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## SUPPLEMENT

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All for Health, Health for All

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#### ABSTRACT SUPPLEMENT

*Guest editors: Thomas Dorner, Walter Ricciardi, Dineke Zeegers Paget*

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## PARALLEL SESSION 9

SATURDAY 12 November 2016 9:40-10:40

**9.A. Oral presentations: Environmental factors in children's health****Individual and area level measures as determinants of childhood asthma in the UK**

Joana Morrison

J Morrison<sup>1</sup>, TKN Nguyen<sup>2</sup>, H Pikhart<sup>1</sup><sup>1</sup>University College London, London, UK<sup>2</sup>Hanoi School of Public Health, Hanoi, Vietnam

Approximately 300 million people suffer from asthma worldwide. It is becoming a particularly serious problem in children. The UK has among the highest prevalence of asthma. Socio economic position and area-level deprivation are associated with a wide range of health and developmental outcomes in children, including asthma. This study aimed to examine associations between childhood asthma household socio-economic position and the Index of Multiple Deprivations (IMD) independently.

The analytical sample included 13,857 children from the MCS a representative birth cohort of children born in the UK between 2000 and 2002. Data were from the fourth survey when children were 7 years old. Multi-level logistic regression modelling was chosen. Individual level explanatory socio-economic variables and Index of Multiple Deprivation (IMD) - a measure of deprivation at the contextual level - were included. Data were linked at Lower Layer Super Output Area. Household income and IMD were important determinants of childhood asthma even after adjusting for individual risk factors. Children living in the lowest income quintile households had 25% higher risk of asthma than those families in the highest one, the risk decreased with each quintile. Children born with low birth weight had 40% higher risk of asthma. Obese children (OR: 1.66 (1.39-1.98)) also had higher risk. Breastfeeding was a protective factor.

This study confirms the presence of inequalities in asthma among children in the UK according to their income household income and neighbourhood deprivation. Children from families with low income living in more deprived neighbourhoods had higher risk of asthma. It suggests the need of for interventions which aim to reduce inequalities in household income and social environment (neighbourhood deprivation) for asthma prevention.

**Key messages:**

- Results showed clear gradients in asthma prevalence by household income and neighbourhood deprivation in the UK
- Multilevel methods allowed us to evaluate the independent effect of higherarchical levels of deprivation and asthma

**Prenatal and postnatal exposure to polycyclic aromatic hydrocarbons and allergy symptoms in children**

Wojciech Hanke

W Hanke<sup>1</sup>, J Jerzynska<sup>2</sup>, D Podlecka<sup>2</sup>, K Polanska<sup>1</sup>, P Majak<sup>3</sup>, I Stelmach<sup>2</sup>, W Stelmach<sup>4</sup><sup>1</sup>Department of Environmental Epidemiology, Nofer Institute of Occupational Medicine, Lodz, Poland<sup>2</sup>Department of Pediatrics and Allergy, Medical University of Lodz, Copernicus Memorial Hospital, Lodz, Poland<sup>3</sup>Department of Internal Medicine and Allergy, Medical University, Lodz, Poland<sup>4</sup>Department of Social and Preventive Medicine, Medical University, Lodz, Poland

Contact: wojt@imp.lodz.pl

**Background**

The studies indicate that exposure to polycyclic aromatic hydrocarbons (PAH) is associated with adverse respiratory and allergy outcomes. Exposure to PAH may impair the immune function of the fetus and subsequently be responsible for an increased susceptibility of children to allergy diseases. The aim of this study was to investigate the association between prenatal and postnatal PAH exposure and respiratory and allergy diseases during childhood.

**Methods**

Current analysis was restricted to 455 mothers and their children from Polish Mother and Child Cohort (REPRO\_PL). The women were interviewed 3 times during the pregnancy in order to collect demographic, socio-economic, exposure and medical history data. Children's health status was assessed at age of one and two. 1-HP concentration as the biomarker of PAH exposure was analyzed in urine collected from women during the second and third trimester of pregnancy and from their children at 1 and 2 years of age. The analysis was performed using high performance liquid chromatography (HPLC). The associations between dependent dichotomous variables and urine concentrations 1-HP were analyzed by using logistic regression.

**Results**

Higher urine concentrations of 1-HP in mothers at 20-24 week of pregnancy increased the risk of more frequent respiratory infections (OR = 1.9; p = 0,02) in children during first year of life. In addition higher 1-HP concentrations in children's urine increased the risk of food allergy (OR = 5.7; p = 0,002) in children during first 2 years of life.

**Conclusions**

This study indicate that PAH exposure is the significant risk factors for airway infections and food allergy in children. Thus, reduction of human exposure to air pollution would in particular result in substantial health benefits for children.

**Key messages:**

- PAH exposure is the significant risk factors for airway infections and food allergy in children
- The reduction of human exposure to air pollution would result in substantial health benefits for children

**Awareness-raising on air quality and health effects in primary school children**

Beatrice Casini

B Casini<sup>1</sup>, A Carducci<sup>2</sup>, M Verani<sup>2</sup>, G Donzelli<sup>2</sup>, G Palomba<sup>2</sup>, E Ceretti<sup>3</sup>, C Zani<sup>3</sup>, E Carraro<sup>4</sup>, T Schiliro<sup>4</sup>, A De Donno<sup>5</sup>, T Grassi<sup>5</sup>, M Villarini<sup>6</sup>, S Bonizzoni<sup>7</sup>, L Zagni<sup>8</sup>, U Gelatti<sup>3</sup>, the MAPEC\_LIFE Study Group<sup>1</sup>Department of Translational Research, N.T.M.S., University of Pisa, Pisa, Italy<sup>2</sup>Department of Biology, University of Pisa, Pisa, Italy<sup>3</sup>Department of Medical and Surgical Specialties, Radiological Science and Public Health, University of Brescia, Brescia, Italy<sup>4</sup>Department of Public Health and Pediatrics, University of Turin, Turin, Italy<sup>5</sup>Department of Biological and Environmental Science and Technology, University of Salento, Lecce, Italy<sup>6</sup>Department of Pharmaceutical Sciences, University of Perugia, Perugia, Italy<sup>7</sup>Comune di Brescia, Brescia, Italy<sup>8</sup>Centro Servizi Multisetoriale e Tecnologico, Brescia, Italy

Contact: beatrice.casini@med.unipi.it

### Background

MAPEC\_LIFE is a project founded by EU Life+ Programme (LIFE12 ENV/IT/000614) which intends to evaluate the associations between air pollution and early biological effects in children. One of the objectives of the project is to raise children awareness on air quality and its health effects.

### Objectives

An educational package, containing leaflets for teachers, a cartoon and three educational videogames, was created and validated for primary school students. In the first phase of the study, the package was set up for understandability and usability on small groups of children and teachers and then tested for pleasantness and efficacy in improving knowledge on 266 children who attended 6 primary schools in 4 Italian cities. A control group of 51 children received only explanations from teachers. In the second phase, the action of improving awareness was extended to 3800 children with the help of 190 teachers.

### Results

Considering the differences between total scores before and after the educational activities a significant increase was observed in the first phase. The mean score in the post-knowledge test ( $11.01 \pm 0.1186$ ) was higher than the mean score in the pre-knowledge test ( $9.199 \pm 0.1347$ ) ( $p < 0.0001$ ). The increase in knowledge for second graders ( $p < 0.0001$ ) was higher than for third graders ( $p = 0.0134$ ), indicating that this grade level should be the choice target. Moreover, in second graders the difference in the mean scores was greater compared with the control group (2.223 vs. 0.96, respectively), demonstrating the effectiveness of audiovisual tools.

In the second phase, the usefulness of the tools to promote new knowledge was evaluated positively by all teachers and videogames were greatly appreciated by the majority of children.

### Conclusions

This intervention of environmental education and health literacy, approaching children with tailored messages and tools, appeared to be very useful, improving children knowledge and stimulating their interest.

### Key messages:

- Our results confirmed prior evidence of the beneficial effects of computer games as instructional tools
- Computer games are able to strengthen and support the motivation to learn because they are attractive to students

### Model for fighting undernutrition among 0-6 yo children in rural communities in Armenia

Hambardzum Simonyan

H Simonyan<sup>1</sup>, A Sargsyan<sup>1</sup>, A Balalian<sup>2</sup>

<sup>1</sup>Fund for Armenian Relief of America, Yerevan, Armenia

<sup>2</sup>Columbia University Mailman School of Public Health, Department of Epidemiology, New York, USA

Contact: hsimonyan@far.am

Armenian demographic and health surveys in 2000, 2005, 2010 showed increasing chronic under nutrition (anemia and stunting) among 0-6yo children. According to World Bank, a 1% loss in adult height due to childhood stunting is associated with a 1.4% loss in economic productivity. In 2013 Fund for Armenian Relief of America started a program to fight the chronic under nutrition in 0-6yo children in Tavush - a poor region near Armenia's north-eastern border which has experienced intermittent military tensions for over 20 years.

As a need assessment a cross sectional study of 6m-6yo children (n=670) was performed, which included measurement of blood hemoglobin, intestinal parasitic infections, anthropometric measurements and survey among caregivers and a cross sectional study of 18-29 yo women (n=562), which included measurement of blood hemoglobin and self-administrated survey.

The prevalence of stunting among the 6-24mo children was found to be 12.1% in rural and 14.3% in urban communities. Among 6m-6 yo children the prevalence of anemia and helminthoses in the urban communities were 15.9% and 13.9% respectively, in rural communities - 20.8% and 25.8% respectively. Anemia among 18-29 yo women was 12.1%.

The first study identified key determinants associated with stunting in this vulnerable region. Consumption of diverse (at least 4) food groups was found to have a protective role on stunting.

The second study showed that, despite the relatively low rate of anemia, lack of knowledge among women of reproductive age about the women's health remains disturbing.

These findings led to the design of professional and community trainings on maternal and children's health, as well as multidimensional interventions - case management, balanced food provision in preschools, healthcare facilities improvement, community economic development, community education improvement.

### Key messages:

- Need assessment for better understanding of problem
- Multidimensional approach for fighting the problem

### Epidemiology of congenital anomalies of the kidney and the urinary tract: a birth registry study

Vitaly Postoev

VA Postoev<sup>1,2</sup>, AM Grjibovski<sup>2,3</sup>, AA Kovalenko<sup>1,2</sup>, EE Anda<sup>1</sup>, E Nieboer<sup>4</sup>, JØ Odland<sup>1</sup>

<sup>1</sup>Department of Community Medicine, UiT- The Arctic University of Norway, Tromsø, Norway

<sup>2</sup>International School of Public Health, Northern State Medical University, Arkhangelsk, Russia

<sup>3</sup>Department of International Public Health, Norwegian Institute of Public Health, Oslo, Norway

<sup>4</sup>Department of Biochemistry and Biomedical Sciences, McMaster University, Hamilton, Canada

Contact: vpo000@post.uit.no

### Background

Congenital anomalies of the kidney and the urinary tract (CAKUT) are common birth defects. The aims of our study were to estimate the prevalence and structure of CAKUT in Murmansk County during 2006-2011 and to explore their risk factors.

### Methods

The Murmansk County Birth Registry was the primary source of information about cases and perinatal exposures. The study included 50936 singletons in the examination of prevalence and proportional distribution of CAKUT, while the multivariate analyses of risk factors included 39322 newborns.

### Results

The prevalence of CAKUT was 4.0 per 1000 newborns [95%CI: 3.4-4.5]. There were six cases of isolated single kidney cyst (Q61.0), which is considered as a minor anomaly by the EUROCAT and, thus, the prevalence according to EUROCAT guidelines was 3.9 (95%CI = 3.3-4.4). Congenital hydronephrosis was predominant form in the structure of CAKUT (14.2% of all cases). Multiple urinary malformation was observed in 10% of cases. Moreover, a half of all malformations were diagnosed as "other congenital anomalies of kidney".

Based on the multivariate analysis, diabetes mellitus or gestational diabetes [OR=4.77, 95%CI: 1.16-19.65], acute infections while pregnant [OR=1.83, 95%CI: 1.14-2.94], the use of medication during pregnancy [OR=2.03, 95%CI: 1.44-2.82], and conception during the summer [OR=1.75, 95%CI 1.15-2.66] were significantly associated with higher risk of CAKUT.

### Conclusions

The overall four-fold enhancement of the occurrence of urinary malformations in Murmansk County for the 2006-2011 period showed little annual dependence. During

**Key message:**

- The nutritional status of pregnant women shows the interest of information and education

**Evaluation of maternal mortality in Afghanistan and neighboring countries**

Nasar Shayan

*S Nasar Ahmad, O Hilal*

Hacettepe University Public Health Institute, Ankara, Turkey

Contact: drnesarshayan@yahoo.com

**Objectives**

The objective of this presentation is to evaluate the maternal mortality rate in Afghanistan and compare with the neighboring countries in the same geographical region (Iran, Pakistan, Tajikistan, Uzbekistan and Turkmenistan).

**Methods**

The data from World Health Organization, UNICEF, UNESCO and Afghanistan Mortality Survey 2010 were used in this review study.

**Results**

Compared to the neighboring countries, Afghanistan has the youngest age population, a larger portion of the population lives in rural areas, women have the lowest literacy rate and the least participating in life working activity. Afghanistan, compared to its neighboring countries, has the highest total fertility and maternal mortality rates. Known causes of maternal mortality in Afghanistan are: severe bleeding and infections. Although the improvement of the health care services, the social and cultural structure of the society is still effecting the accessibility of women and mothers to healthcare services.

**Conclusions**

Compare to countries located in the same geographical region, Afghanistan besides having the lowest socio-economic development level, has the lowest value of maternal health indicators. There is an urgent need for raising the status of women and improving maternal health care services in Afghanistan in order to improve the maternal health indicators.

**Key messages:**

- Safe Motherhood is a Vital Economic and Social Investment
- Improve Access to Quality Reproductive Health Services

**A framework and tool for the process evaluation**

Karine Legrand

*K Legrand<sup>1,2</sup>, C Gailliard<sup>3</sup>, J Langlois<sup>3</sup>, L Saez<sup>2</sup>, AY Omorou<sup>1,2</sup>, E Lecomte<sup>3</sup>, R De Lavenne<sup>4</sup>, L Muller<sup>5</sup>, MH Quinet<sup>4</sup>, S Briangon<sup>1,2</sup>*<sup>1</sup>INSERM, CIC-EC, CIE6, Nancy, France<sup>2</sup>University of Lorraine, Paris Descartes University, EA 4360 APEMAC, Nancy, France<sup>3</sup>National Conservatory of Arts and Crafts (CNAM), Nancy, France<sup>4</sup>Academy Rector of Nancy and Metz, Nancy, France<sup>5</sup>University of Lorraine, Paris Descartes University, APEMAC – EPSaM, Metz, France

Contact: k.legrand@chru-nancy.fr

**Issue**

Vulnerable: individuals derive less benefits from interventions than individuals who are not. Proportionate universalism appears to be a solution by implementing universal prevention activities addressing the whole population (UNIVERSALISM) and acting on each population category according to their needs (PROPORTIONALITY). However, the features of such interventions are as yet to be validated and an urgent need for research on this topic has been expressed.

**Description of the problem**

The PRALIMAP-INÈS trial proposes a school-based intervention to tackle social inequalities in overweight adolescents. One of the secondary aims is to evaluate the process and especially the feasibility of implementing inequalities-oriented interventions in the school setting. In health promotion programs,

intervention complexity, the number of actors and the influence of different setting contexts make it more complicated to analyze process data. The PRALIMAP-INÈS trial aims to document how schools implement the intervention and how the adolescents receives it with quantitative and qualitative measures of participation and intervention delivery. This methodology allows an estimation of intervention dose.

**Results**

Process data are collected through observation, interviews, and self-administered questionnaires from adolescents, the mobile team of healthcare professionals specialized in nutrition, school professionals and the research team. Overall, 36 schools participated, 1,418 adolescents were included and among them 845 participated in at least one activity, more than 250 professionals contributed to the program. An innovative tool (Prev@liss) was used for monitoring activities.

**Lessons**

The tool allows program development and facilitates implementation evaluation for public health professional.

**Key messages:**

- The framework and the tool can be used in any complex program evaluation
- The dose intervention adolescents receive will be estimated and used in “In treatment approach” analyses

**Air pollution and health: study of citizen's attitudes and behaviours using multiple sources**

Annalaura Carducci

*A Carducci<sup>1</sup>, G Donzelli<sup>1</sup>, B Casini<sup>2</sup>, M Verani<sup>1</sup>, G Palomba<sup>1</sup>, G Mascagni<sup>2</sup>, E Ceretti<sup>4</sup>, C Zani<sup>4</sup>, F Bagordo<sup>5</sup>, F Serio<sup>5</sup>, E Carraro<sup>6</sup>, T Schilirò<sup>6</sup>, M Villarini<sup>7</sup>, S Bonizzoni<sup>8</sup>, A Bonetti<sup>9</sup>, U Gelatti<sup>4</sup>, the MAPEC\_LIFE Study Group*<sup>1</sup>Department of Biology, University of Pisa, Pisa, Italy<sup>2</sup>Department of Translational Research, N.T.M.S., University of Pisa, Pisa, Italy<sup>3</sup>Department of Political Sciences, University of Pisa, Pisa, Italy<sup>4</sup>Department of Medical and Surgical Specialties, Radiological Science and Public Health, University of Brescia, Brescia, Italy<sup>5</sup>Department of Biological and Environmental Science and Technology, University of Salento, Lecce, Italy<sup>6</sup>Department of Public Health and Pediatrics, University of Turin, Turin, Italy<sup>7</sup>Department of Pharmaceutical Sciences, University of Perugia, Perugia, Italy<sup>8</sup>Comune di Brescia, Brescia, Italy<sup>9</sup>Centro Servizi Multisetoriale e Tecnologico – CSMT Gestione S.c.a.r.l., Brescia, Italy

Contact: annalaura.carducci@unipi.it

**Background**

In Italy, in December 2015 and January 2016, the routine air monitoring showed a peak of pollution (PM10 in particular) that caused alarm in many cities and was widely reported by mass media. After some weeks from this alarm, we tried to understand the people awareness towards air pollution and their positive behaviors, using different sources of information.

**Methods**

A questionnaire, asking attitudes and behaviours related to air pollution, was administered during an educational program in the context of EU funded MAPEC-life project. Parallel, a quantitative and qualitative analysis was performed on Internet search query data, on newspapers (two national and two local) and on Twitter. These two last kind of sources were collected and analyzed with qualitative analysis software.

**Results**

The media coverage of the theme of air pollution was very high at the end of 2015 and beginning of 2016, with 1.721 newspaper articles published in December-January, followed by a decay in interest (321 in February-March). The same trend was observed also in the internet searches (26.200 vs 6800) and in Twitter. The 57.69% of respondents believe that they can play high role in reducing air pollution but attribute the most important role to the political and environmental protection institutions. The percentage of adopting positive behaviours

(always or sometimes) ranged from 91.69% for separate collections of waste to 33.24% for use of public transport. The major obstacles against the adoption of positive behaviours were high costs and the lack of time (33.29%) and of institutional support (27.52%). Finally, participants consider relevant the role of children in promoting positive behaviours in the family (57.31%).

#### Conclusions

The study can be useful for future program of citizen education, but further research are needed on the perceived obstacles against positive behaviours.

#### Key message:

- The citizens' awareness on air pollution and their adoption of positive behaviours seems to need improvement, despite the high media coverage and the big interest shown towards this topic

### HIV-screening in pregnant women: a systematic review of cost-effectiveness studies

Fabrizio Bert

F Bert<sup>1</sup>, MR Gualano<sup>1</sup>, P Biancone<sup>2</sup>, V Brescia<sup>2</sup>, E Camussi<sup>1</sup>, M Martorana<sup>1</sup>, S Secinaro<sup>2</sup>, R Siliquini<sup>1</sup>

<sup>1</sup>Department of Public Health Sciences, University of Turin, Turin, Italy

<sup>2</sup>Department of Management, University of Turin, Turin, Italy

Contact: fabrizio.bert@unito.it

#### Background

Vertical transmission represents the major route of HIV infection for children; however, the preventive interventions available are extremely effective. Then, we aim to summarize the existing evidences regarding the cost-effectiveness of mother-to-child-transmission preventive screenings, in order to help policy makers in choosing the optimal antenatal screening strategy.

#### Methods

We conducted a systematic review of studies investigating the cost-effectiveness of HIV-screening addressed to pregnant women following PRISMA guidelines, using three databases: PubMed, Scopus and Cost-Effectiveness Analysis Registry (CEA).

#### Results

The final selection obtained 21 papers. Part of the studies assessed the cost-effectiveness of antenatal HIV-screening during early gestation. Others estimated the cost-effectiveness of HIV-screening in late pregnancy. The selected papers focused on both developed and developing countries, characterized by different HIV prevalence. The characteristics and methodology of the retrieved studies were heterogeneous. However, all studies agreed on main findings, outlining the cost-effectiveness of HIV-screening. Cost-effectiveness ratio improves increasing HIV burden. The major findings proved robust across the various scenarios tested in sensitivity analysis.

#### Discussion

Our review confirmed the cost-effectiveness not only of HIV antenatal screening, but also of rescreening in late gestation in both developed and developing countries. In fact, universal screening resulted cost-effective even with extremely low HIV prevalence. One of the most influencing parameter was women acceptance rate. Therefore, maximize screening coverage appears a priority worldwide. Further studies assessing the optimal HIV-test choice and the best testing sequence for confirmation, could be useful and of primary importance for the European public health agenda.

#### Key messages:

- Our review confirmed the cost-effectiveness not only of HIV antenatal screening, but also of rescreening in late gestation in both developed and developing countries
- HIV-screening for pregnant women resulted cost-effective even when the HIV prevalence is extremely low, common in

several European Countries, and can be considered as a prevention strategy in Europe

### Growth trajectories and their associated risk factors among children in Scotland

Larry Doi

L Doi, AJ Williams, J Frank

University of Edinburgh, Edinburgh, UK

Contact: larry.doi@ed.ac.uk

#### Background

Rapid weight gain during childhood has attracted some attention recently because of its short and long-term health consequences. The purpose of this study was to explore whether distinct growth trajectories could be identified among a cohort of children in Scotland. We also examined the maternal and child factors at age 7-8 years that are associated with demonstrating the distinct trajectories of growth.

#### Methods

We used data from birth cohort 1 of the Growing Up in Scotland study. Height and weight data (N=2 857) were available when the children were aged approximately 4, 6 and 8 years. For each child, monthly change in body mass index standard deviation score (BMI-SDS) was calculated to identify growth trajectories. Logistic regression was used to explore which of maternal or child risk factors were associated with belonging to the different growth trajectories.

#### Results

Five discrete BMI-SDS growth trajectories were identified: No Change, Early Decrease, Late Decrease, Late Increase and Early Increase. Relative to the No Change growth trajectory, maternal obesity (odd ratio (OR) = 1.81; 95% confidence interval (CI) 1.25, 2.62) and living in the most deprived quintile (OR = 2.57; 95% CI 1.50, 4.39) were associated with Early Increase trajectory. Maternal obesity (OR = 1.69; 95% CI 1.17, 2.45) and children who were never breastfed (OR = 1.39; 95% CI 1.00, 1.92) were at increased risk of belonging to a Late Increase trajectory, compared to No Change growth trajectory.

#### Conclusions

Maternal weight status, deprivation and breastfeeding were factors significantly associated with membership of the increasing weight status trajectories. These factors may be suitable for identifying high-risk populations for prevention, although the fact that the determinants of these factors are so complex support the need for population wide prevention.

#### Key message:

- Maternal weight status, deprivation and breastfeeding were factors significantly associated with membership of the increasing weight status trajectories

### Power Napping as health promoting intervention at Austrian nursing schools

Stefanie Kirchner

S Kirchner, G Klösch, S Seidel

Department of Neurology, Medical University of Vienna, Vienna, Austria

Contact: skirchner@gmx.at

#### Background

Power Napping has been identified as a method to increase concentration, performance and overall well-being at the workplace. Recently, two nursing schools implemented the possibility of power napping in an educational setting. The following study examined the impact of power napping on the students' health behaviour to elucidate a possible broader application of this method in Austrian high schools.

#### Methods

This cross-sectional cohort study included 201 participants completing a standardised questionnaire. The students were asked about their health behaviour and their use of power napping as well as the immediate effect on performance, concentration and well-being. Items were assessed on a scale of

## Children's requests for unhealthy foods: Influencing factors and implications for food consumption

Michelle Jongenelis

S Pettigrew<sup>1</sup>, M Jongenelis<sup>1</sup>, K Chapman<sup>2</sup>, C Miller<sup>3</sup>

<sup>1</sup>School of Psychology and Speech Pathology, Curtin University, Bentley, Australia

<sup>2</sup>Cancer Council NSW Woolloomooloo Australia

<sup>3</sup>South Australian Health & Medical Research Institute, Adelaide, Australia  
Contact: michelle.jongenelis@curtin.edu.au

### Background

Rates of obesity in children and adolescents represent a significant global public health issue. Although children's requests for unhealthy foods have been identified as an important factor influencing the quality of children's diets, little is known about the various factors influencing these requests. The present study aimed to examine and model the various factors associated with children's requests for unhealthy foods to identify relevant environmental factors and inform the development of interventions designed to address current high levels of child obesity.

### Methods

An online survey was administered via web panel to 1302 Australian parent-child dyads. This survey contained various items that are proposed to be associated with children's requests for unhealthy foods. Variables identified as being significant potential predictors of children's requests for unhealthy foods and their subsequent consumption of these foods were incorporated into a model that included both parents' and children's reports of children's requests for unhealthy foods. This model was assessed via structural equation modelling.

### Results

The analyses included a wide range of demographic, attitudinal, and behavioural variables. The model accounted for a substantial proportion of the variance in both parent-reported and child-reported unhealthy food request frequency. This model provides a comprehensive account of the ways in which various aspects of children's environments contribute to the extent to which they request unhealthy foods.

### Conclusions

These results provide insights into the environmental variables that can be modified to reduce children's requests for unhealthy foods. Developing interventions to address these variables has the potential to improve children's diets and reduce their risk of child obesity. Such interventions also have the potential to increase family harmony, thereby enhancing families' quality of life.

### Key messages:

- Various modifiable factors are associated with the frequency of children's requests for unhealthy foods
- Understanding the relative influence of these factors can assist in the development of effective interventions to reduce the risk of child obesity

## Association between adverse childhood experiences and vegetable consumption in older age in Japan

Natsuyo Yanagi

N Yanagi<sup>1</sup>, T Fujiwara<sup>2</sup>, A Hata<sup>1</sup>, K Kondo<sup>1,3,4</sup>

<sup>1</sup>Department of Public Health, Graduate School of medicine, Chiba University, Chiba, Japan

<sup>2</sup>Department of Global Health Promotion, Tokyo Medical and Dental University, Tokyo, Japan

<sup>3</sup>Center for preventive Medical Sciences, Chiba University, Chiba, Japan

<sup>4</sup>Center for Gerontology and Social Science, National Center for Geriatrics and Gerontology, Aichi, Japan

Contact: n-yanagi@chiba-u.jp

### Background

In an ageing society, fruit and vegetable consumption is recommended to prevent non-communicable diseases. Food preference is considered to be determined early in life stage, and childhood family environment can play an important role for dietary habits. We aimed to assess the association between

adverse childhood experience (ACE) and fruit and vegetable consumption in older age among Japanese population to promote healthy aging.

### Methods

Older people (i.e. 65 years old or more) without nursing care were recruited from nation-wide 30 municipalities in the Japan Gerontological Evaluation study 2013 project. Number of ACEs and current consumption of fruit and vegetables were evaluated via self-administered questionnaire. Poisson regression was employed to investigate the association adjusted for sex, age, other childhood circumstances, education, adulthood SES, access to vegetable stores, and health status.

### Results

A total of 13,694 (60.6%) of 2,2592 individuals reported at least one of eight ACEs, and 409 (1.8%) reported 4 or more ACEs. In age and sex adjusted model, population with 4 or more ACEs were 1.82 (95% confidence interval [CI]=1.53-2.16) times less likely to consume fruit and vegetables compared to those without ACEs. In fully adjusted model, the association of ACEs with fruit and vegetable consumption remained significant with dose-response association ( $p < 0.001$ ).

### Conclusions

Individuals with ACEs were less likely to consume fruit and vegetables in older age among Japanese population. The dose-response association imply causal association between ACE and fruit and vegetable consumption. Health policy tackling ACEs may be beneficial to enhance fruit and vegetable consumption in later life.

### Key messages:

- Adverse childhood experiences were associated with less consumption of fruit and vegetables in older age among Japanese population
- Health policy tackling ACEs may be beneficial to enhance fruit and vegetable consumption in later life

## How much Italian children follow the Mediterranean diet?

Elisabetta Ceretti

E Ceretti<sup>1</sup>, C Zani<sup>1</sup>, GCV Viola<sup>1</sup>, M Villarini<sup>2</sup>, M Verani<sup>3</sup>, F Bagordo<sup>4</sup>, Sa Bonetta<sup>5</sup>, S Levorato<sup>2</sup>, A Carducci<sup>3</sup>, A De Donno<sup>4</sup>, Si Bonetta<sup>5</sup>, S Bonizzoni<sup>6</sup>, P Colombi<sup>7</sup>, U Gelatti<sup>1</sup>, the MAPEC\_LIFE Study Group

<sup>1</sup>Department of Medical and Surgical Specialties, Radiological Science and Public Health, University of Brescia, Brescia, Italy

<sup>2</sup>Department of Pharmaceutical Sciences, University of Perugia, Perugia, Italy

<sup>3</sup>Department of Biology, University of Pisa, Pisa, Italy

<sup>4</sup>Department of Biological and Environmental Science and Technology, University of Salento, Lecce, Italy

<sup>5</sup>Department of Public Health and Pediatrics, University of Turin, Turin, Italy

<sup>6</sup>Comune di Brescia, Brescia, Italy

<sup>7</sup>Centro Servizi Multisetoriale e Tecnologico – CSMT Gestione S.c.a.r.l., Brescia, Italy

Contact: elisabetta.ceretti1@unibs.it

### Background

The Mediterranean diet (MD) is considered one of the healthiest dietary models, which decrease the risk of chronic diseases and may modulate the organism early response to environmental pollution. In the last decades, Mediterranean countries are replacing the traditional diet with other less healthy eating habits, especially in children and teenagers. As part of the MAPEC\_LIFE (Monitoring Air Pollution Effects on Children for supporting public health policy), a project founded by EU Life+ Programme (LIFE12 ENV/IT/000614) which intends to investigate the association between air pollution exposure and early biological effects in children, this study wanted to evaluate children diet style and the level of adherence to MD in over than 1000 children, in relation to their residence, lifestyle, social and family contexts.

### Methods

During the two sampling campaign of the project, a questionnaire was administered to children's parents. The

diet section contained 116 questions, which investigate consumption frequency of different types of food. Total energy load and diet composition in micro and macro nutrients were calculated from consumption frequency and the Italian Mediterranean Index (IMI), ranged from 0 to 10, was calculated taking into account the intake of 6 typical Mediterranean and 4 non-Mediterranean foods. On the basis of IMI score, the adherence to MD was classified as low ( $\leq 3$  IMI score), medium (4-5) and high ( $\geq 6$ ).

#### Results

Diet analysis was computed on 1162 subjects with two complete questionnaires. The body mass index, calculated for each subjects, showed that the 28.9% of the children were overweighted, with some difference between different residence areas. As regards the adherence to MD, the 59.1% of the children were low adherents to MD.

#### Conclusions

The results of this study showed that most of Italian children did not follow MD and that the socio-economic characteristics seemed to not be associated with the diet style.

#### Key messages:

- About 30% of Italian children are overweight
- Most of the Italian children enrolled in the MAPEC\_LIFE project did not follow the Mediterranean diet

### Association between dietary intake of meat mutagens and risk of colorectal adenoma

Liliana Minelli

R Fabiani<sup>1</sup>, L Minelli<sup>2</sup>, P Rosignoli<sup>1</sup>

<sup>1</sup>Department of Chemistry, Biology and Biotechnology, University of Perugia, Perugia, Italy

<sup>2</sup>Department of Experimental Medicine, University of Perugia, Perugia, Italy  
Contact: liliana.minelli@unipg.it

#### Background

A lot of epidemiological studies have indicated that high intake of meat is associated to an increment of colorectal cancer risk. However, the mechanisms behind this effect are still not completely known. One possibility is the involvement of mutagenic and carcinogenic heterocyclic amines (HCAs), which are produced in meat cooked at high temperatures and for long time. Recently, methods have been developed to estimate HCAs exposure in epidemiological studies. Therefore, in the present systematic review and meta-analysis we assessed the association between the intake of different HCAs and the risk of colorectal adenoma, which is a well-established precursor of colorectal cancer.

#### Methods

Relevant studies were identified through PubMed and Web of Science, up to December 2015. Pooled risks were estimated by a random effects model. Heterogeneity and publication bias were analyzed by chi-square based Cochran's Q-I2 statistic and funnel plot asymmetry, respectively.

#### Results

From the 16 articles selected we extracted the OR/RR/HR estimates with 95% confidence intervals for the highest versus lowest category of intake of the following HCAs: DiMeIQx (2-amino-3,4,8-trimethylimidazo[4,5-f]quinoxaline), MeIQx (2-amino-3,8-dimethylimidazo[4,5-f]quinoxaline) and PhIP (2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine). The colorectal adenoma risk was significantly associated with the intake of DiMeIQx (OR: 1.17; 95% CI 1.07-1.23;  $p < 0.0001$ ), MeIQx (OR: 1.16; 95% CI 1.07-1.25;  $p < 0.0001$ ) and PhIP (OR: 1.22; 95% CI 1.15-1.30;  $p < 0.0001$ ). Dose-response analysis is actually in progress.

#### Key messages:

- The dietary intake of meat mutagens (HCAs) increased the risk of colorectal adenoma
- The HCAs formed during the cooking of meat may be responsible for its pro-carcinogenic properties. Changes in

meat preparation practices limiting the production of HCAs may prevent colorectal cancer

### Is reducing salt consumption and replacing it with potassium chloride acceptable for consumers?

Joanna Zajac

M Koperny<sup>1</sup>, R Nizankowski<sup>2</sup>, MM Bala<sup>3</sup>, J Zak<sup>4</sup>, M Seweryn<sup>1</sup>, J Zajac<sup>3</sup>

<sup>1</sup>Province Epidemiological and Sanitary Centre in Krakow, Krakow, Poland

<sup>2</sup>II Department of Internal Medicine Jagiellonian University Medical College, Krakow, Poland

<sup>3</sup>Department of Hygiene and Nutrition Jagiellonian University Medical College, Krakow, Poland

<sup>4</sup>Department of Health Economics and Social Security. Institute of Public Health Jagiellonian University Medical College, Krakow, Poland

Contact: joanna.jankowska@uj.edu.pl

#### Objectives

The study objectives included sensory evaluation and consumer analysis of meat products with different salt content and with replacement of sodium chloride (NaCl) with potassium chloride (KCl).

#### Methods

We designed two studies in Kraków and Olkusz, later outcomes combined for analysis. Participants must have been healthy, not vegetarians and non-smokers. The sensory analysis included two tests – paired samples test and ranking test. In paired samples test participant received two samples of ham and had to indicate which one was more salty (salt content 1.6% with: 99% NaCl and KCl 67% - NaCl 33%); there were seven pairs of samples and the test was done correctly, if participant seven times correctly indicated the same sample as more salty. In ranking test assessors were provided with four ham samples and had to put them in order from the least salty to the most salty (salt concentration 0.8%, 1.1%, 1.3%, 1.6% for NaCl only). Consumer analysis included choosing from two sample of ham (NaCl only and KCl-NaCl) the one more palatable in their opinion.

#### Results

The study included 98 adults, 57% were female. 20 participants properly performed paired samples test and indicated difference in saltiness. Most of the participants (78%) did not feel the difference between NaCl only salt and KCl-NaCl salt.

In ranking test 24 of the participants correctly indicated levels of saltiness in ham samples. 74% of consumers accepted ham with salt concentration lower than 1.6%. In consumer analysis 55% of participants preferred ham with NaCl only, 31% preferred NaCl-KCl ham, 14% did not answer.

#### Conclusions

Consumers do not detect gradual reduction in sodium content in processed food. Potassium chloride is good sodium substitute in ham. Up to 78% consumers in this study did not feel the difference between ham sample with NaCl and KCl. Use of potassium chloride is a solution to reduce sodium content in ham by 30% or more.

#### Key messages:

- Consumers do not detect gradual reduction in sodium content in processed food. Potassium chloride is good sodium substitute in ham
- Up to 78% consumers in this study did not feel the difference between ham sample with NaCl and KCl. Use of potassium chloride is a solution to reduce sodium content in ham by 30% or more

### Determinants of colic vegetable consumption: a population study in Wallonia

Valérie Broers

V Broers, S Van den Broucke, O Luminet

Psychological Sciences Research Institute (IPSY), Université Catholique de Louvain, Louvain-la-Neuve, Belgium

Contact: valerie.broers@uclouvain.be