poster

##### **Purple wheat as healthy invitation source.**

Von Baer E.

Semillas Baer; Casilla 87-Temuco

Out of all the cereals wheat is the most important source of nourishment to the human race.

The objective of the modern breeding has been to create new varieties of wheat for major extraction and greater yield of white flour each time.

Developed from a breeding project of about 25 years in Chile, including mutations and accumulated hybridizations, the PURPURA WHEAT was created. This integral wheat has between 3-4 more antioxidant portions and according to a research done 10% higher survival rate. Anthocyanin-rich Purple Wheat Prolongs the Life Span of *Caenorhabditis elegans* Probably by Activating the DAF-16/FOXO Transcription Factor, University of Heidelberg and Kaiserslautern).

The present antioxidants are a group of phenols, Cyanidin-3-O-glucoside (42.6%) is the predominant anthocyanin in purple wheat, followed by peonidin-3-O-glucoside (39.9%) and malvidin-3-O-galactoside (17.4%).

Currently, this wheat is being produced on a scale of 300 metric tons per year and is used for cereal flakes and bread.

The present objective of Semillas Baer is to invite the nutritional world to research this new salutary hybrid wheat, and produce it for massive human consumption, which will dramatically increase the health and life span of humanity.

#### PT-112

Poster

##### **Sensory evaluation of the menus served in a sample of schools in the health regions of Lleida and High Pyrenees and Aran.**

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Introduction: since 2006 the Catalan Public Health Agency evaluates the quality of the school's menus offer. The Program is framed in the regional strategy of Health Promotion through Physical Activity and Healthy Food Integral Plan. It consists of an initial assessment and a follow-up to suggestions for improvement. To complete this information a third phase on sensory evaluation was performed.

Objective: to evaluate some sensory aspects off meals and the environment on a sample of schools

Methods: the pilot was done in 37 schools of the Health Regions of Lleida and High Pyrenees and Aran (35 was public and 4 concerted), 26 with their own kitchen and 13 with transported food, 12 of which are hot transport and 1 of which are cold transport food. Three health professionals visited the site and tasted the meal assessing sensory aspects of food and the environment, completing a questionnaire. The students between 10 and 12 ages old completed another one.

Results: the student's satisfaction rate was 6.59 of 10 and 6.46 of 10 in the case of the health professional evaluators. Data also indicates that 80% of users approved the service (rate>5).

According to professionals (n=111), the texture and consistency is right in 50% of the starters and in 55% of main dishes.

Temperature is adequate in 97% of the starters and in 64% of the main dishes. According to the students (n=559) The texture and consistency is considered adequate in 41% of starters and in 74 % of the main courses.

Only a 51.5% takes a second piece of fruit a day and a 51.34% eat some food at schools that never eat it at home. 51.5% think that taste is the main aspect to improve.

Conclusion: both professionals and students approved de quality of the sensory evaluation of school meals which increases the variety of food intake of children. The pilot program has been well received by schools. An inform will be sent to the school, municipality and the Education Department.

## PT-113

## Poster

**Changes in body composition according to anthropometry in Brazilian elderly.**

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Objective: To assess changes in body composition due to aging by anthropometric measures in non-institutionalized elderly in Brazil.

Material and methods: A population, household and cross-study among seniors aged greater than or equal to 60 years, of both genders, living in Viçosa, Minas Gerais, Brazil, from June to December 2009. Weight, height, circumferences of waist, hip, calf and arm, body mass index (BMI), body adiposity index (BAI), waist-hip ratio (WHR) and waist- height ratio (WHR) were evaluated according to gender and age groups (60-69 years; 70-79 years; 80 years and over). Data were analyzed using Stata version 9.0 and the Student t test to compare genders; ANOVA was used for comparison between age groups, and  $\alpha = 0.05$  was adopted as the significance level.

Results: 621 elderly were evaluated, with a slight predominance of women (53.3%), who had a higher age mean when compared to men ( $71.54 \pm 8.4$  vs  $69.95 \pm 7.56$  years;  $p < 0.01$ ), and a higher prevalence of overweight (BMI  $\geq 27$  kg/m<sup>2</sup>) assessed by BMI (59.9% vs. 43.3%,  $p < 0.0001$ ). Women had higher mean values for BMI, WHR, BAI and arm circumference ( $p < 0.001$ ), whereas men had higher means of weight, height, and WHR ( $p < 0.001$ ). Means of waist and calf circumferences did not differ between the genders ( $p > 0.05$ ). Weight, calf and arm circumferences decreased significantly with advancing age in both genders ( $p < 0.001$ ). A significant reduction of BMI and height with advancing age was only observed among men ( $p < 0.05$ ). Waist circumference, WHR, BAI and WHR did not change with age in both genders ( $p > 0.05$ ).

Key findings: a significant reduction of total body mass occurs with advancing age, especially in men, mainly due to the loss of peripheral body reserves. The central body adiposity basically did not change with advancing age in both genders and it may result in an increased cardiovascular risk and disability in the elderly.

## PT-114

## Poster

**Vitamin D in adult smoking and ex-smoking females: intake, serum concentration and body composition.**

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Introduction: Smoking is associated negatively with serum concentrations of vitamin D in women and cause changes in the body composition. Obesity may too influence the serum concentration of vitamin D, probably to be stored in adipocytes. In this way, the profile of adult women smokers and ex-smokers were evaluated and compared to serum concentration of vitamin D, dietary intake and corporal composition.

Methodology: 55 women were evaluated in the period from March 2012 to June 2013, including 18 were active smokers (S), 18 ex-smokers (ex-S) and 19 nonsmokers (NS). The evaluation was performed by means of Identification Questionnaire, Frequency Questionnaire of Solar Exposure, 24-hour Recall in triplicate (intake of calcium and vitamin D), Body Composition (weight and height, body mass index) and Biochemical (vitamin D and serum calcium). Comparison of smokers, ex-smokers and nonsmokers groups was performed using the t-test or Mann-Whitney test and multivariate linear regression using the program SigmaPlot for Windows version 12.0 (Systat Software), employing  $p < 0.05$  as statistic significance.

Results: The average age of women smokers and ex- bb smokers was greater than 50 years ( $S=52.8 \pm 7$  years,  $Ex-S=51.7 \pm 8$  years and a  $NS=44.4 \pm 11$  years,  $p=0.011$ ). The assessment of body composition performed by body mass index (BMI) showed that the three groups were similar and all women were overweight. The group of ex-smokers showed a higher frequency of sun exposure ( $S=12.3 \pm 4.6$ ,  $Ex-S=13.3 \pm 3.9$  and  $NS=9.6 \pm 4.5$ ,  $p=0.035$ ), higher serum concentrations ab b a of vitamin D ( $S=26.2 \pm 10.4$  ng/mL,  $Ex-S=30.2 \pm 11.9$  ng/dL and  $NS=21.5 \pm 6.4$  ng/mL,  $ab p=0.033$ ) and higher serum concentrations of calcium ( $S=9.2 \pm 0.5$  mg/dL,  $Ex-ba S=9.6 \pm 0.7$  mg/dL,  $NS=9.3 \pm 0.4$  mg/dL;  $p=0.016$ ). Comparing the intake of vitamin D and calcium, no differences were found between the groups, although the three groups presented consumption lower than recommended intake. By means of multiple regression analysis, it was found that the presence of serum concentrations of vitamin D was explained only by smoking.

Conclusion: The results of this study showed that the changes in serum concentrations of vitamin D are associated with the presence of smoking.

## PT-115

## Poster

**Prevalence of eating disorders in students of educational centers from Gran Canaria .**

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Objectives: To assess the prevalence of eating disorders in Spanish students between 11 and 33 years old using standardized methods.

Material and Methods: 1342 students were randomly selected from educational centers on Gran Canaria, Spain. We used a two phase cross sectional design which involved the screening (EAT-40 questionnaire at a cutoff score of 20) and a semi-structured interview (EDE). Sociodemographic variables and weight status were also evaluated.

Results: In 2013 we studied participants of 15 educational centers on Gran Canaria. In the first phase we found a prevalence of risk of 27.42% (18.11% of females, 9.31% of males). In the second phase, 538 participants agreed to proceed with clinical evaluation (285 at risk, high scorers; 253 selected sample not at risk). The overall prevalence of eating disorder was 4.11% (5.46% of females, 2.55% of males). Using DSM-IV-TR diagnostic criteria, the prevalence of anorexia nervosa was 0.19%, of bulimia nervosa 0.57% and of eating disorder not otherwise specified 3.34%.

Key findings: The prevalence of eating disorders diagnosis in Gran Canaria is similar than in the rest of Spain. However, the prevalence of risk of eating disorders in Gran Canaria is especially high considering data of other studies made in Spain and other countries.

## PT-116

## Poster

**Serum 25(OH)D and its association with adiposity in brazilian adolescents.**

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Objectives: Evaluate the prevalence of insufficiency/deficiency of vitamin D and its relationship with overweight and body fat in adolescents.

Material and Methods: This is a cross-sectional study with 160 adolescents (eutrophic and overweight), aged between 15 and 17 years of high schools of the city of Juiz de Fora, Minas Gerais, Brazil. Nutritional status was assessed by body mass index according to World Health Organization. Dietary intake was assessed using a food record by 3 days. Biochemical evaluation included analysis of calcidiol [25(OH)D]. Adolescents with waist circumference above the 90th percentile were classified at risk. Body composition was assessed by tetrapolar bioimpedance.

Results: The mean age was 16 years, 55.6% was male, 48.1% was eutrophic and 51.9% was overweight. Deficiency of vitamin D [ $\leq 25$ nmol/L( $\leq 10$  ng/ml)] was observed in 1.25% of adolescents. Insufficiency of vitamin D [25-75 nmol/L(11-30 ng/ml)] was observed in 70.6% of the sample. Serum 25(OH)D were lower in adolescents with excess body fat and with waist circumference at risk ( $P < 0.05$ ). In addition, serum levels of 25(OH)D were inversely correlated with BMI and percent of total body fat ( $P < 0.05$ ). The mean intake of vitamin D (2.18 mg/day) was below the Estimated Average Requirements (EAR) regardless of nutritional status. Only 7.2% of individuals with overweight and 15.6% of eutrophic reached the EAR for vitamin D (10  $\mu$ g/day). Lower body mass index and waist circumference were observed in the 3rd tertile of intake of vitamin D for all adolescents.

Key findings: This study concluded a high prevalence of vitamin D insufficiency in adolescents (70.6%), even in sunny country like Brazil. This is one of the few studies conducted in developing countries evaluating the association of vitamin D with abdominal and total adiposity in adolescents. More studies are needed to understand the effect of vitamin D in metabolic changes.

## PT-117

## Poster

**Influence of a Mediterranean dietary pattern on body fat distribution: Results of the PREDIMED-Canarias Intervention Randomized Trial.**

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Objective: To assess the influence of a Mediterranean dietary pattern (Med-Diet) on anthropometric [weight, Body Mass Index (BMI) and waist circumference (WC)] and body composition parameters [percentage of total body fat, (%TBF); total fat mass (TFM); percentage of truncal fat (%TF); and truncal fat mass (TFM)] in a randomized dietary trial (PREDIMED Study) among high cardiovascular risk subjects.

Design: randomized primary prevention trial.

Subjects/Settings: 351 Canarian subjects aged 55 to 80 years old, with diabetes or other cardiovascular risk factors.

Intervention: Participants were randomly assigned to one of three different diets: MeDiet + extra-virgin olive oil (EVOO) (n= 117), MeDiet + Nuts, (n= 117) or a control group with low fat diet (n=117). All participants received quarterly individual and group educational sessions and, depending on

group assignment, free provision of extra-virgin olive oil, mixed nuts, or small nonfood gifts.

Outcome measures: Changes in anthropometric measures and body fat distribution after 1 year. Body composition was estimated by octapolar electrical impedance analysis.

Statistical analyses: Paired t tests were conducted to assess yearly changes in anthropometric and body composition variables in each intervention group. ANOVA tests were used to assess the effect of dietary interventions on these changes. All those comparisons that were statistically significant in the ANOVA analysis were subsequently analyzed two by two through the Benjamini-Hochberg test, which penalizes for multiple comparisons.

Results: A decrease in all anthropometric measurements (weight, BMI and WC) was observed after 1 year of intervention. The control group showed the greater reduction in WC (3 cm), although no significant differences between the intervention groups were observed. Regarding body composition variables, the participants of control group increased the %TBF (1.0 %), TFM (0.4 Kg), %TrF (1.1 %), TrFM (0.3 Kg) and had a greater reduction in the TBW (-0.7 Kg), when compared with the two groups of Mediterranean diet, although the differences between the intervention groups were not statistically significant. The %TBF and TFM showed a slight reduction in the MedDiet + EVOO group (-0.2 % and -0.1 Kg). However, not statistically significant differences were found regarding to the other intervention groups.

Conclusions: Dietary intervention with Mediterranean diet, with a high proportion of total fat (around 40%) predominantly monounsaturated fats can be an alternative to low-fat diets, in the loss or weight maintenance regimes in older adults with obesity or overweight.

Key Words: Mediterranean diet, obesity, body composition, body fat, octapolar impedance analysis, PREDIMED Study

### PT-118

Poster

#### Observer accuracy in the preliminary testing of a newborn anthropometric assessment method using photographic images.

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Objective: The recent recognition of stunting at birth in Guatemalan rural populations highlights the importance of early diagnosis at a public health level. The objective of this study was to determine the observers' accuracy when using a photographic image method to determine newborn length against the gold-standard infantometer.

Materials and Methods: Three observers (A, B, and C) used each, different digital cameras to take pictures of 3 two-dimensional cardboard figures and 2 soft-body baby dolls, both of the approximate overall length of a human newborn. In sagittal exposure photography, we produced an image in the "fetal position." We sustained the head-to-trunk posture to maintain a "Frankfort plane" gaze, while the sole of the foot was positioned to form a 90° angle at the ankle. A reference-length of either 5 or 10 cm was affixed to the model. Pictures were printed out and each observer used a metric ruler, precise to the nearest mm to measure each of three linear components of the body: the trunk segment (TS); upper-leg segment (ULS); and lower-leg segment (LLS). The TS corresponded to the distance from the crown of the head to the hip joint; the ULS was the distance from the hip joint to the knee joint; and the LLS was estimated by measuring the length from the knee joint to the sole of the foot. The estimated total composite length was calculated by adding up the TS, ULS and LLS in mm, and correcting the final dimension in cm, applying the correction-factor from the 5 or 10 cm reference length in the image.

Results: The CVs for 24 cardboard images across observers was: A, 6.2%; B, 5.8%; and C, 5.6%, and for the 32 doll images: A, 6.5%; B, 4.0%; and C, 4.3%. For all common mean cut-out measurements (n=24), the Pearson correlation of observers A vs B was r=0.77; for A vs C, r=0.89 and for B vs C, r=0.84. For all common mean doll measurements (n=32), the Pearson correlation of A vs B was r=0.365 (p=0.04); for A vs C, r=0.54 (p=0.001) and for B vs C, r=0.839 (p<0.0001).

Key findings: There is a significant inter-rater correspondence and low variability within observers, when using this new approach of photographic images to assess newborn length in inanimate models.

### PT-119

Poster

#### Trends in food supply during the last 50 years in Greece.

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<sup>2</sup>Institute of Preventive Medicine Environmental and Occupational Health (Prolepsis)

Objectives: Knowledge on food consumption data and their changes over time is considered essential in order to set and monitor food-based dietary guidelines (FBDGs). Although national food supply data do not reflect actual intakes, they provide insight into food availability and its changes over

time; especially in the absence of regularly conducted national food consumption surveys. The temporal trends in the supply of major food groups in Greece were investigated during the last 50 years.

Materials and methods: Food supply data collected from food balance sheets compiled by Food and Agricultural Organization (FAO) of the United Nations were reviewed from 1961-2009.

Results: During the last 50 years, mean per capita supply of vegetables, and less fruit, increased (vegetables: from 114.6 to 244.3 kg/capita/year, fruits: from 133.5 to 141.3 kg/capita/year), cereal supply decreased (from 166.8 to 148.9 kg/capita/year), while growing trends were observed for potatoes (from 32.0 to 71.6 kg/capita/year). The supply of pulses has been reduced by half in 2009 (3.8 kg/capita/year) compared to 1961 (7.9 kg/capita/year). Dairy products supply has increased, especially milk (from 34.7 to 96.7 kg/capita/year) compared to cheese (from 13.3 to 26.7 kg/capita/year). Meat supply, including poultry, has exhibited considerable increase (from 21.1 to 74.8 kg/capita/year), whereas fish and seafood supply has increased only slightly (from 16.2 to 20.4 kg/capita/year). Animal fat and vegetable oils supply have both increased (animal fats: from 1.9 to 4.3 kg/capita/year, vegetable oils: from 17.5 to 25.9 kg/capita/year), whereas, the increase in vegetable oils referred mostly to sunflower oil (from 0.2 to 5.6 kg/capita/year). Olive oil supply reached a maximum value (21.8 kg/capita/year) during the '70s and showed a decreasing trend thereafter. Mean per capita sugar supply has increased dramatically (from 15.3 to 34.4 kg/capita/year). Alcoholic beverages supply increased also significantly (from 40.3 to 67.7 kg/capita/year), while wine supply is progressively declining compared to other types of alcoholic beverages. During 2001-2009 a subtle decline was observed in vegetable and fruit supply but also for meat supply.

Key findings: Unfavorable changes in food supply have been observed for the majority of the food groups during the last 50 years, reflecting a gradual shift away from the traditional Greek dietary pattern. Food and nutrition policies should focus more in preserving and promoting traditional Greek diet across the life span. FBDGs for the Greek population, used as a policy tool, can contribute towards this direction.

### PT-120

Poster

#### Relationship of screen time with body weight and eating habits in teens.

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Objectives: "Screen time" is a term used for activities performed in front of a screen, like watching TV, working on a computer or playing video games. Screen time is a sedentary activity, which means being physically inactive while sitting, and during the time of screen consumes very little energy, so it is necessary to evaluate if there is any relationship between screen time and eating habits or body weight.

Material and methods: This was a prospective, descriptive, longitudinal study. Male and female adolescents aged between 16 and 22 years were surveyed about the time they spend in front of screens and additionally eating habits questionnaire was applied. The information was separated by anthropometric, socioeconomic, dietary habits and lifestyles, the data were analyzed based on body mass index, having 4 main parameters: underweight, normal weight, overweight and obesity and the statistical analysis was performed for the conclusions.

Results: Normal weight adolescents watch television three to four days a week, however TV hours are one to three and they don't eat while watching TV. They use the computer between one and two hours, listening music but do not eat, neither do when using a game but rarely play. They have three meals a day, drink three to four glasses of water, most have scheduled times of food and perform some physical activity. They consume lots of fruits and vegetables, cereals and snacks and rarely instant food, fast food or soft drinks. In obese adolescents we found that daily television are between one and three hours, more than two hours using the computer, they perform three to four meals a day but without specific schedule, take three to four glasses of water a day, most do not perform any physical activity, consume many simple carbohydrates, instant food and soft drinks, sometimes fruits, vegetables and much of the food they eat is the result of TV ads.

Key findings: Although no relationship between hours in front of screen and overweight and obesity was found, we observed that the influence of television could be a cause of overweight and obesity. According to the findings of this survey is a priority not only promote the development of good eating habits and increasing moderate and vigorous physical activity, including sports activities, but also decreasing sedentary activities such as idle transport, screen time and time sitting.

### PT-121

Poster

#### Betaine and choline intakes are related to total plasma homocysteine: health survey of São Paulo, Brazil.

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and Biostatistics, Institute of Community Health, Fluminense Federal University, Brazil.

**Background:** Elevated concentrations of plasma homocysteine (Hcyp) have been associated with an increase in the risk for cardiovascular diseases. Hcy can be reduced through remethylation to methionine that use folate or betaine as methyl radical donors. Betaine can be obtained directly from diet or choline oxidation. The objective of this study was to evaluate betaine and choline intakes and investigate their relation to Hcy in residents of the city of Sao Paulo.

**Methods:** Data were obtained from 584 adults and elderly of both genders in a population-based cross-sectional study called Health Survey - São Paulo (ISA-SP 2008). Plasma homocysteine geometric means were analyzed according to tertiles of choline and betaine intakes and a linear trend was also performed.

**Results:** The prevalence of hyperhomocysteinemia was higher in men (28%), elderly (21%), individuals with lower family income (21%). About 31% of individuals with hyperhomocysteinemia showed folate deficiency (<7.5 nmol/L) and 26% of them showed vitamin B12 deficiency (<200 pmol/L). There was a decrease in Hcy medians as tertiles of betaine intake increased for all studied variables, except for elderly, individuals with higher family income than minimum wage, individuals who were not normal-weight, non-smokers and non-consumers of alcoholic beverages. Choline was noted to have a relation to plasma homocysteine levels in both genders, in individuals with higher family income, non-smokers and in consumers of alcoholic beverages.

**Conclusion:** The present study suggests the importance of betaine intake and its inverse association with plasma homocysteine levels in adults and elderly residents of the city of São Paulo.

#### PT-122

Poster

##### Understanding vegetable consumption among children and adolescents in Korea.

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This study aimed to investigate the factors influencing on the intention of vegetable consumption among children and adolescents in Korea. To determine students' intention toward vegetable intake, a survey with structured questionnaires based on the theory of planned behavior was implemented to elementary, middle and high school students in Seoul and Gyeonggi province. Out of 901 responses, 758 were analyzed. To examine the differences of attitude, subjective norm, and perceived behavioral control toward vegetable intake among elementary (n=241), middle (n=212) and high school (n=305) students, one-way analysis of variance and Tukey's multiple comparison test were conducted. Intention was not differentiated among groups. Attitude was not differentiated, however, elementary school students had the highest subjective norm (p<0.001) and perceived behavioral control (p<0.001). The regression model for elementary school students (R<sup>2</sup>=69%, p<0.001) showed that attitude (β=.47, p<0.001) and perceived behavioral control (β=.28, p<0.001) were significantly related to intention on vegetable intake and subjective norm was not. In case of middle school students (R<sup>2</sup>=53%, p<0.001), attitude (β=.50, p<0.001) and perceived behavioral control (β=.28, p<0.001) were also significantly related to intention on vegetable intake and subjective norm was not. The result of high school students' model (R<sup>2</sup>=46%, p<0.001) was similar. So, intervention for children and adolescents to increase vegetable consumption should be targeted to improve attitude and perceived behavioral control toward vegetable intake.

#### PT-123

Poster

##### A daily snack containing green leafy vegetables, fruit and milk for increases in women's erythrocyte docosahexanoic acid – a randomised controlled trial in slums of Mumbai, India.

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**Objectives:** DHA is important for brain development and cognition. DHA supplementation during pregnancy influences gestation period and infant size. Snacks containing GLV, fruit and milk, consumed by women before and during pregnancy in the Mumbai Maternal Nutrition Project (MMNP) increased birthweight compared with a control. Our objective was to investigate whether consuming these snacks for 12 weeks increases erythrocyte DHA among women of reproductive age.

**Methods:** Non-pregnant women aged 14-35 y, living in Mumbai slums were randomised to receive a daily fried snack made from GLV, fruit and milk or a control snack made from low micronutrient vegetable. Snacks were consumed under observation. Blood was collected at 0 and 12 weeks. Erythrocyte concentrations of 15 fatty acids including DHA were estimated by Gas Chromatography and expressed as g/100g fatty acid.

**Results:** At least 85% of women consumed ≥3 snacks per week. The me-

dian (IQR) erythrocyte DHA in the experimental group, increased significantly from 1.50 (1.11, 2.03) g/100g at 0 wks to 1.86 (1.50, 2.43) g/100g at 12 wks, while it reduced from 1.78 (1.37, 2.32) g/100g at 0 wks and 1.60 (1.32, 2.04) g/100g at 12 wks in the control group. The median difference in erythrocyte DHA between 0 & 12 wks was -0.21 (-0.42, -0.11) in the experimental and 0.02 (-0.05, 0.30) g/100g in the control group. Group allocation was a significant predictor of change in the erythrocyte DHA in multivariate analysis (p<0.001).

**Key Findings:** Consumption of a food based snack increases women's erythrocyte DHA as a proportion of total fatty acids. This increase may have contributed to the positive effect on birthweight observed in the MMNP. We plan to study the effect of the snack on cognitive function of the MMNP offspring.

#### PT-124

Poster

##### Vitamin D status of Icelandic children – associations with intake and season.

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<sup>2</sup>Children's Hospital, Landspítali University Hospital

**Material and methods:** Blood samples from participants in a prospective cohort study on diet and growth of Icelandic children, born year 2005, were analysed for serum levels of 25-hydroxyvitamin D (s-25(OH)D) (n=76 and n=139 at 12 months and 6 years, respectively). Vitamin D sufficiency (s-25(OH)D≥50nmol/l), possible insufficiency (s-25(OH)D 30-49.9nmol/l) and risk of deficiency (s-25(OH)D<30nmol/l) were defined. Dietary intake was estimated with 3-d weighed food records at 12 months and 6 years.

**Results:** At 12 months vs. 6 years of age, the mean levels of s-25(OH)D were 98.1±32.2nmol/l vs. 56.5±17.9nmol/l. 92% vs. 63% of children were considered vitamin D sufficient, 8% vs. 30% vitamin D insufficient and 0% vs. 6% vitamin D deficient. The median vitamin D intake was lower than recommended (7.7µg/d vs. 4.9µg/d at 12 months and 6 years, respectively). At 12 months, five out of six infants at risk of deficiency had no intake of supplements (vitamin D drops and fish liver oil) or fortified products (e.g. milk, porridges, cereals). At 6 years, intake of fish liver oil was associated with vitamin D status during autumn and winter but not during summer. During summer, physical activity was associated with vitamin D status.

**Key findings:** The majority of Icelandic children following recommendations on vitamin D intake are vitamin D sufficient.

#### PT-125

Poster

##### Plant Food Supplements for gastrointestinal use. Evidence based efficacy.

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The efficacy of Plant Food Supplements (PFS) is not fully evidence based and the recommendations of consumption are mostly based on tradition and observational studies.

**Objective:** To conduct a systematic review to evaluate the efficacy of the ten most used PFS for gastrointestinal uses (according to a research strategy and expert consultation).

**Materials and methods:** This study has been carried out within the Plant-LIBRA project (FP7-EC funded project n°245199). A search strategy was conducted in EMBASE, MEDLINE, SciFinder Scholar and Cochrane library, from January 1970 to July 2013. The search identified 547 abstracts. After applying the inclusion/exclusion criteria, 54 studies were selected for analysis. Twenty-nine studies evaluated the effects of Cassia senna, 12 studies evaluated those of Plantago ovata, 10 studies those of Sylibum marianum, 3 studies those of Cynara scolymus and one study those of Foeniculum vulgare.

**Results:** The results of the analysis showed that for most of the Cassia senna studies did not provide additional benefits over PEG, NaP, castor oil, cascara-salax, an enema or placebo for bowel preparation for colonoscopy, urography, barium enema or colon surgery and produced more secondary effects. Cassia senna was equal to or less effective than other laxatives in improving the symptoms in patients suffering from constipation. Plantago ovata was effective in improving the symptoms in patients with irritable bowel syndrome (combined with a tranquiliser and a muscle relaxant). In patients with haemorrhoids, PFS containing Plantago ovata ameliorated the symptoms and bowel habit and reduced pain in patients undergoing haemorrhoidectomy. Sylibum marianum PFS did not show any benefits on hepatic biochemical markers in patients with acute or chronic hepatitis. Cynara scolymus contained in PFS showed an improvement in cholesterol blood levels. Foeniculum vulgare relieved colic symptoms in new-born children.

Key findings: *Plantago ovata* and *Cynara scolymus* produced benefits on the gastrointestinal area investigated. The PFS for gastrointestinal uses included in this review need to be further investigated with adequate randomized control trials to draw a conclusion about their effectiveness.

#### PT-126

Poster

##### **Sensorial assessment in a sample of schools foods offered in Cornellà de Llobregat.**

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Background: From 2006, the Public Health Agency of Catalonia assesses the quality of regional schools' food offer. The School Menus Revision Program (PREME), in the framework of the Integral Plan of Health Promotion through Physical Activity and Healthy Eating, consists of an initial report and a follow-up of the suggested improvements. Sensory aspects were also assessed in order to complete this information.

Objective: To assess the sensorial quality of school menus and food services.

Material and Methods: The pilot experience has been carried out in the town of Cornellà de Llobregat in 9 schools (7 public and 2 private). Three of the kitchens were self-managed, four were outsourced and two lunch services were caterings. Eight food services were from hot chain production and one cold, as well as seven services were cooked in situ and two transported from and outside kitchen. Two health care professionals visited the dining-rooms and tasted the food in order to assess sensory aspects. Afterwards, a questionnaire was completed by the professionals and students from 10 to 12 years old. Results: 70% of the students considered that the meal was satisfactory, from which 20% consider it good or very good. A total score of 5.5 over 10 was obtained. According to the health care professionals (n=18), the texture and consistency was appropriate in 40% of the first courses and 55% of the second courses, while 61% of the first courses and 55% of the second courses had the appropriate temperature. According to the students (n=110), less than 50% considered that the texture and consistency were appropriate, only 37% eat a second fruit portion per day and 60% eat food at school that they never eat at home. Overall, 63% considered taste to be the main aspect to be improved.

Conclusions: Both health care professionals and students granted a pass score to the sensorial assessment of the school lunch service. The school food service increases the variety of children's food consumption. The pilot test has been welcomed by schools. Reports are made by the school, the local government and the Department of Education.

#### PT-127

Poster

##### **Attributes influencing Chinese consumer's choice between local and imported fruits.**

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Objective: To identify the quality attributes influencing Chinese consumers choice between imported and locally produced fruits.

Methodology: Cross-sectional web-based survey through different Chinese Social Medias in Spring 2014, including socio-demographics, attitudes and knowledge towards fruit consumption and attributes of fruits. Attributes of origin (local/imported), taste (sweet/sower), price (expensive/cheap), texture (hard/juicy/glossy/soft-pulpy) and color (green/red) were presented in combinations issued from an orthogonal design. A conjoint procedure was applied to obtain the utility estimates. All data were analysed with SPSS v 22, and a p-value < 0.05 was considered significant.

Results: In total 398 people participated in the study, but only 305 provided complete questionnaires. Majority of participants (67%) were aged between 20-29 years, 48.9% had Bachelor or higher education, 96.4% believed that eating more than 200g of fruits/day has a positive effect on one's health; however, only 43.2% reached that consumption level. Knowledge about recommended daily intake and actual daily fruit intake were not associated or correlated (P=0.48 and 0.09). Besides, among quality related attributes, the attribute "texture" is the most important factor (39.4%), while "taste" values secondly (19.7%) in these 5 attributes. "Color" is the least important attribute in this case, which is only 12.4%. Attributes "origin" and "price" value are almost equal, respectively is 14.4% and 14%. The utilities for apple show that Chinese consumers prefer to purchase the apple with glossy texture, sweet taste, red, cheap and locally produced.

Key findings: Texture and taste are the most important attributes for Chinese consumer's fruit choices in this study. Besides this, Chinese consumer concerns about the nutrients in fruit. However, the influence of other attributes such as package, size of fruit, does not seem big correlations with fruit quality.

#### PT-128

Poster

##### **Barriers to implementation of "multidisciplinary interventional program for improvement of nutritional status of children in Iran": A qualitative study.**

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Objectives: Malnutrition is one of the most nutritional problems among children under 5 years in IRAN. Because of multi-disciplinary character of malnutrition, an intersectional intervention, named "multidisciplinary interventional program for improvement of nutritional status of children in Iran", were designed and implemented since 1999. In this program a range of interventions were implemented through the primary health care system, including nutrition, health and literacy education for mothers, practical instruction on feeding methods, environmental sanitation, the promotion of home-grown vegetables, reinforcement of the growth monitoring programme, and food distribution among malnourished children in poor families. This study aimed to use qualitative methods to explore the existing challenges and barriers of implementation of this program from the perspective of policy makers, executive manager, and practitioner at national and province level.

Materials and methods: We conducted a qualitative study involving 21 semi-structured interviews, plus 8 telephone interviews with policy makers, executive managers, and health care practitioners at national and province level from March to May 2014. Interviews were recorded, transcribed, and coded. Data were analyzed using directed content analysis.

Results: Lack of inter-sectoral coordination and mobilization, political change and subsequent change in assistant directors in health sectors and the other organization every four years in Iran, confusing eligibility criteria and application process, old version of executive instruction of program, heavy workload of practitioners, limited source of funds and credits, limited human resource in health facilities, practitioner's perceptions of enforcement, lack of monitoring and incentives for health practitioners, and delay in distribution of food rations among children were identified as barriers that influence implementation of this program.

Key findings: Policymakers must address existing barriers as well as consider new strategies to improve nutrition policies in this national multi-disciplinary program so that the program can continue to address nutritional needs as well as provide good health care for its beneficiaries.

#### PT-129

Poster

##### **Nutrient intake in pre-pregnant and pregnant women at high risk of gestational diabetes .**

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Objectives: The objective was to study the nutrient intake and its' adequacy among women at elevated risk of gestational diabetes (GDM).

Material and methods: Subjects were 394 Finnish women either planning pregnancy or at ≤ 20 weeks of pregnancy at baseline, and either obese or had a history of GDM. Nutrient intake was assessed from 3-day food records. Statistical significance for the hypotheses was evaluated by using generalized linear models with appropriate distribution and link function, median regression models (least-absolute-value), and chi-square test.

Results: The pre-pregnant and the pregnant women had a mean fat intake of 33 E% (SD 7 and SD 6), and SFA 12 E% (SD 3). The pre-pregnant women had carbohydrate intake of 44 E% (SD 8) and the pregnant of 46 E%, respectively (SD 6). Sucrose intake among pregnant women with a history of GDM was 7 E% (SD 3) which was different from the other pregnant women's 10 E% (SD 4) (p<0.001). The pre-pregnant women less frequently used dietary supplements than the pregnant (53% vs. 77%, p<0.001), and had median folic acid intake below the national recommendation. Both, the pre-pregnant and the pregnant women had intake of vitamin A below the recommendation.

Key findings: The observed non-optimal dietary composition of macronutrients among women at high risk of GDM may further increase their risk of GDM. A history of GDM, however, seems to reduce sucrose intake in a future pregnancy. Women planning pregnancy and pregnant women seem to have insufficient amounts of vitamin D and folate from food and thus need supplementation. Adequacy of intake of vitamin A in Finnish pregnant women needs further studying.

#### PT-130

Poster

##### **Iron and haemoglobin status in school children and women in West Java, Indonesia – before and after start of cooking oil fortification with vitamin A.**

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**Objective:** Vitamin A has a role in mobilization of iron stores; hence increased vitamin A intake may contribute to improving iron status in vitamin A-deficient populations. We assessed iron status among 5-9 year-old children and 15-29 years-old women, just before and a year after introduction of vitamin A-fortified cooking oil in a pilot program in Indonesia.

**Materials and Methods:** Twenty-four villages from 2 provinces on West Java were randomly selected, and poor families recruited. Hemoglobin, serum retinol, ferritin and soluble transferrin receptor (sTfR), CRP and AGP were measured in two surveys (July 2011 and July 2012), in 159 children and 168 women. Serum retinol and serum ferritin were adjusted for sub-clinical inflammation using standard adjustment factors based on CRP and AGP. Body iron was calculated using Cook's method.

**Results:** Mean serum retinol increased from 34.3±12.6 to 39.4±12.4 µg/dL among children (p<0.001) and from 42.7±19.2 to 50.9±16.6 µg/dL among women (p<0.001). Serum ferritin levels increased from 47.3±25.8 to 53.9±32.4 µg/L in children (p=0.004) and from 49.7±35.1 to 58.1±41.4 µg/L in women (p=0.011).

In children, sTfR concentrations were 5.6±1.2 and 5.7±1.5 mg/L at baseline and endline (p=0.50), with no significant change in prevalence (1.1% at baseline, 3.8% at endline) of cellular iron deficiency (sTfR>8.5 mg/L). In women, sTfR decreased from 16.5±35.6 to 5.7±3.7 mg/L (p<0.001), and cellular level iron deficiency fell from 28.2% to 6.5% (p=0.037). Body iron stores increased from 5.8±2.5 mg/kg to 6.3±2.7 in SAC (p=0.036) and from 6.0±3.0 to 6.6±3.6 mg/kg in women (p=0.036).

In children, mean haemoglobin levels improved from 12.6±1.1 to 12.9±1.1 (p<0.01), but anemia prevalence did not fall significantly (14.5% and 9.7%, p=0.17). In women, neither haemoglobin levels nor anemia prevalence (10% at both baseline and endline) changed.

In univariate analysis, there were no consistent correlations between serum retinol and iron indicators or haemoglobin in children. Among women, baseline-to-endline change in serum ferritin correlated positively with serum retinol at endline (r=0.17, p=0.03) and with the baseline-to-endline increase in retinol (r=0.19, p=0.01); sTfR at endline correlated negatively with sTfR at endline (r=-0.3, p<0.001).

**Key findings:** Findings suggest that consumption of vitamin A-fortified cooking oil, in addition to improving vitamin A status in women and school-age children, also mobilizes iron stores and reduces iron deficiency at cellular level among women (but not school-age children) in Indonesia.

#### PT-131

Poster

#### Antioxidative and hypocholesterolemic effects of two degree of hydrolyses of Chickpea protein (*Cicer arietinum*) in hypercholesterolemic rat.

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Recent studies have shown that some peptides derived from hydrolysed legume proteins exert an important role in the regulation of cholesterol metabolism and antioxidant activities against lipid peroxidation that increased atherogenic processes.

In this study the effects of degree of hydrolysis (DH) of chickpea proteins hydrolysates on lipemia and the antioxidant enzyme defense were estimated in serum and liver of rat fed high-cholesterol diet.

18 adult male Wistar rats (220±10g), that fed 20% casein with 1% cholesterol were divided into three groups and received for 30 days by gavage 1g/kg of chickpea protein hydrolysed at degree of hydrolysis 8% (CPH8) or 17% (HPC17). The third group received in the same conditions water as placebo and constituted the control group (CG).

Compared with CG, Serum total cholesterol levels were respectively 1.3- and 3.5-fold lower with CPH8 and CPH17. However, the serum triacylglycerols were 1.4- fold decreased in CPH17 phospholipids levels in these two groups were also reduced compared with control values. In liver, total cholesterol values were 1.9-fold lower in CPH8 and CPH17 groups. Hepatic triacylglycerols and phospholipids values of CPH8 group were 1,3-fold higher compared with CG, However, in CPH17 triacylglycerols concentration was similar and PL concentration was 1,6-and fold lower compared with control group.

Serum lipid hydroperoxide contents were respectively 1.3- and 2-fold decrease with CPH8 and CPH17. However liver hydroperoxydes products were increased in these groups vs CG (1.8- , 1.5-fold). Compared with CG, serum carbonyl derivatives contents were similar in HPC8 but these values were

significantly decreased only with HPC17, whereas CPH8 and CPH17 treatment reduced significantly carbonyls in liver.

Serum arylesterase activity was significantly higher in rats treated CPH8 and CPH17 while that of glutathione peroxidase was increased only by CPH17. Compared with CG, liver superoxide dismutase activity was respectively 1.3- and 2-fold higher in CPH8 and CPH17 whereas that of glutathione peroxidase remained unchanged.

Therefore, chickpea protein hydrolysed at DH=8% and particularly at DH=17% could be a very useful compound to reduce efficiently cholesterolemia and lipid hydroperoxides by improving antioxidant enzyme activities that protected against oxidative damages induced by the hypercholesterolemic diet.

#### PT-132

Poster

#### Television Viewing, Computer Use, Time Driving and All-Cause Mortality: The SUN Cohort.

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**Objective:** The balance between energy intake and energy expenditure seems crucial for the prevention of obesity and obesity-related mortality. In this context, the assessment of sedentary behaviors demands a greater attention in prospective cohorts. Our objective was to assess the association between different sedentary behaviors and all-cause mortality.

**Material and Methods:** Prospective analyses using data from the SUN Project, a dynamic cohort study of Spanish university graduates. For the present analyses we included 13,284 participants with a mean age of 37 years, followed-up for a median of 8.2 years and a retention rate of 92%. Television, computer, and driving time were assessed at baseline through a previously validated questionnaire. Our primary end point was death from any cause. If participants did not answer any of the 5 repeated mailings with the follow-up questionnaires, they were contacted by e-mail or telephone. Most deaths (>85%) were identified from reports by the next of kin, work associates, and postal authorities. The Spanish National Death Index was checked every 6 months to identify deceased cohort members. Poisson regression models were fitted to examine the association between each sedentary behavior and total mortality.

**Results:** All-cause mortality incidence rate ratios (IRRs) per 2 hours per day of use were 1.40 (95% confidence interval (CI): 1.06 to 1.84) for television viewing, 0.96 (95% CI: 0.79 to 1.18) for computer use, and 1.14 (95% CI: 0.90 to 1.44) for driving, after adjustment for age, sex, smoking status, total energy intake, Mediterranean diet adherence, baseline body mass index, and physical activity. The risk of mortality was twofold higher for participants reporting >=3 h/day of television viewing than for those reporting <1 h/d (IRR: 2.04 [95% CI 1.16 to 3.57]).

**Key findings:** Television viewing was directly associated with all-cause mortality. However, computer use and time spent driving were not significantly associated with higher mortality. Further cohort studies and trials designed to assess whether reductions in television viewing are able to reduce mortality are warranted. The lack of association between computer use or time spent driving and mortality needs further confirmation.

**Funding:** The SUN Study has received funding from the Instituto de Salud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/02658, PI10/02293, PI13/00615, RD06/0045, G03/140 and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra.

#### PT-133

Poster

#### TCross-sectional and longitudinal associations between serum uric acid concentrations and metabolic syndrome and its components in the Predimed study.

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**Objectives:** To evaluate cross-sectionally and prospectively the associations between serum uric acid (SUA) concentrations and the metabolic syndrome (MetS) or its components in elderly individuals at high cardiovascular risk.

**Material and methods:** Men and women (55-80 years-old) at high cardiovascular risk from 8 PREDIMED recruiting centres with biochemical determinations available and with at least two years of follow-up were included in this study. Both, baseline cross-sectional (n=4417) and prospective assessments (n=1511) were conducted. MetS was defined according to the updated harmonized IDF/AHA/NHLBI criteria. Anthropometric measurements, blood pressure, fasting plasma glucose, lipid profile and SUA concentrations were assessed at baseline and on a yearly basis during the follow-up. Parti-

Participants were categorized by baseline sex-specific SUA quartiles. Unadjusted and multivariable-adjusted logistic and Cox regression models were fitted to assess the risk of MetS and of each of its components according to quartiles of SUA.

Results: Participants in the highest baseline sex-specific SUA quartile showed a significantly higher risk of having MetS than those in the lowest quartile, even after adjusting for potential confounders (OR: 2.2 [95% CI 1.8-2.8];  $P < 0.001$ ).

After a median follow-up of 3.8 [RIQ 2.0-5.9] years, a total of 753 participants developed MetS. Participants in the highest baseline sex-specific SUA quartile presented higher hazard ratio (HR) for MetS incidence than those in the lowest quartile (HR: 1.6 [95% CI, 1.2-1.9];  $P < 0.001$ ). This association remained significant even after adjustment for different potential confounders. Participants initially free of several MetS criteria at baseline who were in the upper quartile of SUA had a significantly higher risk of developing these MetS criteria than those in the lowest quartile, during the follow-up, even after adjusting for potential confounders, with HR: 1.9 [1.6-2.3];  $P < 0.001$  for hazard ratios of hypertriglyceridemia; HR: 1.4 [1.1-1.7];  $P = 0.001$  for low HDL-cholesterol and HR: 2.0 [1.2-3.2];  $P = 0.008$  for high blood pressure. For central obesity and high fasting plasma glucose components, also the same positive tendency was observed, but this association did not reach statistical significance ( $P = 0.236$  and  $P = 0.062$ , respectively).

Key findings: These findings provide further evidence suggesting that elevated SUA concentrations are directly and significantly associated with a higher risk for the development of MetS in men and women. SUA measurement might be considered in patients to identify early those at increased risk to develop MetS and who might benefit from an early intervention. However, further studies are necessary to confirm and to understand the mechanisms underlying this association.

#### PT-134

#### Poster

##### Results of the screenings of the nutritional status of under-five children in Upper River Region, the Gambia.

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Introduction: Malnutrition is a leading cause of death among children under 5 years in sub-Saharan Africa. Anthropometry has been identified as one of the most efficient methods for assessing the nutritional status of children at risk of suffering from malnutrition in developing countries. In Gambia, the prevalence of under 5 years (2003-2009) suffering from underweight, moderate and severe is 20%. About 7% of under-fives are suffering from wasting, moderate and severe.

Objective: In 2010 the NGO Nutrition Without Borders (Barcelona, Spain) opened the Centre for Nutritional Rehabilitation and Education (CREN) in the city of Basse, Upper River Region (URR), The Gambia aimed at improving the health status of the children and women of this region of The Gambia by means of improving their nutritional status, decreasing the prevalence of malnourished children and promoting the household food security.

Methodology: Every Month between January 2011 and January 2012, the 12 CHNs were expected to carry out a nutritional screening in 12 villages selected by the NaNA Focal Person in URR. After sensitizing the population and convoking them to the selected venue, the children under five years old had their nutritional status assessed. Using a stadiometer and a UNISSET sling scale and following the WHO guidelines, the status was determined by obtaining the indicator of weight-for-height (WFH) or weight-for-length (WFL) from the weight-for-height Z score charts. Between January 2011 and January 2012 a total of 142 screenings were carried out in different villages of URR.

Results: During 2011, 142 community screenings for malnutrition were carried out in 142 villages of URR, The Gambia. 11744 under-5 years children inhabitants of URR had their nutritional status assessed during this period. The results offer a percentage of 6.84% of under-5 years suffering from severe (5.68%) and moderate (1.16%) wasting according to the definition of the WHO guidelines. The indicator used to achieve these data was the weight-for-height or weight-for length, following the recommendations of the WHO.

Conclusions: According to UNICEF, more than 7% of children in The Gambia were affected by malnutrition in the period 2003-9. In 2011-12, in a sample of 10258 children in Upper River Region, the eastern most region of The Gambia, the percentage of children with severe and moderate wasting is 6.8%. This means that more resources and effort are still to be put into this region in order to help to decrease this high prevalence of children with malnutrition.

#### PT-135

#### Poster

##### The role of nutrition education in the promotion of improved complementary feeding in rural Malawi.

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Chronic malnutrition, and particularly stunting, continues to be a public health burden for Malawi that results in multiple detrimental outcomes for individuals, households, communities and the nation. In Malawi, 47.1 per cent of children under 5 years old are stunted, which is the highest prevalence within the Southern Africa region. During 2011-2012, FAO Malawi in collaboration with the Ministries of Health, and Agriculture and Food Security extension staff carried out Trials of Improved Practices in Kasungu and Mzimba districts to test the feasibility of implementing improved complementary feeding practices targeted at children aged 6-23 months. Recipes were developed using locally available and affordable foods, which were tested with families and caregivers to assess cultural acceptability and affordability. Results of the Trials were used to design the community-based nutrition education strategy "Kupititsa Patsogolo Kadyetsedwe Koyenela ka Ana" - KPCKKA (Let us Improve Child Feeding), which is being implemented in the 4-year FAO integrated agriculture-nutrition programme "Improving Food Security and Nutrition Policies and Programme Outreach in Kasungu and Mzimba Districts" (IFSN). The KPCKKA programme is aligned to the Scaling Up Nutrition movement in Malawi which aims to fight malnutrition among children aged 6-23 months. The key messages focus on the benefits of a diversified diet using local foods, in combination with good hygiene practices, to improve the nutritional status of children aged 6-23 months. KPCKKA involves a cascade of training from government nutritionists in the Ministries of Health, and Agriculture and Food Security, Master Trainers, Extensions Workers and Community Nutrition Facilitators to the mothers/caregivers. In each village, a pair of volunteer Community Nutrition Facilitators organises a group of approximately 15 mothers/caregivers with children aged 6-18 months and undertakes 10 nutrition education sessions (and four cooking demonstrations) for approximately 2 hours each fortnight. Every 6 months, a new group is expected to be formed to ensure sustainability of the programme. To-date, KPCKKA monitoring activities indicate positive nutrition outcomes for children aged 6-23 months as well as for other participants. However, the integration of nutrition education with agricultural input support has raised important programmatic issues such as the need for appropriate targeting to ensure synchronisation of interventions. Also, efforts to scale up using available delivery systems (i.e. health and agricultural extension services) without paying top-up allowances or providing incentives is not straightforward.

#### PT-136

#### Poster

##### The school lunch program review (PRoME) in Catalonia improves the quality of menu planning, 2006-2014.

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Background: The School Lunch Program Review (PRoME), included in the Integral Plan for Health Promotion through Physical Activity and Healthy Eating (PAAS) of the Public Health Agency of Catalonia (ASPCat) is one of the activities of the Project 2.2 of the Health Plan 2011-2015. The program began in 2006, in collaboration with the Department of Education, and it has been offering to review the menu planning of the schools in Catalonia. After the evaluation of 2900 menu plans we have started monitoring the implementation and acceptance of the suggested measures of improvement. Objective: To assess the compliance of the suggested recommendations for improvement.

Methods: After submitting the initial assessment report, a questionnaire for re-assessing and monitoring the evolution of the suggestions for improvement is sent to the school. The answers to the questionnaire and the new menu plans are evaluated.

Results: (n = 898): 88% consider it a useful tool. 83% believe that the report will lead to the improvement of the menu plans. The report was sent to different stakeholders. Regarding to the new menu plans, the following changes are observed in achieving the recommendations (n = 465): specification of ingredients and preparations of starters (25%-62%\*), specification of ingredients and preparations of main courses (65%-72%\*), presence of deep-fried food (79%-90%\*) presence of salad (48%-46%), specification of the salad ingredients (51%-79%\*), presence of fresh fruit in the dessert (50%-78%\*), presence of fresh food (77%-91%\*), daily presence of vegetables (65%-91%\*) and recommended frequencies of foods (45%-60%\*). \* $P < 0.05$

Conclusions: The assessments have improved key aspects of menu planning. The report with suggestions for improvement is known by different stakeholders and is highly regarded. The mainstreaming of PRoME with the involvement of different professionals and local public health teams is essential and bring an added value.

#### PT-137

#### Poster

##### Increased serum calcium levels and risk of type 2 diabetes in individuals at high cardiovascular risk.

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Objective: insulin resistance and secretion depend on calcium homeostasis. Cross-sectional studies have associated elevated serum calcium levels with markers of impaired glucose metabolism. However, only one prospective cohort study has demonstrated an increased risk of diabetes in individuals with increased serum calcium concentrations. The aim of the present study was to prospectively investigate the association between albumin-adjusted serum calcium concentrations and type-2 diabetes in subjects at high cardiovascular risk.

Material and methods: prospective assessment of participants from two Spanish predimed study centers where serum calcium levels were measured at baseline and yearly during follow-up. Multivariate-adjusted Cox regression models were fitted to assess associations between baseline and changes in serum calcium levels and relative risk of diabetes incidence.

Results: after a median follow-up of 4.78 years, 77 new cases of type-2 diabetes occurred. An increase in serum calcium levels during follow-up was related to an increased risk of diabetes. In comparison with individuals in the lowest tertile ( $-0.78 \pm 0.29$  mg/dL), the hazard ratio (HR) and 95% CI for diabetes incidence in individuals in the higher tertile of change ( $0.52 \pm 0.13$  mg/dL) during follow-up was 3.48; 95%CI: 1.48-8.17; P-trend=0.01. When albumin-adjusted serum calcium was analyzed as a continuous variable, per 1 mg/dL increase, the HR of diabetes incidence was 2.87 (95%CI: 1.18-6.96; P-value=0.02). These associations remained significant after individuals taking calcium supplements or having calcium levels out of normal range had been excluded.

Key findings: an increase in serum calcium concentrations is associated with an increased risk of type-2 diabetes in individuals at high cardiovascular risk.

#### PT-138

Poster

#### Plant food supplement consumption, body weight control and BMI: results from the PlantLIBRA PFS Consumer Survey 2011-2012.

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<sup>3</sup>Fundación para la Investigación Nutricional-FIN, Barcelona Science Park, University of Barcelona, Spain, <sup>2</sup>CIBER Fisiopatología de la Obesidad y la Nutrición, Instituto de Salud Carlos III, Spain, <sup>3</sup>PlantLIBRA PFS Consumer Survey Group.

Objectives: To provide an overview of the PFS botanical ingredients consumed for body weight reasons in six European countries and to explore the relationship between their consumption and BMI.

Material and methods: This study has been carried out within the PlantLIBRA project (FP7-EC funded project n°245199). Data on PFS usage were collected in Finland, Germany, Italy, Romania, Spain and the United Kingdom, in a cross-sectional, retrospective survey of 2359 PFS consumers using a bespoke frequency-of-PFS-usage questionnaire. Analyses were performed in a subsample of respondents taking the products for reasons of "Body weight". Subsample characteristics are described, consumed PFS botanical ingredients according to the reason "Body weight" and "Dieting for overweight/obesity" are identified, and the relationship between the 3 most consumed botanicals and BMI is explored (proportions compared using  $\chi^2$  test,  $p < 0.05$  for significance). Results: "Body weight" was reported as one of the reasons of use in 252 of 2874 total products consumed. In Spain, 21.5% PFS were used for "body weight" (top reason for taking PFS), in Germany 8.7%, in Italy 8.2%, in Finland 6.0%, in Romania 5.8% and in the United Kingdom 2.9%. Overall, 113 consumers were "dieting for overweight/obesity": Spain 17.4% (n=70), Italy 6.1% (n=23), Germany 2.3% (n=9), Finland 2% (n=8), Romania 0.8% (n=3) and no dieters in the United Kingdom. *Cynara scolymus* (artichoke), *Camelia sinensis* (green tea) and *Foeniculum vulgare* (fennel) are the 3 most consumed botanicals by respondents taking PFS for reasons of "body weight". Artichoke and green tea PFS consumers' BMI significantly falls  $< 25 \text{ kg/m}^2$  as compared to that of non-consumers ( $p=0.019$  and  $p=0.046$  respectively); BMI is not significantly different between fennel consumers and non-consumers. Among PFS consumers responding to be "dieting for overweight/obesity", the 3 most consumed botanicals are *Cynara scolymus* (artichoke), *Foeniculum vulgare* (fennel) and *Ananas comosus* (pineapple). Artichoke-containing PFS consumers' BMI is significantly  $< 25 \text{ kg/m}^2$  as compared to non-consumers' ( $p=0.038$ ). BMI is not significantly different between fennel- and pineapple-containing PFS consumers and non-consumers.

Key findings: "Body weight" is the top reason for PFS use in Spain. Artichoke and green tea are the most consumed botanicals from PFS taken for reasons of body weight, with their consumers' BMI significantly  $< 25$  as compared to non-consumers'. Among dieters for overweight/obesity, only artichoke-containing PFS consumers have a significantly  $< 25$  BMI as compared to non-consumers.

#### PT-139

Poster

#### Nutritional status of schoolchildren in the Andean region of Peru.

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Objectives: The regional government of Cusco (Peru), based on anthropometric data, reported 60% of malnutrition among children from Ccorca district, located in the Andes at about 3625 meters above sea level and that encompasses rural population and low socioeconomic status. In order to perform a nutritional intervention tailored to the territory, the aim of the project was to assess, together with the NGO Amantaní Ccorca, the degree of malnutrition among school children.

Material and methods: Descriptive study conducted on 171 children between 6 and 12 years old from the Ccorca district. Weight and height, hemoglobin and serum albumin were determined. Dietary intake was assessed using a food frequency questionnaire validated. International Classification of Z-score for weight-for-age and Z-score for height-for-age of the World Health Organization were used to determine acute and chronic malnutrition respectively.

Results: 13.8% of children showed acute malnutrition and 48.6% chronic malnutrition. 0.6% had altered levels of albumin and 0.7% had anemia. The frequency of consumption of dairy products, fruits and vegetables is low (0.8, 0.6 and 0.6 servings per day, respectively). The one of protein foods (meat, fish and eggs) is slightly lower (1.6 servings/day), however, the frequency of consumption of starchy and fat (3.7 and 2.3 servings per day, respectively) is adequate, to the rations recommended for this group of age. Regarding the frequency of simple sugars, it is excessive (3.1 servings/day). Key findings: Chronic child malnutrition in the district of Ccorca is high although the acute is low. This corresponds with the good nutritional status in proteins and iron from the biochemical point of view. The deficient quality of the diet can hide an insufficient supply of micronutrients that can affect specific nutritional status and/or the cognitive status of infants. Therefore, in the project it is planned to assess neuropsychological functions of children and make a nutrition education intervention to improve diet quality.

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#### PT-140

Poster

#### Prevalence of metabolic syndrome and associated factors in elderly of Viçosa, Minas Gerais, Brazil.

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Objective: The aim of this study was to determine the prevalence of metabolic syndrome and associated factors in elderly enrolled in the Program of Family Health Strategy, Viçosa/MG, Brazil.

Material and methods: The study was cross-sectional probability sample of elderly aged over 60 years, both sexes (n = 402). The dependent variable was the metabolic syndrome. Independent variables: gender, age, education, social class, skin color self-reported body mass index, waist / hip ratio, waist circumference, physical activity, self-perceived health status, self-reported diabetes mellitus, hypertension self-reported and biochemical variables (glucose, triglycerides, HDL-C, LDL-C and VLDL). To verify the associations was used chi-square for linear trend. To evaluate the difference between the means used were the t test and Mann Whitney. The response rate was 100%.

Results: The prevalence of metabolic syndrome was was of 60.95% (95% CI -79.60 71.14) in the elderly, ranging from 43.13% to 72.73% in men and women. After adjusting for possible confounding variables were associated with MS in both sexes: the presence of diabetes and hypertension, self negative perception of health, overweight, changed WHR, waist circumference changes, elevated triglycerides, HDL, VLDL and glucose. High levels of LDL was associated only with males.

Key findings: It was concluded that more than half of the sample had metabolic syndrome, similar to that found in the population. Factors amenable to intervention as hypertension, overweight and diabetes were associated with MS.

#### PT-141

Poster

#### Sedentary behavior as an obesity factor in a representative sample of Spanish children from the ALADINO study.

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Objectives: Recent evidence suggests that the time that children and young people spend in sedentary activities (defined as those that involve sitting or reclining) may be associated with increased risk of cardio metabolic disease.

se, obesity and diabetes, independently of other factors, such as physical activity. The aim of this study was to study the sedentary behavior (SB) (TV viewing, video games and computer use, homework time) of Spanish children and the contribution of these sedentary activities to the prevalence of overweight and obesity.

**Material and methods:** The ALADINO (Alimentación, Actividad Física, Desarrollo Infantil y Obesidad—Food, Physical Activity, Child development and Obesity) study is a cross-sectional study of 7659 Spanish children in elementary school (3818 girls and 3841 boys, aged 6–9 years) performed between October 2010 and May 2011 by AECOSAN with UCM. This study is part of the Childhood Obesity Surveillance Initiative (COSI), promoted by the European Office of the WHO. The study used the COSI questionnaires which were translated and adapted for the Spanish population. Weight, height and waist circumference were measured. Children were classified by their BMI using the WHO criteria. Self-declared data about sedentary behavior was collected and used to assess a sedentary behavior score (SBS) (0-100) from of three variables: Television viewing, computer and video-game use, and time used to do homework and reading. The SBS was divided in tertiles (divided by gender) and SB categories were created, classifying children in the 2nd and 3rd tertiles as sedentary and the ones in the 1st tertile as non-sedentary. SPSS(version 20.0) was used to performed the statistical analysis.

**Results:** The means SBS, BMI, weight and waist circumference values of the population were 22.13±0.12 points, 17.9 ±0.07 kg/m<sup>2</sup>, 30.3±7.5 Kg and 60.7±7.66 cm. Significant differences (p<0.05) between sex groups were found in all variables. 73.3 % of the obese children were sedentary. The means of the evaluated parameters for the sedentary group were: 30.1±0.07 points of SBS, 18.1 ± 3.0 kg/m<sup>2</sup> for BMI, 30.1±7.8 Kg for weight and 61.4±8.0 cm for waist circumference with a 20.9% of obesity prevalence; for the non-sedentary group were: 14.3±4.5 points of SBS, 17.1 ± 2.8 kg/m<sup>2</sup>, 29.7±7.2 Kg and 60.0±7.2 cm with a 15.9% of obesity. All values were significantly higher in the sedentary (p<0.05) than in non-sedentary group.

**Key finding:** Children who are engaged in more sedentary activities have higher obesity prevalence and therefore an effort should be made to monitor the time these children spend involved in these activities.

**Body responsible for the investigation:** This study was founded by the Spanish Agency of Consumers Affairs, Food Safety and Nutrition (AECOSAN).

#### PT-142

Poster

##### **Dietary sources of sodium in Spanish schoolchildren.**

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**Introduction:** Identifying the dietary sources of sodium is important in order to take measures to protect the health of the population, especially in children.

**Objective:** To assess the sodium intake and dietary food sources in Spanish schoolchildren aged 7 to 12 years.

**Methods:** We studied 181 schoolchildren selected from different rural and urban areas of the Community of Madrid, Andalusia and Castilla-La Mancha (92 boys and 89 girls). The food intake was recorded for 3 days (including a weekend day) using a dietary record questionnaire. All foods were tabulated using the DIAL program, and food grams, energy and sodium intake was calculated. The contribution of each foods to total sodium intake of the children was calculated and expressed as a percentage.

**Results:** Mean sodium intake (excluding table salt) (2463±479 mg/day) exceeded the UL established for this age group (1.9 mg for 4-8 years, 2.2 mg for 9-13 years) in 91.7 % cases (without sex differences). The main dietary sources of sodium were cold and cured meats, bread and ready-for eat meals, which account for 25.8%, 18.0% and 10.3 % of the total sodium intake. These three groups contribute 54.1 % to total sodium intake. Sodium intake from milk (6.6%), soups and creams (4.3%), and buns (4.0%) is also important.

**Conclusions:** The majority of salt in Spanish children's diets comes from manufactured food products, so reductions in the salt content of these food products are required. Furthermore, the improvement of the dietary habits is also important, including less processed foods in the diet, in order to help to reduce the sodium intake.

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#### PT-143

Poster

##### **Obesity in Morocco and Tunisia, countries in transition: Situation, Study and policy.**

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**Introduction:** in the North Africa countries are in economic emergence, and develop epidemiological and demographic transitions like these known previously in developed countries following the processes of urbanization, industrialization, globalization, environmental problems, climate change and changes in the lifestyles there accompanied them.

**Methodology:** in this context, a project Corus 'Obe-Maghreb' was operated from March, 2009 till April, 2010; it has for purpose to supply knowledge which can help in the elaboration of adapted policies. It associates Ibn Tofail university, Morocco; IRD, France; various partners of Government, Ministries of Health, and other Universities. It also associates National Institute of Nutrition of Tunisia (INNTA), and University of Nottingham of England, so conferring to the study a regional size.

The aimed objectives are to describe, by specific inquiries, the double burden constituted by the coexistence of the overweight and the deficiency at family and individual levels, to study the risk of overweight in case of deficiency and of deficiency in case of overweight, as well as the connection with food, physical activity, psychosociologic and socioeconomic factors. The second part this project concerns the study of the preferences of diverse stakeholders towards various possible options of prevention, it uses the Multi-criteria Mapping methodology (MCM).

**Results:** The most striking results of this regional study are, at first overweight and obesity is in galloping rise in 2 countries, on one hand, and coexistence of certain malnutritions by deficiencies, in particular the iron lack and the anemia, in this period of nutritional and epidemiological transition by which 2 countries pass. All the age brackets including the children are concerned by these aspects. Non-communicable chronic diseases show high prevalences. About physical activity, the result shows its levels, especially in the households, insufficient.

Concerning MCM study, the measures targeting behavior change through education were most valued. In North Africa, obesity is not widely recognized as a public health priority by stakeholders. Stakeholders in Morocco and Tunisia prefer 'downstream' options targeting individual behaviour change through education, rather than 'upstream' options aimed at changing the obesogenic environment.

In conclusion, this study deserves to be driven in other regions to cover all of the Maghreb, which knows an obesogenic environment more and more complex; and it is true with the aim of having a wider vision allowing to base a policy of prevention and based on scientific evidences facts stemming from typical studies MCM and uphold in account the consensus of policy makers.

#### PT-144

Poster

##### **Inadequate intake of fruits during pregnancy is related with higher sugar intake in the offspring at 3 years of age.**

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**Objective:** We aimed to identify the different relationships between the intake of fruits in healthy, overweight, obese and diabetic mothers during pregnancy with the intake of sugar, sweets and pastries of their offspring at 3 years of age.

**Methods:** 61 pregnant women mother-child pairs participating in the PREOBE project (www.ClinicalTrials.gov NCT01634464) were studied in the present analysis. 25 were healthy normoweight women (18≤BMI<25), 13 were overweight (25≤BMI<30), 12 obese (BMI≥30) and 11 developed gestational diabetes. The dietary assessment was performed using a food frequency questionnaire at 24 weeks gestation and was analyzed according to the dietary recommendations for pregnant women from the United States Department of Agriculture (USDA). In the same way, dietary assessment in children at 3 years of age was performed with 3-day food diaries and the percentage of total energy value from sugar, sweets and pastries were analysed using the DIAL software for assessing diets and food calculations (Version 2.16 2012). ANOVA test and multiple linear regression model were performed for data analysis using IBM SPSS Statistics 21.0. Dependent variable was the percentage of total energy value obtained from sugar, sweets and pastries present in the children diet, and independent variables were the mother's fruits intake according to USDA recommendations and the study group.

**Results:** It was seen that the offspring born to those mothers who did not achieve the dietary recommendations for fruits (at least 2 cups per day) during the second trimester of pregnancy, showed an higher percentage of total energy intake from sugar, sweets and pastries (5.6±3.6) versus those children born to mothers that achieved the recommendations (2.8±2.8) (R=0.277; b=-3.25, p=0.02); however, this association was not related to the study group.

**Conclusion:** The inadequate intake of fruits in mothers during the second

trimester of pregnancy is related to a higher intake of sugary foods in their children at 3 years of age regardless of maternal nutritional status before pregnancy. These results support the hypothesis that the intrauterine nutrition causes permanent changes in the fetus which seems to have an influence promoting non beneficial and more obesogenic feeding practices in their children. .

#### PT-145

Poster

##### **Daily eating frequency, blood lipids and dietary aspects of adults and elderly of São Paulo, Brazil: cross-sectional analyses.**

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Objective: evaluate blood lipids and characteristics of the diet according to eating frequency in adults and elderly of the city of São Paulo, Brazil.

Methods: the sample comprises 485 adults and elderly from the cross-sectional health survey of São Paulo (ISA-Capital), conducted in 2008. Dietary intake was assessed using one 24-hour dietary recall using the Automated-Multiple-Pass-Method. Fasting blood draw, anthropometric measures and information on health and life condition were collected in the households. Individuals were classified in four categories according to the number of eating occasions (EO): a) less than three; b) three c) more than three and less than six; d) six or more. Medians and interquartile ranges were used to describe continuous non-parametric variables and Kruskal-Wallis and trend tests were used to compare the values between EO categories. Categorical variables frequencies were described and compared by Pearson chi-squared tests.

Results: women are more likely to have higher eating frequency: 10% of men and 5% of women have less than three eating occasions a day while 2% of men and 7% of women have six or more ( $p=0.015$ ). There were no differences in age, body mass index, waist circumference, smoking status, physical activity level, family income, and blood lipid measures (serum cholesterol, HDL, LDL, triglycerides) in men or women according to EO categories. Energy intake increases in parallel with EO categories in men ( $p<0.001$ ) and women ( $p<0.001$ ), while energy density becomes lower when increasing EO categories ( $p_{men}=0.002$ ;  $p_{women}=0.008$ ). Almost all the nutrients analyzed increases according to EO (except cholesterol, saturated fat acids and glycemic index for men and cholesterol and glycemic index for women). When analyzing nutrients per 1000 kcal, for men, fiber consumption increases in parallel with EO ( $p=0.009$ ); those with three EO had the lowest total fat ( $p=0.0264$ ) and saturated fat ( $p=0.0204$ ) consumption, while those with three or more EO (more than three and less than six; and six or more) had the higher polyunsaturated fat acids consumption ( $p=0.019$ ) and the higher polyunsaturated/saturated fat acids ratio ( $p=0.0064$ ). For women, those with three EO had the lowest fiber consumption while those with six or more EO had the highest fiber consumption ( $p=0.001$ ). Those with less than three EO had the lowest polyunsaturated/saturated fat acids ratio ( $p=0.0138$ ).

Key findings: there were no differences in blood lipid measures according to eating occasion categories while energy intake increases and energy density decreases when increasing eo categories in man and women.

#### PT-146

Poster

##### **Consejos de alimentación y actividad física para personas mayores: de la evidencia a las recomendaciones.**

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Se calcula que hacia el año 2050 el 30% de la población mundial tendrá más de 65 años. Para apostar por la calidad de vida de las personas mayores, el Ayuntamiento de Barcelona con el apoyo de muchas otras instituciones genera una guía "¿Qué debemos comer, cómo y por qué?". De consejos de alimentación y actividad física para la adopción y seguimiento de unos hábitos de vida más saludables para las personas mayores. Tal y como aconsejan las líneas Europeas de salud, de promocionar una mayor responsabilidad de los individuos en la propia salud, se incorporan a la publicación aspectos de autocuidado como consejos de higiene bucal, de control del peso, por una adecuada hidratación, higiene del sueño, alimentación y medicamentos, así como alimentación y descanso. También se incluyen recursos disponibles en la ciudad de Barcelona para garantizar una alimentación adecuada a las personas que así lo necesitan. Actualmente, con las comidas en compañía llega a ofrecer 197.194 comidas anualmente y con las comidas a domicilio se llega a 1.251 personas mayores.

Un aspecto a destacar de la guía es una forma de expresar la composición y proporciones de las comidas principales a partir de esquemas con fotos de ejemplos de los diferentes grupo de alimentos, que buscan una forma de representarlo mas simple que la pirámide y adaptado a la población diana a nivel de diseño.

La guía quiere llegar a un 12% de la población, casi 340.000 personas de más de 65 años de la ciudad de Barcelona a través de la distribución y formación a entidades como hogares de ancianos, centros cívicos, Comedores Sociales y otras entidades y asociaciones de gente mayor.

En definitiva, con la guía se ha hecho un trabajo por parte de un equipo de expertos para consensuar unas recomendaciones apoyadas por una evidencia científica sobre "¿Qué debemos comer; cómo y por qué?". Yendo más allá de "qué" debemos comer sino justificando "por qué" se estipulan unos consejos alimentarios específicos y también poniendo énfasis a "como": como seleccionar, manipular, cocinar y comer los alimentos, preferiblemente en compañía, para fomentar un envejecimiento activo y saludable.

Es calcula que cap a l'any 2050 el 30% de la població mundial tindrà més de 65 anys. Per apostar per la qualitat de vida de la gent gran, l'Ajuntament de Barcelona amb el suport de moltes altres institucions genera una guia "Què hem de menjar, com i per què?" de consells d'alimentació i activitat física per a l'adopció i seguiment d'uns hàbits de vida més saludables per a les persones grans. Tal i com aconsellen les línies Europees de salut, de promocionar una major responsabilitat dels individus en la pròpia salut, s'incorporen a la publicació aspectes d'autocuidado com consells d'higiene bucal, de control del pes, per una adequada hidratació, higiene de la son, alimentació i medicaments, així com alimentació i descans. També s'inclouen recursos disponibles a la ciutat de Barcelona per tal de garantir una alimentació adequada a les persones que ho necessitin. Actualment, amb els àpats en companyia s'arriba a oferir 197.194 àpats anualment i amb els àpats a domicili a 1.251 persones grans.

Un aspecte a destacar de la guia és una forma d'expressar la composició i proporcions dels àpats principals a partir d'esquemes amb fotos d'exemples dels diferents grup d'aliments, que busquen una forma de representar-ho mes simple que la piràmide i adaptat a la població diana a nivell de disseny. La guia vol arribar a un 12% de la població, quasi 340.000 persones de més de 65 anys de la ciutat de Barcelona a través de la distribució i formació a entitats com Casals de Gent Gran, Centres Cívics, Menjadors Socials i altres entitats i associacions de Gent Gran.

En definitiva, amb la guia s'ha fet un treball per part d'un equip d'experts per consensuar unes recomanacions recolzades per una evidència científica sobre "Què hem de menjar; com i per què?". Anant més enllà de "què" hem de menjar sinó "com" ho hem de fer: àpats preferiblement en companyia, com seleccionar, cuinar i menjar per fomentar un envelliment actiu i saludable.

#### PT-147

Poster

##### **Adhesion to nutritional intervention program in shift workers: preliminary study.**

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Objectives: Verify adhesion to a qualitative nutritional intervention program and changes in food intake and body composition in shift workers.

Material and methods: Nineteen shift workers (18 to 55 years), 14 females, 12 fix morning shift workers, and 06 fix night shift workers, were recruited through different forms of media (electronic, newspapers, radio and magazines). Shift workers were submitted to a qualitative nutritional intervention program of 1 month. Before and after intervention subjects were submitted to anthropometric and nutritional evaluations. Anthropometric evaluation included measurements of body weight, height, waist and hip circumferences as well as body composition measurements by plethysmography. Changes in dietary pattern were evaluated by a questionnaire developed by Ministry of Health of Brazil, based on Food Guide for the Brazilian Population.

Results: No baseline differences were observed in anthropometric and demographic characteristics of day and night workers. Day and night workers had good adherence to nutritional intervention, which was observed by the improved of diet quality score. Body weight changed significantly ( $p = .05$ ) from the beginning to the end of the intervention only in night shift workers with a mean loss of  $1.26 \pm 1.5$  kg. Both groups body fat percentage changed significantly ( $p = .05$ ) from the beginning to the end of the intervention with a mean loss of  $1.35 \pm 2.2\%$  for day workers and  $2.12 \pm 1.1\%$  for night workers.

Key findings: The results proved that the objective of the study was successful, since the group manifested an improvement in eating habits and consequent weight loss. The conclusion is that nutritional intervention with emphasis on eating habits and nutrition is effective. Emphasis should be given to positive results in night workers, since there is a higher propensity for the development of metabolic disorders and obesity in this group of workers.

#### PT-148

Poster

##### **Occurrence of falls and fractures and their consequences, in a group of ambulatory older women previously rated through risk screening scales.**

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Falls and osteoporotic fractures are a frequent cause of disability, dependency and mortality in elderly women.

**Aims** To assess the risk and occurrence of falls and fractures by age, body mass index, and bone mineral density in a group of older woman from Córdoba city, and to analyze their causes and consequences.

**Method** Correlational descriptive study. Population: 86 older woman  $\geq 60$  years old, attending senior centers in Córdoba in 2013, with prior risk assessment. Variables: risk of falling; fracture risk; occurrence of falls; occurrence of fractures; body mass index (BMI); bone mineral density (BMD), age. Instruments: Tinetti scale, FRAX, Dual-energy X-ray absorptiometry, questionnaire. All the older woman gave consent.

**Results** Risk assessment: 93% of the older woman had low risk of falling; moderate and high risk prevailed among the  $\geq 80$  years. 39.5% of the older woman presented high fracture risk; with a significant association with age ( $p=0.0007$ ), low BMD ( $p<0.0001$ ) and a family history of hip fracture ( $p=0.0382$ ). The average BMI was  $28.7 \pm 4.2$  kg/m<sup>2</sup>, and the prevalence of obesity in the older woman was 40.7%.

According to the BMD, 36% was normal, 44.2 % had osteopenia and 19.8% of the older woman had osteoporosis. In this last group 35.3% had also submitted a prior fracture, with higher frequencies among those  $\geq 80$  years.

Half of those with osteoporosis had normal weight and the rest had BMI  $\geq 25$  kg/m<sup>2</sup>. 50% of the older woman had suffered  $\geq 1$  fall since the initial assessment, mainly in public/usual places, accidentally, caused by extrinsic factors. 12.2% had serious consequences, of which 9.3% were osteoporotic fractures. 83% of those who fell had overweight/obesity ( $p=0.0283$ ). All the older woman with fractures were  $\geq 70$  years ( $p=0.0396$ ), half of them with prior high fracture risk ( $p=0.0242$ ) and osteopenia.

**Conclusions:** Even though the risk of falling was low, its occurrence was high, especially in the older woman with high BMI. The falls were due to extrinsic factors and were not associated with the previous risk of falling. The occurrence of fractures was as expected for this group and was significantly associated with age, BMD and prior fracture risk.

#### PT-149

Poster

##### Right to adequate food protection in pregnant women and children, Córdoba, Argentina.

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**Objective:** The aims of this project were: -strengthen food and nutrition security from the perspective of human rights and gender in public health policy and nutrition, in the community of Juan Pablo II, Córdoba, Argentina; and -reduce the premature abandonment of the exclusive breastfeeding practice on children under six months, and continue up to age two years old.

**Material and methods:** Subjects of law were pregnant women, lactating women, their children and families, from Juan Pablo II community. Strategies, methodologies, techniques and tools were constructed from the right to health and food, in a context of primary health care focused on families and community, from an equality and social solidarity perspective.

**Results:** The research included a total of 153 pregnant women and infants. Accessibility the healthcare system measured by gestational week identifying indicator, show that 80% of the total number of pregnant women were identified before week 20.

As an indicator of access and right to natural food, the prevalence of exclusive breastfeeding for children under six months was 38%. Also, the continued breastfeeding with complementary food on children aged 6-12 twelve months old was 41%.

The maternal, neonatal and infant mortality, as indicators of health equity, was 0%.

**Main findings:** The results are related to the access to right to food, for children as human right holders. Data obtained, also show that preventable risks and life protection are collective achievements, as a result from cooperation-between state policies and the community involvement.

#### PT-150

Poster

##### Screen time is associated with insulin resistance in school-children of Madrid, Spain.

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**Objective:** Sedentary behaviors have been associated with obesity and type 2 diabetes, particularly screen time. Therefore, the aim of the present study was to analyze the relationship between screen time and the presence of insulin resistance in schoolchildren of the Community of Madrid, Spain.

**Methods:** A group of 564 schoolchildren (258 boys and 306 girls) aged 9-12 years were studied. A physical activity questionnaire that included the hours spent on watching TV, PC use and videogames was applied. Screen time was obtained by the sum of hours spent in the previous three activities. Fasting glucose and insulin were determined and the HOMA-IR was calculated to establish the presence of insulin resistance in children. HOMA-IR cut-off value of  $\geq 3.16$  was used as indicative of insulin resistance. Waist circumference was measured. All calculations were made using SPSS (version 19.0). The statistical significance was set at  $p<0.05$ .

**Results:** Mean screen time was  $1.66 \pm 1.04$  hours per day, boys had more screen time than girls ( $1.76 \pm 1.08$  vs.  $1.58 \pm 0.99$ ,  $p<0.05$ ). The 44% of the studied children had two or more than two hours of screen time per day. Mean glucose, insulin and HOMA-IR were  $81.7 \pm 10.1$  mg/dL,  $6.35 \pm 5.10$   $\mu$ U/ml and  $1.26 \pm 0.88$ , respectively. Glucose were higher in boys than in girls ( $83.3 \pm 10.2$  vs.  $80.4 \pm 9.8$  mg/dL,  $p<0.01$ ), while insulin and HOMA-IR were lower in boys compared with girls ( $5.76 \pm 4.22$  vs.  $6.82 \pm 5.68$ ,  $p<0.01$  and  $1.19 \pm 0.91$  vs.  $1.31 \pm 0.86$ ,  $p<0.05$ ), respectively. The 4.47% of the studied children had HOMA-IR values indicative of insulin resistance. Children who spent less than two screen hours had lower HOMA-IR values than those children who spent two or more hours ( $1.10 \pm 0.79$  vs.  $1.42 \pm 0.96$ ,  $p<0.001$ ). Longer screen time was significantly associated with higher HOMA-IR ( $\beta=0.143$ ,  $p<0.01$ ) after the adjustment for sex, age and waist circumference of children.

**Conclusions:** Almost half of the studied children had more than two hours of screen time per day. The 4.47% of the studied children had HOMA-IR values indicative of insulin resistance. Screen time was associated with insulin resistance in schoolchildren, so it would be advisable the reduction of prolonged screen time for preventing obesity and type 2 diabetes and other related health conditions in schoolchildren.

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#### PT-151

Poster

##### PERSEO Project: Internal consistency for constructs related to fruit and vegetable intake of the children questionnaire.

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<sup>2</sup>Agencia Española de Seguridad Alimentaria y Nutrición (AESAN).

**Background:** This paper describes the internal consistency of constructs related to fruit and vegetable intake in the children questionnaire in PERSEO project, a Project aimed at the promotion of healthier eating and physical activity habits in schools and community with the final aim of obesity prevention.

**Methods:** A community intervention trial was conducted with a quasi-experimental design, involving 67 Primary schools (1st-4th grades) from 6 Autonomous Spanish Regions, Ceuta and Melilla, assigned to an intervention ( $n=34$  schools) and control group ( $n=33$  schools). The evaluation study protocol included anthropometrical measures, food and beverage consumption, usual physical activity, sedentary lifestyle, as well as selected determinants for this behaviours. Using a cross-sectional research design, internal consistency reliability for subscales of behaviour theory-based constructs measuring personal, social and environmental correlates of fruit and vegetable intake in 9-12-year-old children was assessed using Cronbach alpha. The constructs included self-rated intake, self-rated intake compared to other children, knowledge about recommended daily intake levels, preferences, bring fruit/vegetables to school, modelling, active parental encouragement and facilitation, availability at home and at school. All constructs, except knowledge, were assessed with a five-point scale from: 'never/fully disagree/dislike very much' (-2) to 'yes/fully agree/like very much' (+2). Preferences were assessed for 14 different fruits and vegetables. To assess the knowledge about the recommended intake, children were asked on an eight point scale, with response options ranging from 'no fruit or vegetables' to '5 pieces or portions per day or more'.

**Results:** Some 5555 children (9-12 yr.) provided valid answers for this part of the children questionnaire in the study. Five out of the eight subscales included more than one item. Cronbach's alpha values computed were moderate to high (range 0.51 to 0.93) with the exception of parental facilitation, which had a value below 0.50 for fruit ( $\alpha=0.49$ ).

**Conclusions:** PERSEO child questionnaire assessing personal, family, and school-environmental determinants related to fruit and vegetable behaviours has good internal consistency of constructs for the large majority of items.

#### PT-152

Poster

##### A qualitative analysis of the eating habits of primary school children in urban areas of Cork and Almería.

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**Background and objectives:** A number of child health problems are widely perceived to be related to changes in diet and eating habits. This study investigates this perception in two different European urban areas in the following ways: by obtaining and comparing the perception of health professionals, teachers, parents and carers about the eating habits of primary school children; by proposing solutions and strategies for these problem and needs.

**Material and Methods:** In-depth interviews using semi-structured guides were conducted with expert informants matched by professional background, knowledge and experience in each of two cities: Almería (Spain) (n=15) and Cork (Ireland) (n=15). Data from the in-depth interviews was transcribed and analyzed using the grounded theory qualitative research method.

**Results:** The informants were generally negative about child eating habits, which they held were influenced above all by the family, but also by television, marketing, peers and school. The solution they proposed were integrated ones, involving both the family and external factors.

**Key findings:** While informants in both cities were in general agreement, they cast the problem differently: in Almería as the abandonment of the traditional Mediterranean diet, and in Cork as the result of economic development. However, there were no major differences in the actual problems and needs they identified. This suggests that both locations could cooperate to find a solution.

### PT-153

Poster

#### Alpha-tocopherol concentrations and weight status as predictors of HOMA-IR in schoolchildren of Madrid, Spain.

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**Objective:** Alpha-tocopherol concentration is an important biomarker of the antioxidant status, in turn, the insulin resistance is associated with an increased oxidative state. The condition of overweight/obesity is associated both with the oxidative stress and the presence of insulin resistance. Therefore, the aim of the present study was to determine the concentration of alpha-tocopherol and the weight status as predictors of insulin resistance in schoolchildren of Madrid.

**Methods:** A case-control study with an initial sample of 564 schoolchildren (258 boys and 306 girls) aged 9-13 years was performed. Schoolchildren of the same age and sex who were overweight (BMI >P85 and <P97) (n=93), obese (BMI >P97) (n=90) and schoolchildren randomly selected (using a table of random numbers) from the remaining 381 who were of normal weight (BMI <P85) (n=100) were selected from the total sample to participate in the study. The final sample consisted of 283 schoolchildren. Plasma glucose and insulin were determined and HOMA-IR (homeostasis model assessment) was calculated by using the equation: insulin (μU/ml) × glucose (mmol)/22.5. Insulin resistance (IR) was defined as the HOMA value corresponding to the mean plus two standard deviations (SD) of the normal weight group for each sex (boys=1.860 and girls=2.752). Alpha-tocopherol concentrations were quantitated by reverse-phase HPLC with UV detection, and it was adjusted for total serum lipids (cholesterol + triglycerides). All calculations were made using SPSS (version 19.0). The statistical significance was set at p<0.05.

**Results:** HOMA-IR values were significantly higher in girls than in boys (1.73±0.98 vs. 1.34±0.95; p<0.001). HOMA-IR values were significantly higher in obese than in the overweight schoolchildren (2.07±1.19 vs. 1.52±0.81; p<0.01), respectively, as well as, in those schoolchildren who had a normal weight (2.07±1.19 vs. 1.08±0.64; p<0.01), respectively. The concentrations of alpha-tocopherol/total lipids in the schoolchildren without IR were higher in comparison with those who had IR (47.4±9.66 mg/g vs. 39.7±7.85 mg/g), respectively. The HOMA-IR values were significantly inversely associated with the concentrations of alpha-tocopherol/total lipids (β=-0.018±0.006, p=0.005) and were significantly positively associated with BMI (β=0.129±0.018, p=0.001), gender (β=0.459±0.124, p=0.001) but not with age (β=0.136±0.075, p=0.072) (R<sup>2</sup>=0.344, p<0.001 for complete model).

**Conclusion:** These results show that the presence of lower alpha-tocopherol concentrations and a less favourable weight status, are associated with a higher HOMA-IR values and this situation was less favourable in boys than in girls.

### PT-154

Poster

#### Study habits and alcohol consumption risk assessment according to WHO criteria in college students.

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**Objectives:** "The harmful use of alcohol ranks third among the main factors of premature death and disability worldwide. It is estimated that each year causes about 2, 5 million deaths, and a considerable proportion of them corresponds to young people between 15 and 29 years."

The objective of this study is to analyze the alcohol habit in young student population. We wish to determine the risk class of alcohol by the limits defined by the WHO through which define the low, moderate and high risk. Material and methods: Cross-sectional analysis of drinking habits in 2169 young students from the University Juan Carlos I in Madrid by validated test beverage consumption (Heckrich, 2010) in which data are collected weekly and quantity of different beverages. The amount of ethanol consumed alcohol expressed in UBE / week and the percentage of subjects in the sample belonging to each of the risk categories, where as the WHO criteria by which a high-risk drinking is defined to those calculated men presenting consumption > 28 UBE / week and 17 UBE / week or more for women, the moderate risk included.

**Results:** In 2169 a total of 5 students, 9% have a moderate risk of alcohol and 2.12% high risk according to the criteria of the WHO. Men have a tendency to use more high-risk 3, 43% and 1.4% in women, a pattern that is repeated in moderate consumption values of 7% and 5.4% respectively.

**Key finding:** The analysis shows a percentage of lower risk than expected on drinking habits in students. Further investigations are needed to minimize bias due to various factors, including the possibility that data collection is performed during exam periods where alcohol is severely diminished.

### PT-155

Poster

#### Nutritional status of children with Autism Spectrum Disorder.

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**Objectives:** To evaluate nutrient intakes and Healthy Eating Index (HEI) scores comparing children with autism spectrum disorder (ASD) with typically developing (TD) children and the intakes of both groups with dietary reference intakes, given that previous research has suggested that the diet of children with ASD may not meet recommendations.

**Material and methods:** A matched case-control study was conducted using 3-day food diaries completed by 105 ASD (93 boys and 12 girls) and 495 TD (266 boys and 229 girls) children between 6 and 9 years old in Valencia (Spain). The Children were recruited from the same area and similar socioeconomic backgrounds. The probability of intake adequacy was assessed using the estimated average requirement cut-point method and a probabilistic approach. Student's t-tests and χ<sup>2</sup> tests were used to assess the statistical significance of the differences between means and proportions, respectively. Linear regression was applied to compare the two groups and logistic regression to assess the results with respect to Spanish dietary recommendations. Multivariable-adjusted models were fitted to control for potential confounders. All statistical tests were two-tailed and alpha was set at 0.05.

**Results:** We observed no significant differences between the two groups in age (93.7 vs. 95.46 months, p=0.22), HEI score (65.32 vs. 66.17, p=0.43), total dietary intake (1955 vs. 1961, p=0.86) or food variety score (3.72 vs. 3.53, p=0.45). Linear regression showed that ASD children had a lower intake of cereals and dairy products and higher intake of legumes and vegetables (β=-20.1, 95% CI: -30.45 to -9.58; β=-40.8, 95% CI: -78.46 to -3.22; β=21.2, 95% CI: 4.98, 37.36; β=22.5, 95% CI 4.77, 40.28 respectively). This is consistent with higher intakes of fibre, folate, vitamins B6, E, and K, magnesium and zinc, but lower intakes of calcium and sodium in these children. Logistic regression analysis showed that adherence to recommendations was greater for fibre (OR=0.28, 95%CI 0.09, 0.82) and vitamin E

(OR=0.42, 95%CI 0.22, 0.82), and poorer for riboflavin (OR=13.08, 95%CI 1.04, 164.13) and vitamin C (OR=2.60, 95%CI 1.12, 6.03) in ASD than TD children. Overall, however, many children in both ASD and TD groups did not consume the recommended amounts of certain nutrients.

Conclusions: These results suggest that dietary assessment and recommendations should be made on a case-by-case basis. The findings should be used to guide future clinical and research activities in this area. More research is needed to corroborate our results.

#### PT-156

#### Poster

##### **Analysis of Legal Norms which established the Fund for Food and Nutrition Actions in Brazil 2006-2011.**

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A specific funding mechanism to implement the Brazilian National Food and Nutrition Policy actions started in 2006. Since then the Ministry of Health publishes annual Ordinances intended to establish a line of funding to implement the policy guidelines. The funds are passed directly by decree, from the National Health Fund to specific accounts of State or Municipal Health Funds.

Objective: To identify, classify and analyze the Ministry of Health Ordinances published in the period 2006 to 2011, verifying the correspondence of their contents with the political and institutional government context.

Methods: To perform the analysis of administrative normative acts, the Ordinances were organized from its physical structure; Title (nature, number and date); Menu (brief description of its contents); Preamble (justification); Body of the decree (related to the text); Closure (requirements to implement measures, transitional provisions; clause validity and revocation clause); Signature and Attachments. Finally, successive readings were done to identify core content, classify and compare, where relevant quantification and interpretation were performed. The interpretation of information aimed to understand the meanings often not expressed in the body of the decrees, in light of the historical and institutional context.

Results: Although the ordinances should be published every 12 months, intervals of seven to 17 months were noted, in 2007 and 2010 respectively. As for the Menu, the object suffered nominal change: Ordinance number 1,357/2006 refers to "use the remaining balance of financial resources related to the Incentive to Combat Nutritional Deficiencies"; Ordinance number 3,181/2007, "financial resources of the Healthy Eating Program"; but Ordinance number 1,424/2008 and the following ones, as "annual payment from fund to fund" corresponding to the Fund itself. All Ordinances have as reference the National Food and Nutrition Policy and allude to the nutritional surveillance system for the health conditionalities of Bolsa Família, the Brazilian conditional cash transfer program, as well the micronutrient deficiencies programs. Concerning the body of the norm, the 2006 ordinance included 26 cities (the state capitals), but from 2009 on, cities with more than 150,000 people were benefited, leading to a total of 177 cities. With regard to the mode of cash transfer, from the 2007 Ordinance on, the payment was made in a single annual installment on the specific fund. Key Findings: The analysis of ordinances contributed to overcome different interpretations and questions regarding the use of these specific resources.

#### PT-157

#### Poster

##### **Sugar-sweetened beverage consumption and obesity in children: quality of the studies doesn't influence conclusions.**

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Introduction: A number of recent reports assert that sugar containing drinks may play a key role in the aetiology of overweight and obesity in children and adults. However, scientific reviews of the current available evidence show contradictory findings, highlighting the weaknesses of many studies. The main controversy remains whether the association is directly cause-effect or if the quality of the studies may influence the outcome.

Objective: The aim of the current study is to describe the most recent scientific evidence focused in sugar-sweetened beverages (SSB) and child obesity and to further analyze the quality/adequacy of the studies in terms of their results.

Methodology: We conducted a computer search of PubMed database looking for published meta-analyses of epidemiologic studies which primary aim was to describe the relation between SSB intake and obesity in children. Only randomized control trials studies were selected. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-analyses) adherence was assessed in all included studies.

Results: After applying the inclusion and exclusion criteria; only six meta-analyses were included in our study. Only two systematic reviews specifi-

cally reported their data using PRISMA guidelines (Te Morenga et al. 2013, Malik et al. 2013). Remaining studies (Mattes et al. 2011, Kaiser et al. 2013, Forshee et al. 2008 and Vartanian et al. 2007) achieved 83%, 74%, 72% and 50% respectively of adherence to PRISMA guidelines. Two of the included studies found a positive relationship between SSB and obesity. (Vartanian et al. 2007 and Malik et al. 2013). On the other hand four articles found no relationship between SSB and obesity (Kaiser et al. 2013, Forshee et al. 2008, Mattes et al. 2011 and Te Morenga et al. 2012).

Key findings: The increasing consumption of sugar sweetened beverages in children and adolescents as one of the main causes of the current obesity pandemic is a very trendy research area which is not exempt of controversy. There is no relation between the quality/adequacy of the studies (using PRISMA criteria) and the results they reached. Interestingly, the studies with the highest and lowest adherence to PRISMA (Malik et al 2013 and Vartanian et al 2007) both found a positive association between SSB and obesity. Better designed and longer term studies are needed in order to reach science-based conclusions to establish this relationship properly.

#### PT-158

#### Poster

##### **Optimization of a juice with two varieties of prickly pear (Opuntia ficus-indica) treated by thermoultrasound using surface response method.**

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Objectives. The prickly pear (*Opuntia ficus-indica*) is abundant in Mexico, is a good source of bioactive compounds such as polyphenols, this compound has generated great interest because of its antioxidant properties associated with potential positive human health, such as prevention of noncommunicable disease (cardiovascular, cancer, diabetes). Ultrasound is considered an emerging technology. In order to obtain a juice thermoultrasounded secure with high bioactive compounds; an experimental design response surface would find optimal process conditions. This research work aims to obtain the optimal condition of thermoultrasound process of a juice mixture juice with two varieties of prickly pear (*Opuntia ficus-indica*) with low microbial load, high content of phenolic compounds and antioxidant activity using experimental design of response surface.

Material and methods. A mix juice was made with purple and green prickly pear (6:4 volume/volume) and the thermoultrasound treatment was applied using central composite rotary design with two process variables which were temperature (40-50 °C) and time (15-25 min) with a fixed amplitude of 80%, obtaining 10 treatments. The response variables were total count (aerobic mesophilic) and yeast by the method of standard plate count, the content of phenolic compounds by the Folin-Ciocalteu method and antioxidant activity by DPPH using spectrophotometry at 765 and 520 nm respectively.

Results. The R2 obtained was 0.90 in all response variables, this means that the mean values are adjusted to the mathematical model of the experimental design. A decrease in total count and yeasts of 0.5 log CFU / mL until not detected was observed. Microbiology results were found within the NOM-130-SSA1-1995 (2 log CFU / mL), the reduction obtained is attributed to the ultrasound damage the lipid membrane of the microorganisms. The maximum content of total phenolic compounds obtained was of 880 mg of Acid Galid Equivalent/L and the antioxidant activity was of 2280 µl of Trolox Equivalent/L. The increase of phenolics compounds is due ultrasound breaks the cell walls of the pulp releasing compounds, this increase correlates with the antioxidant activity by DPPH.

Key findings. With the response surface design, the optimum process conditions by ultrasound were obtained in temperature and time in order to reach an innocuous juice with high antioxidant capacity that maintains the potential to eliminate free radicals which cause damage to the body.

#### PT-159

#### Poster

##### **Dietary Inflammatory Index (DII) and mortality in NHANES III Cohort Study.**

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Background: Various dietary components are known to have an effect on overall mortality but very little is known about the relation between overall diet and mortality through the effect of inflammation.

Materials and Methods: We examined the ability of a newly developed dietary inflammatory index (DII) to predict mortality in the National Health and Nutrition Examination Survey (NHANES) III cohort study. The DII was

computed based on baseline dietary intake assessed 24-h dietary recalls (1988-94). Mortality was determined from the National Death Index records through 2006. Cox proportional hazards regression was used to estimate hazard ratios. During the follow-up period through the end of 2006, 2795 deaths were identified, including 615 cancer, 158 digestive cancer and 1233 cardiovascular (CVD) deaths.

Results: Multivariable analysis, adjusting for , race, diabetes status, hypertension, physical activity, BMI, poverty index and smoking, revealed positive associations between higher DII and overall mortality (HR for DII Tertile3vs1=1.34; 95%CI 1.19- 1.51, p-trend<0.0001), cancer related mortality (HR for DII Tertile3vs1=1.46; 95%CI 1.10- 1.96, p-trend=0.01), digestive cancer mortality (HR for DII Tertile3vs1=2.10; 95%CI 1.15- 3.84, p-trend=0.03) and CVD mortality (HR for DII Tertile3vs1=1.46; 95%CI 1.18- 1.81, p-trend=0.0006).

Conclusion: These results indicate that a pro-inflammatory diet, as indicated by higher DII scores, was associated with overall, cancer and CVD mortality.

#### PT-160

Poster

#### **Prospective studies of South Asia on Double Fortified Salt as a cost effective approach to combat micronutrient deficiencies.**

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Today's time focuses on progressing economy world wide. National damage assessment report by MI for 80 countries reported mean GDP loss to be 1%, of which 0.2 to 2.7% belonged to developing countries and India.

With respect to Iron deficiency and Iodine deficiency 4 million and 0.2 million DALYs are lost respectively. In 2008 burden of Iron Deficiency Anemia increased and it is estimated that 4 million DALYs will be lost every year. While calculating cost benefits of Double Fortified Salt(DFS) vs Fortified Foods, it was observed from various studies on wheat flour (9:1), home fortification( 37:1), were much ahead than DFS (2-5:1), but the cost effectiveness, ease of technology and its daily usage as a daily commodity puts DFS ahead than any other fortification.

Fortification of salt with 20-40 mg iodine/kg using potassium iodate and 10mg Ferrous sulfate to avail 40ppm Iodine and 1000ppm iron per day has proven that anemia can be brought under control. Our studies in Gujarat using the formula from National Institute of Nutrition, on pregnant women(n=247) proved circulating iron levels were maintained throughout during the entire pregnancy. Over and above the iron status improved by 1.5%(p<0.001). In school aged population a concomitant increase was observed with 0.56gm/dl in girls(431) and 0.6gm/dl in boys(n=516). It showed overall 6.3% decrease in anemic levels of the population (p<0.001). Therefore based on an intake of DFS as 10mg /day the cost when calculated for 1 billion population of India revealed 47.7million\$ for iron and 4.56million\$-for Iodine, which amounts to total cost of 52.26million\$. Therefore we can conclude that if DFS is incorporated into daily diet consumption, it can avert the reported values of 4.2million DALYs lost every year for India.

**PW-001**

Poster

**Edible insects as a gourmet dish in high class restaurants in México.**Melo Ruiz V.<sup>1</sup>; Calvo Carrillo C.<sup>2</sup>; Quirino Barreda T.<sup>1</sup>; Saltijeral Oaxaca J.<sup>1</sup>; Murata Ch.<sup>1</sup>Universidad Autónoma Metropolitana Unidad Xochimilco<sup>1</sup>; Instituto Nacional de Nutrición "Salvador Zubirán"<sup>2</sup>

Mexican food is much more than tamales, tacos and mole (chicken with hot sauce), insect cuisine is emerging from the past and some up-market restaurants are featuring an array of insect food. Grubs, ant eggs, grasshoppers, ants and water bugs, rounded off with ingredients of different kind, are prepared to produce either local traditional food or gourmet dishes in high class restaurants. As a demand for insects food increase and outstrips supplies that can be gathered from the country, the necessity for growing insects have become, and involve farmers and rural people as a producers and consumers to provide information about edible insects, since some species may require special techniques of gathered and preparation to render them nice. Insects captured by farmers help them to improve their nutrition and health. The aim of this study is to investigate the offering of edible insects to the public at gourmet restaurants, and the customers acceptance. Ten gourmet restaurants were visited to investigate the availability of edible insects at the menu, as well as the acceptance by the people. All restaurants have escamoles (ant eggs) three have maguay white grubs, one maguay red grubs and two grasshoppers. Escamoles were the most demanded, followed by maguay grubs, and grasshoppers were the less consumed. Most of the cooking styles at these up market restaurants are traditional based, although also present actual recipes, the association between actual recipes and the more classical ones, produces an unique character of the Mexican cuisine. A fusion of cultural traditional techniques and contemporary cooking methods implies its uniquely Mexican dishes culinary identity.

**PW-002**

Poster

**The influence of nutrition education with controlling blood sugar levels for outpatient type 2 diabetes mellitus.**Hamid K<sup>1</sup><sup>1</sup>Department of Nutrition, Faculty of Public Health, Hasanuddin University

Background and objectives: Lifestyle changes, especially in big cities, led to the increasing prevalence of degenerative diseases such as diabetes mellitus type 2. And lack of knowledge in running a diet therapy in patients with diabetes that can lead to increased blood sugar levels. This study aimed to determine the effect of nutrition education on increased knowledge, dietary adherence and controlled blood sugar levels of Type 2 Diabetes Mellitus Outpatient in New Jumpandang Makassar Health Center.

Methods: was an experimental study of Pre- experimental research design with one group pre and posttest design. Sampling was done using purposive sampling with a sample of 27 people. Data analysis was performed with the Mc Nemar test.

Results: this study showed no change in the increase in patient knowledge significantly ( $p=0.125$ ) but increased knowledge before education from 85.2 % to 100 % better after the education category. There was an increased change in patient diet adherence ( $p= 0.035$ ) before education was from 25.9 % to 59.3 % were categorized as adherent after education. And there was an increased change in patient blood sugar control patients ( $p=0.000$ ), before education was from 3.7 % to 48.1 % were categorized as controlled after education. Dietary compliance after nutrition education based on energy intake; protein intake; fat intake and carbohydrate intake were more docile as many as 59.3%; 59.3%; 85.2% and 63.0%. And the average blood glucose levels contribute controlled on energy intake; protein intake; fat intake and carbohydrate intake were 62.5%; 56.2%; 52.2% and 52.9%.

Conclusions: there was no influence of nutrition education with increased knowledge there was influence of nutrition education on dietary adherence and controlled in blood sugar levels. We suggested to be set onwards diet to control blood sugar assisted with physical activity (Sport) and medication compliance.

**PW-003**

Poster

**Production, Acceptability and Storage of cocoyam Snack, a perfect way of combating malnutrition.**

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Background: good nutrition is essential foundation for health and development, inadequate food intake leads to poor growth in children worldwide, weight loss and wasting in adult. Despite the intervention of the United Nations to reduce hunger by 50% in the Millennium Development Goals, Yet malnutrition continues to be the world's most serious problem and the single-biggest contributor to child mortality. Local production and utilization of traditional foods will encourage dietary diversity for adequate

nutrients intake. Cocoyam is at present underutilized in Africa, the possibility of increasing its utilization lies in developing suitable processing technology, securing consumer acceptance and marketable products and achieving economic feasibility.

Methodology: peeled cocoyam was processed into a delicious snack in three different samples and compared with a control. This snack contain adequate amount of protein, vitamin and minerals. The following analysis were carried out (Proximate Analysis, Sensory evaluation of the different samples, Functional Properties (Mineral Determination, free fatty acid and Anti nutritional Compounds) and stored for 5months.

Result: the proximate composition shows there is no significant difference between the commercial sample, sample A (cocoyam +ginger) and sample C (cocoyam +onions) at ( $p<0.05$ ) level. Also there is significant difference in the fat content of all the samples with sample A(cocoyam+Ginger) having the highest fat content of 18.3g/100g, The low fat content of sample B(Cocoyam +pepper) and sample C(Cocoyam+onions), coupled with its high starch content, makes it an ideal food for geriatric patients. The overall acceptability of the sensory evaluation carried out using 15 men panelist indicates that sampleA(Cocoyam+ginger) is as accepted as the commercial sample. The result of free fatty acid determination after a period of storage which lasted for five(5) months, it very obvious that even after five months(5 months) of storage, only sample C(Cocoyam +onions) was tending towards Rancidity.

Conclusion: in order to attain a considerable level of food security, low and middle income countries should be encouraged and assisted to invest in the production and utilization of traditional foods. Utilization of local foods will increase food supplies and broaden the food base at household and national level, Will also increase household income and stimulate increased consumption.

**PW-004**

Poster

**Monounsaturated fatty acids, olive oil and health status: a systematic review and meta-analysis of cohort studies.**

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Objectives: No dietary recommendations for monounsaturated fatty acids (MUFA) are given by the National Institute of Medicine, the United States Department of Agriculture or the European Food and Safety Authority. In contrast, the Academy of Nutrition and Dietetics as well as the Canadian Dietetic Association both promote <20% of daily total energy consumption in the form of MUFA. Previous meta-analyses of cohort studies reported inconsistent results with respect to the effects of MUFA on risk of coronary heart disease. The aim of this meta-analysis of cohort studies was to focus on monounsaturated fat and cardiovascular disease, all-cause mortality while differentiating between the different dietary sources of the fatty acids (i.e. oleic acid, olive oil).

Materials/Methods: Literature search was performed using the electronic databases MEDLINE, SCOPUS and EMBASE until March 28, 2014. Study specific risk ratios and hazard ratios were pooled using a random effect model by the Cochrane software package Review Manager 5.2. To enable a consistent approach to meta-analysis and interpretation of findings in this review, relative risk estimates for association of fatty acids and outcomes that were often differently reported by each study were transformed. Results: Thirty-one cohort studies (42 reports) including 833,995 subjects met the objectives and were included in the meta-analyses. The comparison of the top versus bottom third of fatty acid (combined subgroups: monounsaturated fat, monounsaturated fat: saturated fat ratio, and olive oil) distribution in each study resulted in a significant risk reduction for all-cause mortality (RR: 0.90, 95% CI 0.84-0.96,  $p=0.003$ ; I<sup>2</sup>=65%), cardiovascular mortality (RR: 0.89, 95% CI 0.82-0.97,  $p=0.007$ ; I<sup>2</sup>=48%), cardiovascular events (RR: 0.91, 95% CI 0.85-0.97,  $p=0.003$ ; I<sup>2</sup>=59%), and stroke (RR: 0.83, 95% CI 0.71-0.97,  $p=0.02$ ; I<sup>2</sup>=70%). No significant changes could be observed for coronary heart disease. Subgroup analyses showed only a significant association between higher intakes of olive oil and reduced risk of all-cause mortality, cardiovascular events, and stroke. Therefore, olive oil is crucial for the results of the primary analysis. Key findings: The results of the present meta-analysis demonstrated an overall risk reduction of all-cause mortality (10%), cardiovascular mortality (11%), cardiovascular events (9%), and stroke (17%). Monounsaturated fat (mixed animal and vegetable sources) per se did not yield any significant effects on these outcome parameters, indicating that only olive oil (the predominant source of monounsaturated fat in south European countries) is responsible for the protective health effects. In a western diet often associated with a higher risk of these events, monounsaturated fat is mostly supplied by foods of animal origin, further substantiating the results of the present meta-analyses.

**PW-005**

Poster

**"Fat? Who is fat?" Self-image acceptance and weight control behaviours among overweight and obese adolescents.**

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Research Group on Community Nutrition and Oxidative Stress, University of Balearic Islands, and CIBERobn (Physiopathology of Obesity and Nutrition)

Objectives: Incidence of modern anti-fat attitudes on overweighted boys and girls by analyzing self-image perceptions and weight-control practices, and self-body attitudes of heavier subjects, their motivation to lose weight and the actual behaviours to achieve this goal were assessed according to the Theory of Planned Behaviour and Transtheoretical Model of Change were tested in a sample of Spanish adolescents.

Material and Methods: Multicenter population-based cross-sectional nutritional survey carried out (2007-2008) in Balearic Islands (Spain) (n=1988; 47.6% male; 12-17 years old). BMI (actual measures); weight estimation (previous to measure); perceived and ideal image (in a series of silhouettes); weight gain concern (in a semantic scale ranging from "not at all" to "much"); and declared regular weight-control practices ("never"; "not at the moment"; "present dieting and/or exercising") were assessed.

Results: 33% of boys and 25% of girls were heavier than recommended. Girls were more accurate in their weight estimation and perceived image, were more unsatisfied with it and choose ideal silhouettes thinner than males. Oppositely, the percentage of overweight and obese boys who declared themselves satisfied with their image, "not concerned at all" about their weight, and having never do anything to reduce it was elevated. In fact 46.7% of overweight boys and 29% of obese boys should thus be considered not at the contemplation but at the pre-contemplation step of the Transtheoretical Model of Change. Corresponding girls' proportions were reduced to 13% and 11% respectively. In contrast half of all adolescents, including many normal weight girls, are in contemplation or even in the preparation/action steps. In that case girls typically combine diet and exercise while boys predominantly rely on exercise.

Funding: Project ISCIII 11/01791, CIBERobn CB12/03/30038). Grant of support to research groups no. 35/2011 (Balearic Islands Gov. and EU FEDER funds).

Key findings: The unexpected high percentage of boys indifferent to fatness probably reflects social habituation and self-defence processes.

A claim is made for clever tailored messages to promote their interest in adopting healthier habits.

A need for specific campaigns to provide subjects in more advanced steps of Transtheoretical Model of Change with psychological and nutritional tools to keep a reasonable weight and to avoid undesirable control-weight behaviours has been detected.

#### PW-006

Poster

##### **Involvement of adolescents in culinary tasks.**

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Introduction: Different dietetic programs have been developed to improve healthy habits between children and adolescents. A good strategy for promoting healthy habits could be to involve young people in food practices such as buying, preparing or cooking foods.

Objective: Analyze the participation of adolescents in different culinary tasks. Material and methods: 384 adolescents (13 to 22 years old) took part in the study. Participants were asked to perform a questionnaire related with 8 aspects: 1/ knowledge about how to do a shopping food list; 2/ how to do the food shopping; 3/ knowledge about cooking; 4/ enjoy cooking; 5/ help to cook at home; 6/ knowledge about where to throw the leftover food after cooking and eating; 7/ knowledge about how to take advantage the leftover food after cooking; 8/ enjoy the food self-prepared.

Results: In general we observed a good participation in culinary tasks. 90.6% of participants know how to do a shopping food list and 58.8% are usually involved in the food shopping.

78% know to cook and 80.8% enjoy cooking. Although we identify that only 51.9% of them cook usually at home, 90.3% enjoy the food when they participate in the preparation.

Most part of the participants know where they have to throw the leftover food after cooking and eating (88.1%), but sometimes they know how to take advantage of the leftover food after cooking (58.2%).

Differences in culinary tasks with gender, age, quality of diet, and interest on food were explored. Although culinary tasks were not strongly affected by gender, age and quality of the diet, some differences were spotted. Principal differences were identified with interest on food, showing that those who have more interest on food are they who have a proactive attitude on culinary tasks.

Key findings: Results from the present study show that adolescents are slightly involved in culinary tasks.

Participate in the cooking process is something positive and satisfactory for most part of them because they enjoy more the food, if they produce it.

Cooking is an activity enjoyed for them, so it could be a good strategy to include this activity in dietary programs for promoting healthy food habits. In addition, we could enhance the way to know how to take advantage the leftover food after cooking in order to improve their food knowledge and also to improve the conscientious value of food.

#### PW-007

Poster

##### **Misunderstandings of adolescents and young adults about nutritional aspects.**

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Introduction: Unbalanced dietary habits in adolescents are a growing problem in the developed world. Nutritional education is central in intervention strategies. A good understanding of eating behaviour and the reasons behind eating healthy or unhealthy food is of particular importance as it can influence on health in adolescence.

Objective: Analyze the nutritional knowledge in young people, and to describe their perception regarding food information.

Material and methods: 384 adolescents and young adults (13 to 22 years old) took part in the study. The task was self-administered, following the instructions given by the interviewers. Participants were asked to perform a nutritional knowledge questionnaire related with 3 aspects: 1/ number of servings that should be consumed daily from different food groups. 2/ nutritional characteristics of foods. 3/ food effects on health.

Complementary 6 discussion groups with 38 participants were done.

Results: Participants have poor nutritional knowledge being the main ignorance related with daily food servings and food effect on health.

Differences in nutritional knowledge with gender, age and quality of the diet were explored. Although nutritional knowledge was not strongly affected by gender, age and quality of the diet, some differences were spotted. Considering gender, differences were found with knowledge about nutritional characteristics of foods. Boys have better knowledge than girls.

Considering age, older participants have better knowledge than youngest, concretely about nutritional characteristics of food, and food effects on health.

Quality of the diet was not related significantly with nutritional knowledge.

Information generated in discussion groups showed that most part of them said that they had enough information about food and dietary habits. The principal settings where they learned about this topic were at school and with family. Participants know the basis of a balance diet and they are conscious about their unhealthy dietary habits. For them health is not the main reason for choosing foods.

Key findings: Results from the present study show that participants have an important confusion in different nutritional aspects although they believe they have a lot of information about this topic. These findings deserve an important reflection about the type and appropriateness of the contents we use to improve dietary habits. Healthy food habits have to be promoted working together with different settings and working in an extended and evaluated program in order to ensure that interventions allow participants to assimilate the contents properly. In addition, interventions in food habits promotion should take into consideration others perspectives beyond health.

#### PW-008

Poster

##### **Men's health eating habits, health status and health behaviour of young Austrian men aged 17 to 20 years in context to their lifestyles.**

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Background: Most studies about men's health focus on adults aged 50 years and older. But it is largely unknown whether and to what extent health behavior in young men represents risk factors for the incidence of lifestyle-related diseases in later life.

Methods: Within this cross-sectional study 1369 young men in lower Austria aged 17 to 20 years were anthropometrically investigated and interviewed about their lifestyle (nutrition, health-related behavior and physical activity) at their investigation on the suitability of the Austrian Armed Forces. The health status was determined on the basis of biochemical parameters and compared with those of ten years ago.

Results: Anthropometric data (body weight and height, waist circumference) and health-relevant characteristics (nutritional habits, physical activity, alcohol consumption and smoking habits) as well as the frequency of cardiovascular risk factors except blood lipid and glucose levels show a clear increase in unhealthy attributes in the period of 10 years among those young men. 29 percent of 17-20 year old men are overweight, 46 percent are smokers, 80 percent consume alcohol and around one third do not participate in sport.

Conclusion: The health-detrimental tendencies increased in the last ten years considerably in the target group of young men. Efficient prevention campaigns are urgently necessary to promote and continually support a health-conscious life-style in young health.

PW-009

Poster

**Community elders in Taiwan who spend more on vegetables and fruit but not animal-derived food use less emergency and in-patient services.**Lo YC<sup>1</sup>, Wahlqvist ML<sup>1,2,3</sup> and Lee MS<sup>1,3</sup><sup>1</sup>School of Public Health, National Defense Medical Center, Taiwan, ROC.<sup>2</sup>Institute of Population Health Sciences, National Health Research Institutes, Taiwan, ROC.<sup>3</sup>Monash Asia Institute, Monash University, Australia

**Background:** Greater vegetable and fruit (VAF) intakes are associated with reduced risks of all-cause, cancer and CVD mortalities in the general population. However, the consumption of various foods for vulnerable groups is threatened by increasing food prices. Much of the economic burden of healthcare involves elders whose diet may alleviate these costs.

**Purpose:** To investigate prospectively the effects of food group (VAF, animal-derived, grain, and others) expenditures on emergency department (ED) visits, length of hospital stay (LOS), and their costs.

**Methods:** In the 1990-2000 Elderly Nutrition and Health Survey in Taiwan, 24-hr dietary recall and food frequency data were gathered from 65 y or older free-living participants. Using monthly mean national food prices, daily expenditures on VAF, animal-derived, grain, and 'others' food groups were estimated. Annual ED and LOS utilizations and costs for 1,650 eligible elders were obtained by linkage to National Health Insurance claims. Generalized linear models were used to appraise the associations between energy-adjusted food group expenditures and annual health care utilization and costs.

**Results:** Among the four food groups, the highest expenditure tertile for VAF had the lowest annual mean usages (i.e., visit, day, and costs) for ED and LOS during an 8-y follow-up; by contrast, animal-derived food intake was associated with the highest of these expenditures.

With adjustment for covariates, that higher VAF expenditure predicted lower health care utilization and costs for ED and LOS, and that higher animal-derived food expenditure predicted increases was confirmed. In sensitivity analysis, the multivariate results shown those had the highest VAF expenditure were associated with significant decreases in LOS (30%) and LOS costs (33%) while the highest animal-derived were associated with increases in LOS (29%) and LOS costs (80%). The p values for linear trends were significant for ED and LOS of VAF and animal-derived foods. The associations of daily fat, dietary fiber and micronutrients intakes with ED and LOS were consistent with those observed for food patterns.

**Conclusion:** An inverse association for VAF and a positive association for animal-derived food expenditure with the economic burden of acute health care are to be found in older community-based Taiwanese. This provides an opportunity for the development of nutritional investment strategies in health care system.

PW-010

Poster

**FoodSwitch: a smartphone application to help consumers make healthier food choices.**Dunford E<sup>1</sup>, Trevena H<sup>1</sup>, Goodsell C<sup>2</sup>, Webster J<sup>1</sup>, Neal B<sup>1</sup><sup>1</sup>The George Institute for Global Health, University of Sydney, Australia.<sup>2</sup>Xyris Software, Brisbane, Australia

**Background and objectives:** Existing front-of-pack labelling schemes can be difficult for consumers to understand. With >50% of Australians owning a smartphone, and consumers increasingly using smartphones to shop for food, the FoodSwitch application was developed to show consumers the nutritional characteristics of foods in an easy-to-understand format and to suggest similar healthier products.

**Methods:** A database containing nutritional information and barcodes for 40,000 Australian packaged foods was created. All foods were categorised into >850 categories, with each item assigned traffic light colours indicating levels of total fat, saturated fat, sugar and salt based on the UK Food Standards Agency guidelines. Food Standards Australia New Zealand's nutrient profiling criteria was applied to each product to calculate which items appeared as healthier choices. A crowd-sourcing function was built into the application to engage consumers in the attainment of healthier choices.

**Results:** When the barcode of a food product is scanned, FoodSwitch displays the level and traffic light colour for total fat, saturated fat, sugar and salt. A listing of healthier products is shown on the screen. FoodSwitch was downloaded by >250,000 users in its first year, had >27,000,000 media impressions globally, and has now been launched in the UK and New Zealand, with plans underway for launch in the USA, India and China by the end of 2015. Crowd-sourcing resulted in 6,000 additional products added to the database in the first week. Nutritional information for >300 products is still sent in by users each week. Over 2000 consumer feedback emails have been received which have led to a version of the application for hypertensives, SaltSwitch, being released and a version for people with Coeliac Disease, GlutenSwitch. **Key findings:** FoodSwitch has empowered Australian consumers seeking to make better food choices. In parallel, the huge volume of crowd-sourced data has provided a novel means for low-cost, real time tracking of the nutritional composition of Australian foods. There appears to be significant opportunity for this approach in many other countries.

PW-011

Poster

**Dietary habits and associated factors in school-aged children living in Libo Kemkem and Fogera districts, Amhara Regional State, Ethiopia.**Pérez-Formigó J.<sup>1</sup>, Herrador Z.<sup>2</sup>, Sordo L.<sup>1</sup>, Gadisa E.<sup>3</sup>, Custodio E.<sup>2</sup><sup>1</sup>Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Spain.<sup>2</sup>Centro Nacional de Medicina Tropical, Instituto de Salud Carlos III, Spain.<sup>3</sup>Armauer Hansen Research Institute, Ethiopia

**Objectives:** The aim of this study was to assess the dietary habits of school aged children in Libo Kemkem and Fogera districts, Amhara Regional State, Ethiopia and identify the socioeconomic, educational and community factors associated with it.

**Material and Methods:** A cross-sectional survey was conducted in May 2009 using multistage cluster sampling. The study population was children 4 to 15 years old of two districts in Amhara Regional State, Ethiopia.

Socio-demographic and clinical data were obtained by questionnaire, and diet information by a 24 hour recall. Food items were classified in 9 food groups following Food and Agriculture Organization (FAO) methodology. The diversity of the diet was considered appropriate when 4 or more different food groups had been consumed the day before. The prevalence of proper diet was calculated according to rural / urban area, sex, and age. The chi square test was used to assess differences between groups.

A socio-economic (SES), socio-educative (SED) and community endowment (CEI) index were created using principal component analysis.

Finally, a multivariate model was created for the outcome "Adequate Diet", including age group, sex and the different indexes created.

**Results:** A total of 889 children were surveyed. The mean age was 8.8 years and 48% (425) were girls. Grains and tubers were consumed by 98% of the children followed by fats and oils (91.2%), Vitamin A non-rich fruits (84.3%) and the group meat, poultry and fish (20.5%). Around 21% of the children had an adequately diverse for the total population, that turned in to 16.4% and 39.9% in the rural and urban settings respectively (p<0.001). In relation to age, 22.3% of the boys had a proper diet compared to 19.8% of the girls although no significant. There were not significant differences between age groups either. In the multivariate analysis proper diet was associated with the setting, being the children in the urban settings nine times more likely to have a proper diet [OR(IC95%) 9.2 (3.6-23.8)] and with living in a house that owned livestock [OR (IC95%) 2.4 (1.3-4.3)]. Diet diversity score was higher in the first tertiles of the the SES and the SED but differences were not significant.

**Key findings:** Diet diversity is significantly better in urban settings compared to rural settings in our area of study. It is a rural area of relatively food security and therefore we consider that an intervention in nutrition education will be appropriate.

PW-012

Poster

**Low dairy consumption associated with stunting in Equatorial Guinea.**Custodio E<sup>1</sup>, Ncogo P<sup>1</sup>, Aparicio P<sup>1</sup>, Benito A<sup>1</sup><sup>1</sup>Centro Nacional de Medicina Tropical, Instituto de Salud Carlos III, Spain

**Objectives:** Equatorial Guinea is a Sub-Saharan country experiencing a nutrition transition and with a 32% prevalence of stunting. However, there is no published data on the dietary practices of its population. The aim of this study was to assess diet practices among children below 5 years of age and determine its association with stunting.

**Material and Methods:** A cross-sectional survey on Nutrition & Health was conducted in Equatorial Guinea at national level in February-March 2004. Anthropometry was measured following WHO procedures and stunting was defined as height for age < -2 standard deviations (SD) based on WHO Growth Standards. Dietary information was collected through a 24 hour recall. Dietary diversity score (DDS) and Minimum Dietary Diversity (MDD) were calculated using the 7 food groups suggested by the WHO guidelines.

**Results:** Out of the 552 children surveyed, 91% consumed grains and tubers the day before, 47% legumes and nuts, 16% dairy products, 89% flesh (meat, poultry and/or fish), 4% eggs, 44% fruits and/or vegetables rich in vitamin A and 75% fruits and/or vegetables not rich in vitamin A. The consumption of legumes and nuts was associated positively with stunting only in the bivariate analysis, and the consumption of dairy products showed an inverse association with it that remained after adjusting by age, sex and socioeconomic status, OR(95%CI): 0.23 (0.06, 0.81). The mean DDS was 3.2 (SD=1.4), and only 61% of the children reached the MDD, although these two indicators were not statistically associated with stunting.

**Key findings:** Dietary diversity is low among children aged 2 years and older in Equatorial Guinea, although the consumption of animal source foods is high. The consumption of milk and dairy products seems to protect from stunting in this population.

**PW-013**

Poster

**Low consumption of fruits, vegetables and dairy products among HIV-infected children in El Salvador.**Martin-Cañavate R<sup>1</sup>, Sonogo M<sup>2</sup>, Sagrado M<sup>3</sup>, Escobar G<sup>4</sup>, Rivas E<sup>4</sup>, Custodio E<sup>1</sup>.

<sup>1</sup>Centro Nacional de Medicina Tropical, Instituto de Salud Carlos III, Spain.<sup>2</sup>School in Sciences of Reproduction and Development, Trieste University.<sup>3</sup>Centro Nacional de Epidemiología, Instituto de Salud Carlos III, Spain.<sup>4</sup>Centro Nacional de Excelencia para Niños con Inmunodeficiencias, Spain. (CEI) index were created using principal component analysis. Finally, a multivariate model was created for the outcome "Adequate Diet", including age group, sex and the different indexes created.

**Objective:** To assess the dietary practices of HIV-infected Salvadorian children. **Material and methods:** In September and November 2010, a cross sectional survey including food frequency questionnaires was conducted to all HIV-infected children attended at Centro de Excelencia para Niños con Inmunodeficiencias (CENID), Hospital de Niños Benjamin Bloom; the reference institution to all HIV diagnosed children in El Salvador. **Results:** A total of 889 children were surveyed. The mean age was 8.8 years and 48% (425) were girls. Grains and tubers were consumed by 98% of the children followed by fats and oils (91.2%), Vitamin A non-rich fruits (84.3%) and the group meat, poultry and fish (20.5%). Around 21% of the children had an adequately diverse for the total population, that turned in to 16.4% and 39.9% in the rural and urban settings respectively ( $p < 0.001$ ). In relation to age, 22.3% of the boys had a proper diet compared to 19.8% of the girls although no significant. There were not significant differences between age groups either. In the multivariate analysis proper diet was associated with the setting, being the children in the urban settings nine times more likely to have a proper diet [OR(IC95%) 9.2 (3.6-23.8)] and with living in a house that owned livestock [OR (IC95%) 2,4 (1,3-4,3)]. Diet diversity score was higher in the first tertiles of the the SES and the SED but differences were not significant. **Key findings:** Diet diversity is significantly better in urban settings compared to rural settings in our area of study. It is a rural area of relatively food security and therefore we consider that an intervention in nutrition education will be appropriate.

**PW-014**

Poster

**Low dairy consumption associated with stunting in Ecuadorial Guinea.**Castro J<sup>1</sup>, Chirinos D<sup>1</sup>, Tejada de Riveros D<sup>2</sup>

<sup>1</sup>Universidad Nacional del Centro del Perú. Huancayo-Peru.<sup>2</sup>Universidad Nacional Federico Villareal. Lima. Perú.

Interamerican Association for Environmental Defense-Peruvian Society of Environmental Law for Oroya reported lead contents in the air that easily exceed 800% the maximum limits set by General Direction of Environmental Health-Peru (1.5  $\mu\text{g}/\text{m}^3$ ) and the highest percentage of WHO (0,5 $\mu\text{g}/\text{m}^3$ ). In Huancayo, the lead level in air was 44 tons per year; being the main sources of pollution the vehicle fleet. The highest concentration of lead for 24 hours was 0.25  $\mu\text{g}/\text{m}^3$  standard as being the monthly average of 1.5  $\mu\text{g}/\text{m}^3$ . **Objectives:** To assess the lead concentration in umbilical cord blood of 64 babies born to pregnant women living in the cities of Huancayo (commercial urban area) and La Oroya (mining area) and its impact on the level of hemoglobin, length, weight and APGAR score at birth. **Materials and methods:** The cross-sectional study was conducted in Hospitals II EsSalud La Oroya and Huancayo Regional Hospital when the La Oroya smelter was operating normally. The quantification of lead concentration was performed by atomic absorption with graphite furnace in the Peruvian Institute of Nuclear Energy. Biological sampling protocols responded to Iyengar and Rapp (2001). **Results:** The mean concentration of lead in the umbilical cord blood in infants of La Oroya and Huancayo city were 18.03  $\mu\text{g}/\text{dL}$  and 22.96  $\mu\text{g}/\text{dL}$  ( $p=0.016$ ) respectively, these values being 3.6 and 4.6 times higher than the critical level (5  $\mu\text{g}/\text{dL}$ ) suggested by the CDC (2012). Hemoglobin levels for infants of La Oroya and Huancayo city were 18.3 and 16.9  $\text{g}/\text{dL}$  ( $p=0.000$ ). Only registered anemia in infants of La Oroya (9.38%). By regression analysis, the inverse association was evident between the content of lead in umbilical cord blood and the hemoglobin content, weight, length and APGAR score at birth. **Key findings:** The average concentrations of umbilical cord blood lead in infants of La Oroya were significantly higher than in Huancayo ( $p=0.016$ ). Huancayo neonates had a higher hemoglobin content than those born in La Oroya ( $p=0.000$ ), which is due to the inverse relationship between hemoglobin and umbilical cord blood lead because of environmental pollution this element. In La Oroya neonates was observed 9.38% of anemia. Statistical relationships between levels of umbilical cord blood lead with weight ( $p=0,000$ ;  $r=0,39$ ), height ( $p=0,049$ ;  $r=0,24$ ) and APGAR scores ( $p=0,000$ ;  $r=0,35$ ) at birth were found, showing that the higher the level of lead in the blood of the umbilical cord, weight, height and APGAR birth were significantly lower. Hemoglobin was also affected, but not significantly ( $p=0,089$ ).

**PW-015**

Poster

**"Preferences of healthy and less healthy foods in school children in Mexico: longitudinal study".**

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**Objective:** To assess healthy and less healthy food preferences (FP) in elementary school children (ESC) and to determine whether there is an association with their body mass index after a period of 12 months. **Methodology:** Children from 2nd and 5th grades in 28 elementary schools were assessed. Weight and height were measured according to standardized procedures. Overweight (OW) and obesity (OB) was calculated according to WHO criteria. Children FP were assessed using 54 cards of foods usually consumed by Mexican children at baseline and one year later. Distribution of children's food preferences was calculated. To assess the associations of healthy and less healthy foods preference in OW/OB and normal weight children Chi square test were conducted. To assess the risk of becoming OW/OB according to their FP multinomial analysis of logistic regression was performed. **Results:** 1531 ESC participated in the study. The average age of children was 11+1.6y (6-13y), 52% were girls and 49% were OW/OB. Baseline: Ice cream, cookies, orange juice, pizza and chocolate milk were the most preferred foods by children while quince paste, tomato, fruit in syrup, avocado and vegetable soup were the least preferred. Forty eight per cent and 33% of ESC preferred more healthy food at baseline and at the end of the study ( $p=0.0001$ ). ESC who preferred healthy food at baseline, after adjusting for mother education, were less likely to become OW/OB at the end of study, OR=0.56 (IC 95%, 0.37-0.84,  $p=0.005$ ), and after adjusting for BMI z-score at baseline, OR=0.59 (IC 95%, 0.38-0.90,  $p=0.014$ ). **Conclusion:** The most preferred foods by children were high in sugar content and energy dense foods. Children liking more healthy food, after adjusting for mother education at the beginning of the study were less likely to become OW or O. After adjusting for BMI z-score at baseline, children who prefer more healthy food were less likely to be OW or O. These results indicate that the preference of healthy food in second and fifth grade children is a protective factor to become OW or O. **Key findings:** Second and Six grade Mexican Children who prefer healthy food are less likely to become OW/OB a year later

**PW-016**

Poster

**Measurements of adiposity associated with cardiometabolic risk factors in Mexican school children.**

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**Objectives:** Obesity is factor to develop cardiovascular diseases and diabetes mellitus type II. In children, is known that excess of adiposity also causes metabolic problems. The aim of this study was to establish the measurement of adiposity that allows identifying cardiometabolic problems in scholar children. **Material and Methods:** Participants were 119 children aged 6 to 12 years old (61 boys and 58 girls). Measurements of adiposity were: body mass index, percentage of body fat, circumference of waist, visceral fat and abdomen subcutaneous fat. Percentage of body fat was estimated with dual energy X ray absorptiometry. Waist circumference was measured around the iliac crests. Visceral and abdominal subcutaneous fat was assessed with imaging magnetic resonance in 4 sites (L1-L2, L2-L3, L3-L4 and L4-L5). The cardiometabolic factors assessed were: high levels in plasma of glucose, triglycerides, total cholesterol, and low-density lipoprotein cholesterol; and low concentration of high-density lipoprotein cholesterol. Homeostatic model assessment to quantify insulin resistance and elevated blood pressure were also evaluated. **Statistical analyses** Descriptive statistics was estimated. Pearson correlations were calculated to establish the association between measurements of adiposity and cardiometabolic factors. Linear regression models were estimated to determine if measurements of adiposity explained the variance of cardiometabolic factors adjusted by sex and age. Statistical significance was used at  $p < 0.05$  **Results:** Boys had significantly higher body mass index, waist circumference and visceral fat than girls. There was no difference in cardiometabolic parameters between sexes. Almost 71 % of scholar children presented one or more cardiometabolic risk factors. Measurements of adiposity did not correlate with total cholesterol, low-density lipoprotein cholesterol and glucose. Diastolic blood pressure was only associated with percentage of body fat. The linear model regression showed that measurements of adiposity explained significantly the variance of homeostatic model assessment (40-50%) and triglycerides (12-17%). The percentage of body fat, waist circumference and visceral and abdominal subcutaneous fat explained the lowest variance of high-density lipoprotein cholesterol (1-12%). **Key findings:** There was a high prevalence of cardiometabolic risk factors in

Mexican scholar children. Insulin resistance was the best cardiometabolic risk factor parameter explained by the measurements of adiposity. High-density lipoprotein cholesterol was not adequately predicted by measurements of adiposity in this sample of Mexican scholar children.

**PW-017**

Poster

**Functional capacity and nutrition status of community-dwelling elderly.**Souza L.B.<sup>1</sup>; Papini S.P.<sup>2</sup>; Corrente J.E.<sup>2</sup><sup>1</sup>Universidade Federal de Mato Grosso do Sul, Brazil;<sup>2</sup>Universidade Estadual Paulista, Brazil.

The aim of this study was to evaluate the relationship between functional capacity and nutritional status for community-dwelling elderly. To evaluate this association, an epidemiological cross-sectional study was conducted with 361 seniors, age 60 or older in Botucatu city, Brazil. The assessment of functional capacity was obtained by applying the Scale of Activities of Daily Living through the Katz index (ADL) and Instrumental Activities of Daily Living through the Lawton index (IADL). To evaluate nutritional status, anthropometric variables were measured: weight, height, body mass index (BMI), waist circumference (WC), circumference arm (CA), arm muscle circumference (AMC), corrected arm muscle area (cAMA) and triceps skinfold thickness (TST). As result, related to functional capacity, it was observed that 89.9% and 67.6% of the older were fully independent for ADL and IADL, respectively. Regarding anthropometry, it was observed that the values of the variables weight, height, AMC, cAMA and WC are higher in men compared to women ( $p < 0.05$ ). The average values of TST behaved in the opposite way, being higher in women ( $p < 0.0001$ ). The average values of AC and BMI show no statistical difference. When evaluated according to BMI, it was observed that 18.28% of the older were underweight, 36.01% were classified as normal weight and 45.71% were overweight. No significant associations were found between any of the variables from the nutritional status and the classification of ADL. Related to IADL, it were found significant associations between IADL and BMI ( $p = 0.0293$ ), WC ( $p = 0.0316$ ) and AC ( $p = 0.0241$ ). Considering the functional capacity obtained by ADL and IADL as dichotomous response variables, a logistic regression model was fitted considering the anthropometric variables and nutritional status as explanatory variables corrected by age and it was observed that there was a relationship between nutritional status and functional capacity (IADL) for older people showing a relationship between BMI (OR=2,34) and WC (OR=1,97). The data show that underweight people have a higher risk of being dependent in IADL than those classified as normal weight as well as those with values of WC above those considered ideal. It is possible to conclude that the maintenance of a healthy and appropriate weight is associated with a good functional capacity in community-dwelling elderly.

**PW-018**

Poster

**Students' attitudes to sustainability and sustainable consumption – a qualitative analysis.**Metz M, Freytag-Leyer B, Klotter C  
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Objectives: Attitudes are a key driver of consumption behavior. Sustainable consumption behavior might only be implemented when adequate attitudes to sustainability are present. But, attitudes to sustainability seem to be often coined by negative aspects such as resistance, renunciation, and denial of anthropogenic responsibility for global problems. This project aims to examine students' attitudes to sustainability and sustainable development. The underlying research question is: Which attitudes do students have to sustainability and sustainable development?

Material and methods: Data were collected from a group of 26 students enrolled in a course on sustainable consumption and behavior change at the University of Applied Sciences Fulda (Germany) in spring 2013. The students were asked to prepare and present a photo-documentation on their lifestyles. The presentations were audio-taped and transcribed. The transcripts were analyzed by means of "qualitative evaluative content analysis".

Results: The dimension of attitudes on sustainability and sustainable development is approached by the participants in terms of motives, barriers, and supportive aspects. From 26 students 15 refer to barriers to sustainability. Two main barriers are mentioned: first rural living which e.g. requires driving by car and often goes along with bad public transport; second the family which e.g. provides non-sustainable products and serve as role models in the living environment. Statements on necessary supportive aspects are only made by three students. They refer to the same aspects, but in a positive way. Family and environment could also be supportive by sustainable food supply and furthering life skills. Almost all participants (25) present motives to sustainability and sustainable consumption. They express e.g. that (la-test) technique is very important to them, but that they also care for saving electricity.

Key findings: The methodical approach seems very useful because all students were motivated to comment on their attitudes to sustainability and sustainability consumption by their photo documentations. It is an innova-

tive approach which links teaching and research. Photo-based research also seems more adequate than e.g. a questionnaire because it can be assumed that stating attitudes consciously is difficult without having triggers such as photos.

Data analysis shows that attitudes are presented in very individual sets mostly differing between individuals. Concerning factors influencing their behavior most participants refer to external factors, also called external attribution.

In a further research step the students' attitudes should be compared to their consumption behavior to discuss strength of influence.

**PW-019**

Poster

**Components of an obesogenic environment in Kuwait.**Garduño-Díaz SD<sup>1</sup> and Garduño Díaz PY<sup>2</sup><sup>1</sup>American University of the Middle East; <sup>2</sup>Independent consultant in sustainable development

Objective: The physical, economic, political and sociocultural components of the environment in Kuwait were analyzed to determine if the country classifies as an obesogenic environment.

Materials and method: Following the ANGELO framework, the physical, economic, political and sociocultural components of Kuwait were analyzed to determine if the country classifies as an obesogenic environment. Further, data from a popular online food delivery system was accessed and the most frequently ordered foods in Kuwait were identified as the dietary component of the analysis. Nutrient composition for these foods was calculated using data from the USDA and is presented per portion.

Results: Meeting the majority of the characteristics required to be identified as such, Kuwait is found to have an obesogenic environment. Availability and accessibility to an almost unlimited amount of food, energy, trans fats and sugars are likely to be significant contributors to obesity and diet-related diseases.

Key findings: In tandem to the diet, harsh climate conditions, sociocultural practices and a lifestyle designed for decreased energy expenditure contribute to the creation of an obesogenic environment in Kuwait.

**PW-020**

Poster

**Menu labeling in traditional restaurants: the most appreciated and effective way.**

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HAS University of Applied Sciences, 's-Hertogenbosch, The Netherlands

Our aim is to support restaurant guests/customers by making the healthy choice the easy choice. Since the introduction of menulabeling in the 'out-of-home' sector, an increasing amount of research has focused on the effectiveness of different types of menulabeling. A variety in labelling possibilities were tested, but mainly in fast-food restaurants and in the United States. Only a limited amount of studies has focused on the implementation of menulabeling in full service restaurants. Though, in the Netherlands about 30% of the energy intake is consumed 'out-of-home', there is only a limited amount of information available on the healthiness of restaurant dishes. In previous studies it was investigated what the chances and barriers are for restaurants to implement menulabeling. Competitiveness and creative challenge were identified as two potential opportunities, where complexity was identified as the main barrier. The objective of this study was to determine what type of label would be mostly appreciated by Dutch restaurant customers and by restaurant owners. Three different types of label were used in this study: simple logo, ranking and nutritional information (calories). Potential restaurant customers were recruited online and asked to fill out a questionnaire, based on Rogers' diffusion of innovations theory. Restaurant owners were approached in person. In this study we included the following attributes: knowledge (does the potential customer know what menulabeling is?), relative advantage (the degree to which the implementer sees menulabeling as an advantage) and compatibility (the degree to which the innovation is consistent with the ideas and opinions of the implementer). Health consciousness of the respondents is investigated using the theory of Dutta-Bergman. A total of 384 respondents will be included, to determine the appreciation for a certain label among the customers. A smaller group of restaurant owners ( $n = 30$ ), responsible for the menu, will be questioned for their opinion. Based on these results, the most appreciated label can be identified and used in future studies. In these future studies it will be investigated whether the use of a label on the menu affects the choice of consumers and if there is an increase in choice of healthy dishes.

**PW-021**

Poster

**Impact of probabilistic food replacement: substitution of meat with oily fish in the UK diet.**Pigat S  
Creme Global

Objectives: This analysis looks at the impact of substituting red and processed meat with oily fish in the UK diet. Creme Nutrition® enables analysis of

dietary intakes and modelling scenarios (e.g. food replacement scenarios) to assess the impact on a population's diet. Consumption of oily fish can reduce the risk of heart disease. Currently this consumption is below the recommended level of at least 140g per week.

**Materials and Methods:** Assessments are performed by combining food consumption diaries and food composition data from the NDNS Adults Rolling Survey with predictive intake models. Red and processed meat is substituted by oily fish consumption using a probabilistic food replacement model, with a replacement probability of 0.2. Nutrient composition of oily fish is set by discrete data distributions using nutrient composition from oily fish consumed in the UK. 40,350 subjects' diaries are simulated and the intake is assessed at eating event level in order to generate a full intake distribution. Results: After modelling oily fish replacement, mean daily intake of oily fish increases from 9g/d to 22g/d, thereby reaching the recommended intake of oily fish. Cis n-3 fatty acid intake increases from 1.01% to 1.12% of total Energy ( $p < .00001$ ), saturated fat intake decreases from 12.21% to 12.11% ( $p < .00001$ ) and vitamin D intake increases significantly from 3.7ug/d ( $\pm 0.1$ ) to 4.6ug/d ( $\pm 0.1$ ) ( $p < .00001$ ).

**Key Findings:** Substituting consumption of red meat and processed meat for oily fish may lead to a more beneficial fatty acid intake profile and increased vitamin D intake. The impact of such a scenario on a population can be predicted using the Creme Nutrition® model.

#### PW-022

Poster

##### Development of Anthocyanin Intake Model using Creme Nutrition®.

Pigat S

Creme Global

**Objectives:** This analysis is part of the EU FP7 BACCHUS project which investigates the beneficial effects of dietary bioactive peptides and polyphenols on cardiovascular health in humans. By combining consumption data from the UK NDNS Rolling Survey with data on the bioactive constituents anthocyanins found in berries (obtained from eBasis), a dietary intake model was created to assess actual intakes of anthocyanins from berries in the UK.

**Materials and methods:** Data on anthocyanin levels in berries was extracted from eBasis, a database containing published data on the content and biological effects of bioactive constituents in plant based foods. This data was then matched to all berries consumed by participants of the NDNS survey. A discrete data distribution of concentrations was created to consider multiple data points of concentrations derived from eBasis. Assessments are performed by combining the UK food consumption diaries and eBasis data with probabilistic Creme Nutrition® intake models.

**Results:** Mean and P97.5 daily total anthocyanin intake from fresh and frozen berries in the UK population were 4.9mg/d ( $\pm 0.9$ ) and 70.5mg/d ( $\pm 23.3$ ) for the total population. The mean daily consumption of total phenolics was 4.4mg/d ( $\pm 0.9$ ) and the P97.5 was 72.2 ( $\pm 23.5$ ). For consumers only the daily total anthocyanin intake had a mean of 28.4mg/d ( $\pm 4.8$ ) and a P97.5 of 246mg/d ( $\pm 35.2$ ) and a total phenolics intake with a mean of 24.1mg/d ( $\pm 4.8$ ) and a P97.5 of 196.9mg/d ( $\pm 34.4$ ).

**Key findings:** A model linking anthocyanin data (based on eBasis data) and berry intake in the UK was established. This research included fresh and whole shaped berries only; further comprehensive intake analysis is currently being carried out for 4 European countries for multiple foods and compounds.

#### PW-023

Poster

##### Components of an obesogenic environment in Kuwait.

Kriaucioniene V<sup>1</sup>, Petkeviciene J<sup>1</sup>, Webber L<sup>2</sup>

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**Objective:** Lithuania participates in the EConDA project which is funded by the EU Health Program and aims to develop the methodology for measuring cost-effectiveness of interventions for chronic diseases prevention, detection and treatment. Obesity is one of the main risk factors of chronic diseases. Primary health care has a unique opportunity for prevention and management of obesity.

Using data from the Lithuanian health behaviour monitoring survey, this study assessed changes in the prevalence of obesity over eighteen years and the level of giving advice on diet and physical activity by health professionals.

**Material and methods:** The data were obtained from ten biennial cross-sectional nationally representative postal surveys from 1994 to 2012. In total, 7968 men and 10695 women aged 25-64 participated in these surveys. Self-reported body weight and height were used to calculate BMI. Information on whether health professionals advised patients to change dietary habits or to increase physical activity was obtained. The odds of receiving advice on diet and physical activity were calculated using multiple logistic regression analyses.

**Results:** Since 1994 the proportion of overweight men increased from 47.0% to 58.9% and the proportion of obese men - from 10.6% to 18.8% ( $p$  for trends  $< 0.05$ ). In women, the prevalence of obesity has not changed significantly and was 20.5% in 2012. The most remarkable increase in the

prevalence of obesity was found in the oldest age group (55-64 years) of men and women. The proportion of obese women decreased in the youngest age group. During the observational period, the odds of obese people being advised by health professionals to control their weight increased (OR per each two-year study period was 1.16 (CI 1.1-1.3) in men and 1.14 (CI 1.1-1.2) in women). In 2012, 37.4% of obese respondents reported that they were advised to change their diet and 19.9% received advice to increase physical activity. The odds of receiving advice increased with age. An association between receiving advice and self-reported attempts to lose weight was found: the obese respondents being advised were 3.4 times more likely to make attempts to reduce their weight than those who weren't being advised.

**Key findings:** Over eighteen years, the prevalence of obesity increased among Lithuanian men. Health care professionals became more active in giving advice for controlling weight of obese. Future work will use these findings in the EConDA models to test the impact of weight management interventions upon future burden on NCDs.

#### PW-024

Poster

##### Changes in beverage consumption habits from pre-pregnancy through pregnancy.

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<sup>1</sup>University of Agder, Kristiansand, Norway; <sup>2</sup>Sorlandet Hospital, Kristiansand, Norway

**Objectives:** The present study explores the changes in beverage drinking pattern from pre-pregnancy through pregnancy.

**Material and methods:** From April 2010 to January 2013 nulliparous women aged  $\leq 18$  years with a singleton pregnancy and a BMI  $\geq 19$ , were consecutively recruited to the randomized control "Fit for Delivery" study from primary health clinics in Southern Norway. At inclusion, in gestational week 15 (median, 9-20), the women reported how often they consumed various beverages at present, and in retrospect how often they drank the different beverages before they got pregnant. Of 256 eligible women from the control group 245 answered the same questionnaire in gestational week 36. The answers were dichotomized into drinking  $\geq 1$  times per day and drinking  $< 1$  times per day for all the beverages except alcohol which was dichotomized into drinking  $\geq 1$  times per week and drinking  $< 1$  times per week. Changes in consumption of different beverages were analysed with repeated measure analysis.

**Results:** The percentage of women reporting drinking milk (40% v. 47%), fruit juice (16% v. 26%) and water (87% v. 93%) daily or more frequently all increased from pre-pregnancy to early pregnancy ( $p < 0.01$  for all items), while the percentage of women who reported at least daily consumption of artificial sweetened beverage (14% v. 10%,  $p = 0.021$ ) and coffee (52% v. 16%,  $p < 0.001$ ) both decreased. Pre-pregnancy, 9% reported drinking alcohol at least once weekly, whereas no one reported drinking alcohol weekly or more frequently in pregnancy ( $p < 0.001$ ). From early pregnancy to gestational week 36 the percentage of women drinking milk (47% v. 60%,  $p < 0.001$ ) and coffee (16% v. 22%,  $p = 0.028$ ) daily or more frequently both increased.

**Key findings:** There is a significant change in beverage consumption from pre-pregnancy to early pregnancy and to some extent also into late pregnancy among Norwegian women.

#### PW-025

Poster

##### Vitamin D status in adult women hypothyroid controlled by the nutritional status.

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School of Nutrition School of Medicine UBA. UBACYT Project 2012-2015.

**Introduction:** Vitamin D deficiency is a situation that prevails in the world and can affect people of any age. Many authors have linked vitamin D deficiency with diseases such as type 2 diabetes mellitus, insulin resistance, metabolic syndrome, cardiovascular disease, various types of tumors, cancer, immune disorders obesity, muscle disorders and falls.

**Objective:** To associate vitamin D status in adult women with hypothyroid nutritional status.

**Methodology:** We evaluated 80 women older than 40 years treated with levothyroxine hypothyroidism treated in a private practice in Martinez in Buenos Aires Province from February 2013 to present. Were studied as a dependent variable D25OH vitamin status (ng/ml) and the independent variable nutritional status by BMI. The level of vitamin D by radioimmunoassay was classified as sufficient (greater than or equal to 30 ng/ml) mild deficit (20-30 ng/ml) and severe deficiency (less than 20 ng/ml).

**Results:** Of a total of 80 women with a mean age of 57.38  $\pm$  5.04 years, 57.5% had normal weight 42.5% being overweight or obese. The vitamin D status of plasma was enough for a 35% of the sample, showing a mild deficit 36.25% 28.75% severe deficit. By statistically controlling vitamin D status with serum TSH, the mean difference was not significant ( $p = 0.563$ ). Was obtained good inverse association between vitamin D levels and BMI ( $r = -0.577$ ,  $p = 0.000$ ). Finally there was an inverse relationship although

weaker between vitamin D levels and age ( $r = -0.270$ ,  $p = 0.015$ ).

Conclusions: The majority of the sample had decreased plasma levels of vitamin D, finding significant inverse association between nutritional status and age with the status of Vitamin D.

#### PW-026

Poster

##### **Rhythm of body weight loss in overweight adult women controlled by TSH level and nutritional treatment adherence. Ubacyt Project 2012-2015.**

Torresani ME, Squillace C, Alorda B, Belén L, Maffei L, Oliva L, Rossi ML. School of Nutrition. School of Medicine. UBA. UBACYT Project 2012-2015.

Introduction: The increased serum level of thyrotropin (TSH) within the reference range may be a predictor factor for difficult weight loss in adult women.

Aim: To study the rate of decline in weight loss in overweight or obese adult women, according to the level of TSH and the degree of adherence to nutritional therapy.

Methodology: Prospective, longitudinal, observational design. Nonrandom sample of overweight or obese  $> 30$  yrs women, who attended the Foundation for Research on Endocrine Metabolic Diseases (City of Buenos Aires). Dependent variable: change in body weight ( $< 1\%$  and  $\geq 1\%$  per week); Independent variables: TSH levels (mIU/L and categorized in Group A  $\geq 2.5$  mIU/L and group B  $< 2.5$  mIU/L), perceived adherence expressed in % compliance (nutritional treatment and activity plan scheduled physical) categorized into  $\leq 50\%$ ;  $60$  to  $70\%$  and  $> 70\%$ ; level of excess weight (BMI (kg/m<sup>2</sup>): 25.0-29.9, 30-34.9 and  $\geq 35$ ); age ( $< 40$ , 40-65 and  $> 65$  years) and period of time between initial and control appointment (2, 3 or 4 weeks). Statistical analysis by SPSS 15.0, establishing X<sup>2</sup>, Fisher's test and Pearson correlation with 95 % confidence intervals (CI) and  $p$  value  $< 0.05$ .

Results: 112 women ( $50.4 \pm 12.6$  yrs) were studied. Mean BMI =  $30.1 \pm 5.0$  kg/m<sup>2</sup>; 58.9 % were hypothyroid treated with LT4. Group A: 33 %, Group B 67 %. Most of the sample lost less than 1 % of weight per week (Group A: 54%, Group B: 57.3%), with an adherence perception between 60 and 70% (Group A: 56,7%; Group B: 50,7 %) without significant differences between groups. Weekly weight loss showed a direct correlation with adherence level ( $r = 0,465$ ;  $p = 0,000$ ), and an inverse correlation with time among initial and control appointment ( $r = -0.30$ ,  $p = 0.001$ ) and BMI categories ( $r = -0.242$ ,  $p = 0.01$ ), regardless age, thyroid function or TSH level.

Conclusions: The weekly weight loss showed direct relationship with treatment adherence, regardless of age, thyroid function or level of TSH.

#### PW-027

Poster

##### **Pesticide Residues in Fruits and Vegetables Samples from Jordan: levels, dietary intake and risk assessment during 2010/2011.**

Alsubaih M.<sup>1</sup>; Jaghbir M.<sup>2</sup>; Battah A<sup>3</sup> Jordan University Medical collage

The presence of pesticide residues was investigated in 2467 samples of fruits and vegetables during 2years (2010–2011) in Jordan. These samples were collected and analyzed by the residue analysis center in the Ministry of Agriculture in Jordan. The aim of this study is to estimate the dietary intake of pesticides residues consumed at 2010 and 2011, depending on the population consumption for these fruits and vegetables based on the results of the Jordanian National expenditure and income household survey carried by the Department of Statistics. Multi-analysis methods to analyze 114 different pesticide types were used. Among the agricultural products studied, pesticides residues were detected in 399 of samples, of which 66 exceeded the EU maximum residue limits (MRLs). Among the 22 detected pesticides, chlorpyrifos has the highest frequency 45% and 61% for 2010 and 2011 respectively, followed by cypermethrin with 28.74% (in 2010) and 27.58% (in 2011). The chronic dietary risk assessment was undertaken by determining the national theoretical maximum daily intake (NTMDI) and national estimated daily intake (NEDI). Neither NTMDIs nor NEDIs for each pesticides residues have exceeded the acceptable daily intakes (ADIs) for both 2010 and 2011 either in adults or teenagers or children. A cumulative risk assessment was performed using the hazard index (HI). None of the HI (for NEDI) exceeded the 100% for all categories. The HI are always less than 5% for adults, less than 7% for teenagers and less than 13% for children for 2010, whereas less than 8% for adults, less than 12% for teenagers and less than 23% for children at 2011 with corresponding to EU ADIs. The determined HI values were found to represent only a small portion of the respective ADIs. This results indicate that the detected pesticides could not be considered a serious public health problem for the Jordanian population through fruits and vegetables con-

sumption. Nevertheless, a continuous monitoring and dietary intake for pesticides residues are recommended.

#### PW-028

Poster

##### **Nutritional status of Polish women serving in the army, police and fire brigades.**

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Work of women in uniformed services has become more and more common phenomenon in Poland. Number of women in the uniformed units steadily increases. Women in the Border Guards represent nearly one-quarter of the officers, in Police they make approx. 15 per cent, and the least percentage of women is in the army.

The aim of the work was to assess nutritional status of women officers serving in the uniformed services. Total of 157 women underwent examination, 28.1% of them was serving in Polish Army, 61.1% in Police and 10.8% in the State Fire Service. Body height and body mass were determined for all women, what made a base for the BMI calculation. Based on the BMI values examined women were classified into following groups: underweight (BMI 17.0 - 18.4 kg/m<sup>2</sup>), standard body weight (BMI 18.4 - 24.9 kg/m<sup>2</sup>), overweight (BMI 24.5 - 29.9 kg/m<sup>2</sup>) and obesity (BMI 30 - 39.9 kg/m<sup>2</sup>).

Results: Average age of examined women was  $30.2 \pm 6.4$  years. Average body height and body weight were  $166.6 \pm 6.2$  cm and  $62.3 \pm 9.4$  kg respectively. Average BMI value amounted to  $22.3 \pm 2.3$  kg/m<sup>2</sup>. Underweight was found among 3.6% of women, standard weight among 83.5% of subjects, while overweight was found in 9.8%, and obesity in 3.1% of women in uniforms. The highest percentage of subjects indicating overweight (18.2%) was found in the group of women serving in the army and the highest percentage of obese women was found among the ones serving in the State Fire Service.

From the metabolic civilization diseases prophylaxis point of view occurrence of nutritional disturbances of various degrees of severity among 16.5% of examined women raise anxiety. Underweight, overweight, and certainly obesity can lead to not only creation and development of diet-dependent civilization diseases, but also to decrease in physical fitness required in uniformed services.

Conclusion: Carrying out trainings on health education regarding principles of rational nutrition and nutritional prophylaxis of civilization diseases seems appropriate.

#### PW-029

Poster

##### **Evaluating the success of reducing body weight.**

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Background: A normal balance of body fat is associated with good health and life longevity. The issue of excess fat in relation to lean body mass, a condition known as altered body composition, can greatly increase risk of cardiovascular disease and more. To indicate the degree of obesity (or slimness) lot of examiners use BMI (body mass index). BMI is a calculated parameter that uses patient's height and weight. Therefore two persons having the same height and weight can have the same BMI although their body composition can be diametrically different.

Methods: For the purpose of the study we have recruited 57 healthy female (with the average age of  $39.0 \pm 8.0$  and BMI  $29.1 \pm 3.1$  kg/m<sup>2</sup>) from the residents of Hradec Králové district, Czech Republic. The subjects meeting the inclusion criteria were randomly divided into two groups. The first group ( $n=28$ ) was assigned targeted a reducing diet. The second group ( $n=29$ ) went through the controlled aerobic exercise in addition to the same diet. The basic anthropometrical parameters and measurement of body composition were used to evaluate the success of the programs.

Results: At 1st group was higher weight loss than the 2nd, but this weight loss included decrease of the fat tissue and the loss of the muscle mass (decrease of weight was significant; the decrease of the fat tissue was not). The loss of the fat tissue as well as the increase of the muscle mass at group 2 was significant.

Conclusions: The commonly used anthropometrical parameters such as BMI and WC are sufficient for a basic assessment of weight change and alert to the risk of increased fat in the abdominal area. However, the evaluation of reduction programs should concentrate on the changes in body composition that cannot be captured by the BMI and WC. Therefore, it is necessary to apply more sophisticated methods, such as the BIA.

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**PW-030****Sugar intake in Cuban children and adolescents.**

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Poster

**Background and objectives:** High sugar consumption is associated with overweight, glucose intolerance, serum lipids modifications and predisposition to diabetes mellitus. Nutritional recommendations set the sugar upper level intake around 10% of the total energy intake. Objective of this study was to assess its dimension in the Cuban young population. **Methods:** 873 children and adolescents (56 preschoolers, 768 school children and 49 adolescents, 4-16 y of age) included in studies of body composition, physical activity and daily energy expenditure by isotopic methods were submitted to semi-quantitative dietary recalls, 24 hours dietary recalls or 3 day weighed dietary records for the assessment of the sugar contribution to the total energy intake. Data were evaluated with the FAO CERES Software.

**Results:** High energy intake, fast foods and soft drinks; low consumption of fruits, vegetables, and micronutrients. Sugar intake doubled the nutritional recommendation. In some studied groups, one of each three children consumed more than three times the recommended daily portion. **Conclusions:** The observed high sugar intake in all children and adolescents favours fat accretion and the high prevalence of NCDs in adulthood. Those results shall be urgently considered in the nutrition policy.

**PW-031****Comparison of results in cheese factories surfaces by ATP bioluminescence and traditional methods. Quickness versus Safety.**

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Poster

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**Objectives:** The microbiological control of surfaces is an important tool for verifying proper cleaning and disinfection program within the framework of a self-monitoring Hazard Analysis and Critical Control Points system that requires rapid monitoring systems to provide information once the production process has finished and before the product is released on the market in order to apply the appropriate corrective measures. Microbiological hygiene in food production and processing aims to protect consumers against pathogenic agents and guarantee food quality by identifying microbial risks in food production surfaces areas that can be avoided through microbiological control of such surfaces.

Most research in this field has focused on microbiological contamination in different food industries, but only a few studies have analysed the contamination of food surfaces in cheese factories comparing different methods. Therefore, the aim of this study was to determine the coherence between the different control techniques used to evaluate the microbial load of different surfaces in cheese factories located in the Canary Islands (Spain) using two traditional microbiological techniques and bioluminescence. The results were analysed and compared statistically to check the effectiveness of cleaning and disinfection.

**Material and methods:** In the present study, the levels of aerobic contamination at different points in the production chain (curd vat, filler, mould, table and tank) at five cheese factories were analysed using contact plates, dipslides and bioluminescence methods. Almost all the cheese factories showed similar levels of contamination.

**Results:** ATP bioluminescence detected the largest number of unacceptably surfaces (47.7%), followed by the contact plates (41%) and dipslides (34.2%). The dipslide and contact plate methods showed moderate concordance and significant differences ( $p < 0.001$ ) between the various surfaces sampled. The points in the production chain were classified according to contamination rates, being minimal in the curd vats-fillers and maximal in tables-moulds. The same surfaces were also sampled to determine total Enterobacteriaceae, mould and yeast growth using contact plates and dipslides and no concordance between these two methods was detected.

**Key findings:** These results were analysed and discussed taking into account the importance of cleanliness and disinfection in cheese factories, as a prerequisite of the Hazard Analysis and Critical Control Points quality assurance system, concluding that industrial cheese factories require ATP bioluminescence as a complementary technique to control cleaning and sanitizing procedures, combined with traditional microbiological methods to identify microbiological hazards that may contaminate final products.

**PW-032****Relation between overweight and obesity with food consumption inside the school in teenagers, aged 11 to 13 in Mexico city.**

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Poster

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The teenagers population takes nutritional specific needs due to its development potential and a scanty knowledge of the concept of healthy food, which pushes them to consume frequently hypercaloric food that can increase the presence of overweight and obesity.

The aim of the present study was to know the food consumption inside the school and evaluate the relation with the nutrition condition. The study sample was constituted by 190 teenagers (96 girls and 94 boys), with age from 11 to 13 years, of eight secondary public schools in Mexico City.

By means of a consumption frequency questionnaire and the use of the Who Anthro Plus program, there was obtained the ingestion of food and the nutritive conditions respectively. With regard to the teenagers nutritious condition there was a overweight prevalence of 27.90 % (29.7 % for girls and 26.1 % boys) and the obesity prevalence was 10.50 % (8 % girls and 13 % boys).

The most consumed food inside the school is, the fruit (40.0 %), the industrialized cupcakes (39.5 %), followed by the industrialized juices, vegetables and yogurt (32.6 %, 30 % and 27.4 % respectively).

Comparing the food offer inside the school with the nutritional state of teenagers, one thought that the teenagers who consume frequently fresh fruit and fresh vegetable as school lunch have minor probability of presenting overweight (28.9 % and 29.8 % respectively) in comparison with the teenagers who almost never consume this kind of food (31.4 % and 34.9 % respectively), those teenagers who eat often sweets, chips, cakes, hot dogs or hamburgers, ice creams, and fresh juices present major probability of suffering overweight (42.1 %, 40.0 %, 41.7 %, 38.1 % and 34.4 % respectively) in comparison with those who almost never consume them (28.1 %, 25.6 %, 22.2 %, 24.4 % and 28.6 % respectively), and teenagers who consume frequently sodas, fried food, industrialized cupcakes, water of flavor bottled, and flavored milk have more probability of develop obesity (20.8 %, 14.3 %, 8.0 %, 20.0 %, 12.9 % and 15.4 % respectively) in comparison with those who almost never consume them (9.4 %, 8.4 %, 3.2 %, 6.0 %, 6.5 % and 8.5 % respectively), being the statistically significant differences ( $p < 0.05$ ) only for the consumption of candies, industrialized cupcakes and marginally for flavored milk ( $p = 0.05$ ). We conclude that the food offer inside the school area it reverberates in the nutritional state of teenagers.

**PW-033****Food appearances in children's television programmes in Sweden.**

Olafsdottir, S. & Berg, C.

Poster

University of Gothenburg, Department of food and nutrition, and sport science.

**Objectives:** Exposure to TV commercials partly explains the association previously found between TV viewing and dietary habits. Studying other television content in addition to advertisements is necessary. The aim of this study was to examine the nature and extent of verbal and visual appearance of food and beverage in children's programmes in Swedish public service television, by analysing frequency and type of foods, determining in what context more or less healthy foods appear, and identifying messages on health and taste.

**Material and methods:** The study object was the most popular children's TV programme in Sweden, watched almost daily by 45% of children under the age of 10 years. The analysed material consisted of approximately 25 hours, broadcast over a four-month period of the most popular TV viewing season. All appearances of food and beverages were coded as well as the context in which the foods were discussed or appeared. Two food groups were analysed further: fruits and vegetables and high-calorie and low-nutrient (HCLN) foods.

**Results:** Of the 287 programme sections, food or beverage appeared in 78%. Foods were often presented with people, in particular adults and males. Of the foods appearing, HCLN foods constituted 19% of the food shown, and fruits and vegetables 39%. HCLN foods were presented significantly more frequently together with children than adults, while the opposite was true for fruits and vegetables. HCLN foods were more in the foreground, consumed and actively handled than fruits and vegetables.

Fruits and vegetables were, on the other hand, promoted with health messages.

Key findings: Food and beverages appear frequently in children's programmes in Swedish public service television. Cookies, confectionaries and other HCLN foods accounted for one food appearance out of five in the analysed material. The HCLN foods seem to be represented as more desirable for children than fruits and vegetables by appearing with children and being actively handled.

#### PW-034

Poster

##### European food and health research infrastructure: inventory and identified gaps and needs.

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Objectives: High-quality food and health research is required to help combat the diet-related public health challenges seen across Europe. This research can only be achieved if supported by the necessary research infrastructures (facilities, resources or services). This study reports on the first phase of the EuroDISH project: mapping the status quo of food and health research infrastructures and identifying gaps and needs.

Material and methods: Research infrastructure was mapped in four areas of food and health, represented by the DISH model: Determinants of dietary behaviour; Intake of foods and nutrients; Status and functional markers of nutritional health; Health and disease risk of foods and nutrients. The study design consisted of desk research, qualitative semi-structured interviews (n=30) and a stakeholder workshop (n=49). A common protocol was used throughout to co-ordinate research objectives, data collection and recording of results.

Results: Few research infrastructures were mapped relevant to determinants of dietary behaviour. In contrast, a number of infrastructures, predominantly knowledge containing resources (collections, archives and data banks), were mapped in the intake, status and health research areas. Several research infrastructure gaps and needs were identified. In general, a need for greater accessibility to data, methods and equipment across countries and disciplines was highlighted. In addition, a requirement to create sustainable infrastructures (not only project based) which pool resources and address multiple/broader research questions was emphasised. Key findings: Research infrastructure is not evenly distributed across food and health research areas. There remains enormous potential to create, advance and link infrastructures to stimulate high-quality food and health research.

Acknowledgements: The EuroDISH co-ordination and support action is supported by the European Commission under the Food, agriculture and fisheries, and biotechnology theme of the 7th Framework Programme for Research and Technological Development (Contract No. 311788). We would like to acknowledge Johanne L Arentoft, Julia Bardes, Astrid Böhm, Rosalie AM Dhonukshe-Rutten, Léopold Fezeu, Paul Finglas, Marjolein Geurts, Camilla Hoppe, Jeppe Iversen, Martine Laville, Marga Ocké, Krijn Poppe, Nadia Slimani, Harriette M Snoek, Inge Tetens, Lada Timotijevic, Pieter van 't Veer, Cécile Vors and K Zimmermann for all their contributions to this body of work.

#### PW-035

Poster

##### Dimensión teórica y práctica de la educación en nutrición en dos contextos de América Latina: Bogotá Y San Pablo.

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University of São Paulo

Introducción: En América Latina, es evidente el proceso de fortalecimiento para estructurar sistemas de salud, basados en la Atención Primaria de Salud, mediante las acciones de promoción de la salud. Entre estas acciones, se incluyen las prácticas educativas grupales como uno de los procesos de trabajo.

Objetivo: El objetivo de este estudio fue comparar los grupos de Educación Nutricional (EN) en la dimensión teórica y práctica de la Atención Primaria en Salud (APS), entre dos capitales de países latinoamericanos: San Pablo (Brasil) y Bogotá (Colombia).

Métodos: Fue identificada la percepción de la EN y las características de los grupos a partir de lo referido por nutricionistas en ambas ciudades a través de la determinación del perfil de los actores, aplicación del cuestionario y realización de la entrevista. Para el análisis de los datos, fue utilizada la técnica del Discurso del Sujeto Colectivo.

Resultados: Fueron entrevistadas 27 nutricionistas en cada ciudad. El perfil de los entrevistados fue similar, sin embargo hubo diferencia en la formación académica y autonomía de trabajo. Se obtuvieron 17 Ideas Centrales sobre la EN, clasificadas en seis ejes temáticos (transmitir mis conocimientos;

patrones de alimentación saludables; espacio de negociación de los hábitos alimentarios; proceso de intercambio de experiencias e autonomía a la hora de elegir). Estos se relacionaron con las características grupales, que al mismo tiempo tuvieron diferencias de acuerdo con los programas de APS.

Conclusiones: Los resultados corroboran que la teoría y la práctica de la EN están en transición en ambos los países, desde un enfoque tradicional para uno más humanista, incorporando el empoderamiento e intercambio de saberes. Sin embargo, a una velocidad lenta comparada con las políticas y necesidades de salud.

#### PW-036

Poster

##### Consumers of organic bread are at risk of inadequate iodine intake in the Netherlands: a scenario study.

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Introduction and objective: Iodine is an essential nutrient for normal physical and cognitive growth and development, especially during pregnancy and infancy. In the Netherlands, iodine intake is generally adequate and two major sources are bread containing iodized salt and dairy products. The Consumption of more sustainably produced foods is an emerging trend. Due to a Court decision, most organic breads produced without iodized salt, in contrast to regular bread for which use of iodized salt is regulated with a covenant. Therefore, consumers of organic bread might be at risk for a low iodine intake. The objective was to quantify the risk of inadequate iodine intake if organic bread would be consumed by the Dutch population. Material and methods: Data from the Dutch Food Consumption Survey (2007-10) and the food composition database (2011) were used to estimate the habitual iodine intake. This intake was compared with the EAR to estimate the proportion with inadequate intakes. In the food consumption data no details on use of organic foods were available. It was assumed that consumers of organic bread had the same dietary habits as the general Dutch population. In the scenario, all bread was assumed to be organic and as such produced without iodized salt.

Results: This scenario study showed a habitual median iodine intake varying between 80 and 132 µg/day for men, depending on age. For women this intake varied between 77 and 119 µg/day. The percentage of men and women with an iodine intake below the EAR was respectively 16-26% and 22-52%, depending on age. During pregnancy the iodine recommendation is higher. Assuming the iodine intake of women of childbearing age is similar to pregnant women, about 90% would have an inadequate intake.

Key findings: In a population that is mostly iodine sufficient, people consuming organic (no-iodized salt) bread were identified as a risk group for a low iodine intake. It is recommended to be able to identify consumers of organic bread in food consumption surveys, especially with the emerging trend for more sustainable food production. In addition, research is needed to identify possible differences in dietary habits between consumers of organic bread compared to the regular population. It is especially important to get insight in the iodine status and intake of pregnant women and young infants, because of the irreversible effects on cognitive development.

#### PW-037

Poster

##### The association of food insecurity and socioeconomic status with general and central obesities in two Iranian ethnic groups.

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Objectives: to assess the relationship between General and central obesity with food insecurity (FI) and socioeconomic status (SES) in Azeri and Kurd ethnic groups living in Urmia city, North Western Iran.

Material and methods: In this cross-sectional study, 723 participants (427 women and 296 men) aged 20-64 year old, from two ethnic groups (445 Azeri and 278 Kurd) were selected through a combination of cluster, random and systematic sampling methods. Demographic and socioeconomic characteristics were assessed by a questionnaire and household food security status were measured using adapted household food insecurity

access scale through face-to-face interviews at homes. Anthropometric indices (weight, height, waist and hip circumferences) were measured and evaluated using standard methods. BMI was. Overweight and general obesity were defined as  $25 \leq \text{BMI} < 30$  and  $\text{BMI} \geq 30$  kg/m<sup>2</sup>, respectively. Abdominal obesity was defined by national cutoffs of waist circumference (WC) (95 cm in both genders) and waist to hip ratio (WHR) (0.95 and 0.90 in men and women), respectively. Multivariate logistic regression was used to estimate odds ratios (OR) of obesity for the studied risk factors.

Results: Of all the subjects, 33.2% were overweight (31.7% of Azeris and 35.6% of Kurds), while 30.7% were generally obese (33.7% of Azeris and 25.9% of Kurds) and 40.8% had central obesity (44.5% of Azeris and 34.9% of Kurds). Prevalence of General and central Obesities were significantly higher in Azeris ( $p < 0.05$ ). Moderate-to-sever FI was more prevalent in Kurds (28.5%), compared to Azeris (17.3%) [ $P < 0.01$ ]. After adjusting for confounders, in Azeris, being female (OR=4.33, CI95%:2.35-7.97) and moderate and sever FI (OR=2.00, CI95%:1.01-3.97), and in Kurds, being female (OR=5.39, CI95%:2.28-12.23) and higher total cost/head (OR=1.005, CI95%:1.002-1.009) were related with higher chance of general obesity. On the other hand, the chance of central obesity was lower in Azeris with high educational levels (OR=0.64, CI95%:0.21-0.94), females (OR=0.83, CI95%:0.11-0.89), as well as home owners (OR=0.62, CI95%:0.39-0.60). However, in Kurds, being female (OR=0.79, CI95%:0.38-0.98) and moderate-to-sever FI (OR=0.34, CI95%:0.16-0.74) and higher total income/head (OR=0.44, CI95%:0.61-0.84) decreased the chance to be centrally obese. In contrast, in Kurds the chance increased with increase in age (OR=1.06, CI95%:1.02-1.1) and total cost/head (OR=1.004, CI95%:1.001-1.008).

Key findings: Better SES decreased the chance of general/central obesity in both ethnic groups. Despite this fact, the association between moderate-to-sever FI and the risk of general/central obesity is different in Azeris compared to Kurds.

#### PW-038

Poster

##### **Guadix, healthy city: local strategy to reduce obesity.**

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Objective: To prevent childhood obesity through optimization and unification of all available local resources and put the politics of health promotion in the local public agenda Guadix. As part of the legislative powers of local government, the city of Guadix (Granada) initiated a municipal strategy designed to prevent obesity.

Materials and methods: It has managed to develop an intersectorial common and continuing between all municipal departments that may be involved directly and indirectly in preventing obesity.

Results: Among the most highlights the participation of students, estimated at 2180, ages 6 and 17, from different educational levels, 62% of the activities have focused on the school while the rest (32%) were distributed in the community and familiar, yet 6% of the proceedings had as objectives the health sector (including the incorporation of the city in a research study on childhood obesity) and restoration. 32 Information campaigns were developed and 965 people participated in outdoor activities. Current date have built a healthy lifestyle based on promoting physical activity and healthy eating also have generated new lines of work under the municipal health plan.

#### PW-039

Poster

##### **Serum lipid levels and dyslipidemia prevalence in Balearic Islands adolescents, a Mediterranean region.**

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Objectives. To provide data on serum lipid levels, dyslipidemia prevalence and associated risk factors among adolescents.

Material and Methods. A random sample (n=362, 143 boys and 219 girls) of the Balearic Islands' adolescent population (aged 12-17 years) was interviewed, anthropometrically measured, and provided a fasting blood sample. Serum lipid levels were categorized according to the 2011 Expert Panel on Integrated Guidelines for Cardiovascular Health and Risk Reduction in Children and Adolescents. Dyslipidemia was defined as the presence of one or more of the following conditions: TChol  $\geq 200$  mg/dL, LDL-c  $\geq 130$  mg/dL, non-HDL-c  $\geq 145$  mg/dL, HDL-c  $< 40$  mg/dL, TGlyc  $\geq 130$  mg/dL.

Results. One in ten adolescents has at least one abnormal lipid concentration. The overall prevalence of borderline-high + high TChol, LDL-c, non-HDL-c, and TGlyc were 24.3%, 10.4%, 13.3%, and 14.9%, respectively. This TChol prevalence was higher among girls (27.8%) than boys (19.1%). The overall prevalence of borderline-low + low HDL-c was 12.2%, higher among boys (20.7%) than girls (6.3%). The overall prevalence of dyslipidemia was

13.7% (boys: 14.9%, girls: 12.9%). Low HDL-c and high TC levels were the most prevalent dyslipidemias in boys (6.4%) and girls (9.1%), respectively. Overweight/obese subjects were significantly more likely to have at least one abnormal lipid concentration (OR: 2.10; 95% CI: 1.06-4.15) and subjects with abdominal obesity were more likely to have at least one abnormal lipid concentration (OR: 3.17; 95% CI: 1.04-9.66) than their leaner counterparts. Early intervention to encourage appropriate nutrition and physical activity at early ages could be relevant strategies to prevent and/or reduce the high risk for atherosclerosis in our population.

Funding. Project ISCIII 11/01791, CIBERobn CB12/03/30038). Grant of support to research groups no. 35/2011 (Balearic Islands Gov. and EU FEDER funds).

Key findings: Serum lipid levels and dyslipidemia prevalence in Balearic Islands adolescents.

One in ten adolescents has at least one abnormal lipid concentration.

A high TC level was the most prevalence dyslipidemia among adolescents.

#### PW-040

Poster

##### **Positive evolution of women in the pseudo-maintenance stage in an intervention for fat consumption.**

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Objectives: To identify the prevalence of "pseudo-respondents," i.e., individuals in the pseudo-maintenance and non-reflective action stages of change and their evolution throughout intervention. The hypotheses were as follows: (1) the prevalence of pseudo-maintenance is high, and (2) individuals in pseudo-maintenance are less sensitive to intervention for fat consumption.

Material and methods: In a randomized controlled trial, the intervention group participated in 10 workshops based on the Transtheoretical Model to reduce fat consumption during six months. Subjects in the intervention group were classified as true or pseudo-respondents. The participants included a sample of Public Health Service users aged  $\geq 20$  years who were regular users of the service and had not participated in any previous intervention for fat consumption. A total of 71 women completed all the study phases from 2009–2010 (20.6% attrition). Individuals were classified as "true respondents", pseudo-maintenance (i.e., mistakenly perceived their lipid intake as adequate - Steptoe et al., 1996), or non-reflective action (i.e., did not recognize the adequacy of their lipid intake - Ma et al., 2003). The main outcome measures were anthropometric measurements; dietary habits and food consumption including three 24-h dietary recalls; and readiness to change. The statistical analyses performed were  $\chi^2$ , Fisher's exact, Student's t-test for independent samples, Mann-Whitney, McNemar, paired Student's t-test, and Wilcoxon signed rank test.

Results: About half of participants were in pseudo-maintenance (control group: 14 of 31; intervention group: 19 of 40). Only two were in non-reflective action and therefore they were not analyzed. Post-intervention, individuals in the intervention group in pseudo-maintenance evolved distinctly from true respondents, with greater progression to later stages of change ( $p = 0.031$ ) and reduced calorie intake ( $p = 0.001$ ), weight ( $p = 0.048$ ), and body mass index ( $p = 0.028$ ).

Conclusion: The results show the importance of pseudo-maintenance stage when Transtheoretical Model is used because of the high prevalence and distinguished performance of people in this stage. However, the development of specific interventions appears unnecessary if perception and food consumption are considered together.

Funding Sources: Fundação de Amparo à Pesquisa do Estado de Minas Gerais - FAPEMIG.

#### PW-041

Poster

##### **Iron Deficiency, Iron Deficiency Anemia and Inflammation Markers in Overweight and Obese Turkish Women.**

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The prevalence of obesity continues to rise in both developed and developing countries. Obese people may be at increased risk of iron deficiency (ID) and iron deficiency anemia (IDA). Cross-sectional studies in industrialized countries have consistently shown that obese individuals are at increased risk of iron deficiency (ID) and iron deficiency anemia (IDA). It is unclear whether this is due to poor dietary iron intake or to adiposity related inflammation. This study aimed to investigate iron deficiency anemia, the relationship between iron status, dietary intake pattern and markers of inflammation in overweight and obese women. A total of 619 women, aged 20-49 years, in normal weight (BMI: 18.5-24.9 kg/m<sup>2</sup>, n: 170, 27.4%), overweight (BMI: 25.0-29.9 kg/m<sup>2</sup>, n: 179, %28.9) and obese

(BMI:  $\geq 30$  kg/m<sup>2</sup>, n:270, %43.6) women admitted to internal medicine, endocrinology and diet clinics outpatients were included to the cross-sectional part of the study. The prevalences of ID and IDA were significantly ( $p < 0.05$ ) higher in obese and overweight women (45.6%, 27.4%; 41.9%, 24.0%, respectively) compared with normal weight women (23.5%, 12.4%, respectively). Despite higher dietary iron intakes in the obese women, serum iron concentrations were lower in overweight and obese women (73.8 $\pm$ 36.4 mcg/dL, 65.4 $\pm$ 33.7 mcg/dL, respectively) than in normal weight women (85.6 $\pm$ 37.5 mcg/dL). White blood cell (WBC), C-reactive protein (CRP), high sensitive C-reactive protein (hsCRP) and serum transferrin receptor (sTfR) levels of obese (7.3 $\pm$ 1.6 mm<sup>3</sup>, 0.7 $\pm$ 0.6 mg/dL, 13.6 $\pm$ 16.8 mg/L, 1.9 $\pm$ 0.7 mcg/mL, respectively) and overweight and (6.9 $\pm$ 1.7 mm<sup>3</sup>, 0.5 $\pm$ 0.3 mg/dL, 2.4 $\pm$ 2.6 mg/L, 1.7 $\pm$ 0.9 mcg/mL, respectively) women were higher than the normal weight (6.4 $\pm$ 1.5 mm<sup>3</sup>, 0.2 $\pm$ 0.1 mg/dL, 1.5 $\pm$ 0.9 mg/L, 1.5 $\pm$ 0.8 mcg/mL, respectively) women. The risk of ID in obese Turkish women was 2.70 fold higher compared with normal weight women. The risk of IDA in obese Turkish women was 2.67 fold higher compared with normal weight women. This increased risk of ID and IDA may be due to the effects of obesity-related inflammation on dietary absorption. It is obvious that obesity is an important public health problem and the precautions should be taken to prevent the occurrence of obesity. Preventive measures should cover life-long activities as obesity is an increasing public health problem and accompanied with many related health and nutritional problems.

#### PW-042

Poster

##### Perceptions of healthy weight of Malians and Moroccans living in different environments.

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Objectives: Perceptions of body size can influence whether obesity is seen as desirable and therefore whether a population is motivated to change. Few African studies have investigated the effect of migration and living in different environments on preferences for body size. The present study examined body size preferences and satisfaction of adults living in urban and rural Morocco and Mali, as well as of migrants to France from these countries, to investigate if their weight status and body size preferences vary in these different geographical contexts.

Material and methods: Cross-sectional studies were conducted in Mali and Morocco (rural and urban zones) and in France of Moroccan and Malian migrants using matched quota sampling of a target sample of n=300 adults. A structured interviewer-administered questionnaire was used. Height and weight were measured to calculate BMI. To estimate ideals for body size, participants associated their views with one of nine silhouettes ranging from underweight to obese.

Results: Mean BMI of migrant Malians (24.9) and Moroccans (26.6) living in France was similar to that in urban Mali (24.9) and Morocco (26.5), but higher than for rural Malians (24.1) and Moroccans (25.1) ( $p < 0.001$ ). Body satisfaction was lower for Malian and Moroccan migrants in France ( $p < 0.0001$ ), compared with those living in Africa, e.g. 35.8% of Malians living in France wanted to lose weight compared with only 19.2% and 20.4% living in rural and urban Mali respectively. The trend was more marked for Moroccans in Africa, i.e. 45.9% of Moroccans living in France wanted to lose weight compared with only 20.0% and 34.4% living in rural and urban Morocco respectively. Malians and Moroccans living in France were less likely to see large body sizes as healthy, i.e. only 5.2% of Malian migrants and 3.7% of Moroccan migrants living in France believed that large body sizes are healthy, compared with rural Mali (43.3%) and Morocco (11.9%) ( $p < 0.0001$ ). Malian and Moroccan migrants in France were less likely to associate being 'large' with success and more likely to see it as shameful, compared with those living in Africa ( $p < 0.0001$ ).

Key findings: There is some evidence of a transition of attitudes within Mali and Morocco, from rural to urban areas, but even stronger evidence of a shift in body size norms for Malian and Moroccan migrants to France, with norms becoming similar to that of French citizens, suggesting evidence of acculturation.

#### PW-043

Poster

##### Improving nutrition in Panamanian children: Assessing knowledge, adherence and practices within the households of children enrolled in a complementary food programme.

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Objectives: A cross sectional study was carried out to assess anthropometrical status, dietary behaviours, knowledge and use of a fortified com-

plementary food product within the household of Panamanian children enrolled in a food distribution programme and hence, examine which of these variables influenced the nutritional status. Collection of this information identified opportunities for growth in delivery of the programme to its beneficiaries.

Materials and Methods: The study was conducted in a local urban health centre in Panama, amongst sixty child beneficiaries aged 9-59 months and their caregiver returning to collect the fortified complementary food. A pre-tested questionnaire and measurements of weight and height were completed. The prevalence of stunting, underweight, and wasting were calculated using WHO cut offs. Statistical tests used included chi square tests for independence, independent sample t tests and multivariate analysis tests.

Results: Fifty three percent of children were enrolled in the programme longer than the recommended duration of six to nine months. Twenty percent of children were stunted, 13.3% were underweight, and 8.3% were wasted. Weight for height Z scores were higher when the product was prepared with milk ( $P = 0.005$ ), the mother was employed ( $P = 0.017$ ). Fifteen percent of mothers were currently employed. A lower household income was associated with other people consuming the product ( $P = 0.002$ ) with 42% of caregivers reporting other household members consuming the product. Children older than 24 months of age were five times more likely to be at risk of/underweight ( $P = 0.01$  OR=5.07, 95%CI= 1.45-17.72). Employment of the mother was associated with the child consuming the product ( $P = 0.042$ ) and carbohydrates more frequently ( $P = 0.009$ ). Reported daily consumption of carbohydrates, protein, dairy and fruit were lower than food based dietary guidelines for pre-schoolers. In 89% of households, the product was prepared according to recommended methods. 'Sufficient' knowledge of the product was identified in 68% of the caregivers; having received initial product education and correctly answered a statement on the nutritional purpose of the product. Key Findings: Children had higher weight for height Z scores if their caregiver reported preparation of the product with milk versus current recommendations with water. Employment status of the mother significantly influenced the child's dietary behaviours, product consumption and nutritional status. Provision of nutrition education has caused to be effective in improving practices of use of the product and dietary habits within the household and act as a complementary method to improving the nutritional status of the child beneficiary.

#### PW-044

Poster

##### Design and implementation of a "Nutri Yapa" social marketing program: for the Buenos Aires Autonomous City Health Center concurrent community.

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Introduction: The social marketing provides a disciplined approach to the promotion of community health with an eminently preventive task, allowing to achieve favorable changes in the population eating habits.

Objectives: To design and implement a Social Marketing Program (SMP) focused on promoting household vegetables and fruits consumption bringing children to the greengrocer's.

Methodology: Prospective intervention design carried out in a concurrent community to the Health Center and Community Action (CESAC) dependent on a Buenos Aires Autonomous City Public Hospital (Argentina) on April- May 2013. Previous situation analysis, "NutriYapa" SMP was designed. For the SPM dissemination: logo, Facebook page (FB), posters, magnets, "Nutrition advices" brochures was created and participation in a local radio program. SMP was implemented in two stages: the first focused on two educational meetings held by Nutritionist in the CESAC waiting room also an anonymous and autofill satisfaction survey directed participants; the second was carried out in three nearby greengrocers that agreed to join the program, where a "yapa" (fruit or vegetable) would give to each child will present the voucher "Give to child the Yapa" previously received in the educational meetings. Every greengrocers had a "NutriYapa" blackboard to promote their deals.

Results: Through the situation analysis on 41 people, was found that daily vegetables and fruits consumption of was 56.1% and 68.3% respectively. 46% used Facebook in social networking. In educational meetings were carried out fresh fruits and vegetables tasting, with the delivery of educational material and 22 vouchers for use at greengrocers participating. 30 adults completed the satisfaction survey, of which 83% rated the SMP as excellent, 94% said the clarity content and considered useful, practical and implementable suggestions received. In FB recommendations, games and simple recipes offered, interacting with the community by answering questions. Before the meetings the FB friends were 18.

Conclusions: Social marketing is a useful and applicable tool in primary health care. "NutriYapa" was well received by most beneficiaries. Should assess the eating habits change impact to the populations whom it is addressed.

**PW-045****Poster****Social marketing program impact: "Nutri Yapa" for the Buenos Aires Autonomous City Health Center concurrent community.**

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**Introduction:** Considering the social marketing as useful and applicable tool in primary health care, is designed and implemented the "NutriYapa" program with the intention of bringing children to the green grocers and to promote family vegetables and fruits consumption.

**Objectives:** To estimate the impact in changing eating habits to consumption of vegetables and fruits, of the "NutriYapa" Social Marketing Program (SMP) recipients.

**Methodology:** A prospective intervention design carried out in the May-June 2013 on the concurrent community to the Health Center and Community Action (CESAC) dependent on a Buenos Aires Autonomous City Public Hospital (Argentina) where the "NutriYapa" SMP was implemented. 41 adults participated in meetings with educational tasting vegetables and fruits. 22 people gave it the "Give to child the yapa" voucher changed in three greengrocers area that agree to join the SMP. Changing eating habits in relation to consumption of vegetables and fruits educational encounter last month by telephone survey to the adult participants was estimated. According to the responses were classified according Prochaska and Di Clemente change process stages. He also interacted with the participants in the NutriYapa Facebook profile.

**Results:** The vouchers exchange was greater than 80%. The survey revealed that 71% were in action stage, having incorporated new vegetables and fruits daily, while 22% were in contemplation as they said they would try in the future and 7% were in precontemplation showing absolute disinterest. Due to the immediate multiplication of Facebook friends it was not possible to differentiate those attending the program of the general users who are actively involved. Work continues on the active site, with 163 followers.

**Conclusions:** To maintain behavior change as well as to cover a larger number of beneficiaries to the program, it is suggested to repeat the activities carried out in these and others CESAC and sites concurrency families (clubs, schools, parks, fairs, etc). The social networks power as a resource is emphasized to encourage the maintenance of changes in eating behavior.

**PW-046****Poster****Food fortification.**

Jorge R., Graça P, and Oliveira C.

Egas Moniz Interdisciplinar Research Center

Hunger, as a permanent state of undernutrition, indicates that a certain population is failing to obtain the essential nutrients for a balanced and healthy life, throw diet.

Poverty limits the access to food, health care and education systems, leading to a highest incidence of illness and lower life expectancy.

Investing in nutrition contributes to productivity, economic development and poverty diminishing by increasing work capacity, a cognitive development, better academic performance and lower illness and mortality risks. A poor nutrition perpetuates the poverty and undernutrition cycle directly due to the loss of productivity as a consequence of a bad physical condition and greater predisposal to illness and indirectly by the diminished cognitive evolution, wasting academic and health care resources.

To that extent, the present communication will approach food fortification as a strategy to fight undernutrition, showing a research focused on a recent literature review about these topics, accessing specific examples that may be adapted to various contexts. The current revision was done to contribute for the creation of the new Strategic Plan for Cooperation in Health of the Community of Portuguese Language Countries.

Micronutrient supplementation and food fortification with micronutrients are increasingly seen as a gold standard of the direct nutrition interventions, with many publications supporting these ideas, such as some reviewed Lancet publications and some expert Copenhagen Consensus publications.

Food fortification seems to be a promising strategy to control micronutrient deficits, as iron, iodine, vitamin A and zinc, although there are some important variables to be considered like technical viability, total costs and cost-effectiveness ratios, safety and bioavailability.

Being vital, to evaluate the impact on the populations covered with these fortification programs.

**PW-047****Poster****Unhealthy fats in ready-to-eat foods in low socioeconomic settings in India: A case study of the food environments of rural villages and an urban slum.**

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**Objectives:** Identifying which policies might be the most effective in specific settings requires a thorough understanding of the existing food environment. The objectives of this study were to: 1) describe the food environment with reference to commercially available ready-to-eat foods sold by vendors in rural village and urban slum settings in India and 2) analyse the type and quantity of the fat in these foods.

**Material and methods:** The food environments of two villages in Haryana (n=260 households) and a slum setting in Delhi (n=261 households) were examined. Snack consumption and purchasing patterns were identified through household surveys using a questionnaire and 24-hour dietary recall. As part of the household survey, participants were asked about their snack consumption and purchasing patterns. Structured interviews with vendors in the rural villages (n=27) and urban slum (n=17) examined the variety of foods available, the factors affecting the choice of oils for snack preparation, cooking practices and trans fat awareness. In addition, snack samples from the villages (n=17) and slum (n=32) were analysed using gas chromatography (AOAC 996.06 protocol).

**Results:** Over half of households in the villages and a third of those in the slum consumed freshly prepared snacks; however, consumption of packaged snacks (labelled and unlabelled) (86% rural; 66% urban) was higher. Although oils and fats manufactured by multinational companies were being purchased, the most commonly used oils and fats were unbranded products produced by small and medium sized manufacturers. Refined oil and vanaspati were commonly used for the preparation of fresh snacks and were not discarded at the end of day. The mean fat content in snacks was 27.7g/100g serving (SD 18.3) in the villages and 30.5g/100g serving (SD 12.5) in the urban slum. Of the vendor samples taken, 65% of rural and 75% of urban snacks contained trans fat. The fat content of sampled oils contained high levels of saturated (ranging from 24.7-69.3% of total fat) and trans (ranging from 0.1-29.9% of total fat) fat. Only 7% of the participating vendors were aware of trans fats and its health implications.

**Key findings:** Improving the quality and transparency of the contents of ready-to-eat food in low socioeconomic settings in India is essential. Interventions should be targeted at the manufacturers of oils, fats and pre-packaged snack foods. Identifying ways of producing affordable healthier oils that have the properties required by vendors will be crucial in improving the quality of ready-to-eat commercially available foods.

**PW-048****Poster****Sardine and bogue protein hydrolysates improve high density lipoprotein composition and their antioxidant potential in rat fed high-cholesterol diet.**

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High density lipoproteins (HDL) play a key role against cardiovascular heart disease by acting on cholesterol efflux and lipid peroxidation.

The aim of this work was designated to determine in rat fed high-cholesterol diet whether HDL composition and their antioxidant potential were improved by sardine (*Sardina pilchardus*) and bogue (*Boops Boops*) protein hydrolysates. 18 male Wistar rats (220 ± 10 g) fed 20% casein, 1% cholesterol and 0.5% cholic acid were divided into three groups and received a daily gavage of 1g/kg BW of sardine (SPH) or bogue (BPH) protein hydrolysates for 30 days. The third group, named control group (CG) received in the same conditions water. Compared with CG, SPH and BPH reduced markedly cholesterolemia (-66%), serum triacylglycerols, free cholesterol and phospholipids concentrations. Serum hydroperoxide contents were respectively 2.2- and 3-fold lower with SPH and BPH and malondialdehyde was also reduced. HDL-cholesterol contents remained unchanged with SPH and BPH. Compared with CG, esterified cholesterol-HDL contents were increased by BPH while those of SPH were reduced. Moreover, BPH increased significantly APOA4- and sphingomyelin-HDL contents but lowered phosphatidylcholine. In the latter group, serum lecithin cholesterol-acyl transferase (LCAT) activity was 1.3-fold higher but with SPH this activity was 1.4-fold reduced compared with CG. APOA1 contents were similar in serum and in HDL fraction of the treated groups compared with CG. Compared with CG, serum paraoxonase activity was 1.3-fold higher in BPH rats but this activity remained unchanged in SPH group. Hydroperoxide- and malondialdehyde-HDL contents were reduced by these two fish protein hydrolysates. Glutathione peroxidase activity was respectively 1.2- and 2.2-fold higher and superoxide dismutase activity was increased by 1.3- and 1.4-fold with SPH and BPH compared with CG.

Despite a low LCAT activity, SPH exerted a hypocholesterolemic effect. Furthermore, the higher sphingomyelin levels noted in BPH group did not seem to have

an inhibitory effect on LCAT activity, this was probably due to the high APOA4-HDL contents. In addition, the lower hydroperoxides obtained particularly with BPH could be explained by the higher glutathione peroxidase activity. It was also probably due to the high shingomyelin levels which represent the resistant phospholipids pool against oxidation. Thus, sardine and especially bogue protein hydrolysates that appear operate by different mechanisms may have great potential for use as a nutraceutical to control hypercholesterolemia and oxidative stress by improving cholesterol efflux and antioxidant potential.

#### PW-049

Poster

### Food intake in institutionalized older people according to the dietary assessment from the Mini Nutritional Assessment (MNA).

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**Objectives:** The prevalence of malnutrition in institutionalized older people is generally high. It is known that food intake decline is not the only factor determining malnutrition and it is also known that the menus at the institutions are overseen by nutritionists. However, the residents sometimes do not eat the full ration or have other foods provided by their families. Therefore it is essential to know the real food intake and its impact on the nutritional status of the residents. The objectives of this work were to describe the dietetic features of the elderly people living in nursing homes in the province of Albacete (Spain), to identify their influence on the nutritional status and to assess the possible differences between men and women.

**Material and methods:** A cross-sectional study was developed with data collected from 895 residents in 34 nursing homes all over the province of Albacete (Spain). Dietary assessment data were obtained using the Mini Nutritional Assessment (MNA) items making up the dietary assessment in the test (full meals eaten daily, food intake decline, fluid consumption, protein intake, fruit and vegetable intake and mode of feeding). Chi-square test was used to compare proportions. Stepwise linear regression analysis was used to analyze the items that best predicted the MNA total score.

**Results:** According to the selected six items from the MNA 97.1% of the residents ate three full meals daily, 95% consumed more than two servings of fruit and vegetables, all the population consumed protein products daily, 5% drank less than three servings of fluid and only 51.1% had more than five servings of fluid daily. Regarding to the declination of food intake over the past three months, significant differences ( $p < 0.05$ ) were found between both genders, being higher in women (26.8% of women). The six questions in the MNA about dietetic assessment explained 43.7% of the variability of the MNA total score.

**Key findings:** According to the dietetic assessment from the MNA, the diet of elderly people living in nursing homes in Albacete follows an appropriate protein intake and most elders have an adequate fruit and vegetable intake. It was found a poor fluid intake in an important proportion of residents. The declined food intake due to loss of appetite was the item with higher predictive value in the MNA total score.

#### PW-050

Poster

### Nutrition of children aged 1 to 3 years from nurseries in Bulgaria.

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**Objectives:** Providing adequate nutrition is one of the main factors, affecting on the growth, optimal physical and mental development and good health status of children aged 1 to 3 years. The aim of the current study is to investigate the nutrition and nutritional status of children, bringing-up in nurseries in Sofia city, before implementation of a legislative ordinance of the Ministry of Health, regulates requirements to ensure that all children aged 0 to 3 years from child care institutions and child's kitchens have healthy nutrition.

**Material and methods:** In 2013, a survey on 41 nurseries in Sofia city, random selected from places of residence with total 10519 children aged 1 to 3 years old, was conducted. The subject of the current survey was to study 1636 children aged 1 to 3 years from 77 nurseries' groups. From the medical documentation collected from the nurseries, the data for age, gender, and last height and weight measurements of the studied children, nurseries' nutrition and organization of nutrition were obtained. The weekly menu

and corresponding food balance sheet from 4 seasons were analyzed. The results were compared with reference values for energy and nutrients intake for healthy children with moderate physical activity.

**Results:** Portion sizes of the offered food of children aged 1 to 3 years in 88% of studied nurseries were larger from recommended and were equal to those recommended for children aged 3 to 6 years. The average daily intake from offered food for energy, proteins, carbohydrates, main vitamins and minerals in these nurseries were upper than the recommended, except folate, vitamin D and iron that were under the recommended levels for the children from 1 to 3 years of age. The average daily fat intake is 32,7g/day or 28,4E% from the average daily energy intake of the food (normal rate 30E%-40E%). In the weekly menu the milk and milk products, vegetables, meat, fish and vegetable oils were insufficiently presented and did not give the correct balance. There are increased risk for deficiency of main nutrients and impaired nutritional status of children due to excessive energy and unbalanced average dietary intake.

**Key Findings:** The results are basis for methodical guidelines material, recommendations and follow-up assessments regarding implementation of the new ordinance for improving nutrition of children from nurseries in Bulgaria.

#### PM-051

Poster

### Use of dessert lizard as a natural product to treat diabetes in a mouse model of the disease.

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**Objective:** Traditional African testimonials describe glucose-lowering effects of orally administered dessert lizard (DL). We aimed to evaluate acute and chronic effects of DL in diabetic C57BL/6 mice.

**Material and methods:** To assess its short-term effect, several doses of DL or saline were administered orally with 2 g glucose/kg during a glucose tolerance test (OGTT), on different days, in a randomised, cross-over design, to C57BL/6 mice fed a 60%-fat diet. The most effective dose was fed in the diet for 90 days and compared with high-fat diet only (n=10/group, 50% males). Body weight (BW), food and water consumption, welfare state and external appearance were assessed weekly. HbA1c (DCA, Siemens), OGTT and intra-peritoneal insulin tolerance tests (ITT) were performed before and after treatment. Cold allodynia response was assessed by the acetone test, higher scores indicating more neuropathy. For comparisons between groups, Wilcoxon's or Student's test were used. A two-tailed  $p < 0.05$  was considered significant (SPSS v.18)

**Results:** Short-term experiments showed hypoglycaemic effects of DL when compared to saline at 15' ( $\Delta[\text{Gluc}(15)]_{\text{LUA-Plac}} = -61.23$  (61.69) mg/dl;  $p = 0.004$ ) and a trend in the AUC ( $\Delta\text{AUC}[\text{Gluc}]_{\text{LUA-Plac}} = -19.63$  (36.03);  $p = 0.073$ ).

During chronic treatment, skin lesions (alopecia and ulcers) and a certain level of stress (observed, not quantified), were seen in both groups, but only in the DL group did they lead to the sacrifice of two females after 9 wks of treatment. In the post-treatment evaluation (Control=10 vs DL=8), no significant differences were observed in OGTT or HbA1c. In the ITT, higher glucose values were shown for DL at 60' [148.12 (33.47) vs 102.9 (52.40) mg/dl;  $p = 0.051$ ], a trend at 45' [128,56 (36,29) vs 89,95 (49,82) mg/dl;  $p = 0.086$ ]. Although both groups increased their BW, the increment tended to be higher in the DL group  $\Delta$  BW DL 6.45 (8.184) g vs control 5.057 (3.941) g,  $p = 0.064$ , which also consumed more food (DL 2.86 (2.83-2.86) vs control 2.52 (2.40-2.64) g/mouse/day,  $p < 0.001$ ). Response to cold allodynia was improved in the treated group, with less frequent and intense responses [Control 1.22 (0.33) vs DL 0.81 (0.34) pain intensity,  $p = 0.022$ ; 1(0.875-1.00) vs 0.75 (0.375-1.00), % of response,  $p = 0.034$ ].

**Key finding:** Orally administered DL acutely reduces blood glucose in diabetic mice. Its long-term administration increases food-consumption, body weight and insulin-resistance. Improvement in cold allodynia suggests a direct effect of DL on pain or on neuropathy itself. More studies are needed to assess the potential uses of this traditional nutraceutical product.

#### PM-052

Poster

### Who do adolescents trust, when it comes to food messages?

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**Objectives:** Adolescents are exposed to different messages about food, and have the pressure of making choices where they take responsibility for their own health and live up to social expectations. A variety of agents mediate food messages, which adolescents have to evaluate and handle. From a health promoting perspective it is interesting to explore how adolescents evaluate the credibility of food messages from different

agents. Our intention was to study this by using role-play and focus group interviews.

**Material and methods:** In total, 31 adolescents (11 males, 20 females), divided into five groups, participated in role-play and focus groups interviews. The adolescents were 15-16 years old. In the role-play, the participants portrayed actors they perceived mediate messages about food in their everyday life. First, they negotiated roles that represented dietary influences, and then they planned, purchased and prepared a meal together. In the focus group, they further expanded and explained what had been chosen, said and done. Furthermore they discussed how to cope with these different food messages in their everyday life and the trustworthiness in messages and agents.

**Results:** The adolescents discussed trust in relation to food messages, why some of the messages and agents were more trustworthy than others. Trust was perceived to be a crucial aspect in order to listen to food messages. The most prominent aspects connected to trust were knowledge, care and commercial interest. Knowledge referred to the agents' expertise in food and nutrition. Agents who the adolescents attributed knowledge were for example home economic teachers, sport coaches, dieticians. To some extent, occupation and education guaranteed knowledge. Care was something that the adolescents mostly connected to parents. Parents were perceived to care for the adolescent by showing a holistic approach considering and balancing different dietary aspects. This was emphasized to be crucial in order to actually trust and listen to messages from their parents. Some agents like, media and Mc Donald's were perceived to have a commercial interest behind their food messages and eager to persuade and "sell" their products or concept. The adolescents found this suspicious, felt like these agents were trying to dupe them, they had no confidence in these agents.

**Key findings:** Trust in food messages is associated with some important aspects related to the agent mediating the message. These aspects are: knowledge about food and nutrition, care for the person receiving the messages and no underlying commercial interest behind the messages.

#### PM-053

Poster

##### **The use of National Cancer Institute (NCI) Method to estimate the Prevalence of inadequacy intake for older people.**

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**Objectives:** the aim of this study is to calculate the prevalence of inadequacy intake of micro and macro nutrients for older people using National Cancer Institute (NCI) method.

**Methods:** a representative sample of 365 older people were chosen at random and interviewed at home collecting data using three 24-hour recalls. This sample were chosen from a data set of older people from the city of Botucatu, São Paulo, Brazil, set up to investigate quality of life. Socio demographic data from these older people were also collected. The data from the 24-hour recall were transformed in consumption of macro and micronutrients using Nutrition Data System (NDS) software. The prevalence of inadequacy of micro nutrients were calculated using NCI method through the routines MIXTRAN and DISTRIB for SAS software and the EAR as cutoff. For macro nutrients, the inadequacy were calculated using Acceptable Macronutrient Distribution (AMD-IOM) categorization. Results: 62,6% of the older people from the sample were female, 58% were married, 66,7% had primary school, 44,7% were hypertensive. It was found that the consumption of macronutrients for the older people was adequate. For micronutrients, it was found that vitamin D and E, calcium and copper presented the most inadequate intake.

**Conclusions:** the NCI method was efficient to estimate the prevalence of inadequate intake and it is very important to establish policies in order to clarify the importance consumption of these nutrients for this age group.

#### PM-054

Poster

##### **Trends of household insecurity during the economic crisis in Portugal – Results from the INFOFAMÍLIA Survey (2011-2013).**

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**Introduction:** Food insecurity (FI) has received much attention in recent years in high-income countries due to the increasing of poverty and social inequalities indicators, as a result of the global economic crisis. The guarantee of food security, defined as a situation that exists "when all people at all times have access to sufficient, safe and nutritious food to maintain a healthy and active life", becomes a priority action for food and nutrition policies. This study aims to evaluate the FI trends during the economic crisis in Portugal.

**Methods:** Data were derived from the national FI survey in Portugal – INFOFAMÍLIA Survey – conducted by the Directorate-General of Health. Data analysed for this paper includes data from three surveys, during the period 2011-2013. FI was evaluated using a psychometric scale adapted from the Brazilian Food Insecurity Scale and data were collected by face-to-face interviews. Descriptive

analyses were undertaken to determine the prevalence of FI and Chi-square tests were used to assess bivariate associations.

**Results:** From 2011 to 2013 the prevalence of FI was essentially unchanged and in 2013 the prevalence of FI fixed on 50.7%. From those Food Insecure households (FIH), 33.4% are in low FI, 10.1% in moderate FI and 7.2% in severe FI. Comparing data from these three years, statistical differences were just found in prevalence of moderate and severe FI between 2011 and 2012. For the national average, it was found a decrease in moderate FI prevalence (2.9 percentage points) and an increase in severe FI prevalence (2.4 percentage points), between 2011 and 2012.

**Key findings:** The prevalence of FI was relatively unchanged between 2011 and 2013. The changes observed were not statistically significant, meaning that the difference may be due to sampling variation. The majority of FIH are in the low FI level, which represents that the household at least had anxiety about accessing adequate food or had reduce the quality of their food intake, without substantially reduce of food quantity. Moreover, moderate and severe FI levels affected 17.3% of the Portuguese sample analysed, indicating situations where the quantity of food intake was reduced because the household could not afford enough food. To our knowledge this is the first study regarding to household FI in Portugal during the economic crisis. The monitoring of FI is helpful to evaluate the extent of this problem and the associated factors in Portugal in order to support the implementation of public health actions, targeting decisions to minimize the health impacts of economic crisis.

#### PM-055

Poster

##### **Chronic diseases in Portugal – a review within the EU project EConDA.**

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**Objectives:** To provide epidemiological data from Portugal on non-communicable diseases (NCDs) prevalence to the European project EConDA. The Economics of Chronic Disease project (EConDA) aims to achieve consensus over the best methods of measuring cost effectiveness and, using micro-simulation models, project future burden of NCDs, their costs and savings after the implementation of cost-effective interventions.

**Material and methods:** A literature review was conducted to identify scientific articles, reports and ongoing projects which provide NCDs data from Portugal. Specifically, data on coronary heart disease (CHD), chronic kidney disease (CKD), type 2 diabetes and chronic obstructive pulmonary disease (COPD), alongside with data on two major risk factors related to these diseases, smoking and body mass index (BMI), were collected.

**Results:** Recent data showed a 24,5% reduction between 2007 and 2011 in the mortality of Ischemic heart disease (34,9) and Cerebrovascular Diseases (61,9), rates per 100 000 population. Since 2007 there has been an increase in mortality from respiratory disease to 2011, and this was higher in men (11,9%/total causes of death) than in women (11,3%/total causes of death). In 2009 COPD mortality rate was 5/105, although the prevalence of this disease is still above 14% in some regions. Diabetes type 2 prevalence, in 2011 was 12,7%. It accounted for 4,4% of the total deaths in Portugal in 2011. Type 2 diabetes accounted for 6,1% of deaths in 2006 and 7,1% in 2010. An 80% increase in incidence was observed between 2002 and 2011. In the last 20 years the annual incidence increased from 261/105 (1992-1994) to 647/105 in 2010/2012. The prevalence of CKD among adults aged 20-79 years was 6.1%, increasing more than 60-fold in 60-79 year olds compared to 20-39 year olds, and was greater in women than in men. Data from the two major risk factors studied (BMI and Smoking) revealed that, in 2005, 39.4% of adults (18-64 years old) were overweight (25.0 ≤ BMI < 30), and 14.2% obese (BMI ≥ 30). Recent data from the e\_COR study (2013) in 3 major Portuguese Regions (ages 18-79) showed an increase in overweight and obesity to 64.9% (overweight 42%, obese 22.9%). With regard to Smoking, data from the 2009 National Health Survey showed that 17,2% of adults in Portugal smoke and this is higher in men (26,1%) than women (9,0%). Contrary to previous reports showing a reduction in smoking rates, the e\_COR study revealed that 22.2% of the surveyed population are smokers, and the number of women who smoke have increased greatly (men 27,4%; women, 16,7%).

**Key findings:** These findings show that Portugal has a non-auspicious epidemiological profile. This work will test the impact of a variety of scenarios to reduce the risk factors associated with these four chronic diseases in 8-EU countries, including Portugal. The modelled results can be used to inform future policies and could help establish the best possible course of action to curb rising chronic diseases. The review highlighted the need for good quality measured surveillance data of diseases and their risk factors.

#### PM-056

Poster

##### **Modelling potential additional iodine intake from the use of iodized salt in the production of widely consumed processed foods in Indonesia.**

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**Objectives:** To assess the potential intake of iodine among different socio-economic groups through the use of iodized salt in the production of three widely consumed processed foods in Indonesia.

**Materials and Methods:** Interviews were conducted with nine major producers of three selected food products: instant noodles, stock (including complete food seasoning), and soy sauce; to determine each product's average iodized and non-iodized salt content, annual production, and market share by region and socioeconomic status. Recent food industry-related reports were analysed to verify and supplement interviews.

**Results:** Based on average per capita consumption and estimated amount of salt per unit of each product; if all salt was iodized to the national minimum of 18 parts per million, these three products alone could contribute to at least 10% of the recommended adequate daily iodine intake for an adult (150µg). This is a minimum estimate since iodized salt in Indonesia often contains considerably higher levels of iodine.

Instant noodles and stock have the highest potential contribution to iodine intake due to the relatively high per capita consumption of the product (instant noodles) and salt content (stock). The instant noodle producer with over 60% market share, distributed fairly evenly across the population, reported that it already includes iodized salt in its products.

Based on market data and assuming a minimum salt iodine level of 18 parts per million, total potential iodine intake from the three products combined was estimated, for the respective socio-economic classes as: A (richest) 17%, B 10%, C1 4%, C2 3%, D 4%, E (poorest) 3%.

**Key Findings:** The World Health Organization recommends universal salt iodization – the fortification with iodine of all salt used for human and animal consumption – as the main strategy for eliminating iodine deficiency. In practice, many countries including Indonesia, currently only regulate and monitor for iodization of table salt.

Legislation and supporting regulations for iodization of salt for the food industry could provide enhanced protection against iodine deficiency, in particular for groups consuming a large proportion of salt from processed foods. To account for expected future decreases in total salt intake following implementation of salt reduction policies, the level of iodine in salt could be adjusted at production based on population iodine status.

The full presentation will report expected impact by product type, examining which products already include iodized salt together with their approximate market share by socioeconomic class and region.

**PM-057** **Poster**  
**Unsaponifiable fraction of pomace olive oil and the composition of postprandial triacylglycerol-rich lipoproteins in HIV patients.**

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**Objective:** Antiretroviral therapy (HAART) reduces morbidity and mortality from HIV. Alterations in lipid metabolism is one of the side effects of HAART. Pomace olive oil (POO) is obtained by chemical processes from the residues of the mechanical extraction of virgin olive oil. The objective of this study is to show how POO intake affects the postprandial concentration of triacylglycerol, cholesterol, apolipoproteins and fat soluble vitamins in the serum and triacylglycerol-rich lipoproteins (TRL) of HIV patients on HAART

**Materials and methodology:** 13 HIV-infected male volunteers Costa del Sol Hospital in Marbella (Málaga), aged 40.7 ± 5.0 on HAART received two meals rich in refined olive oil (ROO) or POO.

**Results:** In serum, after ingestion of POO, triacylglycerol, and -tocopherol were higher in the postprandial period. Retinol concentration decreased. In TRL, POO intake caused a decrease in apo B, apo C- II and apo E compared to ROO. The actions of POO show a potential beneficial effect in reducing HIV lipid disorders.

**PM-058** **Poster**  
**Use of salt shaker by the university population.**  
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 Faculty of Health Science and Welfare. Universitat de Vic.

**Objectives:**

- To know the use of salt shaker in different meals.
- To know the use of salt addition when cooking.
- To study the preference of healthy product buying.

**Material and methods:** An electronic questionnaire was sent to the students and staff of different Spanish universities using the virtual campus. The Universitat de Vic, Universitat Rovira i Virgili and the Universidad de Alicante took part in this study.

We asked about the addition of salt at cooking time, and in what kind of product is added; and the addition of salt in the finished dishes with the salt shaker.

Also wanted to know was the interest for the low-salt products respect to low-fat and low-sugar and the interest in view the quantity of salt products.

**Results:** A total of 1056 individuals of both genders (73% female and 27% male) from 18 to 65 years completed the questionnaire.

The habit for purchasing foods low in salt was very low (76,4%) so that 87,9% of respondents never watch the salt content of foods and they didn't understand the differences between salt and sodium (58,3%). In addition, 25% of respondents did not understand the difference between salt and sodium in the nutrition information on food products. Half of the respondents always or almost always add salt when cooking compared to only 8% who do not ever add salt. The salt addition at the cooking time is in vegetables, pasta, meat, sauces, omelets or soups dishes where salt is always added. However, in most cases the salt was added little by the salt shaker except in salads.

**Key findings:** The university study population does not receive salt intake in the same way that the intake of fat or sugar and this causes their use during the cooking of food is widespread. Training on culinary techniques and the use of other seasonings like herbs or spices to replace the use of salt intake would decrease.

**PM-059** **Poster**  
**Study of the normalization of weight and glycemia in obese prediabetes and diabetes by gastric bypass.**

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**Introduction:** The World Health Organization (WHO) estimates that 171 million people in 2000 were diagnosed with Diabetes Mellitus, a trend that will increase in 2030 to reach 366 million people. Obesity is a risk factor for the development of diseases such diabetes. Bariatric surgery is the most effective treatment for morbid obesity and has been shown to generate an improvement in glucose levels and succeeds in maintaining weight loss over time.

**Material and methods:** Are selected from a sample of 415 obese patients candidates for gastric bypass anastomosis one, those with impaired glucose. Leaving the final sample of 79 patients who were classified into 2 groups: pre-diabetes (glucose ≥ 100 mg / dl ≤ 125 mg / dl) = 47 patients with diabetes (glucose ≥ 126 mg / dl) = 32.

**Variables studied:** weight changes and blood sugar for a year in quarterly checks.

Statistical analysis included analysis of variance ANOVA test P correlation coefficient of Pearson; considering significant p < 0.05.

**Results:** The 2 groups of patients achieve greater decrease in weight at 12 months, the average weight of 62.41 ± 10.93 kg prediabetic and 68.36 ± 11.16 Kg diabetics.

**Prediabetic Group:** The normalization of blood glucose at 6 months (85.5 ± 13.04 mg/dl) P<0.001.

**Diabetic group:** The normalization of blood glucose at year (96.46 ± 25.55 mg/dl). P <0.001.

**Conclusion:** Gastric bypass has proven to be an effective tool in weight reduction and normalization of blood glucose in prediabetic and diabetic obese patients at year.

The normalization of blood glucose is earlier in the group prediabetics (6 months) than in diabetics (12 months).

**PM-060** **Poster**  
**Role of the Dutch food sector in improving public health: opportunities for education and innovation.**

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**Background:** The Netherlands are number 2 globally in exporting Agro-Food products. The majority (>95%) of the food companies are Small and Medium sized Enterprises (SMEs), covering >42% of total turnover in food. There is a continuous need for good professionals in the Dutch food sector. In addition there is the need for healthy food products and responsible marketing in the fight against growing obesity epidemic and related diseases. Against this background two studies were performed with the following objectives:

Study 1) To investigate opportunities and challenges SMEs are facing with respect to innovation in food and health.

Study 2) To make an inventory of the topics technical universities should work on together with the food sector to educate future food professionals.

Methods: Study 1) 110 SMEs filled out an online questionnaire which was developed to obtain an overview of attitudes and activities of SMEs with respect to innovation; their interest in trends, among which health and wellbeing; and their view on logos as a possible way of health communication.

Study 2) Dutch food companies (n 75) were asked, which themes they would prefer to work on with the technical universities.

Results: In Study 1 it was shown that innovation is important for SMEs. This is illustrated by their innovation activities: >80% are innovating in products and >60% in processes. Challenges are: limited time, money and knowledge on innovation in general and lack of specific knowledge on nutrition and health. Health was among the most appealing trends, as was sustainability. However it was also noted that taste is equally or more important than health. Of the responding companies, 43% used a health logo. However the functionality of logos was unclear: whether they increase sales or are informative enough.

Results of study 2 are summarized as three major themes where technical universities and companies could work on together: 1) Healthy product composition, 2) Perception of food by the consumer & 3) Sustainable food production.

Key findings: There is a large willingness in the food sector to collaborate with the technical universities to ensure high quality future food professionals. Opportunities are a large willingness to innovate and an increasing interest in the already appealing trend of nutrition and health in addition to sustainability.

### PM-061

Poster

#### Learning about food allergies in school children .

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Objective: Promote awareness and education through various workshops theoretical practical, on allergic reactions and food security. Disseminate among children schooled aspects involving allergic reactions to foods.

Materials and methodology: 6 educational workshops were held for two weeks in October 2013, in each of the existing schools in the city of Guadix (Granada). Titled "Food Allergies What do we know?" these workshops they went to the school population in the 4th and 5th of education primary. Informative material, coupled with theoretical exposure was distributed practice, group work. Tools were used so that students are able to identify which foods are involved and information must provide the same on their labels regarding the substances can be considered as allergic. The 90-minute sessions per center they entailed conducting 3 groups with 10 students and a pooling of actions worked.

Results: With respect to the initial state of knowledge of reactions allergic noted that all participants, 1.5% had some type allergy. 85% were unaware of having any knowledge on the subject on food allergies. Only 5% of schools on held admitted ever worked the theme of allergies food, compared to other steps taken in the field of food and nutrition. Attending the workshops involved a total of 210 students of average age 10 years. 200 information leaflets were distributed. After exposure and Workshop final evaluation 65% of schoolchildren know which showed basic knowledge between foods and allergies.

### PM-062

Poster

#### Cardioprotective effect of a Punicalagin-Hydroxytyrosol mixture supplement on $\alpha$ -LDL and endothelial function in healthy middle-aged adults.

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Objective: To design and research nutritional products that may promote a healthy aging is a current topic of great interest in food and nutrition science. The aim of the present study was to evaluate the cardioprotective effects of consumption of an antioxidant nutraceutical supplement (punicalagin, hydroxytyrosol) in healthy middle-aged adults.

Material and Methods: In a randomized, cross-over, double-blind, placebo-controlled study, 85 healthy middle-aged adults ranged from 40 to 70 years and BMI from 18.5 to 29.9 kg/m<sup>2</sup> (68 w, 17 m), received 3 capsules/day of an antioxidant nutraceutical mixture supplement (AxS) (65mg punicalagin extract; 3,3 mg hydroxytyrosol; 331.7 mg maltodextrin) or Placebo

(400 mg maltodextrin). Each volunteer received the 2 product in random order (AxS/Placebo or Placebo/AxS) during 8-weeks intervention periods with 4-weeks washout period. Subjects maintain their usual diet and an Antioxidants foods list were forbidden to consume during the study. At baseline and at the end of each intervention period, cardiovascular disease risk indicators were measured: endothelial function through the flow-mediated dilation (FMD) in the brachial artery, assessed with Doppler ultrasonography;  $\alpha$ -LDL (atherogenic factor) in blood samples; and blood pressure. Anthropometric (Weight and BMI) and Dietetic (energy profile) variables were also evaluated.

Results: 72 subjects (14 males) completed the study (53,0±4,4 years, BMI = 24,6±3,0 Kg/m<sup>2</sup>). Subjects compliance with the capsules and dietetic recommendations over the both interventional periods. Voluntaries consuming only AxS during 8 weeks decreased significantly FMD,  $\alpha$ -LDL and Diastolic Blood Pressure (DBP) (FMD: 7,78±3,51 to 9,37±4,71 %, p<0.05;  $\alpha$ -LDL: 115,49±130,90 to 104,75±127,90 ng/mL, p<0.05; DBP: 74,03±9,84 to 71,77±10,72 mmHg, p<0.05). Anthropometric and Dietetic variables were not modified during the intervention.

Key findings: The consumption of an antioxidant supplement with Punicalagin and Hydroxytyrosol, may contribute to promote a healthy aging through a cardioprotective effect on the endothelial function and reducing the atherogenic risk.

### PM-063

Poster

#### Regular consumption of Lactobacillus plantarum 3547 probiotic leads the differentiation of Lymphocytes into effector cells in healthy people.

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<sup>2</sup>Immunology Department. Ramón and Cajal University Hospital (Spain).

Objective: To evaluate the effect of regular consumption of Lactobacillus plantarum 3547 (Lp3547) probiotic on Lymphocyte Subpopulations of healthy people.

Methods: A randomized, double-blind, placebo-controlled clinical trial was carried out during 12 weeks in 78 healthy volunteers of both genders with an IBM  $\geq 18$  - <40 kg/m<sup>2</sup> and between 40 and 50 years old, without chronic diseases and without pharmacologic treatment. Before 2 weeks of diet stabilization and fermented foods suppression participants were randomized into 2 groups: Probiotic Group (LpG, n=39) that consumed a daily capsule of Lp3547 (10x10<sup>9</sup>cfu) and Placebo Group (PG, n=39) with a capsule containing maltodextrin. Both groups maintained the habitual pattern of physical activity and diet. At the beginning and end of the intervention, blood samples were collected to determine lymphocyte subpopulations by Flow Cytometry. Anthropometric data and diet were evaluated. Results: At the beginning of the intervention both groups had similar values of lymphocyte subpopulations in plasma. After the intervention the participants who belonged to PG showed a significantly decreased of B Lymphocytes while those belonging to GP remained stable (- 1.29±3.67 vs. 0.19±1.67 %; p<0.05). Even though Total T Lymphocytes did not show differences at the end of the study, Helper T Lymphocytes (CD4+) had a significant increase between the beginning and the end of the intervention in LpG (from 46.5±6.7 to 49.5±6.2 %; p<0.001) while those participants belonging to PG remained stable (from 47.7 to 48.9±11.2%). Cytotoxic T Lymphocytes (CD8+) showed a significant decrease between the beginning and the end of the intervention in LpG (from 25.0±6.9 to 23.6±6.6 %; p<0.01) while those participants belonging to PG remained stable. Others Lymphocyte Subpopulations as the Natural Killers had no significant changes.

Key findings: Regular consumption of Lp3547 probiotic for 12 weeks leads the differentiation of lymphocytes into effector cells in healthy people. Its intake promotes an increase in helper T Lymphocytes and a decrease in the Cytotoxic T Lymphocytes percentage while B Lymphocytes remained stable which could improve the immune response.

Study supported by CARINSA group through HENUFOOD project (CEN-20101016) from CENIT program of Economy and Competitiveness Ministry of Spain.

### PM-064

Poster

#### WaSH in Nutrition strategy in the Sahel: Highlighting the importance of water, sanitation and hygiene practices in the nutritional responses.

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Acción Contra el Hambre

Objectives: In 2012, several humanitarian water, sanitation and hygiene and nutrition actors, put together a strategy to guarantee minimum wash conditions at the nutritional center and up to the household of the couple malnourished child-caregiver through out the Sahel. The so called WaSH in Nut strategy was diffused and started being implemented in Burkina, Cameroun, Mali, Mauritania, Niger, Senegal and Chad around mid 2012. This study compiles and analyzes the understanding of the strategy, and the extent of its implementation. One of the main objectives of the study is to understand the impact that the implementation of the strategy has in the nutritional status of children.

Material and methods: 50 Surveys were held among wash and nutrition actors of the strategy (National and International NGOs, Funding agencies, Governments) throughout the Sahel. The questions inquired: the overall understanding of the strategy, the coordination among actors, and the monitoring and evaluation of impact of the strategy. Two field visits to

Mauritania and Niger help contextualize the responses. In both countries, were carried out personal interview and visit to the health structures.

Results: Results about the strategy show that the status of implementation and also understanding varies widely between countries. The strategy has been frequently interpreted as the set standards of infrastructure at health centers with distribution of kits for mother and child and there is no evidence about the impact of the strategy.

In the 17 nutritional centers visited, there is common lack of hygiene and poor sanitation facilities, and a systematic absence of treated water available. Post monitoring distribution studies, combined with morbidity data from the supported nutritional centers do not show evidences of improving child health when a water treatment kit are distributed and promoted to use during the nutritional treatment. There are not even clear trends showing the incentive that the kit does on the completion of treatment.

Key findings: The core of the strategy is poorly understood among the involved actors, and thus, its implementation is often limited to health centers, to certain targeted or individual actions, overlooking the importance of behavioral change. The strategy has often been understood as synonymous of the distribution of kits in the health center. There are poor field evidences showing the link between accesses to wash facilities during the nutritional treatment as a means for a faster recovery. Thus, pointing at the need to conduct rigorous studies that combine wash and nutrition indicators.

#### PM-065

Poster

##### **Intake and biochemical status of minerals in pregnant women living in Austria.**

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Objectives: Adequate maternal diet is important in the outcome of pregnancy and the health of the mothers and children. Micronutrient deficiency during pregnancy is associated with several complications. Therefore, this study was designed to determine the intake and biochemical indicators of minerals in pregnant women living in Austria.

Material and methods: Blood samples of 113 Austrian pregnant women (3rd trimester, 18-43 y) were analyzed. Plasma zinc concentrations were examined by atom absorptions spectroscopy (AAS). Vitros DT60 IVD/TS II Chemistry System was used to assess iron, magnesium and calcium in plasma.

Results: Mean serum iron concentrations (12.25 [10.79; 13.72]  $\mu\text{mol/L}$ ) were within reference values (7.5-31.7  $\mu\text{mol/L}$ ). But, corresponding to the poor average intake of 14.95 [12.30; 16.88] mg/d, every fourth women was clearly iron deficient. 60% of estimated women took iron supplements; while 21.3% of these showed too low iron levels, 30.8% of women that didn't substitute iron were undersupplied. Hemoglobin and hematocrit levels reached 15.95 [15.11; 16.79] g/dl and 46.36 [43.94; 48.77] %, respectively. Only three women showed poor levels.

Average magnesium plasma concentrations (0.74 [0.73; 0.76] mmol/L) reached the reference range (0.7-1.0 mmol/L). Even so, child-bearing women had a good supply with magnesium (356.72 [323.63; 389.92] mg/d) via food one third didn't reach plasma reference data. Magnesium status was not affected by supplementation.

On average zinc intake (10.97 [9.91; 12.03] mg/d) reached D-A-CH recommendations of 10 mg/d and plasma levels (8.79 [8.57; 9.02]  $\mu\text{mol/L}$ ) were above the reference of 8.1  $\mu\text{mol/L}$ .

Nevertheless, more than one third had an unsatisfying supply with zinc and 27.4% a bad biochemical status.

Mean calcium concentrations (2.37 [2.35; 2.39] mmol/L) were within references (2.2-2.4 mmol/L) confirming adequate calcium intake.

Key findings: Taken as a whole calcium status can be assessed as highly satisfying, iron status as adequate, while magnesium and zinc levels should be improved. Ensuring adequate intake and monitoring mineral levels in pregnant women is an important health care goal because an unbalanced diet prior and during pregnancy, regarding the intake of micronutrients, can have long-lasting effects on the health of offspring later in life.

#### PM-066

Poster

##### **Nutrient Intakes of Manitoba Children and Youth: A population-based analysis by pulse and soy consuming status.**

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Objectives: In the past 25 years, the rate of childhood obesity in Canadians has tripled. The rate of childhood overweight and obesity in Manitoba alone is 31 percent, a significantly higher proportion than Canada's national average. Children's eating habits play a pivotal role in their current as well as future health, with poor diets being linked to a multitude of negative

health outcomes. As previous work suggests that pulse and soy consumption may favourably influence nutrient intakes, the objective of this study was to use pulse/soy consumption as an indicator to explore and evaluate the eating profile of Manitobans  $\leq 18$  years.

Materials and Methods: Data from the Canadian Community Health Survey Cycle 2.2 conducted by Statistics Canada was used for this analysis and was restricted to respondents 2 to 18 years of age residing in the province of Manitoba. Respondents were divided into groups based on pulse or soy consumption based on results from their 24 hour dietary recall. Pulse or soy consumers were identified as individuals who had reported eating at least one soy or pulse product during their recall period.

Results: Overall, 8.2% of Manitobans age 2-18 y reported consumption of soy or pulse products on any given day. In terms of demographics, there were no significant differences found between consumers and non-consumers in terms of gender, age group, body mass index, or location. On the whole, the nutrient intake profiles of non-consumers and consumers did not differ significantly, except when nutrients were expressed relative to energy intake. Observing the dietary intakes and patterns of Manitobans 2-18 (regardless of consumption status or weight category), it is clear that the majority of Manitoba's youth are not consuming healthful diets. Intakes of calcium, fibre and fruit and vegetable consumption was low among all groups. More alarmingly, the average intake of sodium in both groups exceeded the tolerable upper intake level of sodium.

Key Findings Although pulse or soy consumption does not appear to affect the nutrient intake profile of young Manitobans, results from this study shed light on the poor eating habits of Manitoba's children and youth overall. Results gathered from this project present a variety of dietary intake issues affecting Manitoba children and suggest the need to focus more on this growing concern. In particular the disturbingly high intakes of sodium need to be addressed and require further studies to obtain more detailed information on this trend.

#### PM-067

Poster

##### **Study of the long term impact of micronutrient supplementation during infancy on growth, anaemia and zinc status in pre-school children.**

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Objectives: The key objective of this study was to examine the long term effect of multiple micronutrient supplementation compared with iron supplementation alone on measures of growth, anaemia and zinc status.

Materials and methods: This study was built on an initial randomized, double-blind controlled trial in 2010, supported by UNICEF, in which 902 infants, aged 6-17 months, from Villa El Salvador in Lima, Peru, were given supplements of either iron (Fe) or multiple micronutrients (including iron and zinc) (MMN) daily for 6 months. In 2012, a subsample of 184 children from the original cohort was randomly selected to participate in a follow-up trial. The outcome measures of this follow-up trial were growth, plasma zinc and iron (haemoglobin concentration) for both the Fe (n=97) and the MMN (n=87) groups. Anaemia was defined as haemoglobin concentration below 11 g/dl. Plasma zinc concentration below 70  $\mu\text{g/dl}$   $\sim$  10.7  $\mu\text{mol/L}$  was used to define zinc deficiency. The WHO child growth standards, height-for-age, below -2 Z-Score was used to define stunting. The CDC BMI percentiles were used to define underweight (less than 5th percentile). The age range of the children at follow-up was from 36-48 months old and the mean age of the children was 41.55 (SD=3.16) months for the Fe group and 41.40 (SD=3.23) months for the MMN group.

Results: No significant differences were observed for haemoglobin concentrations ( $t(179)=0.97$ ,  $p=0.334$ ) between Fe or MMN groups. However, anaemia was identified in both the Fe (11.5%) and MMN (14.1%) groups, with no significant group differences: X<sup>2</sup> (1, N=181)=0.29,  $p=0.59$ . No significant differences were observed for plasma zinc status ( $t(178)=0.265$ ,  $p=0.792$ ). Identified Zn deficiency was 1% in the Fe group and 1.2% in the MMN group, with no significant difference between groups: X<sup>2</sup> (1, N=179)=0.08,  $p=0.93$ . With reference to stunting, 2.7% were stunted in the Fe group and 2.3% in the MMN group; and identified underweight children were 5.2% in the Fe group compared to 3.5% in the MMN group. Analyses of these data suggested that children in both groups were no more likely to have stunted growth or be underweight than expected by chance (stunted growth: X<sup>2</sup> (1, N=183)=0.10,  $p=0.75$ ; underweight: X<sup>2</sup> (1, N=183)=0.30,  $p=0.73$ ).

Key findings: Analyses showed that multiple micronutrient supplementation had no additional long term effect on growth and zinc status compared with iron supplementation alone. However, a relatively high prevalence of anaemia was still noticeable in pre-school children who received either treatment for 6 months, suggesting that either a longer period of supplementation was required and/or efforts to improve infants' diet.

**PM-068****Maternal risk factors for low birthweight.**

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**Poster**

Objective: Low birthweight (LBW; <2500 g) can be related to preterm delivery or to intrauterine fetal growth retardation (assessed using small for gestational age, SGA), or to both. While preterm birth is associated with the immediate consequences increasing the risk of neonatal morbidity and mortality, SGA infants mainly are at lifelong increased risk for chronic diseases (hypertension, diabetes type 2, coronary heart disease). Preventive actions are more likely to be successful if we know better the risk factors for different LBW categories. Objective of the study is to investigate the risk factors for LBW arising through one/ both mechanisms related to maternal nutritional status, health and adverse influences.

Material and methods: Survey on a nationally representative sample of 2468 children aged under 5 years and their mothers was conducted. The height and weight were measured. Nutritional status of children was assessed using WHO growth standards, 2006. Data about birth weight of children, term of delivery, maternal age, pre-pregnancy weight, gestational weight gain (GWG), smoking, alcohol consumption, harmful working conditions, gestational diabetes of mothers and their ethnicity were obtained by active interview and medical records. Results: The rate of infants with LBW was 5.5%. In average LBW was associated mainly with preterm delivery (58.6%) but there was a significant difference depending on the ethnicity of mothers. 65% of LBW in Bulgarian mothers were preterm, in Roma mothers the incidence of preterm LBW was 41%. The high rate of SGA infants among Roma mothers was associated with their low economical status and multiple gestations.

The prevalence of mothers with low pre-pregnancy weight (BMI<18,5 kg/m<sup>2</sup>) was 18,9%, those with overweight – 12.3% and obesity – 3.4%. The incidence of LBW among pre-pregnant underweight mothers was significantly higher (30.2%) compared to those from women with normal pre-pregnant weight (5.1%). Pre-pregnancy underweight and obesity were high risk factors for LBW related to preterm delivery.

Low GWG was determined in 30,4% of mothers, more often among women with low pre-pregnancy weight (39.1%). The incidence of LBW was highest when the both risk factors in women were available (17.3%). LBW was twice higher in smoking mothers (p<0.05). The other investigated maternal factors were not significantly associated with LBW.

Key findings: Low pre-pregnancy weight of women is high risk factor for delivery of low birthweight children. The risk for LBW is increased significantly when pre-pregnancy underweight of mothers is accompanied with low gestational weight gain and smoking during pregnancy.

**PM-069****The relation of fast food pattern with body mass index and physical activity in Iranian women.**Rezazadeh A.<sup>1,2</sup>; Omidvar N.<sup>1</sup>; Rashidkhani B.<sup>1</sup><sup>1</sup>Department of Community Nutrition, National Nutrition and Food Technology Research Institute, Faculty of Nutrition and Food Technology, Shahid Beheshti University of Medical Sciences and Health Services, Tehran, Iran<sup>2</sup>Students' Research Committee, Shahid Beheshti University of Medical Sciences and Health Services, Tehran, Iran.**Poster**

Objectives: to determine the association between fast food dietary pattern with body mass index and physical activity in Iranian women.

Materials and Methods: In this cross-sectional study, 516 women aged 20-50 years from 4 municipal regions in north of Tehran were selected by stratified random sampling. Among 516 selected women who were invited to participate, 460 women agreed to involve in the study (the participation rate 89%). Dietary information was collected by a valid and reliable semi-quantitative food frequency questionnaire by trained dietitians. Weight was measured to the nearest 100 g without shoes while wearing minimal clothes. Height was measured to the nearest 1 mm without shoes with shoulders in a normal position. Body mass index (BMI) was calculated as weight in kg divided by height in meters squared. Physical activity was measured using a validated questionnaire and was expressed as metabolic equivalents hour/day (METs-h/day) in which nine different MET levels were ranged on a scale from sleep/rest (0.9 METs) to high-intensity physical activities (>6 METs). The MET-time was calculated by multiplying time spent on each activity level by the MET value of each level. Data were analyzed in SPSS software. Fast food dietary pattern was defined through factor analysis of four items (hamburger, salami, sausages, fried potato and pizza) that were loaded in order to reduce the four items to one representative factor as manifestations of composite factors. Multiple linear regressions were used to estimate the relation between fast food pattern and BMI. Also the relation between fast food pattern and physical activity was assessed by Pearson correlation.

Results: The mean  $\pm$  SD of participants' BMI and physical activity was 26.7 $\pm$ 5.3 kg.m<sup>2</sup> and 25.7 $\pm$ 7.2 MET/hour/day, respectively. The mean  $\pm$  SD of fast foods consumption were 89.03 $\pm$  114.01 g/month for sausages, 77.81 $\pm$ 145.5 g/month for salami, 46.3 $\pm$ 167 g/month for hamburger, 120.27 $\pm$ 177.2 g/month for pizza and 359.3 $\pm$ 1083 g/month for fried potato. There was a negative weak correlation between fast food pattern and physical activity (r=-0.30,

p<0.05). After adjusting for confounders (age, smoking, physical activity and energy intake), fast food pattern was positively associated with BMI (B=0.62, 95%CI: 0.27-0.96).

Key findings: Our findings suggest that fast food pattern was positively related with BMI and negatively correlated with physical activity in the studied women. This calls for the need to design prevention programs as well as proper regulations to promote healthy eating patterns and active life style in the community.

**PM-070****Heterocyclic amines from meat intake is associated with oxidative stress in São Paulo - Brazil.**

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**Poster**

Background. Heterocyclic amines (HA) from meat intake have been linked to cancer due to generate reactive substances that can damage the DNA. Malondialdehyde (MDA) is a widely used marker of oxidative stress, as well a tumor promoter. The action of these reactive substances can be mediated by genetic and environmental factors. The aim of the current study is to investigate the relationship between intake of heterocyclic amines and malondialdehyde concentration in plasma, considering polymorphism of detoxification enzymes and lifestyle factors.

Methods. Data came from a cross-sectional survey of adults and elderly people living in Sao Paulo, Southeastern Brazil, conducted in 2010 (n=479). The HA intake was assessed according to the 24-hour dietary recall method and a structured questionnaire with cooking methods and of doneless meat level information. The amount of heterocyclic amines was calculated by the Computerized Heterocyclic Amines Resource for Research in Epidemiology of Disease developed by National Cancer Institute. It was used PCR-based assays to detection of GSTM1 and GSTT1 deletion. Malondialdehyde was measured in plasma after derivatization by thiobarbituric acid and separation on HPLC. Lifestyle information was obtained by structured questionnaire. The association between MDA and HA was done by a linear regression adjusted by smoking, deletion of GSTM1 and GSTT1, sex, age, body mass index (BMI), race, kcal of diet, and C-reactive protein.

Results. The sample comprised 37% of men, 63% of women, 53% of adults and 47% of elderly. The frequency of deletion of both variants GSTM1 and GSTT1 was 7%. The mean of heterocyclic amines intake was 369ng/day (95%CI: 307; 430ng/day) and the mean of MDA concentration was 0.73 $\mu$ mol/l (95%CI: 0.70; 0.76 $\mu$ mol/l). The MDA concentration was associated to HA intake (B=0.00005 p<0.05) in the adjusted model.

Conclusion. The intake of heterocyclic amines from meat was associated with MDA, after adjustment for genetic and lifestyle factors. A finding of our study is the high intake of HA can increase the oxidative stress independently genetic and lifestyle factors, and potentially increasing the risk of chronic diseases, such as cancer.

**PM-071****Fluctuations in household food consumption related to the presence of adolescents at home.**Rodrigues Prm<sup>1</sup>; Monteiro Ls<sup>1</sup>; Cunha Db<sup>2</sup>; Araújo Mc<sup>3</sup>; Sichieri R<sup>2</sup>; Pereira Ra<sup>1</sup><sup>1</sup>Instituto de Nutrição Josué de Castro, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil<sup>2</sup>Instituto de Medicina Social, Universidade do Estado do Rio de Janeiro, Rio de Janeiro, Brazil<sup>3</sup>Instituto de Saúde da Comunidade, Universidade Federal Fluminense, Niterói, Brazil.**Poster**

Objective: To assess differences in prevalence food group consumption between households with and without adolescents.

Material and methods: The study evaluated data from one day of food record of a representative sample of the Brazilian population (n=34,003)  $\geq$ 10 years old obtained in the first National Dietary Survey conducted in 2008-2009. Foods were grouped into 58 food groups. Individuals were classified as belonging to households formed only by  $\geq$ 20 years old individuals or to households with at least one adolescent (10-19 years old). The analysis considered sample weights and the effect of study design.

Results: In the sample analyzed, 8% of the subjects lived alone and were  $\geq$ 20 years old, 27% were from households with two  $\geq$ 20 years old individuals, 15% lived in households with three or more  $\geq$ 20 years old individuals, 9% were from households with one  $\geq$ 20 years old individual and one adolescent, 41% lived in households with two or more  $\geq$ 20 years old individuals and at least one adolescent, and 1% were adolescents living alone. Compared to individuals belonging to households constituted only by  $\geq$ 20 years old individuals, those belonging to households with at least one adolescent, showed higher prevalence (p<0.01) of consumption of eggs (18 vs 15%), corn (12 vs. 10%), cookies and cakes (33 vs 29%), sweets and sugars (16 vs 13%) and sugar sweetened beverages (32 vs. 29%). On the other hand, individuals of households formed by  $\geq$ 20 years old individuals showed higher prevalence (p<0.01) in the consumption of cheeses (18 vs 10%), soups (12 vs 9%), fruits (39 vs 31%), vegetables (48 vs 36%), coffee or tea (85 vs 78%), and alcoholic beverages (6 vs 3%).

Key findings: The presence of adolescents seems to be associated with the profile of food consumption in the household as there were differences in food consumption among individuals belonging to households with at least one adolescent and those from households with adults only. The presence of adolescents was associated with greater prevalence in the consumption of foods high in sugars. On the other hand, individuals belonging to households composed solely by adults had greater prevalence in the consumption of recommended foods, like fruits and vegetables.

#### PM-072

Poster

##### Interdependence in the consumption of non-alcoholic beverages in adolescents.

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Objective: To evaluate whether there is interdependence in the consumption of non alcoholic beverages in adolescents.

Material and methods: In the baseline of the Longitudinal Study of Nutritional Assessment of Adolescents (ELANA) were examined 1,851 10-19 years old students attending two public and four private schools (1039 high school and 812 elementary school). Food consumption was assessed using a qualitative food frequency questionnaire. The daily frequency of consumption of processed fruit drinks, fruit juices, tea or mate, guarana soft drink, low calorie soda, regular soda, milk, and coffee was estimated. The interdependence in the consumption of these beverages was assessed with Pearson correlation coefficient ( $p < 0.05$ ).

Results: Milk and coffee consumption were positively correlated among both high school ( $r = 0.21$ ) and elementary school students ( $r = 0.12$ ). In both groups, the consumption of tea or mate was positively correlated with the consumption of fruit juices (elementary school:  $r = 0.19$ ; high school:  $r = 0.12$ ) and processed fruit drinks (elementary school:  $r = 0.15$ ; high school:  $r = 0.08$ ) but showing a slight inverse correlation with the consumption of soft drinks, among both elementary school ( $r = -0.08$ ) and high school students ( $r = -0.07$ ). Similarly, the consumption of guarana soft drink was correlated with the consumption of fruit juices (elementary school:  $r = 0.17$ ; high school:  $r = 0.19$ ) and processed fruit drinks (elementary school:  $r = 0.24$ ; high school:  $r = 0.22$ ). Among elementary school students, guarana soft drink was also associated with the consumption of sodas ( $r = 0.20$ ). The consumption of fruit juices and processed fruit drinks was correlated (elementary school:  $r = 0.42$ ; high school:  $r = 0.32$ ). Among elementary school students, the consumption of low calorie soda was positively associated with the consumption of tea or mate ( $r = 0.14$ ), guarana soft drink ( $r = 0.18$ ), fruit juices ( $r = 0.11$ ), processed fruit drink ( $r = 0.13$ ), and regular soda ( $r = 0.14$ ). Among high school students, low calorie soda was only associated with soft drinks consumption ( $r = 0.30$ ). Also, among high school students, there was an inverse correlation between soft drinks and fruit juices ( $r = -0.08$ ) and processed fruit drinks ( $r = -0.09$ ). Finally, among high school students, there was an inverse correlation between the consumption of milk and guarana soft drink ( $r = -0.08$ ), fruit juices ( $r = -0.07$ ) and regular soda ( $r = -0.16$ ).

Key findings: The findings showed that the consumption of beverages can be correlated; remarkably, milk consumption was inversely correlated with sugar added beverages consumption among high school students. Furthermore, the consumption of different types of sugar sweetened beverages was correlated.

#### PM-073

Poster

##### Effect of Weight Loss on Inflammatory Markers and Iron Parameters in Overweight and Obese Women.

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Obesity and its associated comorbidities are an ongoing health-care problem in the worldwide. Excess adiposity is associated with low-grade inflammation and decreased iron status. Iron depletion in obesity is thought to be mediated by an inflammation-induced increase in the body's main regulator of iron homeostasis. Weight loss is recommended for inflammatory indicators reduction and benefits of moderate weight loss with conservative treatment have been described. The aim of this study was to determine the effect of dietary intervention on iron parameters. A total of 147 women, aged 20-49 years, admitted to internal medicine, endocrinology and dietetic clinics outpatients were included to the intervention study. Women (n:147) were divided into two groups and dietary treatment for weight loss was applied. First group was consisted of women with normal hemoglobin levels (n:101). In the study, a general questionnaire was applied, biochemical parameters [whole blood count (WBC), anemia parameters, C-reactive protein (CRP), soluble transferrin receptor (sTfR)], 24-hour dietary intake record for 3 consecutive days and physi-

cal activity levels were determined, anthropometric measurements were taken and bioelectrical impedance analysis was done. After three-months of follow-up intervention, women with anemia had 10.1% weight loss, women without anemia had 10.7%. Statistically significant correlation between body weight loss and CRP levels was determined ( $p < 0.05$ ). Significant decreases were determined in the anthropometric variables ( $p < 0.05$ ) and also in the intakes of energy, total fat, saturated fatty acids and carbohydrate when compared to the baseline intakes ( $p < 0.05$ ). Vitamin C, fiber, iron, calcium and zinc intakes were increased compared to the baseline intakes ( $p < 0.05$ ). In conclusion, weight loss in obese premenopausal women were associated with reduced inflammation. Reduction in inflammation allow for enhanced dietary iron absorption resulting in an improved functional iron profile. It is obvious that obesity is an important public health problem and the precautions should be taken to prevent the occurrence of obesity. Additional clinical research is needed to evaluate the cost effectiveness of dietary intervention in the treatment of obese individuals with iron deficiency anemia.

#### PM-074

Poster

##### Changing the food environment to reduce childhood obesity risk: four case studies in community organizing.

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Objective: Several major organizations have called for action to address the social determinants of health through policy, systems, and environmental change. Unfortunately, many policy, systems, and environmental change initiatives targeting food have shown weak or opposite of expected results. Community capacity building and engagement seem to be a critical and effective component. We hypothesized that the use of a community organizing approach to food systems change would better engage food insecure community members, resulting in lowered risks of childhood obesity.

Methods: Four community coalitions that were engaging or had a desire to engage in food systems change were selected through an application process. Using participatory action research methods (e.g., photo voice, q studies), capacity building workshops, and direct action community organizing, each community advanced or initiated an issue campaign to improve some aspect of the local food system (e.g., city funding of a community kitchen, development of a community garden for youth, etc.). Using participatory observation with detailed ethnographic notes, key informant interviews, surveys, and participatory action research data, we developed case studies of phase one of the issue campaigns (e.g., engaging people affected by food insecurity or at risk of child obesity) in identification of food systems issues and their solutions.

Results: We found that direct action community organizing approaches, such as door knocking in residential neighborhoods, house meetings, and engaging community leaders, were difficult approaches for coalitions to adapt. In particular, the development of relationships between coalition staff, members, and affected community residents was challenging even when coalitions expressed a commitment to engaging communities. Community organizers often expressed unwillingness to participate when asked to knock on doors or host house meetings. These community engagement barriers were addressed through modeling, capacity building workshops to re-frame food systems issues, and in 3 communities replacing community organizers unwilling to engage in direct action.

Key Findings: Building capacity for community engagement is a needed priority for organizations to effectively promote policy, systems, and environmental change.

However, implementing community organizing strategies has proven to be difficult at times and time consuming. Through deep community engagement using community organizing strategies between community organizers' trainers, community organizers, and coalition members, a shift in cultural norms, on an individual and organizational level, is possible and necessary to address systems level changes. As a result, strong connections within communities have been built and mobilized in effort to improve food systems in each of the four communities.

#### PM-075

Poster

##### Evaluation of the appetite ratings by visual analogue scores (VAS) after consumption of a breakfast soft bread.

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Objective: To evaluate the appetite ratings of a breakfast soft bread with a high content of fiber and protein.

2. Subjects and methods: Thirty healthy volunteers consumed an experimental soft bread enriched in fiber and protein (Puravita Breakfast®), as a breakfast, or a control breakfast consisted of sliced white bread (85 g), jam (10 g) and margarine (2 g) to adjust for energy density, fat and sugar levels. Each breakfast was assessed in two different times. Appetite ratings were evaluated with a visual analogue scale (VAS). Subjects were instructed to consume the tested breakfasts within 10 min. The subjects immediately completed two VAS, one on breakfast palatability and another on appetite feelings. Appetite feeling VAS was repeated every 30 min until a total of 4 h had passed. Four hours later, an ad libitum lunch consisting of a standardized meal and water were provided. The subjects were instructed to eat until comfortably satisfied. Immediately, after the ad libitum lunch, volunteers completed the palatability and the appetite feeling VAS. A linear mixed-effects model (LMM) was used to compare areas under curve (AUC) calculated for both breakfasts. The Pearson's coefficient was used to check the lineal associations between variables.  $P < 0.050$  was considered significant.

Results: AUC hunger decrease tended to be greater after the intake of the breakfast soft bread ( $P = 0.055$ ) whereas prospective consumption decrease was higher ( $P = 0.022$ ). In addition, the postprandial time-course of the composite appetite score, as a global magnitude of satiety, was higher after intake of the experimental breakfast ( $P = 0.040$ ). Although there was no difference between groups for the ad libitum lunch energy intake after the two breakfasts, there were significant relationships between energy intake and all appetite scores immediately before the lunch meal (at 240 min) (hunger:  $r = 0.452$ , satiety:  $r = -0.444$ , fullness  $r = -0.394$ , prospective consumption:  $r = 0.528$  and composite appetite score:  $r = -0.483$ , all  $P < 0.001$ ).

Key findings: The consumption of this experimental soft bread enriched in fiber and protein contributes to appetite control by reducing hunger, enhancing satiety feelings. These effects may be beneficial for the prevention of obesity and treatment of metabolic diseases as diabetes mellitus. The present work was supported by PURATOS NV (contract no. 3725 signed with the Fundación General Empresa-Universidad de Granada) and this trial is registered at [clinicaltrials.gov](http://clinicaltrials.gov) as NCT02090049.

#### PM-076

Poster

##### Comparison of five nutrient profiling schemes on labelled foods in Turkey.

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Objectives: Nutrient profiling can be defined as the science of categorizing foods according to their nutritional composition and used as the scientific basis of nutritional labelling, health claims, or nutritional education by helping the consumers to make healthy and reasonable food choices. The objective of this study was to evaluate the nutrient profiling of labelled foods and beverages using five international nutrient profiling schemes.

Material and Methods: In the study five profiling schemes; Food Standards Agency (FSA) FSA-Ofcom WXY, Nutrient Rich Food Index 9.3 (NRF 9.3), Netherlands Tripartite Classification, Food and Drug Administration USA Health Claims (HC) and International Healthy Choices (IHC) were selected and tested. Totally, 3184 labelled food and beverages from 38 food categories and 500 different brands, which were marketed in top two supermarkets were audited. Nutrient profiling schemes were calculated according to the principles of the five systems for each food and beverages, assessed results were compared according to their performance.

Results: It was determined that three schemes results were compatible with each other except FSA-Ofcom and NRF 9.3 model in fruit juices. HC was 68.8%, Tripartite Model was 57.1%, and IHC was 87.5% comply in energy value, while 86.6% wasn't comply in added sugar. Fruit juices were found 79.5% less healthier in FSA Ofcom and got the -3.91 points (rank 20th in 38 food categories) in NRF 9.3 scheme. It was found that all models had compatible results in variety of biscuits, cakes, chocolates, pasta, processed meat and chips. The results were incompatible while evaluating the bread types. Breads did not comply by 53.8% and 69.2% according to HC and Tripartite scheme, respectively. On the other hand in FSA-Ofcom scheme bread was classified as 89.7% healthier. Bread got the 0.19 points (rank 10th in 38 food categories) in NRF 9.3 model. Comparison of WXY and NRF 9.3 nutrient profiling schemes in all foods and beverages ranked scores points out a high positive correlation ( $p=0.01$ ).

Key findings: It was the first study in Turkey using nutrient profiling schemes for evaluating labelled foods. Five schemes have different cut off values, thresholds, reference values and the rationales behind them. It can be concluded that five schemes had correlated results. Further studies need to test and understand the nutrient profiling schemes in order to develop a proper nutrient profiling model for Turkey.

#### PM-077

Poster

##### Perceptions of mothers on the Multiple Micronutrients powder usage in the Peruvian Andes.

Rivero E; Vásquez J; Vargas A.

Action Against Hunger

Objectives: To recognize the rating, knowledge and experiences of mothers whose children received multiple micronutrient powders (MNP) in three Peruvian Andean regions.

Material and methods: This is a qualitative study developed in the rural villages from Huanavelica, Ayacucho and Apurímac regions in 2011. The studied population were mothers with children's age is from 6-36 months who received MNP envelopes through the National Multiple micronutrient Supplementation Program developed by the Health Ministry. 317 mothers participated in the study through focus groups and in depth interviews. The data was collected by anthropologists; and in the analysis nutritionists and psychologists were included.

Results: Most of the mothers know the target group to receive MNP, the inter-day supplementation scheme and how to prepare were messages received during counseling through health facilities. Mothers identified that inter-day supplementation makes difficult the recall and recommend the daily dosage. They perceived that the way of use is simple and do not take away time; some ones perceive an acid and metallic flavor "like antacids" changing the color of the child food; mothers recognize that children have an initial rejection but with responsive feeding techniques improve the acceptance and consumption. Some mothers say that their children had diarrhea, vomiting, constipation or nausea by the consumption of MNP; also, they feel that home visits from the health workers are limited as well as other stakeholder as teachers, pastors, and community leaders; actually, they say that some religious groups oppose to the use of MNP. About the father involvement, they don't go together with the mother to the health facilities; also, don't attend educational meetings on child health and nutrition. Mothers assigned a positive valuation to MNP; there are differences between the drawings of children who consume MNP and those who do not: The former are drawn higher, thick, groomed, with their entire body compared to the seconds that do not consume. In many designs, is highlighted the relation between the consumption of MNP with a better cognitive capacity. Key finding: The MNP are valued by mothers. It could improve the adherence with a participatory communication strategy that emphasizes counseling, home visits, consumer remembrance, responsive feeding, parental support and benefits on the child's intelligence.

#### PM-078

Poster

##### Intakes of antioxidants in a sample of university students

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Objectives

In recent years we have witnessed a transformation of traditional eating patterns in the general population. These changes are even more evident among young people. The decrease in consumption of fruit, vegetables, legumes and cereals added to the increasing consumption of fat, frozen and packaged food requires an assessment of the diet quality of younger adults. The aim of this study was to assess the contribution of antioxidant nutrients to the diet in a pilot sample of undergraduated students of the University of Castilla-La-Mancha in Albacete (Spain).

Material and methods: Cross sectional study performed with a sample of 68 students enrolled during the academic year 2012/13. Studied variables were demographic data (gender, age) and anthropometric measurements (weight, height). Food consumption was gathered by two nonconsecutive 24 hour recalls including a weekend day. The intakes of the following antioxidant nutrients were computed: selenium, zinc, beta-carotene, vitamin C and vitamin E. The Dial program 2.12 was used to determine antioxidant intake and the statistics analyses were performed with IBM SPSS 20.0. Level of significance was established as a P-value <0.05.

Results: The recruited students in the pilot study, 52 men and 16 women, were aged between 19 and 27 years old. The mean BMI of the sample was  $22.4 \pm 3.3$  kg/m<sup>2</sup>. Intakes were higher than recommended daily intakes in both genders. Significant differences were not found in intakes by age, BMI and sex. Mean intakes in men and women were respectively: selenium ( $\mu\text{g}$ )  $21.7 \pm 1.4$  and  $114.5 \pm 70.0$ ; vitamin E (mgEq. of  $\alpha$ -tocopherol)

$7.0 \pm 3.1$  and  $6.7 \pm 3.0$ ; vitamin C (mg)  $80.4 \pm 54.4$  and  $63.0 \pm 3.4$ ; zinc (mg)  $9.7 \pm 2.9$  and  $8.4 \pm 3.0$ ; beta-carotene ( $\mu\text{g}$ )  $1247.2 \pm 1344.1$  and  $841.1 \pm 645$ .

Key findings: Mean intakes of antioxidants were higher in women than in men. Recommended daily intakes are lower than intakes found in the studied sam-

ple. We found a high variance in the beta-carotene intake values. Due to this is a pilot study, the mean values could be affected by the impact of extreme values. Studies with larger sample sizes should be conducted in order to perform further analysis of beta-carotene.

### PM-079

Poster

#### Food consumption patterns in the Community of Madrid. Nutrition Survey of Madrid, Spain (ENUCAM)

Ruiz Moreno E.<sup>(1)</sup>; Belmonte Cortés S.<sup>(2)</sup>; Morey Montalvo M.<sup>(3)</sup>; Granada de la Orden S.<sup>(2)</sup>; del Pozo de la Calle S.<sup>(1)</sup>; Cuadrado Vives C.<sup>(1)</sup>; Valero Gaspar T.<sup>(1)</sup>; Ávila Torres J.M.<sup>(1)</sup>; Varela Moreiras G.<sup>(1)\*</sup>

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<sup>4</sup> University CEU-San Pablo. School of Pharmacy. Department of Pharmaceutical & Health Sciences. Madrid, Spain.

Objectives: to analyze the consumption patterns of certain food groups according to age.

Methods: to evaluate the food consumption of the citizens of the Community of Madrid we used a food frequency questionnaire of over 161 foods. This survey was conducted in a representative sample selected by random sampling (N=1553).

Results: Cereals: consumed by 99.8%, the major percentages of consumption among the 18-34 years group ( $p>0.05$ ). Highest consumption of pasta, white bread, and energy bars among the youngest, while whole wheat bread among those over 65 years. Dairy: consumed by 99.4%, the major percentages of consumption were in the group of over 65 years ( $p>0.05$ ). Highest percentages of consumption of cream cheese, whole milk, natural yoghurt and custard among the youngest; blue cheese, fermented milk with lactobacillus and cured cheese in the group of 35-64 years; skim milk, nonfat yogurt and fresh cheese among those over 65 years. Vegetables: consumed by 99.9%. The highest consumption percentages were in the group of 35-64 years ( $p>0.05$ ). Legumes: consumed by 98% and group of 35-64 years showed the highest percentages ( $p>0.05$ ). Fruits: consumed by 100%. The highest percentages were in those of over 65 years ( $p>0.05$ ). Meats and derivatives: consumed by 99.2%. The highest percentages of consumption of pork,  $p<0.01$ ; bacon,  $p<0.01$ ; beef;  $p>0.05$ ; chicken  $p>0.05$ ; hamburgers,  $p<0.01$  and sausages,  $p>0.05$ , were among the youngest. Fish: whitefish, consumed by 95.3%, the major percentages of consumption were in those over 65 years,  $p<0.01$ . Fatty Fish, no associations were found. Canned fish, consumed by 94%, the major percentages of consumption were in the group of over 65,  $p<0.01$ . Nonalcoholic beverages: consumed by 100%. Coffee, tea, soda and nonalcoholic beer were mainly consumed by the group of 35-64 years, while cola refreshments, low-calorie drinks and juices among the youngest.

Water, consumed by 99%, the major percentages of consumption were in the group of over 65. Alcoholic beverages: consumed by 74.6%. Whiskey and beer were mainly consumed among the youngest; cider and spirituous drinks in the group of 35-64 year, while wine among those over 65 years,  $p<0.01$ . Pre-cooked foods and ready-to-eat foods: consumed by 97.4%, high percentages among the youngest ( $p<0.01$ ).

Conclusions: association between the consumption of certain types of food and age was found, emphasizing the consumption of low-fat foods and fruits in those over 65 years; cereals, lean meats, precooked meals, refreshments, beer and whiskey among the youngest and fish, legumes and cheese in the group of 35-64 years.

### PM-080

Poster

#### Salt and Trans fatty acid content of school meals served in public schools from the Autonomous Region of Madrid (Spain) 2009-2013: "School Meals Programme".

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<sup>1</sup> Fundación Española de la Nutrición (FEN).

<sup>2</sup> Universidad CEU San Pablo. Departamento de Ciencias Farmacéuticas y de la Salud.

Objectives: To analyze the salt and trans fatty acids content of school meals served at public schools from the Autonomous Region of Madrid (Spain).

Material and methods: A total of 291 public schools attending children aged 6-9 years old were visited in these four years: 74 in 2009; 92 in 2010; 55 in 2011; 34 in 2012 and 36 in 2013. Blinded visits to schools conducted by dietetics/nutrition experts were carried out. A duplicate of the meal with

the same portion sizes served to the 6-9 year-old children was collected from the school canteens. The duplicate portion was chemically analyzed in an accredited laboratory (Aquimisa Laboratorios) in order to determine protein content (Kjeldahl method), total lipids (Soxhlet method), trans fatty acids (gas chromatography), carbohydrates (calculated) and sodium. Nutritional reports have been sent to the Education Council including: energy content, caloric profile, lipid profile, trans fatty acids, sodium and salt content.

Results: The average salt content per meal was  $3.53\pm 1.56$ g. This represents the

70.6% of the daily maximum recommended by World Health Organization (5 g per day) for the adult population in just one meal that should correspond randomly 30% of the total energy. If we compare between years, the values are the followings:  $3.72\pm 1.22$ g in 2009;  $3.16\pm 1.16$ g in 2010;  $3.46\pm 1.16$ g in 2011;  $3.12\pm 1.03$ g in 2012 and  $4.54\pm 2.86$ g in 2013. Only 29 of the 291 meals analyzed showed sodium contents less than 40% of the recommendation whereas 28 showed sodium values higher than 90%. The average trans fatty acids content was  $0.17\pm 0.17$ g. If we compare between years, the values are the followings:  $0.25\pm 0.21$ g in 2009;  $0.16\pm 0.14$ g in 2010;  $0.12\pm 0.07$ g in 2011;  $0.09\pm 0.06$ g in 2012 and  $0.15\pm 0.22$ g in 2013. Recommended dietary intakes for trans fatty acids for children should reach less than 1% of the recommended energy intakes of this population (2.000 kcal). Only 2 meals covered the 0,5% of the recommended energy intake.

Key findings: Salt content school meals are still very high, that is why collective catering companies should urgently work to lower the content. As for trans fatty acids content, it has to be considered to be very low, which represents a positive result for the menu evaluation in the observed period.

In addition, positive changes have been observed for different nutritional markers (caloric profile, variety, food servings, etc) related to the school meals service from year 2000 when FEN started the School Meals Programme.

### PM-081

Poster

#### Zinc supplementation in young children: a review of the literature focusing on contextual factors.

Liberato SC, Singh G, Mulholland K

Background and aims: It is estimated that zinc deficiency is responsible for over 400,000 child deaths in Africa, Asia, and Latin America. This review examines the impact of zinc supplementation, administered prophylactically or therapeutically, on diarrhoea.

Methods: Relevant published articles were identified through systematic searches of electronic databases. Bibliographies of retrieved articles were examined. Studies were included if there was a control group not receiving zinc supplementation; included children from birth to 5 years old; participants received zinc supplementation either for treatment of diarrhoea or for prevention of diarrhoea; Outcomes of interest including diarrhoea outcomes (prevalence, incidence, stool output), respiratory infections, otitis media, anthropometric measurements and mortality were reported.

Results: A total of 38 studies met the inclusion criteria and were included in this review. The effect of prophylactic zinc was examined in 29 studies; 14, 7, 1 and 18 examined diarrhoea outcomes, respiratory diseases and pneumonia outcomes, otitis-media outcomes and anthropometric measurements, respectively. Prophylactic zinc has been shown to be effective in decreasing both prevalence and incidence of diarrhoea, reducing respiratory infections and improving growth in children with impaired nutritional status. There is less conclusive evidence of reduction in diarrhoea duration or diarrhoea severity. While prophylactic zinc decreases mortality due to diarrhoea and pneumonia, it has not been shown to affect overall mortality.

Nine studies examined the effects of therapeutic use of zinc for treatment of diarrhoea; 9, 3 and 1 examined diarrhoea outcomes, respiratory infections outcomes and mortality. Therapeutic use of zinc for the treatment of diarrhoea in children has been shown to reduce diarrhoea incidence, stool frequency and diarrhoea duration as well as respiratory infections in zinc deficient children. However, stool output is only reduced in children with cholera. Less conclusive evidence exists for therapeutic zinc reducing mortality due to diarrhoea and respiratory infections.

Key findings: Although zinc has been included in diarrhoea management policies in many countries, there are no guidelines for intervention strategies to reduce zinc deficiency at the population level. It is hoped that this review will serve as a foundation for health workers in the field seeking to scale up nutrition interventions for reducing zinc deficiency in the field.

### PM-082

Poster

#### Factors associated to adiposity in Brazilian elders according to Body Mass Index and Body Adiposity Index

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Objectives: To determine the factors associated with adiposity in elderly according to two anthropometric indices, Body Mass Index (BMI) and Body Adiposity Index (BAI). Material and Methods: Locally representative cross-sectional study carried out in 2009 was used as a set data. The sample size comprised 532 elderly residents in Viçosa, Minas Gerais, Brazil. Domiciliary interviews were conducted using a questionnaire containing sociodemographic and health variables. Weight, height, waist and hip measures were obtained at the time of interview and subsequently the BMI and the BAI indexes were calculated. Sociodemographic, lifestyle characteristics, health status and functional ability were analyzed. Data analysis was stratified by sex and included simple frequency distribution, Student t test and analysis of variance (with Bonferroni correction), in addition to multiple linear regression. The significance level was 0.05.

Results: A total of 261 and 271 women and men were studied, respectively. Age, hypertension and musculoskeletal diseases were associated with BMI and BAI among women. Among men, smoking habit and dyslipidemia were associated with the BAI. Hypertension, musculoskeletal diseases, smoking habit and dyslipidemia were associated with BMI. According to the multiple linear regression, BMI performed better than BAI, since it was associated with a greater number of variables related to adiposity than BAI, specially in men.

Key findings: BMI seems not to be better than BMI to predict adiposity in Brazilian elders. Overweight individuals are more susceptible to cardiovascular risk factors and consequently, to higher risk of morbidity and mortality if left untreated these changes.

#### PM-083

Poster

##### Food consumption assessment of students in a municipal public school in Goiânia, Goiás, Brazil.

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Objectives: Assess activities results regarding nutritional education carried out with students from a municipal school located in the eastern region of Goiânia, Goiás, Brazil, partaking the Health in School Program.

Materials and Methods: The study was done between 2012 and 2013, in a municipal public school participating in the Health in School program. At first, in 2012, a nutritional and food intake assessment was done with 116 students aged between 6 – 12 years with overweight and obesity prevalence (15% and 4,4%, respectively). Daily consumption of protective foods was found to be low, vegetables (7,76%), fresh fruits (34,49%), raw salad (35,18%) milk and derivatives (49,15%), with exception of beans, consumed daily by 88% of students. Foods considered of risk were frequently consumed, particularly soft drinks (20,6%), filled wafers, sweets and candies (18,96%), crackers and snacks (15,51%). Following, nutritional education activities were carried out through a ludic methodology, by use of plays for approaching the ten steps for a healthy eating. Finally, in 2013, a new nutritional and food intake assessment was carried out.

Anthropometric assessment comprised of individuals' weights and heights collection, and the body mass index for the age group was used as nutritional health parameter, with the cutoff points as established by the World Health Organization for those older than 5 years. Food intake was assessed through the Nutritional Vigilance System's food intake frequency qualitative questionnaire, which identifies the food intake frequency for both protective and risk foods in the last 7 days. The daily intake of protective foods was considered adequate, whereas risk food intake frequency should have been limited to a maximum of two days, as professed by the Brazilian Population Food Guide.

Results: 108 students aged between 6 – 12 years partook the activities. A decrease in the daily intake of protective foods such as beans (84,5%), milk and derivatives (44%), fresh fruits (33%), raw salad (24,2%), vegetables (6,61%), and an increase in risk food intake, particularly sweet cookies, filled waffles, sweets and candies (27,75%) and soft drinks (21,6%) was verified.

Key findings :Activities did not achieve the expected results in promoting the consumption of protective foods, possibly due to being specific, isolated activities. Finding suggests that a framework of actions to be carried out longitudinally, pervading disciplines, as means to a collective construction, might be more effective in reaching the students.

#### PM-084

Poster

##### Children malnutrition inequality between two Brazilian poor regions

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Objectives: Estimate children malnutrition inequality between two Brazilian poor regions.

Material and methods: The data are from the demographic and health surveys during the periods 1996-2006 in North and Northeast of Brazil. Malnutrition of children younger than 5 years of age was measured by height-for-age <-2 Z-scores, with the World Health Organization (2006) data providing the reference. We assessed malnutrition inequality during periods through concentration curve and concentration index. The rank variable was building for principal component analysis using 17 socioeconomic variables.

Results: The prevalence of malnutrition was 50,2% and 49,8% for 1996 e 2006 respectively. The concentration curve for under-five malnutrition variable takes higher values among poorer people in both years, the concentration curve stood above the line of equality. The farther the curve is above the line of equality, the more concentrated the health variable is among the poor. The concentration index was 0.011 and -0.057 in the two years respectively. The negative concentration index in 2006 reflects the higher concentration of stunting among poorer children than 1996.

#### PM-085

Poster

##### Health Promotion and weight control: Viva Bem Group experiences

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Objectives: Develop health education activities, aggravation prevention and rehabilitation with a health promotion interdisciplinary approach focused on overweight adults with other comorbidities assisted by a family health unit in Goiânia – Goiás – Brazil.

Material and Methods: Viva Bem group is a health education and intervention group that holds place twice a year, during 4 months and hosting 30 participants in each cycle. The group is composed by individuals residing in the Recanto das Minas Gerais' Family Health Center's coverage area, in Goiânia, Brazil. This report refers to groups conducted in 2013. Meetings were fortnightly, held in a regional social facility and coordinated by Municipal Health Secretary's professionals and by Goiás Federal University's instructors and scholars. Activities were conducted by facilitators of various areas. Addressed topics were: healthy weight, portioning, sabotaging thinking, physical activity, obesity complications, food labelling and culinary workshops. In activities, active methodologies with biological, psychological and social perspectives were used, with emphasis in health promotion, aggravation prevention and disease rehabilitation, focused in enhancing the individuals' life quality. Nutritional assessment was done monthly, and a quantitative and qualitative assessment was done at the group's end. For individual treatment of patients with comorbidities associated to obesity, a partnership with Escola Vida Clinic, of the Pontifical Goiás Catholic University was formed.

Results: Both groups conducted in 2013 had a predominant female participation (89%). 79% had observed weight loss, 6% were unaltered and 16% gained weight. It was found that participants showed interest, motivation and engagement (adhesion of 70%), reporting changes in eating habits, physical activity, and improvement in health profile.

Key findings: Viva Bem Group has been found to be an effective model of actions aimed at an integral, individual support to the overweight adult, offering an educative, inter sectorial exchange opportunity of experiences, aspirations and reflections.

#### PM-086

Poster

##### Consumers' knowledge, views and understanding of nutrition labeling of packed food: a qualitative evaluation in Mexican urban settings.

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One policy recommendation by international agencies as a strategy to help people improving choices when buying foods is to use front of package labelling systems (FOPLS) along with a communication strategy and clear food guidelines. Food industry has developed a voluntary FOPLS using the Guideline Daily Amount (GDA) strategy. Alternatively, a binary system using a green logo and the MoH endorsement has been proposed for products that contain low amounts of sodium, saturated fat, trans fat and added sugars according to the WHO recommendations.

Aim: Assess how social knowledge about food labelling is constructed including understanding and beliefs about the FOPLS-GDA and the "O.k." logo.

Methods: We conducted 12 focus groups with individuals from different socio economic groups in four large cities in Mexico. We developed a guide using the theory of planned behavior and conducted a thematic analysis based on a positivism perspective using NVivo software with the following categories: a) motivation to select foods, b) attitude and perceived behavioral control, c) reliability of the information on labels, d) opinion about labels endorsement. Triangulation of categories and discourse data was made with 2 codifiers and with quantitative data from questionnaires.

Results: People under a specific diet or with current health conditions reported buying foods based on health benefits and are more likely to read labels. Regardless socioeconomic status, participants do not trust nor use the FOPLS-GDA since they believe their behavioral control is limited due to lack of understanding on: a) what the percentages mean and b) what are the nutritional recommendations per age group. Comments about the "O.k." logo were favorable: it was easier to understand "... (the logo) it implies that the product has been revised... Yes, you can eat it with confidence" (P3, P4, MSE\_Mty) " If I see a product with this logo, I know that someone already assessed it, study it and is recommending it, you buy it with more confidence" (P3, MSE\_Gdl) "...it would be easier to choose a product, you see the logo and you don't have to be doing the math..." (P7, HSE\_Gdl). Few participants exposed the need to clarify the term "habitual consumption". Discourses emerged about the need of information on labels that is reliable and easy to use, including the frequency of consumption for each product. Conclusions: This is an insight of participants' accounts regarding food labels. Important deviance needs to be considered in people's beliefs, discourse and behavior, however this study will help to understand what

people are more likely to adopt in their behavior from the environmental changes, including regulations on food labeling and interventions to promote healthy eating currently taking place in Mexico.

**PM-087**

Poster

**Evaluation of wasted hot foods distributed in the restaurant in the metropolitan region of Curitiba - Brazil: sustainability ensured?**

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Objective: According to national survey (POF 2008-2009), increased frequency of food outside the home was 35% in recent years, evidencing the interest for establishments offering variety, low cost, speed, autonomy in choosing what and how much is consumed. Waste exists in restaurants free consumption. Because to this, the aim of this study was to quantify the clean and dirty scraps, and remnants of food in a restaurant with self-service consumer.

Material and method: To conduct the survey in question were weighed 100% of hot preparations produced on the local for 30 days of study. After the production process of each preparation, all preparations were potted and their actual weights were identified. The clean and dirty scraps were quantified, in addition to food scraps on the plates of customers. Data analysis was also necessary to quantify the number of customers per day, plus the mean amount of food sales to customers. Through these data we obtained the average consumer and rest-intake, the analysis of the mean percentage of food consumption and waste and quantify losses by over-production. To facilitate the analysis, were grouped foods that had preparations, ingredients and ways of cooking in similar types of groups. Through these data we obtained the average consumer and rest-intake and we could analyze average percentage of food consumption and waste.

Results: The average kilograms of food produced was 240 kg (SD 43 kg), average food waste produced and distributed in buffet 1.48% (SD 1.89%), and average food wasted in tanks distribution was 37.5 kg (SD 14.4 kg). The average food waste was thrown into 40.8 kg and 16.8 kg rest intake per day. Considering the total clients served on the local (n = 6510) and the amount consumed, it was possible to estimate that the per capita was 422 grams per customer.

Key finding: We conclude that, to be successful in an enterprise there is a need for improvement in planning, reducing waste of raw materials, which apart from being a factor of financial sustainability for producers of dining establishments, also represents significant environmental impacts.

**PM-088**

Poster

**Right to Adequate Food and Health of children and adolescents in public schools: a local experience in Buenos Aires (Argentina).**

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Objectives: This work focuses on the Right to Adequate Food and Health of children and adolescents in public schools in the City of Buenos Aires (especially in La Boca, a high vulnerability neighborhood), and the violation of these rights.

Its aim is to describe the joint work process between Health, Education and Justice on malnutrition in excess (overnutrition) at public schools and the responses that the Local State provides to this problem.

Material and methods: Anthropometry in children and adolescents in public schools; observations in schools during lunch time and recess; interviews with school directors and assistant directors; interviews with health professionals; and analysis of legal, political and social framework and its responses to the infringement of children's and adolescent's Rights to Adequate Food and Health (using as theoretical framework the International Human Rights Law)

Results: In the City of Buenos Aires (and specially in La Boca), anthropometry showed that more than one third of the students were overweight. However, this problem is "naturalized" by the school community (teachers, school directors and assistant directors, families) and different areas of government do not contemplate this health problem in their programs and actions, and do not implement the differential treatment that these cases deserve. The only exception was found in lunch school programs, which provide special menus with a medical prescription. However, the public health sector lacks the operational capacity to complete comprehensive actions needed in all the schools. There are specific laws (N° 2598/2007 and N° 3704/2010) on school health and healthy eating in schools; this last one has only a partial implementation.

Key findings: The rights-based approach to Social Protection holistically face the problems of children and adolescents. Despite the co-responsibilities that families, society and State have; the State have an obligation to immediately meet the rights of food and health.

This work found that the State is not taking the actions that children and

adolescents with overweight need in order to achieve their rights to adequate food and health. Intersectorial work is needed in order to jointly build a community that demand for their rights and fully access them.

**PM-089**

Poster

**Prevalence of abdominal obesity in Brazilian studies.**

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Objective: Abdominal obesity is characterized by the accumulation of fat in the central or abdominal region of the body and is usually associated with metabolic abnormalities and greater occurrence of chronic diseases. To diagnose abdominal obesity anthropometric indicators are used. Based on the above, this study aimed to know the anthropometric indicators of abdominal obesity used in Brazilian studies.

Material and methods: The study was based on literature search of articles published between 2002-2012 and indexed by SCIELO. The keywords used were: "abdominal obesity", "central obesity", "android obesity", "central obesity", "waist circumference", "waist circumference", "sagittal abdominal diameter", "SAD", "waist", "index conicity", "C Index", "waist-hip ratio", "WHR", "waist-thigh ratio", "WTR", "waist-height", "WHeR". After the screening of articles, reading the summaries was taken considering the inclusion criteria (original article, population-based study conducted in schools, health centers or outpatient clinics, considering all age groups, with individuals of both sexes in any city in the country and Portuguese language of Brazil) and exclusion (studies with pregnant women, postpartum women, renal disease, liver disease, mental patients with hereditary syndromes, HIV patients and review articles). Finally, the results were summarized and described, considering the prevalence of abdominal obesity, anatomical points used to measure and cut points.

Results: In this study 54 articles were analyzed, and most studies have been conducted with adults (56%) and women (75%). The prevalence of abdominal obesity was determined in 43% of articles, and in the group of children and adolescents the prevalence ranged from 7.5% to 88.1% and among adults and elderly the prevalence ranged from 35% to 67%. The most widely used indicator was waist circumference (n = 48), with different cutoff points (range between 80 and 88cm for women and 88 and 102cm for men), despite having a national standard.

Key finding: We can observe the lack of standardization among Brazilian studies on the anatomical point and cutoff, which proved to wide variations in the prevalence of abdominal obesity.

**PM-090**

Poster

**Problem of allergic diseases in Polish children population. Is it connected with blood type?**

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Background and objectives: According to ISAAC, ECRHS and ECAP, Poland belongs to group of countries with very high incidence of allergic disease. Symptoms of allergy are present in almost 20% of children 6-7-year old, 11% in 13-14-year old and almost 13% in adults 20-44 years. The aim of the study was to recognise if blood type affects the development of allergy as well as the timing of initial symptoms.

Material and methods: The study comprised 990 592 males and 398 females ages 0-15 years. Neonates and infants as well as preschool children comprised 30% of subjects. Calculated mean age in males and females were similar - 7.49±4.03 years and 7.76±3.88 years respectively. The study was conducted in the period 1999-2008 year in Poland. The examinations were done at the consulting rooms of physicians cooperating with the Polish Help Society for Children with Asthma and Allergic Disease in the whole Poland. Results: The most allergies were present in the group of subjects with blood type A (44%) and blood type O (27%). Percentage of children with disease among males and females with the main criterion of blood type was similar ( $\chi^2=0.85$ ;  $p=0.84$ ). Percentages of males with blood type AB and O and females with blood type O were different when compared to averages among Polish population. There were no relationship between the length and course of mother labour ( $\chi^2=0.48$ ;  $p=0.49$ ), medication taken through pregnancy ( $\chi^2=1.77$ ;  $p=0.18$ ) or during breast feeding period ( $\chi^2=0.03$ ;  $p=0.87$ ), and signs of allergies in children. There was significant statistical relationship between uneventful pregnancy course and food allergy in infant, maternal allergy (allergies to pollens and food allergies) and signs of allergy in affected children. There is another significant relationship between the kind of feeding (bottle vs. breast), infants had received and signs of food allergy ( $\chi^2=22.96$ ;  $p<0.0001$ ) and aero-allergy ( $\chi^2=13.82$ ;  $p=0.0002$ ) in children. Another statistically significant link exists between

sensitivity/intolerance to breast milk when breastfed and development of allergy symptoms in children ( $\chi^2=16.72$ ;  $p<0.01$ ). In infants with blood types AB and B there was no relationship between blood type and sensitivity to breast milk. However, this relationship was statistically significant in children with blood types A and O (A type  $\chi^2=11.09$ ,  $p<0,01$ ; type O  $\chi^2=13.87$ ,  $p<0.01$ ).

Conclusion: Timing and type of food allergy symptoms is connected with the way the infants were being fed during first months of life and the blood type of affected individuals.

#### PM-091

Poster

##### Prevalence of overweight and obesity and status of chronic non-communicable diseases and some related risk factors among Egyptian adolescents.

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Objectives: are to study the current prevalence of overweight and obesity among adolescents in Egypt from 2000 to 2008, to estimate the prevalence of glucose disorders, hypertension, Lipid profile, and metabolic syndrome, and to investigate some related risk factors among 10 to 18 years old school adolescents.

Materials and methods: For assessing prevalence rates of overweight and obesity among adolescents, data from reports of other cross-sectional studies carried out by NNI (2000-2005) and EDHS, 2008 were compared. To estimate the prevalence of glucose disorders, hypertension, lipid profile, and metabolic syndrome, a randomized stratified cluster-sample of preparatory and secondary school students was used. BMI was calculated and referred to corresponding international reference values for age and sex. A fasting blood sample was drawn to assess lipid profile and fasting plasma insulin.

Results: Overweight and obesity are prevalent among Egyptian adolescents of both sexes, and at least for girls the prevalence has increased in the last few years. Pre-diabetic state was present among 16.4% of adolescents. The crude prevalence of hypertension is 1.4%. The overall proportion of adolescents with high total cholesterol is 6.0%; the proportion with high LDL-cholesterol is 7.5%, with high triglycerides 8.2%, and with low HDL cholesterol 9.4%. The nationwide prevalence of metabolic syndrome among Egyptian adolescents is 7.4%. Regarding pattern of physical inactivity among adolescents by sex, about half of female and third of male adolescents did not practice any form of physical activity. With respect of tobacco use among adolescents, about two third of the adolescents were exposed to smoking by families and friends and about 7% were regular smokers. Also, among the results of this study, breakfast was skipped by almost 50% of adolescents. One third of students did not include basic food groups in their diet. Pickles and salt intake are high in nearly 25% of participants. More than 50% of adolescents reported frying as the usual way of cooking preferred by their families.

Conclusions: The problem of overweight and obesity appears to be emerging rapidly among this age group. Type 2 DM, hypertension and cardiovascular risk factors in youngs are serious in terms of morbidity and mortality suggesting that they are an appropriate target for screening. School-based programs promoting healthy eating, increasing physical activity and cessation of smoking are recommended for prevention of obesity and related diseases.

#### PM-092

Poster

##### Evaluation of nutrition education program for prevention of type II diabetes among Egyptian children & adolescents.

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Objectives: To raise the awareness of the students to the importance of protective rôle of healthy nutrition and lifestyle for prevention of T2DM and its' sequelae and to evaluate their nutrition knowledge, anthropometric and laboratory results pre and post to Nutrition Education Program (NEP).

Material & Methods: 324 students (118 males and 206 females) were selected and representative of twenty eight (preparatory and secondary) schools in urban (143 adolescents) and rural (181 adolescents) areas. They were subjected to nutrition education process that was deliver nutrition education through a series of lessons and activities to the students. The process was continued for three months and conducted in three stages: Pre-program evaluation, N E P implementation and Post-program evaluation. The studied adolescents were subjected to clinical, anthropometric and laboratory assessments in the pre and post program period. The program consists of two modules that covered topics related to basics of nutrition and diabetes mellitus.

Results: This study revealed an impressive gain in knowledge among participants following the NEP implementation. The program has not successfully changed obesity and overweight percentages, however. A dramatic improvement in fasting blood glucose (FBG) level was elicited after the NEP as 16 out of 21 (76.0%) of the diabetics and 61 out of 104 (58.7%) of the pre-diabetics had normal FBG in the post evaluation phase. Lipid profile didn't change significantly but 17.0% of participants had an increase in

their high density lipoproteins (HDL-C) level in the post evaluation phase to be re-categorized in the acceptable range.

Conclusion: The results of this study suggest that patients who are at risk for T2DM should be screened early and treated aggressively to prevent the onset of the T2DM whenever possible. The short-term changes observed in the present study are markedly encouraging and indicate great potential for progressive improvement.

#### PM-093

##### Cardiovascular risk profile of Brazilian vegetarians.

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<sup>3</sup> University Federal of ABC

<sup>4</sup> University Federal of São Paulo

Poster

A total of 96 healthy subjects (56 vegetarians and 40 omnivores) were recruited. Fasting blood samples were analyzed for glucose, insulin, cholesterol, triglyceride, high-density lipoprotein cholesterol (HDL-C) and low-density lipoprotein cholesterol (LDL-C). Health-conscious was determined by smoking habits, taken of dietary supplements and physical activity. In order to assess cardiovascular risk, Total/high-density lipoprotein (HDL) cholesterol and LDL/HDL cholesterol ratios were calculated. Insulin Resistance (IR) was assessed by HOMA-IR. We undertook that study to examine the total cardiovascular risk profile of Brazilian vegetarians.

Results: There was no significant difference in age, sex, smoking habits, triglyceride, cholesterol and LDL-C between the two groups, whereas the Total/high-density lipoprotein (HDL) cholesterol ( $3,23 \pm 0,84$  vs  $3,90 \pm 0,99$ ,  $p<0,001$ ) and LDL/HDL cholesterol ( $1,91 \pm 0,69$  vs  $2,42 \pm 0,79$ ,  $p<0,001$ ) ratios were significant lower in vegetarians than omnivores. The vegetarian group had significantly lower body weight ( $63,9 \pm 10,4$  vs  $69,4 \pm 14,6$ kg,  $p=0,032$ ); BMI ( $22,5 \pm 2,6$  vs  $25,0 \pm 3,9$  kg/m<sup>2</sup>,  $p=0,001$ ); waist circumference ( $81,8 \pm 8,2$  vs  $87,8 \pm 10,9$  cm,  $p=0,003$ ) and higher HDL-C ( $54,88 \pm 14,44$  vs  $47,30 \pm 12,27$  mg/dl,  $p=0,008$ ). The vegetarians also had lower risk for IR by HOMA ( $1,17 \pm 0,70$  vs  $1,48 \pm 0,8$ ,  $p=0,021$ ) compared to omnivores. In relation to health-conscious, vegetarians have a tendency to practice more physical activity ( $64,3\%$  vs  $42,5\%$ ,  $p=0,056$ ) and take more dietary supplements ( $48,1\%$  vs  $20,5\%$ ,  $p=0,012$ ), although the number of smokers were similar in both group.

Conclusions: Brazilian vegetarians have lower body weight, BMI and waist circumference and high level of HDL-C than omnivores. Total/high-density lipoprotein (HDL) cholesterol and LDL/HDL cholesterol ratios are risk indicators with greater predictive value than isolated parameters used independently, particularly LDL, so owing to different predictive value of each risk factor, the Brazilian vegetarians had a better cardiovascular risk profile than omnivores. Vegetarians also were associated with reduced risk for IR and may potentially provide metabolic and cardiovascular protective effects.

#### PM-094

Poster

##### Post-launch monitoring of novel foods/ingredients Methodology applied to additive Stevia.

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Objectives: In Europe novel foods and novel food ingredients (NF) need to be approved before entering the European market. Companies must provide a safety dossier including an estimation of the expected use and intake. In the Decision of the European Commission to the company, it is indicated in what products and to what levels the NFs are allowed. Subsequently, other companies may ask permission to introduce similar NFs. As a consequence, the actual use of a NF might become substantially larger than initially thought, meaning that safety of a NF might no longer be guaranteed. How may novel foods or ingredients be monitored after launching?

Materials and methods: We developed an approach to monitor in what foods and to what levels a NF has been introduced to the Dutch market (post-launch monitoring). We developed a flow-chart which consists of 7 steps: the first 4 steps have to do with the identification in what foods a NF is currently on the Dutch market; the last 3 steps deal with the quantification of the level of NF used. We applied the newly developed method to the additive Stevia Rebaudiana. This natural sweetener is added among others to tabletop sweeteners, flavoured drinks, and milk drinks. In the European Union Stevia is an approved additive (and not officially approved as novel food). The method has appeared to be feasible and per May 2013 the stevia-extract steviol glycosides was identified in 37 brands on the Dutch market.

Results: With two scenarios we estimated the intake of Stevia in the Dutch population: the worst-case scenario and the '25%-market share' scenario. The worst-case scenario assumes that all food products in those food categories to which the novel food ingredient is actually added, contain the novel food ingredient and to the maximal reported or measured level.

In this scenario, the Acceptable Daily Intake (ADI) for Stevia was exceeded in less than 5% of the children and in less than 9% of the adults. The 25%-market share scenario gives a more realistic estimation of daily intake. In this scenario, the ADI was exceeded in less than 3% of the children and adults. Main contributor to daily steviol glycosides intake for children is water-based flavoured drinks, on a large distance followed by milk drinks and tabletop sweeteners, and for adults tabletop sweeteners followed by water-based flavoured drinks.

Key findings: We conclude that the developed approach seems to be feasible to estimate actual intake of approved NFs (or approved additives). It is unclear whether exceeding the ADI to the observed levels can involve health effects. Regular monitoring is warranted, especially because it is expected that Stevia will be added to more foods and in higher concentration levels (up to the permitted levels).

#### PW-095

Poster

##### Body fat, inflammation and cardiometabolic risk in Cuban adolescents.

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Background. Overweight (OW) is highly prevalent in Cuba but there is a lack of data in adolescents.

Main Objective: To identify possible associated factors with increased body fat.

Material and methods. A case control study was carried out in 50 OW vs. 50 normal adolescents matched by age and sex and submitted to records of body composition by deuterium dilution, epidemiological recall, blood pressure, biochemical indicators, physical activity by PAQ-A questionnaires, 24 h dietary recall, and cardiometabolic risk. Groups were compared using non parametric tests and the associations with  $X^2$  independence analysis and non parametric correlations. The Cohen's effect size (d) was used to evaluate means differences.

Key findings. OW adolescents showed 20 kg more Wt, a 40% higher BMI, and 48% more fat than controls of similar age (13y), height (162 cm) and sexual maturity. Fat accretion was accompanied by higher serum lipids, insulin, HOMA IR, C Reactive Protein, IL-6, TNF- $\alpha$ , blood pressure, and cardiometabolic risk. They were mainly born, with similar mean birth weight (3400 g), from mothers with higher Wt and Ht at conception. Exclusive breastfeeding was general low (3,4 months), but OW subjects had more OW parents. Both groups evidenced sedentary behavior (2,4 of the PAQ-A), lack of breakfast, daily intake of 2 soft drinks, less than one portion of fruits and vegetables and more than 4 portions of fast foods/week. OW adolescents ingested more energy (26%), proteins (27%), and fat (36%) mainly as animal products, only 25% of the dietary fiber DRI, and 2,2 times more sugar (21% of energy) and sodium (3-4g) as recommended. Their total plasma antioxidant capacity (TAC) was also higher. Variables associated to their higher cardiometabolic risk (+1,8 vs. -1,8) were serum lipids, glycaemia, insulin, HOMA index, body fat, PCR, IL-6, PAC, blood pressure, and the dietary intake of energy, macro- and micronutrients. Hb and serum HDL-C were inversely associated to OW. The logistic regression showed OW not associated with birth weight, mother BMI at conception or physical activity, but with a higher energy intake ( $p=0,000$ ; OR:1,003; CI: 1,001-1,004), their fathers overweight ( $p=0,014$ ; OR:1,171; CI: 1,023-1,337) and a lower stage of sexual maturity ( $p=0,025$ ; OR:0,508; CI: 0,281-0,917). Very high or high size effect values showed body (abdominal) fat, serum insulin, HOMA, cardiometabolic risk, dietary energy and fat. Most of the life style indicators evidenced a moderated-small effect. Physical activity showed no effect.

Conclusion. The excessive body fat of adolescents was accompanied by high levels of inflammation, glucose intolerance, serum lipids, blood pressure and cardiometabolic risk. The life style characterized by sedentary behavior and obesogenic food habits seems to affect more the susceptible adolescents with a familiar predisposition to body fat accretion. Their increased TAC, generated by the increased nutrient intake was not able to avoid the enhanced cardiometabolic risk.

#### PW-096

Poster

##### Mate consumption: a popular tradition in Uruguay present in the new generations.

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Objective: To determine the pattern of mate consumption in teenagers students in the Department of San José, Uruguay.

Material and Methods: Descriptive, cross-sectional study of a non-random sample of 49 students between 14 and 19 years of age attending a Technical School in San José, Uruguay. The information was collected through an online self-administered survey. Consent of a responsible adult and the

student's assent were required. Registration and submission of the questionnaire was done via internet through a blog designed for the purpose. Results: Mate is a traditional beverage in Uruguay made by infusion in hot water of dried and grinded leaves of *Ilex paraguariensis* and drunk with a metal straw ("bombilla"). The receptacle used is usually a gourd made from the fruit of *Legenaria vulgaris*. Mate was consumed by more than half of the respondent students (67.3%), particularly by females. Among those drinking mate, 54.5 % started this habit at 9-13 years of age, and 15.2 % at 4-8 years of age. 25% acquired this habit at home. The main reason for consuming mate was flavor, followed by the feeling of well being. Nine out of ten consumed mate daily, 57.6 % drank between half to one liter of the infusion, and 10% used very hot water. 43.1 % preferred the bitter natural flavor, which is due to the tannins of the mate leaves, while 15.2 % used sweeteners. Most of the students (60.4 %), consumed plain mate leaves while the rest used a combination of mate leaves and other medicinal herbs. The afternoon was the preferred time of the day for consumption. More than half consumed mate in the company of friends and family, and 50 % ate cookies and/or pastries at the time of mate consumption.

Conclusion: The amount and patterns of mate consumption in this population age group in Uruguay indicate the need of further studies of the potential nutritional and health effects. Mate consumption has a social and emotional role which is transmitted throughout generations.

#### PW-097

Poster

##### Fruit and meat intake are associated with oxidative damage in DNA.

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Objectives: To verify the association among fruit, meat and heterocyclic amines from meat intake and oxidative damage in DNA.

Material and methods: Data were sample from 72 adults and elderly from the Health Survey of Sao Paulo, Brazil (ISA-Capital 2008). Fruit and meat intake was estimated by a 24-hour dietary recall (24HR) and a detailed food frequency questionnaire with preferences of cooking methods and level of doneness of meats. The heterocyclic amines intake was estimated linking the meats from 24HR to a database of heterocyclic amines. The oxidative damage was estimated by concentration of 8-Oxo-2'-deoxyguanosine (8OHdG) in plasma. The relationship among the variables was done by Pearson's correlation test. Multivariate linear regressions models were used to verify associations among the dependent variable (8OHdG concentration) and the following independent variables: meat intake; fruit intake; heterocyclic amines intake; ratio of fruit and meat intake; ratio of fruit and heterocyclic amines intake; adjusted by sex, age, energy intake, smoking and body mass index.

Results: The meat intake ( $r=-0.03$ ;  $p=0.780$ ) and heterocyclic amines ( $r=-0.11$ ;  $p=0.339$ ) were not correlated with 8OHdG. However, fruit intake ( $r=-0.31$ ;  $p=0.007$ ), ratio of fruit and heterocyclic amines intake ( $r=-0.37$ ;  $p=0.022$ ) and ratio of fruit and meat intake ( $r=-0.39$ ;  $p=0.001$ ) were correlated with oxidative damage in DNA. After models adjustment, fruit intake ( $\beta=-0.0005$ ;  $p=0.047$ ), ratio of fruit and heterocyclic amines intake ( $\beta=-1.8702$ ;  $p=0.015$ ) and ratio of fruit and meat intake ( $\beta=-0.1213$ ;  $p=0.011$ ) were associated with concentration of 8OHdG in plasma.

Conclusion: Fruit intake, ratio of fruit and meat intake, and ratio of fruit and heterocyclic amines intake were associated with 8OHdG, showing that high fruit intake and low meat and heterocyclic amines intake can be efficient in prevention of oxidative damage, and cancer.

Key-words: fruit; meat; heterocyclic amines; oxidative damage.

Funding: Researches relating to this abstract were funded by Municipal Health Secretariat of Sao Paulo, National Counsel of Technological and Scientific Development and Sao Paulo Research Foundation (no2012/10965-0).

#### PW-098

Poster

##### Food and nutrition research in the Family Health Strategy, Brazil.

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The Family Health Strategy was implemented in Brazil in 1994 as a political initiative to transform the public health care system. It focuses on prevention and health promotion. It includes the need to propose and implement actions on food and nutrition field.

Objective: to trace the profile of the research groups and publications focusing on nationwide food and nutrition-related interventions, diagnosis, or assessment in the context of the Family Health Strategy since 1994.

Material and Methods: Two methods were used: structured review and research group search. A Structured Review was conducted according to the systematic review principles of the Cochrane Collaboration and the

searched databases were Web of Science, Medline, Lilacs, SciELO and Embase. The following variables were collected: author, journal, and publication year; location; population, classified according to the municipality size by the Brazilian Institute of Geography and Statistics; Family Health Strategy coverage; the Municipal Human Development Indices; study design, methods, sample size, and target population; study objective/theme; education of the first author; and the degree of nutritional intervention or management. The research groups were searched in the Research Group Directory of the National Council for Scientific and Technological Development.

**Results:** Fifty-four original articles on some type of Family Health Strategy action related to food and nutrition were analyzed. They were published between 2002 and 2012 in 20 different journals. Focusing mostly on children from the Southeast region, these studies were coordinated by dietitians, nurses, and physicians. Thirty-one municipalities had Family Health Strategy coverage higher than 50%; and of these, 20 had Family Health Strategy coverage higher than 70%. Diabetes Mellitus, high blood pressure, and breastfeeding were the most common topics (n=23). The quantitative methodology was employed by 42 articles, most about diagnoses. The groups who explicitly cited primary care as a study field of food and nutrition numbered two in 2000, eight in 2002, eleven in 2004, 18 in 2006, 22 in 2008, 24 in 2010, and 26 when the database was consulted. Some groups focused at least one research line in food and nutrition within the Family Health Strategy: one in 2002, two in 2004, three in 2006, four in 2008, seven in 2010, and four in the database.

**Key findings:** The findings of this structured review indicate that few studies focused on food and nutrition in the Family Health Strategy, probably because of the existence of few research groups in the country.

#### PW-099

Poster

##### **Nutrition transition and the organization of Food and Nutrition care in the Brazilian Primary Health Care system.**

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Food and nutrition, as basic requirements for health promotion and protection, are guaranteed by the Brazilian Constitution. Thus, food and nutrition actions are the responsibility of the National Public Health System. **Objective:** This study presents and discusses the food and nutrition actions in primary care, taking as reference the current stage of the nutrition transition in the Brazilian population.

**Method:** The debate was structured in three sections: the first describes the food and nutrition situation of the Brazilian population; the second presents the Ministry of Health activities and the third, the remaining challenges of this agenda.

**Results:** The foods consumed by Brazilians, with higher average energy consumption (as cookies, processed snacks, pizza and soft drinks) are also related to diets with a high intake of saturated fats, sugar and salt, as well as insufficient dietary fiber. The Brazilian population is undergoing a nutritional transition process, characterized by the reduction of malnutrition and increased overweight and obesity in all the life cycle. Weight for age deficits in children under five years old decreased from 5.4 to 1.8 %, while the reduction of height for age deficit was from 19.6% to 6.7% between 1989 and 2006. On the other hand 50% Brazilians are overweight and 12.4% of adult men and 16.9% of adult women are obese. The second section presents the actions taken to organizing food and nutrition care that involves promotion of adequate and healthy food practices, food and nutrition surveillance, the comprehensive care of nutritional disorders, intersectoral actions addressed to the determinants and constraints of food and nutrition and qualification of nutrition attention in the territories. Finally, in the third section, one of the major challenges of this agenda is to guarantee the human rights to health and nutrition. One of the concerns is the low insertion of Nutrition professionals in the management of food and nutrition actions in the municipalities and their implementation at the local level. The fledgling monitoring and evaluation of food and nutrition actions, that should rely on tripartite: federal, state and municipal funding, can be seen as another limitation.

**Key findings:** The current policy developments and food and nutrition programs in Brazil, as well as strengthening of the specific actions of care in primary care, are promising. On the other hand it is necessary to recognize that there is a long way to reach the consolidation of food and nutrition actions in the National Public Health System.

#### PW-100

Poster

##### **Sesame oil therapeutically mitigates chronic kidney disease by activating Nrf2 and attenuating osteopontin.**

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**Objectives:** Chronic kidney disease causes a progressive and irreversible loss of renal function. We investigated the therapeutic effect of sesame oil, a natural nutrient-rich and potent antioxidant, on deoxycorticosterone acetate (DOCA) and 1% sodium chloride solution (DOCA/salt) induced chronic kidney disease in rats.

**Material and methods:** Chronic kidney disease was induced by subcutaneously injecting uni-nephrectomized rats with DOCA and 1% sodium chloride in drinking water. Four weeks later, the rats were gavaged with sesame oil (0.5 or 1 ml/kg/day) for 7 days. Renal injury, histopathological changes, hydroxyl radical, peroxyntirite, lipid peroxidation, Nrf2, osteopontin expression, and collagen were assessed 24 h after the last dose of sesame oil. **Results:** Blood urea nitrogen, creatinine, urine volume, and albuminuria were significantly higher in the DOCA/salt treated rats than in control rats. Sesame oil significantly decreased these four tested parameters in DOCA/salt treated rats. In addition, the creatinine clearance rate and nuclear Nrf2 expression were significantly decreased in the DOCA/salt treated rats compared to control rats. Therapeutic sesame oil significantly decreased hydroxyl radical, peroxyntirite level, lipid peroxidation, osteopontin, and renal collagen deposition, but increased creatinine clearance rate and nuclear Nrf2 expression in DOCA/salt treated rats.

**Key findings:** Sesame oil therapeutically mitigates DOCA/salt induced chronic kidney disease in rats by activating Nrf2 and attenuating osteopontin expression and inhibiting renal fibrosis in rats.

#### PW-101

Poster

##### **Nutritional assessment of gastronomic tourism service offered in Lanzarote.**

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In the last decades, tourism has become one of the most predominant sectors of the national economy, contributing to the increase in GDP. Although Lanzarote is not considered as a "culinary tourism" destiny, the island has a good, varied and qualified offer in restaurants. The objective of this study is to analyze the nutritional assessment of restaurants and establishments frequented by tourists by observing the type of food offered, for further analysis, and to propose changes if necessary. We understand that food, as a touristic attraction and as a tourism product, can produce and transform territories as well as promote regional development based on sustainable tourism.

This project's justification is based on the need of food-related tourism analysis. As a different elements part of host communities, it can be used by tourism from planning to management. We part from the hypothesis that the touristic menus offered, do not match healthy diet parameters. The methodology focuses on a previous literature review, observation, interviews and a signing technique in restaurants and other facilities frequented by tourists in areas of Puerto del Carmen, Playa Blanca, Costa Teguise, Arrecife and other resorts in Lanzarote island. We have based on analysis-synthesis, induction - deduction and statistical method. Type of study: Cross-sectional, horizontal and descriptive, trying to estimate different nutrients proportions and to identify correlations and, if possible, some kind of causality. A comparison will be made with a healthy balanced diet. Once the nutritional assessment is made, results will be compared with reference diets such as the Mediterranean, noting differences and similarities.

#### PW-102

Poster

##### **Difference in levels and predictors of food insecurity among urban and rural households of Kombolcha woreda of East Harerge zone, 2014.**

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**Introduction:** Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food for a healthy and active life. In Ethiopia over 12,000,000 people are chronically or sporadically food insecure. This study can help to inform policy makers the level and predictors of household food security status in urban and rural areas.

**Objective:** to assess levels and predictors of food insecurity among urban and rural households in Kombolcha district, Eastern Harerge zone, Eastern Ethiopia 2014.

**Methodology:** Cross sectional study was conducted from January 7 to 16; 2014. One urban and five rural wards known for their Khat and vegetable,

maize-sorghum and sorghum-coffee production (Livelihood zones) were included in the study. Using stratified sampling 144 urban and 570 rural, a total of 714 households were selected. Two tools, Household Food Insecurity access scale and Household dietary diversity score were used for data collection. Descriptive summary and Cross tabulations using Analysis of Variance, independent sample t-test, were performed. Finally hierarchical linear regression was run after assumptions were satisfied.

**Findings:** The Proportion of households that fall in food insecurity category was accounted for 74.6 percent (81.5 percent rural and 47.9 percent urban residents). Using household dietary diversity score, 61.7% rural households and 26.4% urban households had poor dietary diversity hence, food insecure. There was significant difference in mean household food insecurity access scale and household dietary diversity with respect to gender of household heads among urban households. There was also significant difference in mean household dietary diversity of urban and rural households with respect to vegetable garden ownership, but not for household food insecurity access scale. The most important predictor of food insecurity for rural residents measured by both tools was wealth index and livelihood zones. Using household dietary diversity and household food insecurity access scale the most important predictor of food insecurity among urban households were vegetable garden ownership and women occupation respectively. In general food insecurity magnitude was greater among rural households than urban and there was also difference in magnitude of food insecurity among livelihood zones. Even though this place is known for its cash cropping, the state of food insecurity is not different from major food crop producing areas of the country.

### PW-103

Poster

#### The Effect of Carob Flour on Blood Lipid Profile in Adults.

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The aim of the survey is to find the effect of consuming 10 g/day of carob flour on the blood lipid profiles of 20 adults (35-60 years old, 10 male and 10 female), with high triglycerides ( $\geq 360$  mg/dL), and/or total cholesterol ( $\geq 200$  mg/dL), and whose body mass index (BMI) levels were above 25 kg/m<sup>2</sup>. At the beginning of the study, dietary intake recalls were determined for two days (one day for weekend and during the week) and biochemical measures were assessed three times (at the beginning, first month and second month). Out of total, 80.0% of females and 70.0% of males were classified as overweight according to BMI classification and 40.0% of males and 80.0% of females were physically inactive ( $p > 0.05$ ). Total fat, monounsaturated fatty acids (MUFA) and total cholesterol intakes of males were higher than females during the weekends ( $p < 0.05$ ). Dietary fiber intakes were higher during the week, both in males and females ( $p > 0.05$ ). Daily carob flour consumption reduced total cholesterol level by  $7.89 \pm 13.03\%$  in the first month and  $13.72 \pm 13.36\%$  in the second month ( $p < 0.01$ ). Also statistically significant decrease was determined in total serum lipids by  $14.89 \pm 16.09\%$  ( $p < 0.01$ ). Significant decrease in serum triglycerides level was determined in males but not in females ( $p > 0.05$ ). Low density lipoprotein (LDL) cholesterol levels were decreased (Both gender: 1st month:  $8.90 \pm 23.25\%$  and 2nd month  $13.09 \pm 14.77\%$ ; males:  $13.27 \pm 17.34\%$ ; females:  $12.90 \pm 12.63\%$ ) ( $p < 0.05$ ). No significant differences were found in high density lipoprotein (HDL) cholesterol, LDL/HDL cholesterol ratio, Apo A-1 levels increased only in females ( $p < 0.05$ ). No significant changes were determined in Apo B-100 and total serum bilirubin levels ( $p > 0.05$ ).

### PW-104

Poster

#### Combined effect of cardiorespiratory fitness and sedentary behavior on overweight among adolescents.

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Universidade Federal do Rio de Janeiro

**Objective:** To investigate the combined effect of cardiorespiratory fitness and sedentary behavior on overweight in adolescents.

**Materials and Methods:** Data from 1015 adolescents aged between 13 and 19 years old, from two public and four private schools of the metropolitan area of Rio de Janeiro, Brazil, participants of the baseline of Longitudinal Study of Adolescent Nutritional Assessment (ELANA project) were analyzed. Cardiorespiratory fitness ('risk' and 'adequate') was assessed based on the 9 minutes running and walking test; sedentary behavior was defined as 2 or more hours of television viewing time; Overweight were classified by the sex-and-age specific body mass index cut-offs (weight/height<sup>2</sup>) based on World Health Organization criterion ( $> 1$  z-score). The categories of cardiorespiratory fitness and sedentary behavior were combined into a new variable with 4 categories: a) risk and sedentary, b)

adequate and sedentary, c) risk and no sedentary; d) adequate and no sedentary. Binary logistic regressions were carried out and associations were expressed in terms of odds ratio and its 95% confidence interval.

Results are stratified by sex, age and type of school. Results: The prevalence of overweight was 27.2% and 53.6% presented cardiorespiratory fitness risk and sedentary behavior. Compared to this category, considered the worst case scenario, the odds ratio for association between overweight and having same cardiorespiratory status but no sedentary behavior was 0.55 (CI95% 0.35-0.88) for girls, 0.64 (CI95% 0.45-0.92) for adolescents aged from 15 to 19 years old and 0.91 (CI95% 0.39-0.97) for students from private schools.

**Key findings:** The prevalence of overweight was high and most teens at cardiorespiratory risk and sedentary behavior suggests inactive life style. Regardless the cardiorespiratory fitness status, not having sedentary behavior protects adolescents from being overweight, i.e. sedentary behavior is an important issue on strategies to prevent overweight among teenagers.

### PW-105

Poster

#### The nutri-guardians project - joining nutrition education and entertainment at global level.

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Nutri Ventures is the first children's entertainment brand in the world developed exclusively to promote healthy eating. Nutri Ventures works by creating a positive environment so that children, from 4 to 10 years old, will associate good feelings with healthy food.

The objective of this project is to transform the Nutri Ventures adventures, a major cartoon success on TV, into a free of charge educational tool to promote healthy lifestyles, called the "Nutri-Guardians Project". It's an educational project targeted to all education and health professionals dealing daily with children from 4 to 10 years old, such as teachers, nutritionists, dietitians, nurses and medical doctors. All the materials are grouped into kingdoms of nutrition (similar to the divisions of the Portuguese Food Wheel) plus evil kingdoms (sugars, fats, fried foods and salt) so that it's easy to professionals to present these issues to children. Health professionals can have access to a specific area where they can find support materials such as diplomas, food diaries, nutrition messages, posters and videos which can be used in clinical settings.

Parents can have access to all the information about the Nutri Ventures project, as well as professional advices about nutrition, tips and recipes to try at home with the kids. They can also learn about the story of Nutri Ventures and change the way they talk about food with their children, with the "Nutri-Translator". With this tool they can check the meaning of the Nutri-Words that their children are using and apply them to daily conversations about food.

At the moment, the "Nutri-Guardians Project" is being implemented in Portugal with the support of the Ministries of Health and Education. Educational materials are offered through a free website and promoted by direct actions in schools. It is now available for more than 750.000 children in the country. Also in the USA, Nutri Ventures has signed an agreement with Partnership for a Healthier America (PHA), a nonprofit organization chaired by the First Lady Michelle Obama under which all 29 episodes of the series, along with educational materials, music videos and other digital features, will be made available for free to nearly 60,000 public elementary schools. "Nutri-Guardians" is to be implemented also in Brazil and Hungary, always through partnerships with Ministries and Education Associations.

This project is proving that entertainment can be associated with education without losing a sense of commitment to quality information and scientific based evidence.

### PW-106

Poster

#### Trends in the prevalence of major cardiovascular disease risk factors among Korean adults: Results from the Korea National Health and Nutrition Examination Survey, 1998–2012.

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**Background:** Mortality from coronary heart disease in Korea has increased continuously, but there are few comprehensive national data on trend in the prevalence of risk factors for cardiovascular disease in this population. We examined the trends in the prevalence of major risk factors for cardiovascular disease, including smoking, obesity, hypertension, diabetes, and hypercholesterolemia, from 1998 through 2012 in a representative Korean population.

Methods: Using data from the Korea National Health and Nutrition Examination Survey I (1998) to V (2010-2012), we selected the adults aged  $\geq$  30 yr who participated in both a health examination and health interview survey.

Results: From 1998 to 2012, significant decrease in the prevalence of hypertension was observed in both men (32.5 to 31.5%) and women (26.9 to 24.3%). Smoking rates decreased only in men (65.1 to 47.0%), whereas the prevalence of diabetes did not change over time. Conversely, the prevalence of hypercholesterolemia significantly increased from 7.2% to 12.6% for men and from 8.4% to 14.9% for women, whereas the rates of awareness and treatment for hypercholesterolemia were relatively lower than that of hypertension and diabetes. During the period, prevalence of obesity significantly increased from 26.8% to 38.1% only in men.

Conclusions: The increased prevalence of hypercholesterolemia and obesity may have contributed to the increasing trend in the mortality from coronary heart disease in Korea. Further population-based surveillance of blood cholesterol levels and obesity needs to be performed, and national strategies for improvement of these factors should be established in Korea.

#### PW-107

Poster

##### **Trends in energy intake among Korean adults: Results from the Korea National Health and Nutrition Examination Survey (KNHANES) from 1998 to 2012.**

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The objective of this study was to examine trends in energy intake among Korean adults from 1998 to 2012. This study included subjects who were 19 years and over and who completed the nutritional survey in the Korea National Health and Nutrition Examination (1998, 2001, 2005, 2007-2009 and 2010-2012). Nutritional information was obtained from 1-day 24-hour recall administered by a trained dietary interviewer. In men, mean daily intakes of total energy significantly increased from 2196 kcal for 1998 to 2457 kcal for 2010-2012 ( $p$  for trend  $<$  .0001). In contrast, mean daily intakes of total energy of women decreased from 1748 kcal for 1998 to 1721 kcal for 2010-2012 ( $p$  for trend = 0.0001). The percentage of energy from fat increased (from 17.3% for 1998 to 20.0% for 2010-2012 in men,  $p$ -for trend  $<$  .0001; from 16.0% for 1998 to 18.5% for 2010-2012 in women,  $p$  for trend  $<$  .0001), whereas the carbohydrate (from 66.9% for 1998 to 64.6% for 2010-2012 in men,  $p$ -for trend  $<$  .0001; from 69.2% for 1998 to 67.1% for 2010-2012 in women,  $p$  for trend  $<$  .0001) and protein (from 15.8% for 1998 to 15.4% for 2010-2012 in men,  $p$ -for trend  $<$  .0001; from 14.8% for 1998 to 14.4% for 2010-2012 in women,  $p$  for trend  $<$  .0001) contribution to total energy intake decreased in both men and women. The energy intake from animal foods which considerably contribute to fat intake increased during survey years. Also, the energy intake from unhealthy food with high energy density, such as sweetened or alcoholic beverages, increased more than two fold in both men and women, although trends in total energy intake differed by gender. This present results suggest that dietary interventions should be focused on decreasing animal foods and unhealthy food intake among Korean adults.

#### PW-108

Poster

##### **Latin American Survey of Nutrition and Health Study (ELANS): Study design.**

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Objectives: To present the design rationale of Latin American Survey of Nutrition and Health Study / Estudio Latinoamericano de Nutrición y Salud (ELANS), with particular emphasis to its quality control procedures and recruitment processes.

Material and methods: ELANS is a multicenter cross-sectional study of a representative sample of urban population from 8 Latin American countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Perú and Venezuela). A standard study protocol was designed to investigate anthropometric profile, nutritional intake, and physical activity of 8,000 subjects enrolled. The study was based on complex, multistage sample design, stratified by conglomerates, being all regions of each country represented, and random selection of main cities within each region according to probability proportional to size method. Sample will be stratified by

gender, age (15 to 65 years old), and socioeconomic level. Socioeconomic levels will be balanced and divided in three strata (high, medium and low) based on national indexes used in each country. All the study sites are university-based and will adhere to a common study protocol for training, implementation of fieldwork, data collection and management, and quality control procedures to be performed simultaneously. All participants will be required to provide a written informed consent. A pilot study at small scale will be performed in each country in order to test procedures and tools involved in ELANS. Anthropometric variables, including body weight, height, waist, hip and neck circumferences will be measured according to a standardized protocol. Nutritional intake evaluation will be performed using two 24-hour dietary recalls, with 'multiple pass' procedure and a food frequency questionnaire. Nutritional data will be entered in Nutrition Data System for Research (NDS-R, Minnesota University) after a harmonization process between local foods and NDSR database. Physical activity and energy expenditure will be assessed by IPAQ-long version questionnaire and 7-day accelerometry.

Results: This study will result in a unique dataset for Latin America, enabling cross country comparisons in nutritional status, focusing both energy intake and expenditure. Thus, it will provide reliable information for planning of health policies and programs aimed to control nutritional inadequacies and their consequences that may be culturally adapted for implementation in Latin American countries.

#### PW-109

Poster

##### **Physical Activity and Energy Expenditure in an Urban Latin American representative sample: The ELANS Study Methodology.**

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Objectives: To characterize the methodology of data collection for determination of subjective- and objectively-measured physical activity, sedentary time and energy expenditure in a urban representative sample of adolescents and adults from eight Latin American countries.

Material and methods: The study evaluates 8,000 subjects (15 to 65 years, both genders and from 3 socioeconomic strata) participating in the Latin American Survey of Nutrition and Health Study / Estudio Latinoamericano de Nutrición y Salud (ELANS), a cross-sectional study that will be performed in 8 Latin American countries (Argentina, Brazil, Chile, Colombia, Costa Rica, Ecuador, Peru and Venezuela). Objective and subjective measurements will be taken according to standardized procedures. Self-reported physical activity will be assessed by the International physical activity Questionnaire (IPAQ-long version) in four domains (at work, transportation, housework and leisure-time). The total time engaged in walking, moderate physical activity and vigorous physical activity will also be scored. Information not included as part of the summary score of physical activity, such as sitting activities will also be analyzed. To objectively monitor physical activity and sedentary behavior, forty percent of the participants will be asked to wear a GT3X accelerometer at the waist on an elasticized belt, on the right mid-axillary line for 7 days (including at least 1 weekend day). Data will be expressed as average intensity and amount of time engaged in moderate- to vigorous-intensity physical activity, as well as energy expenditure in METs.

Results: The study characterizes the data collection methodology in a representative sample of urban population from Latin American countries. It will provide a unique dataset, enabling cross-country comparisons in order to understand current and changing physical activity levels, sedentary behavior and its relationship with nutritional status.

#### PW-110

Poster

##### **Good practice in nutrition education programs, the Uruguayan case.**

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The increase of nutritional diseases in Latin America is a mayor preoccupation for governments, professionals and scientists that cannot find a solution for this problem. Nutrition education seems to be one of the resources that professionals have, to revert this situation.

The VI Workshop of the Iniciativa América Latina y Caribe sin Hambre (IALCH), from the Food and Agricultural Organization (FAO), established the need of creating a data bank of information, communica-

tion and nutrition education (ICEAN) programs to analyze them and to define good practices in nutrition education. In order to meet these goals, a study was developed in 18 countries; Uruguay was one of the countries included studied.

Objectives: 1. Identify the ICEAN programs developed in Uruguay.  
2. Identify the good practices in ICEAN programs and the success actions in each of them  
3. Identify human resources that work in those programs and the training that they have.

Material and methods: 1. A list of public and private institutions that have ICEAN programs was made and each one of them response an interview. To be included in the study, the ICEAN programs must fulfilled five requirements: they must be communication and/or education programs, they should have a nutrition and alimentation approach, they must be in the implementation phase or be implemented in the last 5 years, they should have at least 100 beneficiaries and they must include evaluation.

2. With the results of the interviews, the programs were cataloged as having good practices or not, using a 12 item list provided by the IALCH.  
3. The deans of the nutrition careers were interviewee and they respond about the teaching of nutrition education to future professionals.

Results: 18 ICEAN programs of Uruguay were interviewed and 12 met the inclusion criteria to the study. Just 2 of them qualify as good practices in nutrition education; one of these programs involved 45.000 children from 0 to 3 years and the other one, 138 scholar children.

In reference of the teaching of nutrition education in sanitary careers, only the nutrition careers included it.

In order to revert these results, an intervention program is going to be develop to increase the number of programs that qualify as good practices in ICEAN.

#### PW-111

Poster

##### **Photo voice - a powerful tool for mapping the obesity facilitators in the Arab Israeli women population.**

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Photo voice is a process by which people can identify, represent, and enhance their community through a specific photographic technique. In Israel, the highest obesity rates are found among Arab Israeli women. Arab women are at 3.5 time's higher risk for obesity than the Jewish women at the same age group. The study is a pilot.

Objectives: a. to recruit Arab women in their towns that will record and reflect their community's food environment through photos. b. To record thru the photo voice the major causes of obesity in their villages. c. To assess the impact of the tool on the awareness of the participating women to their obesogenic environment.

Material and methods: Arab nutrition students at their practicum chose to learn the photo voice technique and to run a pilot study practicing it in their 2 home towns. They recruited 8 women willing to participate in a pilot with cameras with which they photographed any scenario relating to obesogenic environment, inside their homes and in the town streets.

Results: the impact of the method on the students was overwhelming. Even though they were nutrition students who lived in their towns all their lives, the awareness to the obesogenic environment was striking. Mapping the obesogenic promoters from the photos included: sugary drinks, high fat dairy products, high fat meats, white flour bakery products, cakes, cookies, extensive use of samne (high milk fat product) in cooking, and high use of sugar liquid on top of bakery products.

Key findings: The photos voicing loud: the portion sizes are huge everywhere; at restaurants, at home, and even of traditional foods. Fraying and sugary drinks are everywhere; the tables on which the food is served are totally covered with foods and sugary drinks. The environment is loaded with variety of high fat bakery products. There is lack of even basic walking trails. The photos included the very low salaries, taken by the women themselves, voicing the correlation of inequality to obesity. The tool had a striking effect on the awareness of the Arab women to the impact of the environment on their food habits. The lecture will include the photos as the powerful essence of the study, and its public health nutrition potential.

#### PW-112

Poster

##### **SALTEN: a school-based intervention improves attitudes and behaviours towards healthy eating in low-SES Argentinean children.**

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Objectives: SALTEN (Healthy, Active and Free from NTC, for its initials in Spanish), is an ongoing two year school-based multi-component intervention aimed at improving healthy eating and physical activity habits in low SES Argentinean schoolchildren. Specific healthy eating objectives are to

improve children's attitudes towards fruits and vegetables and to adopt healthier eating habits.

Materials and Methods: Seven hundred and eleven 9-11 yrs children attending schools (4 intervention and 4 control), matched for socio-demographic characteristics in a middle-to low-income area of Bs As, Argentina take part in this programme. Within the healthy eating arm of the intervention, there is an educational component focused on healthy eating habits, with a bottom-up, hands-on and motivational approach. Children are encouraged to challenge norms or habits around eating (e.g., eating fruit during school break) and to take this message home through specific activities such as games, or research activities. Another component of the intervention is that of facilitating accessibility to healthy eating opportunities. Specifically, the programme ensures daily access to fresh seasonal fruits during break-time as well as tasting days of less well-known fruits. Children in the control group follow the usual academic curriculum. Children's attitudes and frequency consumption of fruits, vegetables, core and non-core foods are assessed with a researcher administrated dietary recall and a culturally adapted version of the Child Nutrition Questionnaire. Anthropometric measurements (weight and height) are assessed according to a standardized protocol. Outcome assessments are conducted at baseline and repeated at 6, 12 and 24 months later. Ethics approval was obtained from the Argentinean Medical Association.

Results: Preliminary results comparing baseline and 6 months follow-up outcomes show improvements in the intervention group for attitudes toward fruits and vegetables ( $p=0.006$ ), and statistically significant increases in weekly fruit consumption ( $p=0.009$ ). Furthermore, children in the intervention group report decreased frequency of consumption of non-core beverages and foods during school breaks (both  $p<0.001$ ). At 6 month follow-up, there are no statistically significant changes in BMI z-scores in any group.

Key Findings: Over a short 6 month-period, ensuring daily access to fruits and providing knowledge with a motivational approach is a successful strategy to change children's attitudes and behaviours towards a healthier diet.

#### PW-113

Poster

##### **SALTEN! Healthy, active and free from NTC: study protocol.**

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Objectives: To present the study protocol of SALTEN (Healthy, Active and Free from NTC, for its initials in Spanish), a school based intervention carried out in low SES areas of Bs As, Argentina.

Materials and Methods: SALTEN is a two-year multi-component intervention to improve physical activity and healthy eating habits in 9-11 years old children. The intervention is set in primary public schools (4 intervention; 4 control) matched for socio-demographic characteristics in a middle-to low-income area of Bs. As. It is framed within the ANGELO ecological model which emphasises the role of supporting environmental modifications (i.e., physical, economic, political or socio-cultural). Another core aspect of SALTEN, is on that of changing attitudes and motivation with an emphasis on fun and pleasure, the company of others and an absence of competitive aspects. The intervention consists of an educational component focused on healthy eating habits and physical activity, with a bottom-up, hands-on and motivational approach. Another component of the intervention is that of facilitating accessibility to healthy eating and physical activity opportunities. Specifically, the programme ensures daily access to fresh seasonal fruits and easy access to drinking water; it promotes active school breaks (e.g., teachers coordinate traditional and no-traditional activities such as hip-hop dancing); and introduce simple changes in school playgrounds (e.g., provide balls, ropes). Children in the control group follow the usual academic curriculum and also participate in a healthy eating and a physical activity workshop. Anthropometrical measurements of body weight, height, sitting height and waist circumference are held according to a standardized protocol. Children's diet, eating habits and attitudes towards healthy eating are assessed with a culturally sensitive version of the Child Nutrition Questionnaire. Children's sedentary behaviours, engagement in, attitudes and barriers towards physical activities are assessed with a shorter version of the Child and Adolescent Physical Activity and Nutrition Survey. Outcome assessments are conducted at baseline and repeated at 6, 12 and 24 months later.

Results: The programme is currently underway and reaches a total of 1700 children in the intervention schools, directly affecting 711 children within the study target age-group. The results of this study will provide unique information on the feasibility of these types of multi-component interventions in hard-to-reach communities and with the difficulties of implementing prevention programs in developing countries. Preliminary results will be presented at the conference.

#### PW-114

Poster

##### **Self perception of weight and body image in full time professors in a mexican university.**

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**Objective:** There are currently new factors that influence overweight and obesity beyond positive energetic balance and sedentarism, such as the erroneous perception of body weight and body image. The objective was to determine the relationship between self perception of body weight and image and BMI in professors at the Mexicali campus of UABC.

**Material and methods:** Observational, transversal and relationship study in 225 professors. A validated questionnaire was implemented, conformed in three sections, to evaluate sociodemographic and antropometric data and images of anatomical models (Mortero) were used to evaluate self perception of body image. Information was processed with SPSS-18.0 statistical package, obtaining descriptive and parametric statistics ( $p < 0.05$ ).

**Results:** The average BMI was 29.2 mg/m<sup>2</sup>. Overweight and obesity prevalence was 81.3% (90.3% in males and 74.3% in females). A tendency to underestimate weight was present. 42.5% of professors had an erroneous perception of their body image related to their BMI ( $p < 0.05$ ).

**Conclusions:** Professors that carry overweight and obesity have a deficient perception of their body image and body weight.

**Key findings:** Self perception, obesity, body image.

#### PW-115

Poster

##### **Prevalence of physical activity combined with sedentary behavior among adolescents.**

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**Objective:** Assess the prevalence of physical activity levels combined with sedentary behavior among adolescents according to sex, age and type of school.

**Materials and Methods:** Data from 917 adolescents aged between 13 and 19 years old, from two public and four private schools of the metropolitan area of Rio de Janeiro, Brazil, participants of the baseline of Longitudinal Study of Adolescent Nutritional Assessment (ELANA project) were analyzed. The level of physical activity was assessed by self-filled short form of The International Physical Activity Questionnaire. The adolescents were classified as 'active' or 'inactive' based on World Health Organization recommendation on physical activity for children and adolescents (>60 or ≤60 minutes of moderate to vigorous physical activity daily, respectively); sedentary behavior was defined as 2 or more hours of television viewing time. The categories of physical activity and sedentary behavior were combined into a new variable with 4 categories: a) inactive and sedentary, b) inactive and no sedentary, c) active and sedentary, d) active and no sedentary. The chi square test was applied for comparison between sex, age (13 to 14 and 15 to 19 years old) and type of school (public or private) with  $p < 0.05$  for statistical significance.

**Results:** The overall prevalence of physically active teenagers was 77.4% and sedentary behavior was 56.3%. The prevalence of active adolescents who watched television less than 2 hours per day (the healthiest case scenario) was 32.9%. On the other hand, 12.9% of the teenagers were inactive and sedentary (the unhealthiest case scenario). Considering this category, the prevalence was higher among girls compared to boys (16.4% vs 9.0%,  $p = 0.001$ ) and also higher among students from private schools compared to those from public ones (15.8% vs 10.1%,  $p = 0.01$ ). The prevalence of physically active adolescents who watch television more than 2 hours per day was 44.5% and higher among boys compared to girls (50.8% vs 38.8%,  $p < 0.001$ ). No statistical significance was found on analysis stratified by age.

**Key findings:** High prevalence of physically active adolescents who watch television more than 2 hours per day suggests coexistence of both physical activity and sedentary behavior. Girls and students from private schools seem to be less active and sedentary than their pairs, so at higher risk of morbidities associated with physical inactivity, which demands special attention on strategies to promote physical activity and reduce sedentary behavior.

#### PW-116

Poster

##### **Nutrition transition and the organization of Food and Nutrition care in the Brazilian Primary Health Care system.**

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Food and nutrition, as basic requirements for health promotion and protection, are guaranteed by the Brazilian Constitution. Thus, food and nutrition actions are the responsibility of the National Public Health System.

**Objective:** This study presents and discusses the food and nutrition actions in primary care, taking as reference the current stage of the nutrition transition in the Brazilian population.

**Method:** The debate was structured in three sections: the first describes the food and nutrition situation of the Brazilian population; the second

presents the Ministry of Health activities and the third, the remaining challenges of this agenda.

**Results:** The foods consumed by Brazilians, with higher average energy consumption (as cookies, processed snacks, pizza and soft drinks) are also related to diets with a high intake of saturated fats, sugar and salt, as well as insufficient dietary fiber. The Brazilian population is undergoing a nutritional transition process, characterized by the reduction of malnutrition and increased overweight and obesity in all the life cycle. Weight for age deficits in children under five years old decreased from 5.4 to 1.8%, while the reduction of height for age deficit was from 19.6% to 6.7% between 1989 and 2006. On the other hand 50% Brazilians are overweight and 12.4% of adult men and 16.9% of adult women are obese. The second section presents the actions taken to organizing food and nutrition care that involves promotion of adequate and healthy food practices, food and nutrition surveillance, the comprehensive care of nutritional disorders, intersectoral actions addressed to the determinants and constraints of food and nutrition and qualification of nutrition attention in the territories. Finally, in the third section, one of the major challenges of this agenda is to guarantee the human rights to health and nutrition. One of the concerns is the low insertion of Nutrition professionals in the management of food and nutrition actions in the municipalities and their implementation at the local level. The fledgling monitoring and evaluation of food and nutrition actions, that should rely on tripartite: federal, state and municipal funding, can be seen as another limitation.

**Key findings:** The current policy developments and food and nutrition programs in Brazil, as well as strengthening of the specific actions of care in primary care, are promising. On the other hand it is necessary to recognize that there is a long way to reach the consolidation of food and nutrition actions in the National Public Health System.

#### PW-117

Poster

##### **Body image perception and eating habits with Body Mass Index in university students.**

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**Introduction:** obesity increases the risk of chronic non transmissible diseases, affects quality of life and decreases life expectancy by 5 to 10 years. The relative risk of high blood pressure and diabetes is 3 times higher in obese adults. On the other hand new factors exist that influence in overweight and obesity beyond positive energetic balance and sedentarism, such as the erroneous perception of body image and food intake.

**Objective:** determine the relationship between self perception of body image and eating habits with BMI in nursing school students at UABC, Mexicali campus.

**Material and methods:** observational, transversal and relationship study in 334 students. A validated questionnaire was applied, conformed of three sections to evaluate socio-demographic and anthropometric data and anatomical model images (Montero) to evaluate self perception of body image and nine items of Lickert's scale to evaluate self perception of eating habits. Information was processed with the statistical SPSS-18.0 package obtaining descriptive and parametric statistics ( $p < 0.05$ ).

**Results:** the average BMI in males and females was 25.5 kg/m<sup>2</sup>. Overweight prevalence plus obesity was 48.5% (59% in males and 41.9% in females). 42.5% of students had an erroneous perception of their body image in relation to their BMI ( $p < 0.05$ ). Regarding eating habits 57.2% of males and 74.3% of females with overweight and obesity do not have healthy eating habits ( $p < 0.05$ ), but nonetheless 48.5% of students with overweight plus obesity (61% males and 43.1% females) answered they had healthy eating habits.

**Conclusions:** students who are overweight and obese have a deficient self perception of their body image and eating habits.

#### PW-118

Poster

##### **Life after retirement - a qualitative analysis of nutrition related attitudes.**

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**Objectives:** Life transitions like retirement are associated with changes in social relations, health lifestyle patterns and related behaviors, such as diet behavior, which may influence people's ageing process and quality of life. The aim of this study was to investigate how eating habits change after retirement, and which motives/norms, attitudes, and experiences are related to such changes.

**Materials and methods:** Guided qualitative interviews were conducted between March and May 2010 with 15 men and 17 women aged 62 to 70 years, retired for 1-5 years and living in private households in canton Bern/Switzerland. Topics addressed were health and health awareness, nutrition knowledge, information seeking behavior, cooking and eating habits, food purchase, mobility, and social network during transition from employment to retirement. The interviews were transcribed and a computer-aided systematic contents analysis conducted.

**Results:** Retired people are generally interested in diet and health; they consider themselves as having a basic knowledge of food, nutrition and health. There was agreement among participants that maintaining good health should be given high priority after retirement. However at the time of interview, changes in eating habits were thought to be unnecessary. Most described their diets as well-balanced or pragmatic. Especially women indicated that they must be more careful about what they eat since retiring. More men than women described weight problems and generally showed interest in nutrition training courses. A certain helplessness and desire for clear directives was expressed, particularly with regard to information seeking behavior. The participants described it as challenging to be constantly confronted with changing and inconsistent nutrition/health information. Sharing domestic work still follows traditional gender roles. Preparing meals for example is mostly done by women. Additionally, male participants find that it is not worth cooking for them alone.

**Key findings:** Most of the participants in the present study experienced the transition into retirement without major health problems. The importance of health was consistently stressed during the interviews. Since prevalence of chronic diseases rises with increasing age which is often associated with functional impairments combined with a loss of autonomy and a reduction in quality of life, health lifestyle patterns should be further raised within this population group. Especially men should be given special consideration. Therefore, more men-specific health promotion activities should be established/ implemented to maintain quality of life of retired single men.

#### PW-119

Poster

##### **Prevalence and correlates of obesity in Chile: findings from the National Health Survey 2009-10.**

*Celis-Morales C<sup>1</sup>; Salas C<sup>2</sup>; Martinez MA<sup>3</sup>; Diaz X<sup>4</sup>; Leiva AM<sup>5</sup>; Willis ND<sup>1</sup>.*

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**Objectives:** The numbers of overweight people continues to rise globally and more than one billion adults have a body mass index (BMI) greater than 25kg.m<sup>-2</sup>. However, the factors contributing to the increase in obesity prevalence may differ by country. Therefore, the aim of this study is to estimate the prevalence of obesity and identify correlates that could contribute to the obesity level in Chile.

**Materials and methods:** A representative sample of 5,434 Chilean adults aged ≥15 years (59% women) who participated in the National Health Survey (2009-2010) were included. Socio-demographic data (age, sex, environment, education, income and smoking status), anthropometric (weight, height, waist circumference and BMI), diet and physical activity data were collected. Prevalence of obesity was estimated using the WHO guidelines for BMI (Normal <25.0, overweight ≥25 to 29.9 and obese ≥30.0). Linear and logistic regressions were used to determine the association between lifestyle and socio-demographic factors and obesity-related traits.

**Results:** Overall 64.5% (95%CI: 62.0, 66.8) of the cohort were overweight or obese. Univariate regression analysis shows that BMI was significantly associated with age (B: 0.06, SE: 0.004, p<0.0001), number of days cycling per week (B: -0.16, SE: 0.02, p<0.0001), vigorous exercise (B: -0.41, SE: 0.06, p<0.0001), intake of dairy products (B: 0.25, SE: 0.05, p<0.0001), whole grain consumption (B: 0.29, SE: 0.05, p<0.0001), salt intake (B: 0.59, SE: 0.04, p<0.0001), fruit and vegetable intake (B: 0.11, SE: 0.05, p=0.025), sleeping time (B: -0.17, SE: 0.05, p<0.0001) and smoking (B: 0.17, SE: 0.06, p=0.005). In addition, logistic regression analysis reveals that individuals living in urban compared to rural environments (OR: 0.78; 95%CI: 0.65, 0.94) and people with a middle or high level of education compared to a low level of education (OR: 0.66; 95%CI: 0.56, 0.77) were less likely to be overweight or obese. Conversely, people spending more than 4 hours per day sitting (OR: 1.14; 95%CI: 1.01, 1.29) and smokers (OR: 1.57; 95%CI: 1.33, 1.85) were more likely to be overweight or obese.

**Key findings:** The Chilean National Health Survey reveals that overweight and obesity is highly prevalent in the Chilean population. In addition, our analysis shows that modifiable socio-demographic, dietary and physical activity-related lifestyle factors are associated with the level of obesity in Chile. These findings provide evidence of factors that should be tackled through the implementation of public health interventions to reduce obesity levels in the Chilean population.

#### PW-120

Poster

##### **The modern mediterranean diet pyramid for italian population.**

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**Objectives:** To develop a new pyramid based on the Italian Mediterranean diet that takes into account the evolution of consumptions and cultural heritage based on age-old knowledge, tastes, processing, food and crops linked to the territory. This need arises from a shift of lifestyle moving away from MD to an energy-dense food diet rich in protein, saturated fats and simple sugars.

**Material and methods:** In the III Conference CIISCAM (International University Centre for Studies on Mediterranean Food Cultures) held in Parma (2009), a consensus position has been defined for the development of the Mediterranean Diet Pyramid. Starting from the theory of an original Mediterranean Diet "Platonic", investigators have proposed a representation common to all Mediterranean basin, but adapted to any specific reality of the different countries (Italy, Spain, Greece and others). The statements defined are: distribution of food on several levels taking into account the contribution nutrient, frequencies and portions of consumption at every meal, every day and every week, the characteristics of MD such as tradition, seasonality, sustainability, frugality, conviviality. Each country, according to typical of own tradition, geographic location, socio-cultural aspects and changes in food consumption, proposes its own pyramid.

**Results:** In the first level of the pyramid importance is given to the meal with foods such as cereals (pasta, bread, rice), fruits and vegetables, sources of nutrients, fiber and antioxidants. In the second level there is food to be consumed daily: milk, yogurt and breakfast cereals. Importance should also be given to the use of EVO, main food of the Mediterranean tradition and source of monounsaturated fatty acids. The use of herbs and spices can be used to reduce the consumption of salt and to preserve palatability and flavor. In the last level there are foods to be eaten in moderation weekly such as meat, fish, eggs, cured meat and cheeses. Legumes, when consumed with cereals represent a single dish typical of the tradition and with great nutritional value for the complementarity of nutrients. Even dried fruit can be eaten weekly. While the wine, taken preferably at meals, can be consumed daily in moderation.

**Key findings:** In the Italian model, outside of the pyramid are the concepts that characterize the MD: tradition, conviviality, frugality, sustainability, seasonality, territoriality and physical activity. Furthermore, the graphical representation can be easily acknowledged and this may allow a greater adherence to the Mediterranean diet.

#### PW-121

Poster

##### **Socio-demographic patterning of physical activity levels and sedentary behaviour in Chile: results from the National Health Survey**

*Celis-Morales C<sup>1</sup>; Salas C<sup>2</sup>; Martinez MA<sup>3</sup>; Diaz X<sup>4</sup>; Leiva AM<sup>5</sup>; Willis ND<sup>1</sup>.*

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**Objectives:** Given the rapid socio-demographic and nutritional transition and the high prevalence of non-communicable diseases (NCDs) in Chile, risk factor surveillance, including physical activity and sedentary behaviours, is especially important. The aim of the present study was to examine the prevalence of, and trends in, physical activity and sedentary behaviour with respect to socio-demographic factors in Chile.

**Materials and methods:** A representative sample of 5,434 Chilean adults aged ≥15 years (59% women) who participated in the National Health Survey (2009-2010) were included. Socio-demographic data (age, sex, environment, education, income and smoking status) were collected. Physical activity levels were assessed using the Global Physical Activity Questionnaire (GPAQ v.2). Total activity, sitting time and sub-domains of physical activity, including time spent at work, transport and leisure were estimated.

**Results:** A quarter of the study population (24.1%; [95% CI: 21.5 to 26.7]) did not meet the international physical activity recommendations (spending ≤600 MET.min.week<sup>-1</sup>). The odds of being physical inactive were higher in participants aged ≥65 years compared to the youngest (≤25y) age group (OR: 2.89 [2.27 to 3.68]) and higher in women than men (OR: 1.49 [1.29 to 1.70]). Participants with lower education and income levels were less likely to meet the guidelines compared to those with higher education and income levels (OR: 0.62 [0.51 to 0.75] and OR: 0.72 [0.57 to 0.93] respectively). The overall age-adjusted prevalence of sedentary risk behaviour (spending >4hr per day sitting) was 38.4% [35.6 to 41.2] in the study population. Women were less likely to spend more than

4 hours sitting per day (OR: 0.84 [0.74 to 0.94]), but participants living in a rural environment (OR: 1.83 [1.52 to 2.21]), having a higher education (OR: 2.08 [1.75 to 2.47]) or income level (OR: 2.17 [1.73 to 2.72]) were more likely to spend more than 4 hours sitting per day.

Key findings: Our findings suggest sedentary behaviours are highly prevalent in the Chilean population. Physical inactivity and sitting time correlated strongly with socio-demographic factors, which can inform future public health interventions to increase PA in the Chilean population.

#### PW-122

Poster

#### **Socio-demographic patterning of physical activity levels and sedentary behaviour in Chile: results from the National Health Survey.**

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Objectives: Given the rapid socio-demographic and nutritional transition and the high prevalence of non-communicable diseases (NCDs) in Chile, risk factor surveillance, including physical activity and sedentary behaviours, is especially important. The aim of the present study was to examine the prevalence of, and trends in, physical activity and sedentary behaviour with respect to socio-demographic factors in Chile.

Materials and methods: A representative sample of 5,434 Chilean adults aged  $\geq 15$  years (59% women) who participated in the National Health Survey (2009-2010) were included. Socio-demographic data (age, sex, environment, education, income and smoking status) were collected. Physical activity levels were assessed using the Global Physical Activity Questionnaire (GPAQ v.2). Total activity, sitting time and sub-domains of physical activity, including time spent at work, transport and leisure were estimated.

Results: A quarter of the study population (24.1%; [95% CI: 21.5 to 26.7]) did not meet the international physical activity recommendations (spending  $\leq 600$  MET.min.week<sup>-1</sup>). The odds of being physical inactive were higher in participants aged  $\geq 65$  years compared to the youngest ( $\leq 25$ y) age group (OR: 2.89 [2.27 to 3.68]) and higher in women than men (OR: 1.49 [1.29 to 1.70]). Participants with lower education and income levels were less likely to meet the guidelines compared to those with higher education and income levels (OR: 0.62 [0.51 to 0.75] and OR: 0.72 [0.57 to 0.93] respectively). The overall age-adjusted prevalence of sedentary risk behaviour (spending  $>4$ hr per day sitting) was 38.4% [35.6 to 41.2] in the study population. Women were less likely to spend more than 4 hours sitting per day (OR: 0.84 [0.74 to 0.94]), but participants living in a rural environment (OR: 1.83 [1.52 to 2.21]), having a higher education (OR: 2.08 [1.75 to 2.47]) or income level (OR: 2.17 [1.73 to 2.72]) were more likely to spend more than 4 hours sitting per day.

Key findings: Our findings suggest sedentary behaviours are highly prevalent in the Chilean population. Physical inactivity and sitting time correlated strongly with socio-demographic factors, which can inform future public health interventions to increase PA in the Chilean population.

#### PW-123

Poster

#### **Food Consumption and Nutritional Labeling Among Immigrants to Israel from the Former Soviet Union.**

*Gesser-Edelsburg A, Endevelt R, Zemach M, Tirosch-Kamienchick Y*

Objectives: Nutritional labeling helps consumers make healthier choices regarding food product purchases. In this study, we examined the difference between immigrants from the former Soviet Union who immigrated to Israel beginning in 1990 (IIFSU) and the general population of Israel regarding food consumption broadly and the use of nutritional labeling specifically.

Material and methods: A representative sample of each population (n = 592) was composed and interviewed about food purchasing and use of food labeling.

Results: According to the findings, compared to the general population, the IIFSU attribute less importance to health factors in purchasing food products and information about the ingredients contained in food products; they tend not to follow nutritional labels; and report less on the need for nutritional integrative labeling. Following from this, in the second part of the study, we investigated which of the socio-economic variables is most dominant in shaping attitudes towards food consumption and nutritional labeling. Only immigration and age were found in correlation with attitudes related to healthy food consumption. In contrast, gender, education and religious observance did not affect food selection.

Key Findings: Immigration was recognized as the main factor with more clout than the other variables. In conclusion, it is crucial to clarify immi-

grants' perceptions of the concept of "health" and "proper nutrition" in formulating health promotion programs.

#### PW-124

Poster

#### **Association between bread consumption and overweight/obesity: the Sun project.**

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Objectives: White bread is the main staple consumed in Spain. To evaluate prospectively the relationship between bread consumption and the incidence of overweight/obesity in the SUN (Seguimiento Universidad de Navarra) project, a Mediterranean cohort of former university students who graduated from many Spanish Universities.

Material and methods: We followed-up 6,496 Spanish university graduates with initial body mass index  $< 25$  kg/m<sup>2</sup> (67 percent women, mean age: 36 years) during an average of 5 years. We assessed dietary exposures using a validated semi-quantitative 136-item food-frequency questionnaire (FFQ). Serving size was 60 g.

We assessed the association between baseline consumption of white bread (five categories) or whole-grain bread and the incidence of overweight/obesity using multivariate models to adjust for age, sex, physical activity, time spent in TV watching, total time of sedentary activities, smoking status, baseline BMI, fiber intake, total Energy intake, and olive oil consumption.

Results: Among 6,496 participants initially free of overweight-obesity we found 943 incident cases of overweight/obesity. A higher consumption of refined bread was associated with incident overweight-obesity (multivariable-adjusted odds ratio (OR) for  $\geq 2$  portions/day versus  $\leq 1$  portion/week: 1.40; CI 95%: 1.08-1.81) (linear trend, P = 0.008). No significant association was observed for the same comparison regarding whole-grain bread consumption (multivariable adjusted OR: 0.66, 95% CI: 0.35-1.23). Key findings: A higher consumption of white bread (but not of whole-grain bread) was associated with an increased risk of developing overweight /obesity in a highly-educated Mediterranean cohort with a low baseline body mass index.

Funding: The SUN Study has received funding from the Instituto de Salud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/02658, PI10/02293, PI13/00615, RD06/0045, G03/140 and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra. "

#### PW-125

Poster

#### **Proposal of a new index of adherence to the Mediterranean Diet.**

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Materials and methods. Has been created a questionnaire for the study that consists of 23 multiple choice questions. The questions, based on the new Italian Mediterranean Diet Pyramid, investigating not only the eating habits, but also other aspects of the mediterranean model such as the conviviality, sustainability, tradition, frugality and physical activity. The validation of the test is performed with logistic regression analysis with BMI as outcome. The sample was recruited among municipal employees. The different options of each answer were sorted in order of increasing adherence and was built identified an array of evaluation of the questionnaire answers with respect to the optimal answers. Has been identified 7 domains: consumption of cereals, animal foods, vegetables, pastries, alcohol as well as the eating habits and behaviors. It was a composite score calculated from the average deviations of 7 domains. Were compared the scores obtained by the sum of total deviation (all 23 questions) and that obtained by average the scores of the 7 domains: the two scores of the subjects produce rank highly correlated. Has been attributed a score from 0 to 12 to the answers, according to the different relevance assigned to the items in terms of adherence to the Mediterranean Diet. In this way it is meant to highlight the more likely the differences between the various items.

Results. Were collected 33 completed questionnaires for validation. Analysis of the single domains is that the adequate consumption of animal foods is negatively correlated with the adequate consumption of cereals, while the adequate consumption of animal foods is positively correlated with right behavior. In addition, the results indicate that increasing the score decreases the risk of not being normal weight. The value which seems most discriminating normal weight vs. overweight / obese seems to be the median. The risk of overweight / obesity has decreased for women and increased by 5% for each year of age. This analysis supports by the choices made in terms of predictive value of BMI of the respondents.

Key findings. The new index of adherence to the Mediterranean Diet will

allow to make preventive interventions and nutrition education more appropriate.

**PW-126**

Poster

**Nutrition transition in indigenous children: analysis from the Brazilian system of food and nutrition surveillance (SISVAN).**

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Universidade Federal da Grande Dourados - Brasil

Introduction: Currently living in Brazil, 817,000 Indians, about 0.4% of the population, distributed 688 indigenous lands and some urban areas, located in almost every state (except Piauí and Rio Grande do Norte), occupying about 15% of the territory national. An analysis of epidemiological and nutritional profile of indigenous peoples reveals that worrying scene, in which children appear to be particularly affected, but that adolescents and adults are not free from the nutritional problems. The phenomenon known as the Nutrition Transition, which was historically associated with high-income populations, has also been observed in low-income populations and traditional populations, as Indigenous, for example.

Objective: This study aimed to verify the nutrition transition in under 10 years ago indigenous children from the Brazilian System for Food and Nutrition Surveillance (SISVAN).

Methods: The present study is the verification of the prevalence of nutritional risks in indigenous populations from data provided on the basis of records of the National Food and Nutrition Surveillance (SISVAN) for a long time of five years 2008-2012. Database of BMI (Body Mass Index)/Age (BMI/A) of Indian children 0-10 years of both sexes were collected. Results: It was observed that both the prevalence of deficit as overweight was higher than expected for healthy populations, on the other hand, there is a tendency to increase in the prevalence of overweight and downward trend in the prevalence of deficit.

Conclusion: It was concluded that prevails the phenomenon of nutritional transition in the studied population.

**PW-127**

Poster

**Places, occasions and company influence Chinese consumers' choice between local and imported fruits.**

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<sup>1</sup> Integrated Food Studies, Aalborg University-Copenhagen. <sup>2</sup> Department of Development and Planning, Aalborg University-Copenhagen

Objective: To identify the places, occasions and the company that would influence the choice between locally produced vs. imported apples.

Methodology: Cross-sectional web-based survey through different Chinese Social Medias in Spring 2014, including socio-demographics, attitudes and knowledge towards fruit consumption and attributes of fruits. Participants were asked to indicate whether they would choose locally produced apples or imported ones on given occasions (week day, weekend, festivity, other special occasions), places (home, work, school, street) and company (family, friends, classmates, colleagues). All data were analysed with SPSS v 22, and a p-value < 0.05 was considered significant.

Subjects and setting: In total 398 Chinese people participated, but only 305 provided completed questionnaires (67% females; 67% aged 20-29y, 49% had higher education; and 39% were married).

Results: Chinese participants consume both local and imported fruit at home and more often with their family members and friends. The difference between places where they eat local or imported fruit, the company of the person they eat with and the occasion where they usually eat them are significant (P<0.001). Chinese consumers choose to eat more often local fruit than imported fruit at weekdays and weekend. However, for festival and other special occasions, they consume more imported fruit than local ones (P<0.001), and they will prefer imported fruit at school or eating out (P<0.001).

Key findings: Chinese consumers choose imported apples mainly for special occasions while locally produced ones in more ordinary situations. The different consumption behaviours between local and imported fruit reflect the different values and intended use that Chinese consumers have regarding local and imported fruit.

**PW-128**

Poster

**Foods consumed at lunch and their contribution to energy and nutrient intakes in U.S. children and adolescents: analysis from the National Health and Nutrition Examination Survey 2007-2010.**

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Objectives: Lunch meals provide an opportunity to offer a wide variety of food groups to children. However data on this eating occasion are scarce. This study aims therefore to examine lunch meals of U.S. children.

Material and methods: Data collected from a single 24-hour recall in chil-

dren 4-8y (n=1895), 9-13y (n=1717), and 14-18y (n=1535) in the 2007-2010 National Health and Nutrition Examination Survey were analysed.

Results: Lunch skipping was common, especially among older children. A total of 10.3%, 19.9%, 19.0% of the children 4-8y, 9-13y and 14-18y respectively did not report any lunch meal on the day of the recall. On average, lunch contributed to 25.5%, 23.9% and 27.1% of total energy intake in children 4-8y, 9-13y and 14-18y. The ten food groups most commonly consumed for lunch by children 4-8 years old were: breads, rolls, tortillas (36.3%), fruits (25.3%), condiments and sauces (19.1%), cured meats / poultry (18.1%), vegetables excluding potatoes (18.0%), cheese (17.2%), white potatoes (12.3%), poultry (12.3%), fats and oils (12.1%) and savoury snacks (11.8%). Although consumption of most food groups was comparable with older children, fruit and vegetable consumption tended to decrease with age. Fruit consumption decreased to 18% among 9-13 year olds and to 10.5% among 14-18 year olds. Intake of vegetables (excluding potatoes) dropped to 15.6% and 14.0% of consumers among children 9-13y and 14-18y respectively. However, the frequency of consumption of mixed dishes as sandwiches and pizza increased with age and most likely contributed to vegetable intake. With regard to beverages, children 4-8y consumed mostly sweetened beverages (21.2%), flavoured milk (19.0%), plain water (15.5%), plain milk (15.2%) and 100% fruit juice (12.8%) with lunch meals. Consumption of milk based beverages and 100% fruit juices decreased with age. Relative to energy contribution, lunch provided higher percentages of the day's total intake for protein and sodium and lower intakes for added sugar, iron and vitamins A and C among all age groups.

Key findings: Variety of food groups at lunch tended to decrease with age in U.S. children. Nutrition education programmes specifically targeted to adolescents are required, with emphasis on increased fruit, vegetable, milk and water consumption.

**PW-129**

Poster

**Yoghurt consumption in UK children and adults and associated food and nutrient intake.**

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Objectives: Yoghurt is a source of dietary minerals, B-vitamins and essential amino acids. The consumption of yogurt as well as other dairy products, in observational studies is associated with a reduced risk of weight gain, cardiovascular disease and diabetes. The objective of this analysis was to estimate intakes of yoghurt in the UK using nationally representative survey data and to explore the associated dietary pattern and diet quality.

Materials & methods: The analysis was conducted on data from years 1, 2 and 3 (2008/09-2010/11) of the National Diet and Nutrition Survey Rolling Programme (NDNS), in UK children (4 to 18 years old) and adults (19 to 64 years old). Participants completed a four-day estimated food diary. 'Yoghurts' included all fresh dairy and excluded dairy desserts, soya yoghurts and quark. Participants were classified as 'Yoghurt consumers' (YC) if they reported 'Yoghurt' intake at least once in the four-day food diary. 'Yoghurt' consumption (g/d) was split into tertiles in children (0 < T1 < 31 < T2 < 62 < T3) and adults (0 < T1 < 37.5 < T2 < 75 < T3). Consumption of macro- and micronutrients were categorised against UK dietary reference values.

Results: 45% of children and 37% of adults were YC (median intake of 40g/d and 50g/d respectively). The diet of YC contained a higher mean intake of fish, high-fibre cereal and fruit and a lower intake of meat, manufactured products (including ready meals) and sugar sweetened beverages than non-consumers. The proportion of non-consumers who exceeded the recommended 35% of daily energy intake from fat was greater than in YC, children (46% v 39%; p=0.02) and adults (41% v 34%; p=0.02). In both children and adults, a higher proportion of non-consumers than YC, had intakes of vitamin A, riboflavin, folate, calcium, magnesium, iron, zinc, iodine, potassium and selenium which fell below the lower reference nutrient intake (all p<0.01). Amongst YC, greater consumption of yoghurt was associated with a higher mean intake of riboflavin, folate, calcium zinc, iodine and potassium.

Key findings: A diet containing yoghurt is associated with greater intakes of micronutrients and fruit and lower intakes of fat and sugar sweetened beverages in this cross-sectional analysis, suggesting a higher diet quality. However, current intake of yoghurt in the UK is relatively low.

**PW-130**

Poster

**Costs of a Mediterranean diet in the PREDIMED Study.**

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**Objective:** There is a scarcity of studies evaluating the relationship between costs associated to a Mediterranean diet. Therefore, our objective was to evaluate the costs of adhering to a Mediterranean dietary pattern (MDP) in the PREDIMED Study.

**Material and Methods:** Cross-sectional and longitudinal analyses of 6,731 participants of the PREDIMED clinical trial. Diet was assessed through a previously validated 137-item food frequency questionnaire (FFQ). There were nine options for the average frequency of intake of food items in the previous year, based on typical portion sizes, ranging from never/almost never, to at least six times per day. Costs of foods were derived from the Ministry of Industry, Tourism and Commerce of Spain. Monthly reported average costs for each food item were averaged to obtain the annual costs of each food item, and the appropriate costs were used for the year that participants completed the FFQ. The total daily costs of foods for each participant were calculated by multiplying the cost of each food item per gram by the quantity of grams that the participant indicated he/she consumed in an average day. Linear regression models and ANCOVA analyses were used to analyze daily foods costs according to categories of adherence to the MDP (evaluated by 9-point Trichopoulos' score) to adjust for age, sex, educational level, marital status, and occupation.

**Results:** After one year of intervention the average daily costs (95% CI) in euros for each group of the PREDIMED study was: 6.33 (6.16-6.50) for those participants in the Mediterranean diet supplemented with nuts, 6.16 (5.99-6.33) for those in the Mediterranean diet supplemented with virgin olive oil, and 5.85 (5.67-6.03) for those in the control low-fat group. The baseline adjusted daily food costs (Euros/1000 kcal) according to categories of Mediterranean dietary pattern were: 2.25 (2.17-2.33) for very low adherence, 2.35 (2.30-2.40) for low adherence, 2.47 (2.42-2.53) for medium adherence, and 2.51 (2.42-2.60) for high adherence, (P for trend < 0.001). Those participants who increased their adherence to the MDP after 1 year of follow-up increased their daily foods costs 1.63% more (95% CI: 0.30% to 2.97%) than those who did not change their adherence. By contrast, the daily food costs for those who decreased their adherence were 0.60% less (95% CI: -1.94% to 0.73%) compared to those who did not change.

**Key Findings:** On average, a higher adherence to a Mediterranean diet was associated with slightly higher daily food costs.

**Funding:** The SUN Study has received funding from the Instituto de Salud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/02658, PI10/02293, PI13/00615, RD06/0045, G03/140 and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra.

### PW-131

Poster

#### Prospective study of sweetened carbonated beverage consumption and the risk of gestational diabetes mellitus: the sun cohort.

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**Objective:** Little is known about sugar-sweetened carbonated beverage (SSCB) and artificial-sweetened carbonated beverages (ASCB) consumption as risk factors for gestational diabetes mellitus (GDM). Therefore, our objective was to evaluate the association between regular SSCB and GDM.

**Material and Methods:** Prospective study among 2970 women free of type 2 diabetes who reported at least one pregnancy between 1999 and 2011 in the SUN dynamic cohort. Diagnosis of GDM was self-reported confirmed through an additional questionnaire and medical records by an endocrinologist blind to the exposition. Non-conditional regression models were used to adjust for potential confounders.

**Results:** We identified 159 incident cases of GDM during follow-up. After adjusting for age, body mass index, smoking, physical activity, alcohol intake, Mediterranean dietary pattern, fast-food consumption, number of pregnancies, and family history of diabetes, SSCB consumption was significantly positively associated with incident GDM. Those women in the highest category of consumption ( $\geq 1$  serving/day) showed the highest risk of developing GDM (adjusted OR: 2.21; 95% CI: 1.08-4.52; p for trend: 0.043) compared with women who never or almost never consumed regular SSCB. By contrast, no association was found between ASCB and GDM.

**Key Findings:** Our results suggest that pre-pregnancy higher consumption of regular SSCB was a risk factor for GDM.

**Funding:** The SUN Project has received funding from the Instituto de Salud Carlos III, Official Agency of the Spanish Government for biomedical research (Grants PI10/02658, PI10/02293, PI13/00615, RD06/0045, G03/140

and 87/2010), the Navarra Regional Government (45/2011) and the University of Navarra.

### PW-132

Poster

#### Physical fitness levels in elderly people according to the sarcopenic stage.

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**Objective:** To evaluate the influence of the sarcopenia stage proposed by the European Working Group on Sarcopenia in Older People (EWGSOP), on the deterioration of physical fitness (PF) in elderly people.

**Material and methods:** A total of 564 elderly people (166 men and 398 women) aged 71.9 $\pm$ 5.1 were evaluated for body composition and PF within the framework of the elderly EXERNET multi-centre study. Body composition was measured by bioelectrical impedance (Tanita BC 418-MA; Tokyo, Japan). Muscle strength and physical performance were evaluated by handgrip strength (kg) and the 8-foot-up-and-go test (s), respectively. PF was evaluated using 7 validated tests for the elderly (balance, lower and upper body strength, lower and upper body flexibility, walking speed and aerobic capacity). According to EWGSOP, three sarcopenic stages were established: 1) Presarcopenia (low muscle mass without impact on muscle strength or physical performance); 2) Sarcopenia (low muscle mass, plus low muscle strength or low physical performance); 3) Severe sarcopenia (low muscle mass, low muscle strength and low physical performance). Statistical significance was set at p < 0.05.

**Results:** Fifty nine percent of the total sample presented normal values of muscle mass, considering normal as the three highest quintiles of muscle mass ( $>8.61$  kg m<sup>-2</sup> in men and  $>6.19$  kg m<sup>-2</sup> in women), according to Spanish reference values. The lowest quintiles of muscle strength ( $\leq 31$  kg in men and  $\leq 17$  kg in women) and physical performance ( $\geq 5.9$  s in men and  $\geq 6.7$  s in women) were considered as low values. Twenty-eight, nine and four percent of the sample were included in the presarcopenia, sarcopenia and severe sarcopenia category, respectively. Deterioration of PF was associated with sarcopenic stage, with elderly people with severe sarcopenia obtaining lower levels of physical fitness compared with the sarcopenia and presarcopenia stages, in both sexes. Inside the presarcopenia stage, men obtained better results than women in all PF tests except for flexibility tests (all, p < 0.05). In the sarcopenia stage, differences between sexes were only significant for handgrip strength, lower body flexibility, agility, walking speed and aerobic capacity (all, p < 0.05). Inside the sarcopenia severe stage, significant differences were only found for handgrip strength and upper body flexibility (both, p < 0.05).

**Key findings:** Taking into consideration the classification proposed by the EWGSOP, the elderly with severe sarcopenia have a significantly lower level of PF, which may have a negative influence on quality of life and carrying out activities of daily living. Sex differences disappear with increasing levels of sarcopenia.

**Financial support:** Instituto de Migraciones y Servicios Sociales (IMSERSO). Project number: 104/2007.

### PW-133

Poster

#### The association of maternal perceived responsibility for children's feeding tasks on children's dietary and meal habits.

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**Objectives:** Mother possesses a pivotal role in the development of healthy dietary and meal habits from children as the feeding practices she uses affect child's emerging food preferences, intake patterns, developing food intake self-regulation and body weight. However, some of these practices, such as over-control, may emerge risks for children's eating behaviours. Perceived responsibility for children's feeding tasks is a significant factor that might elicit parental use of control in child feeding. Objective of the present study was to evaluate the association of mother's perceived responsibility for children's feeding tasks on children's dietary and meal habits.

**Material and Methods:** This cross-sectional study evaluated the dietary and meal habits of 132 mothers (age: 41.3 $\pm$ 5.0 y and BMI: 24.2 $\pm$ 5.3 kg/m<sup>2</sup>) and 132 children (56% boys, age: 9.3 $\pm$ 1.7 y). Data were collected through self-administered questionnaires (one for mothers, one for children) based on already existing validated tools. Mother's perceived responsibility for children's feeding tasks was assessed through the Child Feeding Questionnaire. For analytical purposes, mothers were divided in two groups: those achieving a score of at least 3.5 in the perceived responsibility component and those who did not. Normality was tested with Kolmogorov-Smirnov test. Independent samples t-tests were used to investigate the differences between children's meal and dietary habits

when the perceived responsibility of mother was high compared to when it was low.

Results: When the perceived responsibility of mother was high, children consumed higher quantities of full fat yogurt ( $p$ -value=0.029), red meat ( $p$ -value=0.001) and fish ( $p$ -value=0.021) compared to children whose mother had low perceived responsibility. Furthermore, children whose mothers had high perceived responsibility consumed fewer out-of-home meals during the weekend ( $p$ -value=0.015) and more family breakfast meals ( $p$ -value=0.006) compared to those with low mother's perceived responsibility. No differences were found among other dietary or meal habits of children in relation to the high or low perceived responsibility of mother.

Key findings: The children whose mothers had high perceived responsibility for their feeding tasks presented better meal habits but, mostly, worse dietary habits. These findings emerge questions regarding the way mothers' perception is related to children's adherence to a prudent diet. More research is needed to confirm these findings and to further investigate the effect of father's perception as well. The development of efficient strategies targeting on parents' behaviours and beliefs regarding children's optimal nutrition is crucial.

#### PW-134

Poster

##### Culinary practices in urban households in Montevideo.

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Objective: To determine the culinary preparations commonly consumed at lunch and dinner in urban homes in Montevideo, Uruguay in April-May 2014.

Material and Methods: Descriptive, cross-sectional study of a non-random sample of 817 urban households in Montevideo, Uruguay. The survey method was employed using a structured form. The information was collected by interviewing the person(s) responsible for preparing the meals at home.

Results: More than half of the households surveyed (54.7%) were composed by 2 or 3 members. 20.7% of households were in poverty and 6.8% in extreme poverty. The type of preparation consumed usually differed at lunch and dinner, except for breaded beef patties present at both meal times, reflecting a tradition deeply rooted in this population. At lunch, garnished breaded beef represented 22.6%, while pasta with tomato sauce 8.4% and pot meals (casseroles, stews) 8%. At dinner, preparations mostly consumed were cakes, pies and pizzas (12.7%); soups and broths (10.2%); and garnished breaded beef (8.6%). Milk, tea, or fruit were sometimes consumed at dinner like a collation. During the weekend, there was the highest consumption of simple and stuffed pasta with sausage or tomato sauce (24%), grilled meat (22%) and pizzas (17%). These preparations reflect the influence of Spanish and Italian immigrants in the country. Boiling and baking represented the main cooking methods used. The reasons for choosing a preparation were: taste (31%), convenience (23%) and cost (19%). In more than half of the households meals were not planned, and there was not interest in finding new recipes, issues that can lead to routine and little kitchen creativity. When selecting a food, one third of the respondents did it for price relative to performance; 25%, to satisfy the taste of the family; another 25% for health care, and nearly 20% to satisfy appetite.

Conclusion: The characteristics of the usual culinary preparations in Montevideo homes point to the need to strengthen and innovate strategies for information, communication and nutrition education to help families make informed decisions about the meals consumed.

#### PW-135

Poster

##### Food Insecurity among Brazilian households with children under five years of age.

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Objective: This article intends to study the process of food insecurity and hunger in Brazilian households with children under five years of age.

Methods: It is a nationally representative cross-sectional study performed with data from the National Survey on Demography and Health of Women and Children (PNDS-2006) in which the outcome variable was moderate and severe food insecurity combined (IAM+G), measured by the Brazilian Food Insecurity Scale (EBIA). Analyses were conducted considering the complex sampling design. Prevalence estimates and Prevalence Ratio were generated with confidence intervals of 95%.

Results: The results show high prevalence of IAM+G concentrated in the North and Northeast (30.7%), in economic classes D and E (34%), and among those beneficiaries of Conditional Cash Transfer Programs (36.5%). The multivariate analysis model found that social risks (beneficiary PTR), regional risks (North and Northeast) and economic risks (classes D and E) were 1.8, 2.0 and 2.4, respectively.

Key findings: By aggregating those three risks to households with IAM+G we found 697.586 households in which adults and children starved at least once during the three months period preceding the survey.

#### PW-136

Poster

##### The effect of parental gender on role modeling of eating habits.

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Objectives: The development of children's food preferences is the result of interaction between genetic, familial, and environmental factors. Regarding familial factors, parents influence their children's eating habits through various ways, one of which is modeling eating behavior. Several studies have investigated the effect of role modeling on children's food intake presenting mixed results. Additionally, it has been shown that a child's body weight seems to be influenced most by same gender parents depicting probably similar eating habits. Thus, aim of the present study was to explore the effect of same gender parental role modeling on child's food intake.

Materials and Methods: This was a cross-sectional study including 132 families having at least one child (mean age:  $9.6 \pm 1.5$  years). The study population was reached through schools. Self-completed food frequency questionnaires, developed from already existing validated tools were administered to the children during class (one questionnaire for every member of each family). Informed consents were obtained from parents both for participation of them and their children in the study. For analytical purposes 61 dyads of mother-daughter and 62 dyads of father-son were made. Normality of variables was tested using Kolmogorov-Smirnov test. Pearson correlations were used to examine associations between parent-child food intakes.

Results: From 42 food items and food groups tested, ten associations were found regarding food intake of fathers and sons and nineteen regarding food intake of mothers and daughters. In specific, in both cases, statistically significant positive associations were found for fish, vegetables eaten as side dish, fresh juices, full fat yogurt and whole wheat breakfast cereal consumptions. Regarding father-son dyads, positive correlations were also found for red meat ( $p=0.044$ ), legumes ( $p=0.031$ ), home-made pies ( $p=0.012$ ), regular soft drinks ( $p=0.019$ ) and refined bread/melba toast/rusk ( $p=0.009$ ) consumption. For the mother-daughter dyad, positive associations were also found for low fat milk ( $p=0.032$ ), chocolate milk ( $p \leq 0.001$ ), full fat cheese ( $p=0.019$ ), white rice ( $p=0.023$ ), refined pasta ( $p=0.001$ ), potato ( $p \leq 0.001$ ), seafood ( $p \leq 0.001$ ), fresh fruits ( $p=0.025$ ), margarine/ butter ( $p \leq 0.001$ ), light soft drinks ( $p \leq 0.001$ ), salty snacks (i.e. potato chips) ( $p=0.001$ ), honey/marmalade/sugar ( $p=0.013$ ) and pizza or hamburger ( $p=0.006$ ) consumption.

Key findings: More associations were found between food intake of mothers and daughters than for fathers and sons. Secondly, associations were found for both the same and different kinds of foods/ food groups for the two dyads. These findings could be attributed to several factors that need further investigation.

#### PW-137

Poster

##### The situation in selenium as a modulator of blood pressure in schoolchildren

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Objectives: Some studies have shown that individuals with hypertension produces more reactive oxygen species and have an impaired antioxidant defense system. Selenium is a micronutrient with antioxidant properties, so we hypothesized that it has a protective effect on hypertension. The aim of this study is to analyze the influence of status of selenium in blood pressure (BP) in a group of school children from Madrid.

Methods: 573 children (264 boys and 309 girls) of 8-13 years were studied. Dietary intake data was obtained using 3-day food records. Serum selenium concentration was estimated by inductively coupled plasma mass spectrometry. Anthropometric and BP data were also collected, which allowed the identification of normotensive, prehypertensive (PHTA) and hypertensive (HTA) children, considering systolic and / or diastolic BP  $\geq 90$ th percentile as PHTA and  $\geq 97$ th percentile as HTA. It was established that children had excess of weight when their BMI was greater than 85th percentile for the reference population.

Results: Among the children studied, 94.2% had normal BP ( $96.4 \pm 12.8$  mmHg for systolic and  $57.1 \pm 8.1$  mmHg for diastolic), 4.6% PHTA ( $111.2 \pm 14.5$  mmHg for systolic and  $69.6 \pm 4.7$  mmHg for diastolic) and 5.8% HTA ( $116.5 \pm 15.7$  mmHg for systolic and  $77.9 \pm 9.6$  mmHg for dias-

tolic). Only 0.52% children had intakes of selenium lower than recommended, but 36.5% had serum deficiency (<70 µg/L), although a positive correlation was found between serum selenium and selenium intake ( $r=0.338$ ,  $p<0.05$ ). For the total sample, no significant differences were found in selenium intake and serum selenium levels, comparing children with hypertension and normal BP. However considering children with excess of weight (29.7%) we found that HTA have showed serum selenium levels ( $52.1\pm 17.8$  µg/L) lower than those children without hypertension ( $65.5\pm 16.3$  µg/L) ( $p<0.01$ ), with no significant differences at intake ( $96.1\pm 15.8$  mg/day HTA and  $95.5\pm 20.4$  g/day in normotensive). Logistic regression analysis, taking into account the influence of age and sex, showed that the risk of hypertension in children decreased as selenium levels increased in serum, but only in those children with excess of weight; (OR = 0.9550 [0.9188- 0.9926]).

Conclusions: We observed that the increase in serum concentrations of selenium could protect from hypertension in children with excess of weight, so improve situation in this mineral may help improve cardiovascular protection of these children long-term.

Acknowledgements: Study supported by a Health Research Project from the Carlos III Health Institute (ISCIII-FISS) (Project: PI060318).

### PW-138

Poster

#### Body Weight gain from the menopause and thyroid status.

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Introduction: Menopause and the increase in serum concentrations of TSH, as well as within the reference range, may be associated with the increase in body weight.

Aim: Study the body weight gain from the menopause in women concurrent to the Foundation for Research into metabolic diseases and Endocrine Applied Clinical Research (FIEEM-ICA) of Buenos Aires. Argentina. Associate weight gain with the thyroid state and other possible predictors in this stage.

Methodology: Observational cross-sectional design. Sample non-probabilistic postmenopausal women who first attended nutritional consultation of FIEEM-ICA. Dependent variable: body weight gain after menopause (< 5% and ≥5 %); independent variables: state thyroid (hypothyroid and euthyroid in treatment with Levothyroxine), age at menopause (> 47 years; ≤47 years), nutritional status at the beginning of the menopause (<25 kg/m<sup>2</sup>; ≥25 kg/m<sup>2</sup>), years in menopause (< 5 years; ≥5 years) and physical activity scheduled (sedentary and active). With SPSS 15.0 statistical establishing X<sup>2</sup>, Fisher's exact test and Pearson's correlation with  $p$ -value<0.05. Results: We studied 116 postmenopausal women with an average age of  $59.9\pm 6.9$  years, being the age of the menopause  $47.8\pm 4.8$  years. The 39.7 % reported physical activity scheduled at least three times per week. At the beginning of the menopause the 37.1 % were overweight or obese; there were no women with low weight. The 34.5 % of the women suffered weight gain ≥5% from menopause. On average, the body weight increase  $4.6\pm 7.6$  kg (range: 0 to 31 kg). The 31.9 % of the sample had hypothyroidism, no difference was observed for weight gain with the euthyroid women. The increase in body weight was significantly associated with only and in reverse order with the years spent in menopause ( $r$ : -0.30;  $p$ : 0.001).

Conclusions: Menopausal women who took less than 5 years at this stage had significantly higher body weight gain, without associating with the same with the thyroid state and the other variables studied.

### PW-139

Poster

#### Does depression affect on diet quality in adolescents?

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Objectives: The aim of this study was to assess the association between symptoms of depression and diet quality and in adolescents of both genders.

Material and methods: Study conducted on 229 adolescents (87 boys and 142 girls) aged 12-15 years. Symptoms of depression were assessed using the Youth's Inventory. Diet quality was assessed using Krece plus food questionnaire and we classified the subjects according to the cut-off defined by the authors. Then, we divided as low diet quality and medium-high diet qualities which were named "low diet quality" and "high diet quality". We also recorded body mass index (BMI), physical activity by Krece Plus Physical activity questionnaire, and socio-demographic level using Hollinghead index.

Results: Females with low diet quality show significantly higher score of depressive symptoms ( $17.85\pm 9.8$  (mean ± SD)) than females with high diet quality symptoms ( $12.40\pm 6.95$  (mean ± SD,  $p<0.001$ ), whereas we

not observe differences among males. Our results not show differences significant in BMI values or physical activity. Logistic regression model adjusted by socio-demographic, physical activity and anthropometric dates confirmed that high scores of depressive symptoms (OR: 1.081 IC 95% (1.03-1.13,  $p=0.001$ ) score and low socioeconomic level was associated with low diet quality (OR: 2.91 IC 95% (1.29 - 6.58),  $p=0.010$ ). In contrast, in males symptoms of depression were not associated with low diet quality, but low socio-economical level was associated with low diet quality (OR: 5.28 IC 95% (1.74- 15.96),  $p=0.010$ ).

Key findings: Depressive symptoms influence on low diet quality in female adolescents from a school-based sample, but no in males. As well as, low diet quality were influent by low socio-economical level. These results highlight the importance to include nutritional programs in prevent depression strategies especially in critical periods of development as adolescence. Future research should seek to confirm these findings.

Acknowledgements: Spanish Ministry of Health and Consumption (PI07/0839)

### PW-140

Poster

#### Alcohol consumption and risk of Non-Hodgkin Lymphoma: a meta-analysis of prospective studies.

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Objective: The aim of this meta-analysis is to quantitatively synthesize the published prospective studies examining the association between the consumption of alcohol and risk of Non-Hodgkin Lymphoma (NHL).

Material and Methods: Potentially eligible articles were sought in PubMed with a predefined search algorithm and no language restrictions were adopted (end of search date: January 31, 2014). Reference lists of eligible articles and relevant reviews were systematically searched for additional articles in a "snowball" procedure. Two authors working independently performed the selection of studies and data extraction. Random effects (DerSimonian-Laird) models were implemented for the calculation of the pooled relative risk (RR) estimates. Separate analyses were performed by gender, type of alcoholic beverage (beer; wine; liquor) and subtypes of NHL (Diffuse Large B-Cell Lymphoma, DLBCL; Follicular Cell Lymphoma, FCL; Small Lymphocytic Lymphoma/Chronic Lymphocytic Leukemia SLL/CLL; T-cell NHL). Analysis was performed with STATA 13.1 statistical software; this study was funded by Wereld Kanker Onderzoek Fondsen (WCRF NL) and administered by WCRF International as part of the WCRF International programme.

Results: 11 cohort studies were deemed eligible, corresponding to a total cohort size of 2,638,026 subjects among whom 11,316 incident NHL cases were noted. Ever or current alcohol consumption was associated with lower risk for NHL (pooled RR=0.89, 95%CI: 0.83-0.96). The protective association of ever/current consumption was particularly evident in males (pooled RR=0.85, 95%CI: 0.77-0.93); on the other hand, significance was not reached among females (pooled RR=0.93, 95%CI: 0.81-1.07).

Protective effects of ever/current alcohol consumption were noted in DLBCL (pooled RR=0.84, 95%CI: 0.78-0.90) and FCL (pooled RR=0.86, 95%CI: 0.79-0.94). On the other hand, no protective actions were detected with respect to SLL/CLL (pooled RR=1.10, 95%CI: 0.90-1.36) or T-cell lymphomas (pooled RR=0.91, 95%CI: 0.75-1.09).

Subgroup analyses by alcoholic beverage type were rather hampered by decreased statistical power, although RRs pointed to a protective direction. Specifically, the synthesis of studies yielded a pooled RR=0.89, 95%CI: 0.79-1.00 for beer ( $p=0.048$ ); pooled RR=0.97, 95%CI: 0.91-1.03 for wine; pooled RR=0.90, 95%CI: 0.78-1.04 for liquor.

Key findings: The synthesis of cohort studies points to the protective effects of alcohol consumption in NHL risk, especially among males. Future studies should focus on the mechanistic evidence underlying the beneficial effects, with emphasis on histotype-specific associations and differential effects along with gender.

### PW-141

Poster

#### Sodium intake in Spanish schoolchildren assessed by 24h urine levels.

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Introduction: High salt intake is associated with higher blood pressure at all ages, including children. Sodium intake in Spanish adults is high, but it is unknown the current situation in Spanish children. The measurement of

24 h urinary sodium excretion is considered the 'gold standard' method for obtaining data of Na intakes in population surveys.

**Objective:** To determine the salt intake in a sample of Spanish schoolchildren measuring urinary excretion of sodium in 24h urine samples.

**Methods:** We studied a group of 181 schoolchildren from different rural and urban areas of the Community of Madrid, Andalusia and Castilla-La Mancha. Valid 24h urine samples were obtained from 166 students (86 boys and 80 girls). Sodium content of 24 h urine samples were quantified using an indirect potentiometer with selective solid membranes.

**Results:** Mean urinary Na was  $135 \pm 50.6$  mEq/24h, equivalent to a Na intake of  $3105 \pm 1163$  mg/day. Males excreted larger amounts of sodium ( $3344 \pm 1289$  mg/day vs  $2848 \pm 954$  mg/day in girls,  $p < 0.05$ ). Assuming that the Na eliminated in the urine comes from the diet, this excretion would correspond with a dietary salt intake of  $7.76 \pm 2.91$  g/day ( $8.4 \pm 3.2$  g/d in boys and  $7.1 \pm 2.4$  g/d in girls). 82.5 % of the subject (86% of boys and 79% of girls) had intakes over the UL of sodium for children of this age (1.9 mg for 4-8 years, 2.2 mg for 9-13 years)

**Conclusions:** Sodium intake in Spanish children, estimated from urinary excretion of the electrolyte, greatly exceeds the maximum recommended, so taking steps to reduce sodium intake of this group.

This study was supported by the Santander-Universidad Complutense Research Grant Program (Ref: PR6/13-18866)

#### PW-142

Poster

##### **Support to the effectiveness of a dietary intervention for the treatment of obese patients through non-invasive endoscopic techniques by endosuturing and Intra-gastric Dual Balloon.**

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**Objectives:** In the nonsurgical treatment of obesity there is a high rate of failure. New endoscopic techniques have been developed, that could help not only during the treatment stage but also during the subsequent weight maintenance stage. These methods minimally invasive, such as endosuturing techniques (endoscopic sleeve gastropasty (APOLO) and Primary Obesity Surgery Endolumenal (POSE)) and Intra-gastric Dual Balloon, need to be evaluated because long time outcome data is not available. The objective of the study is to investigate the safety and weight loss outcomes by these methods in the Bariatric Endoscopy Unit of the San Chinarro University Hospital of Madrid during the past two years.

**Material and Methods:** 60 patients receiving a ReShape Duo Balloon, 14 patients undergoing the APOLO procedure and 160 undergoing the POSE technique, were followed for 6 months. Follow-up was carried out by a multidisciplinary team (endocrinologist, psychologist and sport assessor). The three procedures were under general anesthesia and in the APOLO and POSE procedure all the patients received overnight inpatient observation. Outcomes included adverse events, change in total body weight (TBWL) and percentage of TBWL (%TBWL).

**Results:** With the endosuturing methods, patients tolerated the procedure well with no serious short or long term adverse events. All but one patient was discharged within 24 hours of procedure. In relation with the dual intra-gastric Balloon, one partial (single) Balloon deflation was noted with no migration. The intolerance rate was very low (< 2%) and patient satisfaction level was high, with 84% of patients reporting being satisfied or very satisfied with the procedure. Baseline BMI for APOLO, POSE and Dual Balloon was:  $38.6 \pm 5.1$ ,  $38.0 \pm 4.7$  and  $38.9 \pm 5.3$  kg/m<sup>2</sup> and mean age was:  $45.7 \pm 8.6$ ,  $43.4 \pm 11.0$  and  $39.2 \pm 9.5$  years. Initial body weight was significantly reduced at 6 month of follow up. Weight loss for APOLO, POSE and Dual Balloon was:  $20.2 \pm 9.6$ ,  $14.8 \pm 8.1$  and  $14.4 \pm 7.4$  kg and %TBWL was:  $18.4 \pm 8.0$ ,  $13.7 \pm 6.5$  and  $13.5 \pm 6.4$ %.

**Key findings:** Bariatric endoscopy techniques, included within a multidisciplinary unit can be a support to the effectiveness of a dietary intervention for the treatment of obese patients and be considered an effective, safe and well tolerated treatment.

#### PW-143

Poster

##### **Total body water, water intake and cognitive function in children aged 8-9 years.**

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**Objetives:** Although several studies performed in children suggest that a

state of mild dehydration is associated with worse cognitive performance few studies have demonstrated the beneficial effects of drinking water during the school day. The aim of the present work is to analyze the relationship between water intake and total body water and cognitive function in a group of schoolchildren.

**Material and methods:** This study included 97 Spanish schoolchildren (8-9 years of age) whose diets were recorded using a 3 day food record (from Thursday to Sunday). Total water intake (food and beverage) was calculated using the nutritional analysis software DIAL. Total body water (TBW) was determined by multifrequency bioelectrical bioimpedance analysis. Cognitive function was assessed using the d2-test of Attention.

**Results:** Mean water intake was  $1496 \pm 411.6$  mL/day and 80.4% of the participants didn't meet water requirements. A positive correlation between TBW (kg) and the processing speed ( $\beta = 5.5 \pm 2.5$ ,  $p < 0.05$ ) and total effectiveness of the test ( $\beta = 5.4 \pm 2.5$ ;  $p < 0.05$ ). Furthermore, those children with TBW above 18 kg (P50) had a higher processing speed (boys: 139.0 points; girls: 139.6 points) than those with less TBW (boys: 108.6 points; girls: 110.8 points) ( $p < 0.05$ ). Although we didn't found an association between total water intake and the different d2-test scores we observed that those with a higher mid-morning water intake (P50= 339 mL/day) had a better effectiveness of the test (boys: 113.7 points; girls: 133.7 points) than those with lower water intake at the same time of the day (boys: 99.3 points; girls: 88.2 points) ( $p < 0.05$ ). Even, we found that per 100 milliliters of water drunk at mid-morning decrease 4.5 the number of omissions (unmarked "d's" characters) and increase 18.9 points the effectiveness of the test.

**Key findings:** Low total body water and an inadequate mid-morning water intake might affect adversely some cognitive abilities which can affect to school performance. It would be necessary to conduct more studies in order to facilitate the development of effective strategies for promoting appropriate drinking patterns at school.

**Acknowledgements:** This work was supported by a Santander-Complutense University of Madrid project (Ref. PR6/13-18866)

#### PW-144

Poster

##### **Maternal obesity in early pregnancy and risk of preeclampsia, gestational diabetes mellitus and gestational hypertension in the pregnant population of Gran Canaria.**

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**Objectives:** To assess the role of the health consequences of maternal overweight and obesity at the start of pregnancy and weight gain during pregnancy on preeclampsia, gestational diabetes and gestational hypertension

**Material and methods:** We studied the cohort of pregnant women (n=137.887) having delivered at the Maternal & Child University Hospital of Gran Canaria (HUMIGC) from 1993 to 2013. Outcomes were compared using multivariate analyses controlling for confounding variables. Ordinal logistic regression analyses calculating odds ratios (OR) and their 95% confidence intervals (95% CI) were fit to assess the association between gestational morbidity (preeclampsia, gestational diabetes and gestational hypertension) and maternal categories of BMI, Normoweight women were used as the reference group. Potential confounders included as covariates in the model were maternal age (years, continuous), smoking habit (yes/no), socio-economic level (low, middle and high) and parity (yes/no).

**Results:** Compared to normoweight, overweight and obese women have greater risks of preeclampsia (RR=2.43 (95% CI: 2.24-2.63) and (RR=6.28 (95% CI: 5.81-6.78), gestational diabetes (RR=1.91 (95% CI: 1.80-2.02) and (RR= 3.36 (95%CI: 3.16-3.57) and gestational hypertension (RR= 2.39 (95%CI: 1.87-3.05) and (RR= 6.69 (95%CI: 5.33-8.40).

**Key findings:** Obesity and overweight status at the beginning of pregnancy increase the risk of preeclampsia, gestational diabetes and gestational hypertension. It is important to promote the normalization of bodyweight in those women who intend to get pregnant and to provide appropriate advice to the obese women of the risks of obesity at the start of the pregnancy

#### PW-145

Poster

##### **Proposal Title: A tale of two reviews. Policy and program lessons from two systematic reviews of feeding programs for preschoolers and school-aged children in developing countries.**

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**Introduction.** The consequences of undernutrition in childhood are severe; more than 35% of deaths and another 35% of the disease burden in young children are due to undernutrition. Physical and intellectual development may be adversely affected. Furthermore, undernourished children are less likely to attend school and benefit from it when they do attend. Early intervention is important to reduce hunger and maximize potential. Feeding programs are designed to do that. Billions of dollars are invested in these programs; it is essential to learn whether, how, and why they work. We conducted two rigorous Cochrane systematic reviews on: (1) food supplementation for young children 2) school feeding. We performed structured process evaluations.

**Objectives.** To compare and contrast key outcomes and process factors for feeding programs for children and present policy and program implications.

**Method.** We followed rigorous procedures, developing a logic model, standardized searching and involving at least two authors in reviewing searches, inclusion/exclusion, conducting data extraction, analyses and bias assessment. Our team assessed RDI for energy, leakage, and, and barriers and facilitators to effectiveness.

**Results.** Thirty studies were in the preschool review, 26 from LMIC. Eighteen studies were originally in the school meals review with 8 more in the update; 17 from LMIC. Here, we focus on findings from LMIC. Both reviews showed small effects on weight (preschool: .12 to .25 kg/year, school: .25 to .75 kg / year) and height (preschool: .48 to .67 cm/year, school .25 to 1.47 cm/year). The preschool review showed significant, moderate effectiveness for psychomotor development in 4 out of 5 studies. Both reviews showed significant effects for mental development, but evidence was sparse. School meals had consistent benefits for attendance and math performance.

**Factors that impacted on effectiveness included:** nutritional need, broken supply chains, redistribution of the supplement within the family, amount of supplemental energy given, palatability, parental/school capacity to give food, and degree of supervision of the feeding.

**Policy/program implications.** There is stronger evidence for ensuring that: 1) community organizations/schools are well-organized and prepared to deliver food 2) food is palatable and accepted by children and the community 3) distribution and intake of the supplement are closely supervised, 4) a high portion of the RDA for energy is given 5) supplementation starts early and continues for several years and 6) the poorest/ most undernourished children are targeted. There is moderate evidence for giving foods with high energy density and providing families extra rations.

#### PW-146

Poster

##### **Mediterranean alcohol-drinking pattern, alcohol-abstention and cause-specific mortality: the SUN Project.**

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**Objectives:** Moderate alcohol intake has been related to lower total mortality compared with abstinence. Moreover, it is well known that alcohol use include other dimensions beyond the amount of alcohol consumed. However, the effect of the alcohol consumption pattern may differ with respect to different specific causes of mortality. Therefore, in different populations at different risks, the effect of the alcohol consumption pattern may differ. We aimed to evaluate the relationship between the overall alcohol-drinking pattern and abstinence with mortality and the interaction between the alcohol-drinking pattern and death from cardiovascular, cancer, and non-cardiovascular causes in a healthy Mediterranean cohort (SUN Project).

**Methods:** We followed 18,394 participants up to 12 years. A validated 136-item FFQ was used to assess baseline alcohol intake. We developed a score assessing simultaneously seven aspects of alcohol consumption to capture the conformity to a traditional Mediterranean alcohol-drinking pattern (MADP). It positively scored moderate alcohol intake, alcohol intake spread out over the week, low spirit consumption, wine preference, red wine consumption, wine consumed during meals and avoidance of binge drinking.

**Results:** During the follow-up, 206 deaths were identified. Compared with the category of higher conformity with the MADP, the low-adherence group exhibited a three-fold [HR (95% CI)=3.09 (1.74-5.55)] increased risk of mortality, and abstainers had an 82% increased mortality [HR (95% CI)=1.82 (1.14-2.90)]. Among drinkers, the risk of cardiovascular, cancer and non-cardiovascular non-cancer mortality apparently decreased within increasing categories of adherence to the MADP. However, abstainers were apparently at higher risk of cardiovascular mortality and non-cardiovascular non-cancer mortality, but at lower risk of cancer mortality.

For each 2-point increment in a 0-9 score of adherence to the MADP, we observed a 25% relative risk reduction in mortality (95% CI 11, 38%). Within each category of alcohol intake, a higher adherence to the MADP was associated with lower mortality. Abstainers (excluded from the calculations of the MADP) exhibited higher mortality (hazard ratio 1.82, 95% CI 1.14, 2.90) than participants highly adherent to the MADP.

**Key findings:** In conclusion, abstainers should not initiate the consumption but even moderate drinkers can benefit from the advice to follow a traditional MADP.

#### PW-147

Poster

##### **Metals (Ca, Mg, K, Na, Cr, Fe, Mn and Zn) in Salvia officinalis.**

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**Objectives:** to quantify and to evaluate the levels of Ca, Mg, K, Na, Cr, Fe, Mn and Zn in Salvia officinalis based on the type of production (organic versus non-organic) and the type of packaging (filter bags versus packets). **Material and methods:** 16 samples of Salvia officinalis commercialized in Tenerife (canary islands, Spain) were analyzed by inductively coupled plasma-optical emission spectrometry (ICP-OES), of which 5 were organic, where 5 were in filter bag and 11 in packets.

**Results:** mean levels of metals were: Ca (5848.49 mg / kg), Mg (1575.01 mg / kg), K (3791.46 mg / kg), Na (248.24 mg / kg), Cr (0.43 mg / kg), Fe (186.92 mg / kg), Mn (11.73 mg / kg) and Zn (8.63 mg / kg).

Organic samples showed lower levels of all metals except for the Na (275.89 mg / kg in conventional vs 235.67 mg / kg in organic).

Conventional vs. organic samples had a higher mean concentration of the other metals: Ca (5909.02 mg / kg vs 5715.31 mg / kg), Mg (1585.38 mg / kg vs 1552.19 mg / kg), K (4058.94 mg / kg vs 3203.02 mg / g), Cr (0.47 mg / kg versus 0.33 mg / kg), Fe (201.83 mg / kg vs. 154.13 mg / kg) Mn (13.24 mg / kg versus 8.42 mg / kg) and Zn (9.77 mg / kg versus 6.13 mg / kg).

Packets presented higher concentrations of Na (268.9 mg / kg vs 202.78 mg / kg). However, filter bags have a higher average concentration of the other metals: Ca (6631.44 mg / kg vs 5492.6 mg / kg), Mg (1749.56 mg / kg vs 1495.66 mg / kg), K (3854.65 mg / kg vs 3445.51 mg / kg), Cr (0.52 mg / kg vs 0.38 mg / kg), Fe (188.41 mg / kg vs 186.24 mg / kg), Mn (12.22 mg / kg vs 11.51 mg / kg) and Zn (9.4 mg / kg versus 8.28 mg / kg).

**Key findings:** Salvia officinalis should be considered as a dietary source of Ca, Mg, K, Na, Cr, Fe, Mn and Zn. The average content of all metals except Na was always higher in the conventional and filter bags samples except Na bags both. However, the differences are not statistically significant. The differences in the content of Na may be due to the Salvia cultivation area (Cost or country) but since packing provides no information on the origin of the vast majority of samples, we have not been able to clarify a relationship.

#### PW-148

Poster

##### **Trace Elements in Lager Beers: Intake Assessment.**

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**Objectives:-** To determine the concentration of trace elements (Fe, Mn, Cu, Zn, Cr, Mo, Co, B, Ba, Li, Sr, Ni and V) in lager beers consumed by the Spanish population.

- To estimate and evaluate the contribution to the recommended daily allowances (RDA), Tolerable Daily Intakes (TDI) and Upper Limit (UL) set for each metal considering a moderate beer consumption (330 ml/day in women and 660 ml/day in men).

**Material and methods:** A total of 124 samples of lager beers sold in public establishments of the island of Tenerife were analyzed. Metal determination was performed by Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES).

**Results:** The average concentrations, in mg/L, were: Fe (0.159 ± 0.129), Mn (0.090 ± 0.049), Cu (0.211 ± 0.085), Zn (0.137 ± 0.098), Cr (0.009 ± 0.008), Mo (0.009 ± 0.006), B (0.043 ± 0.038) Ba (0.053 ± 0.040), Li (0.708 ± 0.335) Sr (0.156 ± 0.081), Ni (0.009 ± 0.004) and V (0.077 ± 0.046). In the case of Co, the concentration was below the limit of quantification. Considering the above mentioned moderate beer consumption, the estimation of the dietary intakes showed the following results for women and men, respectively: Fe (0.29 and 1.17 % of the RDA), Mn (1.65 and 2.58 % of the RDA), Cu (6.33 and 12.66 % of the RDA), Zn (0.65 and 0.95% of the RDA), Cr (11.88 and 16.97% of the RDA), Mo (6.60 and 13.20% of the RDA), B (0.15 and 0.25% of the TDI), Ba (0.15 and 0.25% of the TDI), Sr (0.66 and 1.13% of the TDI), Ni (0.41 and 0.71% of the TDI) and V (1.63 and 2.79% of the UL).

**Key findings:** Moderate consumption of lager beer contributes to the dietary intake of trace elements, especially Li, Cu, Fe, Sr and Zn.

**PW-149****Poster****Major dietary patterns are related to biomarkers of endothelial dysfunction.**

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**Objective:** To examine whether dietary patterns constructed using principal component analysis are associated with markers of endothelial dysfunction in an Argentine population.

**Material and methods:** A cross-sectional study was conducted among non-institutionalized mainly urban 187 Argentine men and women from the Cescas I Study and free of previous cardiovascular event at baseline. We measured diet (food-frequency questionnaire), blood pressure and plasma concentrations of C-reactive protein, soluble vascular cell adhesion molecule-1, soluble intercellular adhesion molecule-1, and soluble E selectin. Correlations and multiple linear regression models were used to assess the relation between dietary patterns and makers of endothelial dysfunction.

**Results:** We identified three dietary patterns: Traditional (TDP), Healthy (HDP), and Convenience and processed (PDP) food patterns. TDP was characterized by a high intake of refined grains, red meat, whole fat dairy products, vegetable oils, and "mate", a traditional South American infused drink; HDP was characterized by a high intake of vegetables, fruit, low fat dairy products, whole grains, and legumes; and PDP consisted mainly of processed meat, snacks, pizza, and "empanadas", a stuffed bread baked or fried. Lower scores in the TDP were inversely associated to serum concentrations of E selectin ( $p < 0.0001$ ). In HDP, higher scores were inversely associated with C-reactive protein, whereas that lower scores showed a positive relation with E selectin ( $p < 0.05$ ). Contrary, higher scores in PDP were directly associated with E selectin concentrations ( $p < 0.05$ ).

**Main findings:** The present study supports the hypothesis that major dietary patterns are related with markers of endothelial dysfunction in an Argentine population.

**PW-150****Poster****Vitamin K intake in Spanish adults: possible role in control of blood pressure.**

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**Objectives:** Vitamin K is an essential element in the coagulation, which is also involved in gamma-carboxylation reactions of proteins as osteocalcin, which may exert a protective effect against age-dependent bone loss. But there is also evidence that vitamin K can have a benefit in controlling blood pressure. Therefore, the aim of the present study is to analyze the adequacy of vitamin K intake and its possible association with blood pressure in a representative sample of Spanish adults.

**Material and methods:** A sample of 418 adults (196 men and 222 women) with ages ranging from 18 to 60 years, was selected in ten Spanish provinces to constitute a representative sample of the population nationwide. The dietary study was carried using a 24-hour recall questionnaire for two days. Personal, anthropometric and health data were also collected. Dietetic data were processed using DIAL software. Blood pressure was measured using an automated sphygmomanometer, which allowed the identification of normotensive, prehypertensive (PHTA) and hypertensive (HTA) adults, considering systolic (SBP) and diastolic (DBP) blood pressure. **Results:** Vitamin K intake ( $138.8 \pm 82.6$   $\mu\text{g/day}$ ) was lower than the established adequate intake for the vitamin in the 37.3 % of the studied participants. Fifty one point eight percent of the studied people had normal blood pressure, 36.7% pre-hypertension (SBP>130 mmHg or DBP>80 mmHg) and 11.5% hypertension (SBP>140 mmHg or DBP>90 mmHg). Systolic blood pressure in people with vitamin K intake lower than that recommended ( $117.5 \pm 14.7$  mmHg) was higher than in people with vitamin K intake higher than 175% of that recommended ( $112.8 \pm 16.2$  mmHg) ( $p < 0.05$ ). The same picture was seen in diastolic blood pressure ( $74.2 \pm 10.5$  vs.  $70.9 \pm 11.0$  mmHg,  $p < 0.05$ , respectively). The risk of hypertension was lower in people with higher contribution to the coverage of recommended intakes of the vitamin (OR=0.9930 [0.9875-0.9985]), taking into account age and BMI as covariables. The risk of pre-hypertension also was lower in people with higher contribution to the coverage of recommended intakes of the vitamin (OR=0.9967 [0.9939-0.9995]). Although vegetables are the main source of vitamin K ( $r=0.4766$ ,  $p < 0.05$ ), the consumption of this food group it is not associated with hypertension

and does not vary the association between vitamin K and hypertension when it is included in the logistic regression analysis (OR=0.9931 [0.9870-0.9993]).

**Key findings:** Vitamin K intake could be improved. Although, vitamin K intake was lower than that established as adequate in the 37.3 % of the studied participants, probably a slightly higher intake than the adequate intake, besides to ensuring that all individuals meet their requirements, also could be beneficial to improve the health of the population, especially in the control of blood pressure.

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**PW-151****Poster****Nutrition risk among home delivered care support users: Baseline evaluation of a continuing education program for care providers.**

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**Background and objectives.-** A cross-sectional survey was conducted in the context of a continuing education intervention program for workers in home delivered support care service. In this paper we present results of this baseline evaluation regarding nutritional risk of users of the service.

**Methods.-** A cross-sectional survey among users of home delivered support care was conducted in the context of a 20 hour multidisciplinary education program. The protocol for baseline assessment included determinant factors of nutrition risk, food habits and physical activity of clients and nutrition risk screening using the validated short version of the Mini Nutritional Assessment (MNA).

**Results.-** In the first phase of the project 75 people providing care in two city districts were involved. About 600 clients receive care in these districts. Data were collected for 218 users. Mean age of clients was 76.89 yr for men and 81.19 yr for women. Key determinant factors of nutrition risk identified in the group were consuming more than 3 drugs daily, eating alone and limitations for buying, preparing or consuming food and beverages. Significantly more women than men had more than three drugs daily ( $X^2=7,224$ ;  $p=0,001$ ); had difficulties for chewing or swallowing ( $X^2=5,393$ ;  $p=0,021$ ) or minimal mobility ( $X^2=7,481$ ;  $p=0,024$ ). Conversely, more men had difficulties for buying, cooking or eating alone ( $X^2=5,294$ ;  $p=0,031$ ), usually drank less than 3 glasses of beverages daily and had less than one portion of milk or dairy products daily ( $X^2=5,981$ ;  $p=0,028$ ). According to MNA screening, 63% scored at risk of malnutrition; some 10,8% were classified in the malnutrition group.

**Conclusion.-** Prevalence of risk of malnutrition is high among home delivered support care. Awareness and adequate training for care providers should be essential for a high quality service.

**PW-152****Poster****Proyecto ALIBEFIS-GLANC: Hábitos alimentarios y actividad física en países iberoamericanos.**

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**Introducción.-** El proyecto ALIBEFIS-GLANC, partiendo de una definición consensuada de lo que se entiende por hábitos, usos y costumbres alimentarias y de la evidencia disponible sobre la influencia de estos hábitos sobre la salud, la calidad de vida y la enfermedad, pretende responder las siguientes preguntas de investigación: ¿Qué conocemos de los hábitos alimentarios de los países Iberoamericanos, que similitudes y diferencias existen? ¿Cuáles son los hábitos, usos y costumbres vinculadas a la recreación y actividad física en adultos jóvenes y sus familias en países Iberoamericanos? El objetivo de este proyecto es analizar los hábitos, usos y costumbres en relación a la adquisición, preparación y consumo de alimentos, así como en relación con la actividad física en población joven adulta de distintos países de Iberoamérica.

**Métodos.-** Se ha diseñado un estudio transversal mixto impulsado por el Grupo GLANC vinculado a la Sociedad Española de Nutrición Comunitaria (SENC). El estudio se realizará en población adulta joven como unidad primaria. El protocolo de estudio combina métodos cuantitativos, cualitativos y recopilación de información contextual de fuentes formales e informales existentes. El protocolo se ha adaptado al lenguaje, usos y contextos del entorno en cada país y se encuentra en fase de evaluación en un estudio piloto.

**Resultados.-** En el proyecto ALIBEFIS-GLANC participan nodos de 14 países iberoamericanos. En la primera fase piloto se han seleccionado muestras de 50 individuos en los centros participantes. Los resultados de esta primera fase permitirán adaptar y validar el protocolo de la investigación. Se han seleccionado muestras de 400 individuos por cada nodo. El proyecto tendrá una duración de cinco años. En el contexto del Congreso Mundial de Nutrición y Salud Pública en Las Palmas de Gran Canaria tendrá lugar

una nueva reunión de coordinación y trabajo del Grupo ALIBEFIS-GLANC. Conclusiones.- El Proyecto ALIBEFIS-GLANC permitirá comparar patrones de dieta y actividad física en países iberoamericanos, conocer las percepciones y necesidades sentidas en estas poblaciones y proponer estrategias para mejorar o reforzar los hábitos, usos, costumbres alimentarias y de actividad física.

**PW-153**

Poster

**Beer consumption and its relationship with body mass index, waist circumference and body fat percentage in a group of healthy adults from Madrid.**

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Objectives: Despite the myths, beer is a fermented drink with a low caloric content. Different studies show that there is no relationship between moderate beer consumption and an increased weight and body fat, meaning it is not considered as being responsible for the so called "beer belly". Therefore, the aim of this research is to analyze how body mass index (BMI), waist circumference and body fat percentage (BF%) can be affected by the consumption of beer in a healthy adult population.

Material and methods: From a wider sample, 120 adults from Madrid (18-50 years) were selected considering their beer consumption frequency: 60 Regular-Beer Drinkers (RBD) (27 men, 33 women) and 60 Non-Regular Beer Drinkers (NBD) (30 men, 30 women). RBD were defined as those men who declared to drink 5 or more beers/week or women who drink 3 or more beers/week; NBD were those with lower consumption. The following anthropometric parameters were recorded: weight, height, waist circumference and skinfolds (biceps, triceps, subscapular and suprailiac). BMI and BF% were calculated. Also Bioimpedance Analysis (BIA) was used to measure BF%. For the statistical analysis we used the SPSS program (version 20.0). Results: RBD had significantly lower BMI ( $23,1 \pm 2,3$  kg/m<sup>2</sup>) than NBD ( $24,6 \pm 4,7$  kg/m<sup>2</sup>) even considering the influence of sex by a two way ANOVA ( $p=0.030$ ). The same pattern appeared for waist circumference, meaning RBD are the ones who had significantly lower values ( $76 \pm 12,7$  cm) than NBD ( $81,7 \pm 12,9$  cm,  $p=0.011$ ).

Regarding BF%, calculated values from skinfolds and BIA were similar in both RBD ( $24,9 \pm 7,3\%$  and  $22,8 \pm 8,4\%$  using skinfolds and BIA respectively) and NBD ( $26,1 \pm 7,3\%$  and  $24,2 \pm 8,9\%$ )

Key findings: The results in this sample showed that regular beer drinkers had lower BMI and waist circumference than those who don't drink it habitually. In addition no relationship between moderate beer consumption and an increased BF% was observed.

Acknowledgements: This study was supported by the Brewer's Association of Spain (94/2011) and "Manuel de Oya scholarship" (2012).

**PW-154**

Poster

**Homocysteine and Vitamin Levels in Cuban Elderly with Alzheimer's Disease or Mild Cognitive Impairment.**

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Objectives: To assess the association between homocysteine and vitamins levels with mild cognitive impairment (MCI) and Alzheimer's disease (AD) in Cuban elderly.

Material and Methods: A cross section study was carried out in 428 subjects older than 65 years; 47 with Alzheimer's disease (AD), 131 with Mild Cognitive Impairment (MCI) and 250 healthy subjects from different areas of Havana city. Dementia was diagnosed using the 10/66 Dementia and DSM-IV criteria and MCI with the Hughes Clinical Dementia Rating. Plasma Homocysteine (enzymatic assay by autoanalyzer), vitamin C (dinitrophenyl-hydrazine assay) and vitamin A (HPLC) were determined. Serum folate and vitamin B12 concentrations were analyzed by electroquimiluminescence immunoassay. Total blood thiamine was measured by TPP-effect and riboflavin by erythrocyte glutathione reductase activation coefficient. ANOVA, Pearson's Chi square, prevalence ratios and multivariate analyses were used for data analysis.

Results: AD subjects showed higher homocysteine and lower vitamin C and vitamin A levels than MCI and healthy individuals ( $p<0,05$ ). Thiamine level was not significantly different among the groups. The AD group had higher proportions of hiperhomocysteinemic and folate, vitamin B12 and vitamin C deficient subjects. Higher homocysteine levels were associated with higher MCI and AD prevalence. Additionally low folic acid, vitamin

B12 and vitamin C levels were associated to higher prevalence of AD.

Conclusion: Those nutritional indicators are associated to MCI and AD, without identifying if they are cause or consequence of disease.

**PW-155**

Poster

**DBP polymorphisms and vitamin D status.**

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Background: Interaction of genetic and nutritional factors in the development and progression of type 2 diabetes mellitus (T2DM) has been much discussed and assessed, and the goal of all the studies in this field is controlling and preventing late complications of T2DM. In recent years lots of information in the line of the association of vitamin D binding protein (DBP) genes and its common polymorphisms with susceptibility to T2DM have been collected. The contradictory results have been obtained so far and the role of DBP polymorphisms still remains uncertain. The goal of the present study is to investigate the relationship between vitamin D status DBP polymorphisms in diabetic patients comparing with healthy controls.

Methods/design: In a case-control study consisting 100 people with diabetes and 100 healthy subjects, Genotypes of two polymorphisms of DBP (HaeIII and StyI) were studied using PCR-RFLP method. Biochemical data have been also collected. Information about dietary intakes of each subject during the last three months was collected using a semi-quantitative food frequency questionnaire. In this study, the frequency of two DBP polymorphisms distribution was determined in two groups. Then the frequency distribution of all genotypes of each polymorphism were found in all three levels of vitamin D status and finally the 25 (OH) D3 levels were determined in all genotype subgroups. To determine the concentrations of 25(OH)D3 levels in diabetic patients and healthy subjects according to the genotypes of each polymorphism, two-way ANOVA were used.

Results: In this study between vitamin D status in terms of serum 25(OH)D3, and also the condition of deficiency, inadequacy or adequacy no significant relationship were observed in various genotype subgroups. However, the distribution of HaeIII polymorphism genotype frequency between the two groups showed no significant difference. But the mean serum 25 (OH) D3 was significantly different between diabetics and healthy subjects. The distribution of StyI genotype frequency between two groups was significant, but in the case of this polymorphism, the mean serum 25 (OH) D3 was significantly different between diabetics and healthy subjects.

Conclusion: No association between StyI genotypes with vitamin D status was observed in this population, In the case of HaeIII, a statistically significant association was observed. These data help us to better understand the differences in genotype frequencies in case and control subgroups.

**PW-156**

Poster

**Foods of animal origin and contamination by organochlorine pesticides and polychlorobiphenyls.**

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Objectives: Foodstuff of animal origin are well known to be prominent contributors to the level of contamination with persistent organic pollutants (POPs). The current study aimed to assess the role of the dietary intake of animal products as a probability factor for increased serum POPs. Material and Methods: The intake of animal products (dietary variables) as a determining factor for serum POP levels was investigated using multivariate statistical models.

Results: Our results showed that while poultry, rabbit, and cheese consumption increases the probability of having high levels of non-DDT-derivative pesticides, sausage, yogurt, lard, and bacon consumption decreases the probability of having high levels of these pesticides. In addition, poultry, rabbit, eggs, cream, and butter consumption increased the probability of having detectable levels of marker PCB, while dairy dessert decreased the probability of having detectable levels of these PCBs. On the contrary, sausage and meat consumption increased the probability of having detectable levels of dioxin-like PCBs (DL-PCBs). The current results confirm that dietary intake of foodstuffs of animal origin is a relevant risk factor for accumulation of POPs (and therefore their serum levels).

Key findings: Our study indicates that the analysis of dietary patterns may be useful for identifying those individuals that will probably present a high body burden of POPs. Because POPs can exert deleterious effects on human health, the identification of populations at risk of being highly contaminated is mandatory in order to implement policies that minimize the exposure to these compounds.

**PW-157**

Poster

**Prediction of metabolic syndrome by clinical indicators.**

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Universidad Autónoma del Estado de Hidalgo, México.

Objectives: The main objective of the research is to generate evidence of the association between the presence of acanthosis nigricans and metabolic syndrome.

Materials and methods: It is an applied clinical research, analytical observational directed to effective diagnosis and preventive procedure.

Anthropometric and clinical variables (weight, height, abdominal circumference, blood pressure and acanthosis nigricans in 400 students between 18 and 25 years old, of the Universidad Autónoma del Estado de Hidalgo, of which 99 were classified as overweight or obese. Were measured biochemical parameters (plasma glucose, HDL cholesterol and triglycerides), for the diagnosing of metabolic syndrome was made according to the criteria of the International Diabetes Federation.

For quantitative variables was calculated mean, median and standard deviation, for qualitative variables absolute and relative frequency.

$\chi^2$  parametric test was used to establish the association of the variables and the statistical analysis was done using SPSS version 21.

Results: The mean body mass index was 27.7 kg/m<sup>2</sup> according to WHO criterios, the most overweight. Taking into account the components of MS, we observed that the average waist circumference in women was 91.6 cm and 89.4 cm in men, in the case of glucose and triglycerides was 79mg/dL and 128.8 mg / dL, respectively; being below the range that the International Diabetes Federation takes as diagnosis of metabolic syndrome.

Otherwise HDL cholesterol, we found that the average was 23mg/dL for men and women 30 mg / dL, fulfilling the diagnostic criteria for metabolic syndrome.

The association between acanthosis nigricans and metabolic syndrome was positive ( $p = 0.020$   $\chi^2$ ) also noted that in subjects with overweight or obesity, acanthosis nigricans and hypertension are at greater risk of developing metabolic syndrome (prevalence ratio 2.73), without a significant change with altered levels of glucose.

Conclusion: The association between the presence of acanthosis nigricans and metabolic syndrome in students is positive and significant ( $p = 0.020$   $\chi^2$ ). Metabolic syndrome is fully controllable, reduce to 70% the clinical expression with the treatment of obesity, which is why we conclude that prevention should be the primary strategy for public health and clinical is essential to it; so you can use the presence of acanthosis nigricans as a useful tool in the diagnosis and treatment.

**PW-158**

Poster

**Calcium Intake and The Risks of Overweight and Obesity Among Preschool Children in Jakarta.**

Hustina Rachman P<sup>1</sup>, Agustina R<sup>1,2</sup>, Endyarni Medise B<sup>3</sup>  
<sup>1</sup> SEAMEO RECFON (South East Asian Ministers of Education Organization Regional Center for Food and Nutrition). <sup>2</sup>Department of Nutrition, Faculty of Medicine, University of Indonesia. <sup>3</sup>Department of Pediatric Health, Faculty of Medicine, University of Indonesia

The prevalence of overweight and obesity in both developed and developing countries has been escalating. Yet the role of nutrients, such as calcium, towards overweight and obesity remains unclear among children in urban settings of developing countries. This study investigated the association between dietary calcium intake with the risks of overweight and obesity among preschool children age 3 to 6 years. A case control study with 81 matching pairs by age, sex and school was conducted in 23 randomly selected preschools in East Jakarta, Indonesia. Cases (n=81) were overweight or obese children, whereas controls (n=81) were normal children.. Milk was the main contributor of calcium intake for both groups. After adjusted for high energy and protein intake, introduction to formula milk < 6 months, high restriction, overweight and obese mothers, preference of sweet snacks, duration of breastfeeding < 6 months, and high pressure to eat, the risks of calcium intake towards overweight and obesity were not significantly different between case and control (Adjusted OR, 95% CI = 1.537, 0.57-4.16). Calcium intake was not associated with the risk of overweight and obesity among Indonesian preschool children.

**PW-159**

Poster

**Gender perspectives on food security and nutrition in Nepal.**

Jhabindra B<sup>1,2</sup>  
<sup>1</sup> PhD Student, College of Public Health, Chulalongkorn University, Thailand. <sup>2</sup>Nepal Coalition for Global Research, Nepal

Introduction: Nepal is one of the least developed countries in the world. Poverty, gender inequality, illiteracy, malnutrition, food insecurity and poor health care systems are some of the emerging development challenges. A vast majority of population have limited access to food, health and nu-

trition services. The malnutrition among women and children in particular is very high.

Objectives: The purpose of this study was to review the gender perspectives of food security and nutrition in Nepal and assess its socio-economic impacts on households, families and communities.

Materials and methods: It was a cross sectional study which adopted mainly qualitative research methodologies such as focus group discussions, in-depth interview, key informant interviews and participatory observations.

Results: Food security and nutrition are among the priorities of development in view of the impact on agricultural productivity of global economic crises, food price spikes, and climate change. The extent to which gender inequalities in general, and the gender gaps in agriculture in particular, thwart attainment of these twin priority goals is a key concern given the vital role of women smallholders in household and community food and nutrition security.

Key findings: Rural women assume critical roles in attaining each of the pillars of food security: availability, access, and utilization. Their role is thus crucial throughout the agricultural value chain, from production on the family plot, to food preparation, to distribution within the household. However, their roles are generally undervalued and constrained by limitations on their access to resources, services, and labor market opportunities. Most rural households and communities in the country manage their agricultural production systems based on social norms and practices that determine the gender division of labor which have profound impacts on nutrition status of women and children in particular.

**PW-160**

Poster

**Live experience and satisfaction of urban Iranian women regarding subsidy targeting program through cash transfer.**

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Objectives: The subsidy targeting program through cash transfer in Iran, introduced in 2010, influence the quality of social life as well as nutritional status of Iranian households. In this qualitative study, life experience and viewpoints of urban women in Tehran about the program was evaluated. Material and methods: This study was conducted in the framework of "Effectiveness of subsidy targeting through cash transfer on food security and nutritional status of urban population in Tehran: evaluation of a program". To collect data, seven semi-structured focus group discussions were conducted with 76 women who experience the effects of cash transfer program on their households as mother, wife or daughter. Based on open sampling, with the aim of maximal variation of the participants' experiences, three demographically diverse areas from the north, centre and south of Tehran were selected. All the focus group discussions were audio recorded and transcribed verbatim. Data collection and analysis were done simultaneously using the Strauss and Corbin analysis method.

Results: In spite of primary goals of lowering inequalities and poverty, subsidy targeting program through cash transfer has increased the relative deprivation and social gaps in residents of capital cities like Tehran. FGDs showed that social observability and participation of members of Iranian household in social events has decreased as major components of social capital. Moreover, most of the participants believed that dependency ratio has become reverse in the households and spouses in reproductive age has more dependent on older family members for their livelihood. Some women believed that this program has increased the domestic violence and decreased their hope to the future of their children which in turn could led to lower childbearing and population growth. In contrast, some women evaluated it as a good program which was not implemented well. Key findings: Cash transfer Program in Iran has raised negative and positive viewpoints in women based on its impacts on inflation and household expenditures.

**PW-161**

Poster

**Association between eating in the absence of hunger with body mass index and abdominal obesity in Mexican university students.**

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Objective: To assess the association between eating in the absence of hunger with body mass index and abdominal obesity in Mexican university students.

Methods: A cross-sectional study was conducted in October 2013 with first and second year university students from the medical, dentistry, psy-

chology and nursing schools. We measured height (m), weight (kg), and waist circumference (cm). The body mass index (kg/m<sup>2</sup>) was calculated. A previously validated eating in the absence of hunger questionnaire was applied. Factorial analysis was conducted to assess the main components by Varimax rotation. From the components obtained, analysis of variance test was performed to determine differences between gender, body mass index categories, and abdominal obesity.

**Results:** The study population was 697 college students. Mean age was 20.3 years, and 64% were women. The prevalence of overweight and obesity was 39%. Men had higher overweight and obesity than women ( $p=0.012$ ); women (39%) had higher abdominal obesity than men (28%) ( $p=0.003$ ).

External stimuli, negative feelings, fatigue and boredom contributed to 68.5% of the variability. There were significant differences in external stimuli and negative feelings by discipline ( $p=0.009$  and  $p=0.001$  respectively). Women had more eating in the absence of hunger due to negative feelings and boredom than men ( $p=0.0001$  and  $p=0.001$  respectively). In both genders, differences between participants by weight status in external stimuli, fatigue and boredom ( $p=0.024$ ,  $0.007$  and  $0.0001$  respectively) were observed. Normal weight men ate more in the absence of hunger by external stimuli, fatigue and boredom ( $p=0.046$ ,  $0.006$  and  $0.001$  respectively) than overweight or obese. Normal weight women ate more in the absence of hunger by boredom ( $p=0.012$ ) than overweight or obese.

**Key findings:** Women had more eating in the absence of hunger due to negative feelings and boredom than men. Normal weight men had more eating in the absence of hunger than overweight or obese men due to external stimuli, fatigue and boredom. Normal weight women had more eating in the absence of hunger than overweight or obese due to boredom.

#### PW-162

Poster

#### The Nutrition Sensitivity of Agriculture and Food Policies: A Synthesis Report of Eight Country Case Studies.

Fanzo J.

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**Background and Objectives:** Nutrition-sensitive agriculture aims to maximize the positive impact of the food system on nutrition outcomes while minimizing any unintended, negative consequences of agricultural policies and interventions for the consumer. The complex role of how agricultural policies can effectively address nutrition is not yet well understood. There is considerable conceptual knowledge on this topic, but little understanding of how to carry concepts and policy objectives into effective implementation and delivery of food-based approaches that impact nutritional status of populations.

**Methods:** The purpose of this study is to contribute to the on-going dialogue of the gaps in our understanding of effective nutrition-sensitive agriculture and food policies and commitments, and the food-based solutions that help inform countries in their efforts to scale up nutrition. Eight country case studies as well as a synthesis report were commissioned by the UNSCN and examined the nutrition sensitivity of agriculture and food policies. The eight countries studied include Brazil, Malawi, Mozambique, Nepal, Senegal, Sierra Leone, South Africa, and Thailand.

**Results:** The analysis found that most of the country case studies demonstrated increased awareness of the multi-sectoral nature of nutrition and political will to address the problems of undernutrition and overweight and obesity. Many of the policies analyzed in the case studies incorporated nutrition objectives, and indicators to measure progress, targeted the vulnerable and women and focused on a diversified food production. However, some policies did not emphasize interventions to improve processing, storage, marketing and utilization of foods. Very few have assessed impact of their policies on nutrition outcomes. Major policies often include nutrition objectives, but there is a tendency to prioritize explicit sector priorities within ministries at the expense of nutrition.

**Key Findings:** The country case studies demonstrated that there is some level of commitment to achieving positive nutrition outcomes, as well as an understanding, to varying degrees, that the agricultural sector has a pivotal role in achieving nutrition objectives. As we move forward into the post-2015 era, good practices and transferable lessons can be drawn from each country case study. The studies collectively highlight the importance of a supportive policy environment, well-developed human resources, and effective systems for planning, implementation, and monitoring impact for creating successful, nutrition-sensitive agriculture policies and programmes.

#### PW-163

Poster

#### Comparison of Food Intake Patterns of Adolescents with USDA My Plate Dietary Guidelines.

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Evaluating food intake among children has a great importance in preventing the onset of adult health problems. Studies suggest that dietary

recommendations are not met among adolescents. The aim of this study was to determine if adolescents from highly educated families meet the USDA recommendations based on "Choose MyPlate". A cross-sectional study was conducted among 336 females and 252 males ages 12-18 years attending selected private and public schools in California and Michigan, who reported their food intake using a web-based food frequency questionnaire. Recommended total daily amounts of food groups of the Choose My Plate guidelines were used for assessment of intake and  $\chi^2$  test was used for comparison. Intake were non-normally distributed, thus, median values were compared to the guidelines. Nineteen percent of study population is vegetarian. Mean (SD) self-reported exercise was  $30.5 \pm 25.6$  min/day. Daily recommendations were based on gender and age group, thus, evaluation was differentiated accordingly. Median intakes were: fruits, 2.35 svg/d; vegetables, 3.95 svg/d; protein, 2.85 svg/d; dairy, 2.35 svg/d; and grains, 6.53 svg/d. More than half met the recommendations for fruits (67%), vegetables (71.6%), and grains (51.7%) but only 12% and 34.5% met the recommendations for protein and dairy, respectively. These results suggest that nutrition education even in knowledgeable population might be helpful for promoting healthy nutrition among adolescents.

#### PW-164

Poster

#### Introduction of soft drinks and industrialized beverages in the diet of infants attending public day care centers.

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<sup>3</sup>Federal University of São Paulo, Brazil.

**Objective:** To identify the age at introduction of soft drinks and industrialized juices in the diet of infants enrolled in public day care center and compare their nutritional compositions with the natural fruit juice.

**Material and Methods:** Cross-sectional study with 636 children (aged zero to 36 months) of nurseries day care centers, whose mothers were interviewed about the age of feeding introduction. We evaluated the proximate composition of soft drink and artificial juice, comparing them with those of natural fruit juice for energy, sugar, fiber, vitamin C and sodium value. The chemical composition of fruit juice was obtained by consulting the Table of Food Composition and for industrialized drinks it was used the average of the nutritional information on the labels of the five most consumed product brands.

**Results:** The artificial drinks were consumed before the first year of life for more than half of the children studied with approximately 10% consuming it before six months. When compared to the composition of natural fruit juice beverages provide these quantities from 9 to 13 times higher than sodium and 15 times less vitamin C.

**Key-findings:** The introduction of soft drinks and industrialized juices in the diet of infants was untimely and premature as well, when compared to natural fruit juice, have worst nutritional composition, suggesting the need for action, based on strategies for food and nutrition education in order to promote the formation and maintenance of healthy eating habits.

#### PW-165

Poster

#### Periodontal and nutritional assessment of children in a rural zone in Minas Gerais, MG.

Toloni, MHA<sup>1</sup>; Pereira, SM<sup>1</sup>; Souza JNP<sup>1</sup>; De Angelis MCP<sup>1</sup>; Pereira LJ<sup>1</sup>; Ambrosano GMB<sup>2</sup>; Pereira AC<sup>3</sup>

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**Objective:** To evaluate the periodontal and nutritional assessment of children from a rural school in Minas Gerais state and to investigate possible associations between social variables, behavioral, nutritional profile and periodontal.

**Material and Methods:** Cross-sectional study with 146 students aged 4-16 years old from a rural school in Lavras. Was sent to parents a socioeconomic questionnaire validated in the literature with questions related to social variables, economic and behavioral. Oral examinations were performed by two calibrated examiners, following the criteria of the World Health Organization. Children were examined in the schoolyard sitting on chairs and under natural light. Before examining the supervised brushing teeth was performed (the children received brushing kit containing toothbrush, paste and floss). Mouth mirrors plans and ball point probes were used. For anthropometric examination subjects were placed on a digital scale with centralized, barefoot and with as little clothing as possible, considering the factors weight, gender, age and height. Association analyzes by chi-square test or Fisher's exact frequencies lower than when there were 5 tests were performed. Comparison of periodontal indices, depending on the groups classified according to BMI, was performed by descriptive statistics median, minimum and maximum value and by Kruskal-Wallis test.

**Results:** The average age of our sample was 10.4 years with a standard deviation of 3.12 years. Data were analyzed by means of frequency distribution tables for each measured variable. Revealing that most of the

individuals examined were normal (79.5%), followed by overweight 12 (8.2%), already malnourished were present in 7.5% of the sample. It is observed that most of the children examined were from families with a monthly income up to the minimum wage, lived with a number of families between 4 and 6 individuals and their parents had studied up to primary education, and 50% of mothers and 53% of fathers had studied up to 4th grade of elementary school. Regarding periodontal indices observed, it was found that most had examined dental plaque and bleeding sextants (level > 0), indicating gingival changes. In relation to dental calculus the same trend was not observed.

Key-findings: Despite the reviews rural individuals present low family income, up to the minimum wage, these are mostly in eutrophic and with a tendency to overweight, suggesting the nutritional transition process for this population. Through the findings were not observed relationship between nutrition and periodontal conditions, since most of the examined showed dental plaque and bleeding sextants.

**PW-166** **Poster**  
**Media Strategies and Commercials Appeals for Promotion of Food Products.**

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Objective: To investigate the contents of advertisements about the foods in relation to the commercial appeals divulged by means of internet and television.

Material and Methods: An interpretative survey of advertisements conducted in internet and television-conducted media, seeing that for this purpose, takes into account the ones interlinked by the key words: alcoholic beverages, cookies, meats and meat derivatives, cereals and legume plants, candies, processed meats, starchy foods, milk and dairy products, oils and olive oil were sought. The data were stood for in the form of relative frequency for each category and to test the significance of the differences was performed a square chi test of expected equal proportions, at the levels of 5%.

Results: The 154 advertisements surveyed were divided into 16 categories, where it was found that the main commercial appeals utilized singly or simultaneously were stimulus of the eating object (21.1%), illusion/ fantasy (13.9%), family / friendship (13.2%) and flavor (13.2%). On the other hand, the commercial appeals utilized for spreading of foodstuffs were nutritional /dietary appeal (2%), price (1.7%) and critical consciousness (1%). Key-findings: The media involved with food industry makes use of artifices, mainly emotional and affective, to attract the attention of consumers and aggregate the consumption of the product to a sensation of pleasure, with social rewards and satisfaction of the ego. Normally, they do not possess informative character but rather persuasive, appealing to the consumer's appetite. Those results call the attention to greater investments in policy programs which aim at the nutrition education, making the subject more critical and more autonomous in the formation of his eating habits.

**PW-167** **Poster**  
**Traffic Light Labeling: tool for understanding food labeling.**

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Objective: To present an adaptation of Traffic Light Labeling adopted in the UK and other European countries, to the current norms in Brazil and classify processed products marketed here.

Material and Methods: This tool is based on the use of light colors to appraise concentrations of total fat, saturated and trans fat, corresponding to sodium and 100g or 100ml of the product fiber. The red light indicates that the nutrient is present in excessive quantities; yellow, green and average adequate. Fibers for low concentrations have red color and the recommended green. The adaptation and application of these concepts to Brazilian consumers were based on the standards of the National Sanitary Surveillance Agency and the Food Standards Agency.

Results: one hundred industrial products, which were selected from the electronic page of a Brazilian hypermarket, opting for the first product listed on the page for each category were ranked. The analysis shows that there are higher amounts of total and saturated sodium and low amounts of trans fat and fiber. These data show that contemporary society due to the lack of time to prepare your meals, it is attempted to purchase ready made available by the food industry, and acquires under the influence of advertising and unaware of the health risks associated with the continued use of these foods.

Key findings: The use of this methodology aims to facilitate choosing healthy foods, sensitizing consumers about the disadvantages regarding the nutritional quality of industrial and stimulating industry to improve the nutritional composition of its products, from the perspective of receiving

higher amount green signals and lower amount of red; thus contributing to the prevention of food errors, obesity and chronic diseases, the leading causes of disability and premature death in Brazil.

**PW-168** **Poster**  
**Development of Instructional Resources for Nutritional Education of Children aged 5 to 6Years.**

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Objective: This study is intended to report the experience of the development of three instructional resources turned to food and nutrition education of children of five to six years old by a team of the course of Nutrition of the Food Science Department of the Federal University of Lavras (Universidade Federal de Lavras –UFLA).

Materials and methods: The study was based on Freire's pedagogy, which proposes an awareness education, with a participatory methodology. For such a goal, three resources have been developed: puppet theater, memory play and primer. The puppet theater addresses the importance of wholesome feeding, of nutrients and of the affective relationship involved in the act of eating in a playful and simple way. Basing on the importance of the pedagogic nature of the games in education, a memory game was developed related with the content of dramatization to promote the fixation of the content transmitted by the puppet theater. To give continuity to the activity of food and nutrition education proposed, a primer containing clear and objective texts about wholesome feeding and personal hygiene and of foods and recreational activities for children.

Results: Experience has shown that the development and preparation of teaching materials and nature that interact with the same subject in different activities should consider the needs and constraints of the target audience. It is important to create, develop and produce a material economically and quality content that conveys a clear and objective manner and involve the learner in the formation of knowledge and knowledge exchange process. During the development of this work it became clear that food and nutrition education interactive has a detachable result in infant feeding. When the process of education is not restricted to children and meets the parents, teachers and guardians, becoming more efficient and extending activities throughout life.

Key findings: The work concluded that a well planned nutrition education, considering both needs and limitations have outstanding results in the child feeding and when that education is not limited to children and meets the parents, teachers and legal guardians, it becomes more effective and its results last throughout all their lifetime.

**PW-169** **Poster**  
**Understanding local narratives, attitudes, beliefs and care-seeking practices during diarrhea episodes to inform public health behaviour change strategies in San Marcos, Guatemala.**

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Center for Studies of Sensory Impairment, Aging and Metabolism (CeS-SIAM), Guatemala City, Guatemala<sup>1</sup>; Micronutrient Initiative, Canada<sup>2</sup>.

Objective: The study aimed to understand current knowledge, attitudes, beliefs and care-seeking practices during diarrhea among caregivers of children ≤5 year old children in a region of Western Guatemala to inform the development of a Ministry of Health's behaviour change strategy.

Material and methods: As part of a larger formative research study, we included 8 health centres from 4 rural municipalities in the Department of San Marcos in the Western Highlands of Guatemala. Participation was voluntary. A total of 24 individual in-depth interviews and 7 focus-group discussions with a total of 77 caregivers of children ≤ 5 year old children were held using reflective dialogues and open-ended question guides. Interviews and focus groups were digitally voice recorded, transcribed verbatim and translated from Mayan Mam, Spanish and English languages. Data were coded using the study domains and HyperResearch® software. Results: Caregivers characterized 11 types of diarrhea; each was associated with a unique perceived cause. Most of the putative causes offered by the mothers were not based on allopathic biomedical principles, but rather included aspects such as "hot and cold" properties of foods and drinks, the "evil eye", and weather changes, among others. Regarding care-seeking practices, taking young children with an active diarrhea episode to health center was a second resort, only after first attempting home treatment with traditional household remedies such as herbal infusions, herb-based pastes and self-prescribed biomedical. Elements for any reluctance to seek care within the public health system included factors such as long distances, confidence in health workers and economic.

Key Findings: The response to an episode of infantile diarrhea has a complex basis in San Marcos. The perceived typology and related cause of diarrhea as well as the attitudes towards the effectiveness of diarrhoea treatment influenced caregiver's choices in care-seeking and treat-

ment. Considering local narratives surrounding concepts and behaviours of diarrheal and preferred treatment strategies is essential for designing public health behaviour change strategies to influence caregivers. Funded by: The Micronutrient Initiative Canada through a grant from Grand Challenges Canada.

**PW-170**

Poster

**Estimated daily consumption of fortified table sugar among women of distinct socio-demographic origins in western Guatemala: a comparison of two methods.**

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Objective: As the governmental mandate in Guatemala calls for the fortification of granulated table sugar with retinyl palmitate, we sought to provide quantitative estimation of table sugar and the contribution of preformed vitamin A from this sugar in women of reproductive age from 3 selected socio-geographic settings using two distinct methods: (i) a single 24-hr recall and (ii) a 7-day food frequency questionnaire (FFQ).

Materials and methods: 120 women, aged 18-45 y and neither pregnant nor lactating, were recruited across 3 socio-geographic sectors in the departments of Quetzaltenango and Retalhuleu in western Guatemala. A single previous-day dietary recall was collected and a 7-day FFQ, focusing on foods and beverages with added sugar, were collected on the same day. Portion sizes were estimated with local household measures. Total estimated daily intakes of table sugar were calculated. Total vitamin A contribution from sugar was calculated as 10 µg vitamin A per gram of granulated sugar. Differences in estimated sugar intakes and contribution of vitamin A between area and assessment method were compared using Kruskal-Wallis. The daily contribution of vitamin A from sugar toward the daily Recommended Nutrient Intake (RNI) of 500 RE was computed.

Results: The correspondence between the two methods to assess table sugar consumption was low. Estimated median sugar intakes using the 24-hr recall were 36g for the urban, lower class are in Quetzaltenango (QUL), 38g for the urban, middle class are in Quetzaltenango (QUM) and 19g for the rural, middle class are in Retalhuleu (RUM). Using the food-frequency, the estimated intakes were higher: 69g QUL, 50g QUM and 63g RUM. These sugar intakes correspond to 351, 379 and 188 RE units of vitamin A using a 24-gr recall and 690, 496 and 630 RE units using the FFQ for, QUL, QUM and RUM, respectively. Table sugar, alone, covered 100% of the daily RNI for 30%, 43% and 20% of women using the 24-hr recall and 65%, 50%, 62% using the FFQ for QUL, QUM and RUM, respectively. Using the FFQ methods, 34 women had an estimated daily intake of preformed vitamin A from table sugar above 1000 µg/day, and 2 women approached the 3000 µg UL for the preformed vitamin from sugar alone. Key findings: There is a lack of correspondence between table sugar estimated by means of a single 24-hr recall and a 7-day FFQ. Values are higher using the FFQ, and if these values were correct women would be approaching hazardous levels of vitamin A intake with the overall diet. Funded by: Sight and Life of Basel, Switzerland

**PW-171**

Poster

**Variation in consumption of fortified table sugar among women of distinct socio-demographic origins in western Guatemala.**

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Center for Studies of Sensory Impairment, Aging and Metabolism (CeS-SIAM), Guatemala City, Guatemala

Objective: As the governmental mandate in Guatemala calls for the fortification of granulated table sugar with retinyl palmitate at levels of 20 mg/kg, and monitoring shows a stable level at consumption of 10 mg/kg, we sought in this study to provide quantitative estimation of previous day's intakes of fortified table sugar and the contribution of preformed vitamin A from this sugar in women of reproductive age from four selected socio-geographic settings.

Materials and methods: 171 women, aged 18-45 y and neither pregnant nor lactating, were recruited across 4 socio-geographic sectors in the departments of Quetzaltenango and Retalhuleu in western Guatemala. Previous-day dietary recalls were collected. Portion sizes were estimated with local household measures. Total estimated daily intakes of table sugar were calculated. Total vitamin A contribution from sugar was calculated as 10 µg vitamin A per gram of granulated sugar. Differences in sugar intakes and contribution of vitamin A among areas were compared using Kruskal-Wallis. The daily contribution of vitamin A from sugar toward the daily Recommended Nutrient Intake (RNI) of 500 RE was computed.

Results: The mean age of the participants was 26±7 y for the rural, low-income class in Quetzaltenango (n=51, QRL), 31±7 y for both urban samples in Quetzaltenango [low (n=40, QUL) and middle (n=40, QUM) class] and 29±8 y for the urban, middle-income class in Retalhuleu (n=40, RUM). The estimated median daily intake of table sugar was in descen-

ding order were: 53 g (QRL); 38 g (QUM); 36 g (QUL); and 19 g (RUM) (p<0.001). These sugar intakes correspond to 528, 379, 351 and 188 RE units of vitamin A, respectively, and were correspondingly significantly different between areas (p<0.001). Table sugar, alone, covered 100% of the daily RNI for 55%, 43%, 30%, and 20% of women, respectively. In RUM, 9 women had an estimated daily intake of preformed vitamin A from table sugar above 1000 µg/day, but not a single woman approached the 3000 µg UL for the preformed vitamin from sugar alone.

Key findings: When the specifications for retinyl palmitate addition in sugar fortification were enacted, it was assumed that women would consume 40 g of sugar daily; the median overall (37 g) is actually lower than that for these four groups combined. Preformed vitamin A in other food items and sources of provitamin A will be needed to complement sugar to assure adequate intake by all.

Funded by: Sight and Life of Basel, Switzerland

**PW-172**

Poster

**Risk of Eating Disorders in university students, physical activity and quality of life.**

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Objective: To estimate the prevalence of risk of eating disorders (ED) in university students and its correlation with overweight and obesity, physical activity and health related quality of life.

Methods: Cross-sectional study. We determined: BMI, waist circumference, physical activity time (minutes / day), motivation for physical exercise (EMI-2 adaptation AMPEF), adherence to the Mediterranean diet (14-items scale), and Health-related quality of life SF-12. Risk of eating disorders were determined by TCA Eating Attitudes Test-26 (EAT26) with cut-off point greater than or equal to 21. We applied WHO cut-off points for BMI and waist circumference, and 75-percentile as cutoff of adherence to the Mediterranean diet scale. The correlation between variables was obtained by Pearson test, differences between proportions with Fisher's test / Chi and the differences between means with T-test and ANOVA.

Results: We studied 155 university students with a mean age of 21.6 years and 55% of women. We obtained mean values of BMI of 24.9 and 23.7 in men and women respectively; waist circumference were 85.2cm and 75.8 cm. Men had higher weekly physical activity than women: 75.6 min/d versus 53.1 min/d (p<0.007). The score of adherence to the Mediterranean diet was 5.6 (95% CI 5.3 to 5.9), with no differences between sexes. The health-related quality of life measure (SF12) presented means values of physical health of 54.5 in men and 53.7 in women; in terms of mental health, quality of life was similar (43.3 and 44.5 respectively).

Women had higher EAT26 scores, indicating greater risk of ED than men: 12.5 vs. 7.9 (p<0.002). Risk prevalence of eating disorders in women was 22.5% compared with 8.1% of males (p<0.02). The risk of ED was correlated with BMI, waist circumference and perceived mental health related to quality of life (SF12), but not with physical activity. There were no differences in physical activity and adherence to the Mediterranean diet based on the presence of risk ED.

The motivation for perform physical activity in young people at risk of ED were aimed at weight control and body image, and not towards the competition, social affiliation and challenge. Physical activity of young college correlates with perceived mental health and adherence to the Mediterranean diet, but not with the risk of ED.

Key finding. The risk of eating disorders in university students has a higher prevalence in women and is directly related to anthropometry and inversely with perceived mental health. Males spend more time performing daily physical activity than women. In young people at risk of ED, motivation for exercise was primarily associated with the control of body image and not the competition.

**PW-173**

Poster

**Obesity amongst parents and children; Is it passed on?**

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Objective: To determine the prevalences of overweight (SOB) and obesity (OBS) amongst a young population, made possible looking at the parents nutrition.

Material and Methods: A cross-sectional study. City of Cadiz. School attending population 2005-2006 (3-16 years old) 14.332 subjects. A two stage sample: 994 subjects: 504 men (50.7%) and 490 women (49.3%). A survey amongst family antecedents: weight and size of the parents (TMS SEEDO CRITERIA) Anthropometric measurements of the child: weight and size; IMC (en kid criterion): overweight (SSP): Overweight and Obesity. The prevalence are calculated: IC 95%, x2 and the prevalence reasons given.

Results: The prevalence of SSP in the ancestors was: Fathers: 68.5%, Mothers: 38.1%. Amongst children: SOB: 17.1%, OBS: 11.4% and SSP: 28.5%. Calculating the prevalences amongst children according to their excess weight, one of their parents; the Father, the Mother, or both; give reasons for prevalence with understandable values between 1-1.5 and are found within the following cases, with reasons for prevalence close to 2; Father SSP:(RP-OBS:1.97); Mother SSP:(RP-OBS: 1.97); Mother SSP:(RP-OBS: 3.28, RP-SSP: 2.99, RP-SSP: 2.06) Only Mother SSP: (RP-OBS: 3.07, RP-SSP:1.95).

Key findings: There is a significant relationship between the excess weight of the child and of their parents, in both sexes and within all three age groups (3-5, 6-12 and 13-16).

The forementioned is more obvious amongst obese children than amongst those with excess weight, except within the 3-5 age range, that is superior amongst those overweight.

Excess weight of children and those obese are strongly related to the Mothers weight excess.

A Mothers excess weight has a big influence on the child. It is necessary to educate the Mother, as it of a high possibility that the excess weight and obesity of the child is due to poor alimentary habits from the family, especially the Mother.

#### PW-174

Poster

#### **Anthropometric and sociocultural characteristics of the parents and the prevalence of underweight, overweight and obesity in an infant or young Spaniard.**

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Objectives: To determine the prevalence of underweight, overweight and obesity, according to the anthropometric and sociocultural characteristics of the parents of children aged between 13 and 16, attending school in Cadiz.

To analyse the possible relationship between underweight, overweight and obesity with the obstetrical antecedents, with the eating habits and the completion of physical activity.

Material and Methods: A transverse study based on a population of 1283 children, aged between 3 and 16 attending school in Cadiz. Amongst the sociocultural characteristics of the parents we collected; the level of education, personal qualifications, work activity and the socioeconomical status of the family. We weighed the children and measured them at school, and using surveys, we asked the parents about their eating habits, physical activity, sedentary lifestyle, family antecedents and obstetrics. The BMI of the children was worked out according to the International Obesity Task Force measurement (the World Obesity Federation, as it is now known.)

Results: The underweight prevalence was 3.8%, 56.6% a normal weight, 26.2% overweight and 13.4% obese. A higher level of education amongst the parents showed a higher number of underweight children (3.6% vs 4.3%); differing from the figures for overweight and obese children, where they are more prevalent amongst children from less educated families - especially on the mums side; high levels associated - 28% overweight and 17.6% obese.

The prevalence of overweight and obesity is higher when parents have excess weight (33% vs 53.2%). There is a significant relationship between underweight, overweight and obesity with the weight at birth and the weight gain during pregnancy: 12% of the children underweight have underweight antecedents at birth and 30% have a low weight gain. 47% of overweight or obese children have antecedents with a high weight gain during pregnancy.

We did not find any significant differences in the prevalence of underweight, overweight or obesity related to breastfeeding or the eating habits of children. The fulfilment of the recommended amount of physical activity was principally amongst boys of a normal weight and amongst girls of legal age.

Key findings: Underweight, overweight and obesity are influenced by the level of education and the professional status of the parents, especially in the case of overweight or obese children. The prevalence of underweight children does not seem to be related to the socioeconomical status of the family, nor is it associated to the significant differences within their eating habits nor physical activity. On the contrary the correlation is significant with variable anthropometrics of the parents; the weight gain during pregnancy and the weight at birth.

#### PW-175

Poster

#### **Does free school fruit improve school performance?**

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Objectives: In order to increase children's fruit intake, from fall 2007, an official free school fruit program was implemented in all secondary ele-

mentary schools (grades 8-10) and all combined schools (grades 1-10) in Norway, but not in pure elementary schools (grades 1-7). It has been reported that pupils at 1-10 schools increased fruit intake and decreased consumption of unhealthy snacks compared to 1-7 schools (not receiving free school fruit) due to the nationwide free fruit implementation.

A political argument for free school fruit is that it improves the pupils concentrations, and therefore possibly school performance. To our best knowledge, there is no scientific evidence backing this claim, other than a report stating that this is the teachers impression. There are, however, indications for linking nutrition to school performance in developed countries, but proper intervention studies are dearly lacking.

The objective of the present study is to evaluate the effect of free school fruit program on academic performance (comparing 1-10 schools vs. 1-7 schools), and also to investigate a potential relation between the number of years with free school fruit and academic performance.

Material and methods: We analyzed the effect of the free school fruit program on school performance in 5th grade. In this grade level, national tests in mathematics, Norwegian and English have been repeated yearly since 2008. We used school average data from 2008 (i.e. one year with free school fruit) to 2012 (i.e 5 years of free school fruit), including 1462 pure elementary schools (grades 1-7, 85% participation rate) and 499 combined schools (grades 1-10, participation rate 66%). School performance was measured on a level from 1 to 3. Data was analyzed using t-tests.

Results: All years combined, the difference between combined and pure elementary schools were respectively 1.87 vs. 1.99 (p<0.01) for math, 1.91 vs. 2.01 (p<0.01) for English and 1.92 vs. 2.01 (p<0.01) for Norwegian. Analyses stratified on years showed all similar results, and there were no trend towards improved results for the combined schools, compared to pure elementary schools, with increasing years of exposure to free school fruit program.

Key findings: The results show that pure elementary schools did better in all three tests, in all years, indicating no effect of the free school fruit program on school performance.

#### PW-176

Poster

#### **Abdominal but not overall obese women: prevalence, environmental and socio-economic patterning in Tunisia.**

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Objectives: Due to the epidemiological and nutrition transition, Middle East and North African countries feature, especially among women, dramatically high prevalences of obesity. Overall, abdominal fat accumulation seems specifically predictive of adverse health outcomes, and its prevalence seems to be augmenting independently of overall obesity in some countries. Nevertheless, most epidemiological assessments of the burden of obesity and its co-factors are based on Body Mass Index only and epidemiological data regarding within-subject agreement of abdominal and overall adiposity is scarce. We studied within-subject abdominal vs. overall obesity and associated environmental and socio-demographic cofactors among Tunisian women.

Methods: The cross-sectional study was based on a national, stratified, three-level, clustered sample of 35-70 year old women (n=2964) in 2005. Overall obesity was Body Mass Index=weight/height<sup>2</sup>≥30 kg/m<sup>2</sup>, abdominal obesity Waist Circumference≥88 cm. We assessed within-subject abdominal but not overall obesity (AnO) and overall but not abdominal obesity (OnA) statuses (vs. concordance of the two types of adiposity): their association with environment (urban vs. rural area of residence, the 7 administrative regions which divide Tunisia), individual (age, menopause, parity) and socioeconomic factors (education, profession, household welfare) was estimated by multinomial logistic regression models.

Results: In the population, abdominal obesity was much more prevalent (60.4%[57.7-63.0]) than overall obesity (37.0%[34.5-39.6]) mostly due to a high proportion of AnO women (25.0%[22.8-27.1]), while prevalence of OnA was residual (1.6%[1.1-2.2]). There were no adjusted associations of AnO status (vs. concordance) with urban vs. rural area of residence (P=0.21), married status (P=0.79), education (P=0.97) or household welfare level (P=0.94). Pre-menopausal (P=0.093), lower parity women (P=0.061) or those with manual jobs (P=0.038) were slightly less likely to be AnO. However, there was a large variability of the proportion of AnO between the 7 regions (from 16.6% to 30.0%, P<0.0001).

Key findings: In a nutrition transition context with a high prevalence of obesity, one women out of four featured abdominal but not overall obesity. AnO status was not associated with the urban environment nor with most socio-economic status items, mildly so with individual characteristics such as menopause, parity and profession. But it was much more preva-

lent in the eastern more developed regions than in the more rural western ones, possibly linked to genetic, epigenetic or developmental origins differentials. Abdominal obesity must be included in the assessment of the burden of obesity in such contexts and causes of the highly prevalent abdominal but not overall obesity status among women must be sought further.

**PW-177**

Poster

**Child obesity and healthy life style habits: differences between physical activity and a sedentary lifestyle in relation to the parents education.**

Rodríguez Martín, A.<sup>1</sup>; Villagrán Pérez, SA<sup>2</sup>; Novalbos Ruíz, JP<sup>1</sup>; Martínez Nieto, JM<sup>1</sup>; Lechuga Sancho, A<sup>2</sup>.

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Objectives: To determine the prevalence of overweight and obese children with a healthy lifestyle and with the parents level of education.

Material and methods: Cross sectional study. Reference population: school children in Cadiz during 2005-2006 (aged 13-16): 14.332. Taking a random selection of students from 6 schools: 4 state and 2 public schools. Bietapic sampling: 1.283 subjects: 677 men (52.8%) and 606 women (47.2%). Anthropometric measures: weight and size according ENKID tables criteria of excess weight (SSP): overweight and obesity; no excess weight (NSP): Underweight and of a normal weight. A survey of the completeness of physical activity (AF) of students according Ainsworth and Pate criteria (MET: Metabolic equivalent/d and physical activity  $\geq 60$  min/d of moderate or intense physical activity), Sedentary habits (HS:  $\leq 2$ hrs screen/day or  $> 2$ hrs). We classified the level of education of the father (Pa) and of the mother (Ma): without studies and school graduate: Father(Se-Ge) and Mother(Se-Ge); Father(BUP-FP) and Mother(BUP-FP); and University Students: Father(U) and Mother(U).

Results: Schooling centres related to the level of parents education: we can highlight 2 socially favoured schools, observing an obvious increase in the level of the parents studies: the minimum being 0%-1% 'without studies' (Father-Mother), with an outstanding increase amongst the school graduates (fathers:22-33% and Mothers:30-40%) and the parents who are University graduates (fathers:22-44% and Mothers:23-40%). On the other hand we observed 4 unfavoured centres with completely different patterns. 'Without-studies' 0-10% (Father and Mother); school graduates, around 39% and 60% (Father and Mother); and University graduates (Father-Mother, 1%-5%).

The completeness of the recommended daily amount of physical activity at a school age is increasing at a significant rate amongst the children of parents with a high level of education; fathers(SE-GE): 55.4%, Mother(-SE-GE): 55.8%, and fathers(U) 63.5% and mothers(U) 65.7%. On the other hand, a significant decrease in sedentary habits is apparent amongst children of a schooling age;  $> 2$ hours screen/day; matching the variations amongst the parents education level; Fathers(SE-GE) 55.0%: Mothers(-SE-GE) 58.3% to Fathers(U) 38.0%, mothers(U) 33.3%. Interestingly for the said (AF) tendency, it is more common amongst the SSP children, especially those influenced by the Mothers level of education.

Key findings: The habits of healthy lifestyles, physical activity and less time spent in front of a screen (sedentarism) are the most prevalent factors related to the level of education of the parents.

There seems to be schooling centres which are favoured and those that are not, according to the level of education amongst parents., for both education and the healthy lifestyle habits. Physical activity and sedentary habits (number of hours spent in front of a screen per day).

A health education intervention is required amongst the young generation to treat and prevent obesity; Above all amongst the unfavoured social classes.

**PW-178**

Poster

**Adherence to the Mediterranean diet of college students and its association with obesity, hypertension and quality of life.**

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Objective: assess the adherence to the mediterranean diet of college students and analyze its association with overweight and obesity, high blood pressure and quality of life.

Method: cross-sectional study of a random sample of 155 university students. BMI, waist circumference, SBP, DBP, 14-item scale of adherence to the Mediterranean diet, and Health-related quality of life SF-12 was measured. WHO cut-off points for blood pressure and BMI and waist circumference were applied. We used the 75-percentile as cutoff of adherence to the Mediterranean diet scale. The correlation between variables was obtained by Pearson test, differences between proportions with Fisher's test / Chi and the differences between means with T-test and ANOVA.

Results: the study group had a mean age of 21.6 years and consisted of 55% women. The mean values of BMI were 24.9 and 23.7 in men and

women respectively; with values of waist circumference 85.2cm and 75.8 cm. SBP mean were 126 mmHg and 118 mmHg in men and women ( $p < 0.01$ ), and DBP mean of 77 mm Hg and DBP 75 mmHg respectively. The health-related quality of life measure (SF12) presented means values of physical health of 54.5 in men and 53.7 in women. As for mental health, the average score was 43.3 and 44.5 respectively.

The score of adherence to the Mediterranean diet in college students was 5.6 (95% CI 5.3 to 5.9), with no differences between sexes. Overweight youth showed a discrete greater adherence to the Mediterranean diet (6.13) versus obese (4.94).

20% of men and 9% of women had systolic or diastolic arterial pressure compatible with hypertension. There was a significantly lower adherence to the Mediterranean diet in young people with high blood pressure (5.36) than those with normal-high blood pressure (6.55).

Significant differences were observed in physical health related to quality of life in association with adherence to the Mediterranean diet: those with greater adherence to the Mediterranean diet better perceived physical health related to quality of life ( $p < 0.018$ )

Key findings: despite the low levels of adherence to the mediterranean diet in university students, it maintains an inverse association with both obesity and hypertension, and a direct relationship with physical health related quality of life.

**PW-179**

Poster

**Efficacy study of the consumption of fortified milk on the iodine status of Moroccan schoolchildren.**

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Introduction: It was found in a nationwide survey conducted in 1993, among school children (6-12 years) that average iodine excretion in urine was 8.60  $\mu\text{g/l}$  and 63% of the samples were below normal (10 $\mu\text{g/dl}$ ). These results situate Morocco among countries where the severity of disorders due to iodine deficiency is moderate. Iodine deficiencies compromise the health and the development of many school-age children. The aim of this study (2013-2014) was to determine the efficacy of iodine fortified milk consumption among Moroccan schoolchildren ( $n = 193$ ) in rural region.

Methods: Iodine status was assessed in 50 children aged 7-9 y before and after consumption of 200mL UHT fortified milk (providing 30% RDI for iodine) daily for 9-months compared to a control group ( $n = 103$ ) who consumed non-fortified milk. Anthropometric measurements and urine samples were collected and analysed at baseline (T0), 4 months (T4) and 9 months (T9).

Results: There was a marked improvement of severe iodine deficiency in the fortified group (T0= prevalence of iodine deficiency was 48% , at T9=prevalence of iodine deficiency was 22%). A significant reduction of the prevalence of iodine deficiency was observed in the control group certainly due to the presence of residual iodine in the whole non fortified milk (10.4 $\mu\text{g}/100\text{ml}$ ).

Conclusion: The consumption of iodine fortified milk led to a clear improvement of iodine status among schoolchildren of rural.

This study was performed with the support of Fondation Centrale Laitière pour la nutrition de l'enfant.

**PW-180**

Poster

**Phytoestrogen intake influence on body mass index and estrogen metabolites concentration in urine - Bioactive Food Project.**

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Objectives: The estrogen levels and their mutual proportions play important role in cancer development in women. The latest studies indicate that women diagnosed with breast cancer have lower 2-hydroxyestron (2-OHE) to 16 $\alpha$ -hydroxyestron (16 $\alpha$ -OHE) ratio compared to healthy women. Several food compounds such as phytoestrogen or antioxidants can play role in estrogen levels modification. The aim of this study was to determine connections between phytoestrogen consumption, body mass and 2/16 OHE levels and define their main food sources.

Material and methods: The study group consisted of 59 women in average age of 41 years and mean body mass index (BMI) of 30,5  $\text{kg}/\text{m}^2$ . The body mass, anthropometric indicators were measured and estrogen metabolites concentration in urine was determined. The phytoestrogen daily intake was estimated using validated food frequency questionnaire (FFQ) in face-to-face interview. Phytoestrogen dietary intake was calculated basing on available international databases.

Results: Study showed negative correlation between BMI, daily phytoestrogen intake ( $p < 0,05$ ) and intake of food products rich in phytoestrogen ( $p < 0,05$ ). The highest intake of phytoestrogen was associated with low-, medium- and high-phytoestrogen food items consumption accordingly in 49%, 32% and 19%. Moreover it was due to higher consumption

of whole grain bread and groats, vegetables (mainly cruciferous, yellow-orange vegetables, leafy, tomatoes, cucumbers), legume seeds and seeds ( $p < 0,05$ ). Patients characterized by medium phytoestrogen intake had significantly higher consumption of low-phytoestrogen food items compared to those with low phytoestrogen intake ( $p < 0,05$ ) but there were no significant differences compared to those with highest phytoestrogen intake. 43% of study population with the highest phytoestrogen daily intake was characterized by the highest level of 2/16 OHE ratio.

Key findings: The results showed that the higher BMI the less phytoestrogen daily intake. Furthermore the highest phytoestrogen daily intake was associated with higher level of 2/16 OHE ratio which can indicate a reduced predisposition to breast cancer.

Research related to this abstract was funded by the project PO IG 01.01.02.00-061/10.1

#### **PW-181**

Poster

#### **Diet diversification influence on metabolic disorders development in obese patients - Bioactive Food Project.**

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Objectives: Overweight and obese patients have paradoxically high rates of micronutrient deficiencies which in addition to excess body mass, body fat percentage can play role in metabolic disorders development. Human health is strongly associated with diet and its greater diversification can prevent diet related diseases. The aim of this study was to determine the relation between obesity, diet variety and nutritional state.

Material and methods: The study group consisted of 67 patients in average age of 43 years with average body mass index (BMI) of 36,7  $\text{kg}/\text{m}^2$ . The body mass, anthropometric indicators, body composition were measured and blood biochemical parameters were determined. The diet diversification was estimated using validated Food Intake Variety Questionnaire (FIVeQ) and expressed by the Food Intake Variety Index (FIVel) which was calculated on the basis of number of food groups consumed per week (max 63) in amounts greater than trace.

Results: Food Intake Variety Index analysis proved that consumption of products from most of food groups: grain products and potatoes, fats, fruits, vegetables, dairy, meat, fish and eggs, sweets and snacks, non-alcoholic beverages/besides alcohol ( $p < 0,05$ ) result in higher diet diversification ( $> 25$  FIVel). The study showed that the more varied diet the higher iron, folic acid ( $p < 0,05$ ) and vitamin C ( $p = 0,052$ ) blood concentration. The negative correlation between BMI and blood albumin, creatinine ( $p < 0,05$ ), iron ( $p = 0,07$ ) and positive between BMI and glucose, insulin and leptin ( $p < 0,05$ ) was found.

Key findings: Diet diversification and greater consumption of food from different groups rich in key nutrients and antioxidants positively affect the nutritional status of obese patients. Further research on wider group are needed to obtain more detailed data considering intake of specific food products and the nutritional value of patients' diet.

Research related to this abstract was funded by the project PO IG 01.01.02.00-061/10.1

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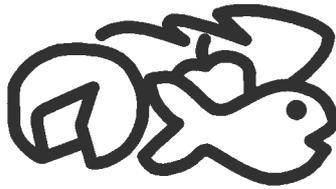
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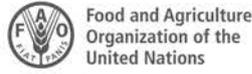
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