

# **BOOK OF ABSTRACTS**

3<sup>rd</sup> NUTRITION AND FOOD SCIENCE RESEARCH CONFERENCE

## Table of Contents

Results from the First Culturally-Tailored, Multidisciplinary Diabetes Education in Lebanon: Effects on Glycemic Outcomes and Cardiovascular Risk factors .....	3
Cardiovascular Diseases and Nutrition: the Case of Lebanon.....	3
The Determinants and Dietary Implications of Household Food Waste Generation: The Case of Urban Lebanon.....	5
Vitamin D Receptor Gene Polymorphisms Expression and Serum 25-Hydroxyvitamin D in Lebanese Patients with Cardiovascular Risk.....	6
Determinants of a longer duration of exclusive and mixed breastfeeding and its relationship with infants' and toddlers' health: First nationwide study on daycares in a developing country. ....	7
Micronutrients Intake among Hematopoietic Stem Cell Recipients: .....	8
Result of a Randomized Controlled Trial at Hospital Discharge.....	8
Perceptions and Experiences of Syrian Refugees and Community Workers towards Community Kitchens in Lebanon: A Qualitative Study .....	9
Aflatoxins M1 and Ochratoxin A in Baby Formulae Marketed in Lebanon: Occurrence and Safety Evaluation .....	11
Influence of the extraction system on the organoleptic attributes and physico-chemical quality of olive oil in North Lebanon.....	12
Tracing of Genetically Modified Sequences in Adult and Infant Foods Commercialized in the Lebanese Market.....	13
A novel technique for aflatoxin M1 detoxification using chitin or treated shrimp shells: In vitro effect of physical and kinetic parameters on the binding stability.....	14
Lead, cadmium and arsenic in human milk and their socio-demographic and lifestyle determinants in Lebanon .....	15
The effect of actinobacteria on OTA production and detoxification by <i>Aspergillus carbonarius</i> .....	16
Promoting Evidence-Informed School Policies for Childhood Obesity Prevention in Lebanon through Knowledge Translation, Citizen Consultations and Advocacy .....	17
Tackling Gaps in The Implementation of The Lebanon National Salt Iodization Policy..	19
The Food Security Situation of Syrian Refugees in Lebanon 2017 .....	20

## Results from the First Culturally-Tailored, Multidisciplinary Diabetes Education in Lebanon: Effects on Glycemic Outcomes and Cardiovascular Risk factors

M. Bassil, O. Sukkarieh-Haraty, J. Abi Kharma, L. Egede

*Lebanese American University*

Background: Diabetes self-management education (DSME) is an essential component of lifestyle management needed for diabetes care, and is known to improve glycemic control and reduce cardiovascular risk factors of patients with type 2 diabetes (T2D) (American Diabetes Association [ADA], 2017). According to ADA, effective DSME is multidisciplinary, patient-centered, as well as age and culturally appropriate (ADA, 2017). Despite ranking second in the world in the prevalence of diabetes, there is no reported intervention addressing diabetes self-care in the Arab world. Aims: The aim of this pilot-study was to test the effect of the first culturally-tailored educational program targeting diabetes self-care on glycemia and cardiovascular risk factors of Lebanese patients with T2D. Methods: A sample of 27 adults (Age:  $61 \pm 10$  yrs, 59% M, A1C:  $8.98 \pm 1.38\%$ ) diagnosed with T2D for at least one year was recruited from two dispensaries in Beirut. Participants received culturally-tailored, multidisciplinary educational sessions based on the Information-Motivation-Behavioral model and on ADA's National Standards for Diabetes Self-Management Education and Support. Summary of Diabetes Self-Care Activities (SDSCA), Social Support Scale (SS), Diabetes Fatalism Scale (DFS), and Diabetes Knowledge Test (DKT), as well as blood samples and anthropometric measures were collected at baseline, 3 months and 6 months post-intervention. Results: Various diabetes self-care activities (Diet, SMBG and foot care) showed improvement after 6 months, which was reflected in a significant decrease in glycaemia (HbA1C:  $-0.5\%$ ; FPG:  $-38$  mg/dl;  $p < 0.05$ ). Also, waist circumference ( $107.52 \pm 12.91$  vs.  $106.59 \pm 12.01$ ) and cholesterol/HDL ratio ( $4.45 \pm 1.39$  vs.  $4.06 \pm 1.29$ ) decreased at 6 months post-intervention ( $p = 0.02$ ). Discussion & Conclusion: This is the first intervention study showing the effectiveness of a culturally-tailored, multidisciplinary education program in improving diabetes self-care behavior, glycemic control, body adiposity and blood lipids of Lebanese patients with T2D, and thus reducing the risk for diabetes complications. It sets the stage for larger scale implementation with more representative sample.

## Cardiovascular Diseases and Nutrition: the Case of Lebanon

Lara Nasreddine, PhD

*American University of Beirut  
Department of Nutrition and Food Sciences*

Lebanon, like several other countries of the Eastern Mediterranean Region, is currently witnessing fast rates of development and modernization with concurrent shifts in diet, physical activity and body composition. These shifts and changes are implicated in the multidimensional phenomenon of the nutrition transition, which is characterized by an increase in the intakes of energy, fat, added sugars, and salty foods. Through these distinctive changes in food consumption patterns and practices, the nutrition transition has been linked to the escalating burden of non-communicable-diseases (NCDs) in the country. Recent data have showed that 84% of deaths in Lebanon is attributed to NCDs, with cardiovascular diseases (CVDs) being the largest contributor (45% of deaths). The etiology of cardiovascular diseases is complex and multifactorial, resulting from the interaction of genetics and the environment. Of the environmental mechanisms, diet is recognized as one of the most important factors modulating the risk of CVDs. Our research group has conducted several studies investigating the association between diet and cardiovascular risk factors in Lebanon. Findings have identified high fat, saturated fat, sugar and salt intakes as dietary risk factors in the population and characterized the shift in the diet across time. Cardiovascular risk factors such as obesity, the metabolic syndrome and diabetes, were found to be associated with higher adherence to the “western” dietary pattern while the Lebanese traditional pattern was found to be protective. Findings stemming from this research could catalyze the development of effective interventions and policies for the control of CVDs in Lebanon, orient further studies, and assist policy makers in implementing successful, culture specific prevention strategies. These findings may also be viewed as a case-study for other middle-income countries in similar stages of the nutrition transition.

## The Determinants and Dietary Implications of Household Food Waste Generation: The Case of Urban Lebanon

Ali Chalak, Lara Nasreddine, Mohamad Diab and Mohamad G. Abiad

*American University of Beirut*

Food waste is a topic captivating high interest due to its great impact on food security, the environment, and global as well as regional and national economies. This is no different in the Arab countries, in general, and Lebanon, in specific, where food loss and food waste generated per person may sometimes exceed 200 kg per year. Published literature shows that although there is an increase in the number of institutions and research in this area globally, little is done in developing countries. To the best of our knowledge, the present paper comes as a first attempt to investigate food waste drivers at the household level in a developing country. Accordingly, this study provides nutritional information on food waste in urban Lebanon expressed in terms of weight (Kg) and energy (Kcal) which are in turn explained by socio- economic and behavioral factors. Data was collected using a 7-day food waste diary accompanied by a short questionnaire involving 250 households in Administrative Beirut. The results show that food wasted per capita per day in urban Lebanon contains 451.2 Kcal, 37.5 g carbohydrates, 14.9 g protein, 46.7 mg cholesterol, 2.9 g dietary fiber, 2.4 mg vitamin D, 165.2 mg calcium and 343.2 mg potassium. Moreover, a Tobit model was then applied to assess the influence of socio-demographics and behavioral factors on food waste generation. The model shows that certain factors believed to affect the amount of food waste generated were significant such as owning the premise, spending more on food, number of people in the household, income, planning, buying special offers and preparing a shopping list before going to the store.

## Vitamin D Receptor Gene Polymorphisms Expression and Serum 25-Hydroxyvitamin D in Lebanese Patients with Cardiovascular Risk

Sahar Nakhl, Ghassan Sleilaty, M.D., M.S., Eliane Chouery, PhD, Nabiha Salem,  
Youakim Saliba, PhD, Ramez Chahine PhD, and Nassim Farès PharmD. PhD

*Saint Joseph University*

Introduction: Vitamin D is no longer solely studied for its role in calcium metabolism. Emerging evidence confirms its important role in metabolic pathways in cancer, diabetes mellitus, cardiovascular diseases (CVD) and CVD risk factors, multiple sclerosis, osteoporosis, and dermatitis. Regardless of their effect on calcium metabolism, Single Nucleotide Polymorphisms (SNPs) of the Vitamin D Receptor gene (VDR) have been associated with CVD. In the Mediterranean region, especially the Middle East region there is often a deficiency of vitamin D. Curiously high rates of CVD deaths exist in the MENA region, and CVD and CV risk factors seem to appear more prematurely than in Western populations. Whether VDR affects vitamin D levels and could be a risk factor for CVD is still controversial, and not well elucidated.

Materials and Methods: We examined the association of five SNPs in the VDR gene with 25-hydroxyvitamin D (25[OH]D) levels in patients who have at least one CVD risk factor. Genomic DNA was sequenced for five VDR SNPs (*BsmI* rs1544410; *Apal* rs7975232; *Cdx2* rs11568820; *TaqI* rs731236; *FokI* rs2228570); in 50 Lebanese subjects having hypovitaminosis D with at least one documented CVD risk factor, aged 18 years or more. The collected variables were serum levels of 25 OH vitamin D, HbA1c, fasting plasma glucose, triglycerides, LDL cholesterol, and total cholesterol.

Results: *BsmI*, *Apal*, and *TaqI* were fairly to highly intercorrelated. *Cdx2* was less frequent than expected. With respect to number of mutations in *FokI*, levels of 25 OH D were  $11.2 \pm 5.5$  ng/ml in the absence of mutations,  $12.6 \pm 4.7$  ng/ml in the presence of 1 mutation and  $16.5 \pm 5.5$  ng/ml in the presence of 2 mutations.

Conclusion: *FokI* polymorphism is more frequent in Lebanese subjects with cardiovascular risk factors than in the general Caucasian population.

## **Determinants of a longer duration of exclusive and mixed breastfeeding and its relationship with infants' and toddlers' health: First nationwide study on daycares in a developing country.**

Lama Mattar, Maria Hobeika, Jana Taouk, Ghiwa Haddad, Lara Yazbeck, Rouba-Karen Zeidan, Pascale Salameh, Carine Issa

*Nutrition Department, Faculty of Public Health II, Lebanese University*

**Background:** Breastfeeding rates continue to decrease dramatically in Lebanon. Current literature lacks studies addressing a possible relationship between the duration of breastfeeding and health outcomes in infants and toddlers in Lebanon a developing country, while strictly applying the WHO definition of exclusive breastfeeding. The aim of this study is to investigate the determinants of both exclusive and total breastfeeding durations and the relationship with health outcomes in infants and toddlers aged between 12 months and 36 months, recruited from daycares across Lebanon and to discuss potential intervention strategies.

**Methods:** The following study has a retrospective and cross-sectional design. 1051 survey that was administered to mothers having a toddler attending daycare, aged between 12 and 36 months. The sample is nationwide and representative of toddlers aged between 12 and 36 months enrolled in daycares.

**Results:** This representative survey of toddlers attending daycares all over Lebanon shows that the mean age of formula introduction was 2.03 ( $\pm 3.22$ ) months, and half of the toddlers (51.6%) were exposed to formula milk the first day after birth. The median of exclusive breastfeeding duration was 0.5 months (15 days). Exclusive breastfeeding (BF) was initiated at a mean of 10.56 ( $\pm 27.12$ ).

Longer durations of exclusive and total breastfeeding were associated with several socio-demographic and behavioral factors of parents and to various birth-related conditions. The duration of exclusive breastfeeding was significantly associated with a lower frequency of pediatrician visits, antibiotic prescriptions, absence from daycare, a lower risk of otitis, colic and UTI occurrence. Similarly, the duration of total breastfeeding was significantly associated with less antibiotics prescriptions, a lower risk of otitis occurrence

**Conclusions:** Our study highlights simultaneously various health benefits of breastfeeding on toddlers attending daycares in Lebanon, a middle income country. To address low BF rates, there is an urgent need to act at a system level through the implementation and enforcement of policies and at a community level to raise awareness and create a supportive environment for breastfeeding, involving various stakeholders and of course mothers.

## Micronutrients Intake among Hematopoietic Stem Cell Recipients: Result of a Randomized Controlled Trial at Hospital Discharge

Batoul Manana, LD; Jana Jabbour LD, MPH; Ali Bazarbachi, MD, PHD ; Didier Blaise MD and Jean El-Cheikh MD.

*American University of Beirut Medical Center*

**Background:** Among hematopoietic stem cell transplant (HSCT) patients, micronutrient profile is altered due to increased excretion, decreased intake, and increased need of some nutrients. The nutrition care in HSCT is focused on meeting energy and protein needs with minimal attention to micronutrient needs. We aimed to assess adequacy of vitamins and minerals intake among HSCT patients in the peri-transplant phase.

**Methods:** This is a randomized control trial approved by the Institutional Review Board. Patients admitted to undergo HSCT at the American University of Beirut Medical Center were invited to join the study. Assessment points were at admission for transplant, at hospital discharge, and at days 30, 60, and 100 post HSCT. Study participants (n=46) were randomized at hospital discharge into intervention group (IG, n=22) and control group (CG, n=24). IG received standardized meal plan and nutritional counselling at the assessment points post hospital discharge aiming at optimizing energy and protein intake while CG received the standard of hospital care. At assessment points, the intake of patients was monitored, and 24-hour recalls were collected and analyzed via Nutritionist Pro® software. Data was analyzed by age and gender based on the dietary reference intake (DRI) values and results were reported as percentages of DRI.

**Results:** The IG participants were of median age (years) of 52 vs. 39 in CG (p=0.15), both groups had more males, 15 (68%) in IG and 15 (63%) in CG. Results post hospital discharge showed alarmingly low intake levels of vitamin D in both groups at all assessment points; median intake was below 18% DRI in IG and 23% DRI in CG. At all assessment points, median vitamin E intake remained below 70% DRI in IG and 40% DRI in CG. The intake of many micronutrients showed a significant improvement at day 100 post HSCT compared to hospital discharge in the IG. Intake was statistically better for beta carotene, vitamins K, B2, B12 and C and for Zinc, Potassium, Phosphorous, magnesium, manganese and iron in IG. Changes in CG were of a lower magnitude. Fiber intake was better in IG but did not reach 100% of needs at all assessment points.

**Conclusion:** This study fills a research gap by providing an overview of nutrients intake among HSCT patients in the peri-transplant phase. Results showed that nutrition counseling improves intake of some micronutrients, while some remains at risk in both control and intervention groups.

**Trial Registration:** [clinicaltrials.gov NCT02791347](https://clinicaltrials.gov/ct2/show/study/NCT02791347), June 2016.

**Conflict of Interest:** The authors report no conflict of interest.

**Keywords:** Hematopoietic Stem Cell Transplantation, Nutrition Counseling, Micronutrients.



## Perceptions and Experiences of Syrian Refugees and Community Workers towards Community Kitchens in Lebanon: A Qualitative Study

Nadiya Ibrahim, Gladys Honein, Giuliano Martiniello, Shady Hamadeh, Lamis Jomaa

*American University of Beirut*

**Background:** The Syria crisis and the huge influx of refugees to Lebanon since 2011 have greatly impacted the food and nutrition security status of both the Syrian Refugees (SRs) and the Lebanese host communities. Community Kitchens (CKs) represent one of the humanitarian interventions that were employed in Lebanon in order to respond to the needs of vulnerable Lebanese populations and SRs. CKs are defined as kitchens in which small groups of people meet regularly to prepare one or more meals together. Within the development literature, CKs have not been extensively studied as a food aid modality within a protracted refugee crisis neither have they been examined as a tool to contribute to the development of rural communities taking into consideration the women's perspective.

**Study aim and objectives:** This study aims to explore the CKs as a model for food assistance in a protracted crisis context and as an initiative for local development of rural communities in Lebanon. The objectives of the study were to: 1-examine the perceptions, experiences and attitudes of SRs and women working in CKs in four regions of Lebanon (Minyara, Zahle, Tripoli, and Khiara); 2-highlight the role of gender in configuring those experiences, perceptions, and attitudes for both groups; and 3-explore the role of these kitchens in empowering women in rural and impoverished communities of Lebanon. A Qualitative Descriptive (QD) approach was adopted to fulfill the purpose of the study and Focus Group Discussions (FGDs) were conducted to collect data from SRs and Community Workers (CWs) in the four kitchens.

**Results:** A total of eight FGDs were conducted: four focus groups with CWs and four focus groups with SRs. A total of 16 themes emerged from these discussions, nine of which were depicted from FGDs with CWs and seven from focus groups with SRs. Major themes with CWs were: motivation for joining the CKs, impact of these kitchens on the women and their families, the effect of halting these CKs, the perception of the families of CWs and society towards CKs, and the sustainability of kitchens beyond the grant period.

As for discussions with SRs, they led to the following major themes: impact of receiving CK services, perception towards CKs, and interest in initiating SR-led kitchens. Findings from this study showed that CKs have contributed to decreasing the tension among the Syrian and Lebanese women who worked within the same kitchens and resulted in fostering unity and equality among the SR community within the Informal Tented Settlements (ITSs). Findings have also showed that CWs were empowered through contributing financially to their households, being given autonomy in food preparation-related tasks within the kitchens, and providing services that benefit their communities at large. However, the success of CKs in empowering the CWs to their full potential so as to sustain the kitchens beyond the grant period was questionable. In addition, CWs emphasized the acceptability of the society towards this type of work and the potential of expanding such a food aid

modality to be an opportunity to empower other women and for the development of their rural communities. Fewer women from the SR beneficiaries' communities were involved in the CKs. They were mostly recipients of this food aid and were not empowered to develop similar projects within their local communities.

Conclusion: Our study has shown that the CK modality implemented in Lebanon is a successful model for alleviating food insecurity and fostering social cohesion. It is also a promising model for empowering local women and promoting the development of rural communities in Lebanon. Future studies need to further examine the longer impact and sustainability of these kitchens and explore their role in women empowerment and in the development of rural communities. In addition, research in this area needs to take into consideration the viewpoints of community members and other key stakeholders involved in the planning, implementation, and funding of these projects.

## Aflatoxins M1 and Ochratoxin A in Baby Formulae Marketed in Lebanon: Occurrence and Safety Evaluation

Hussein F. HASSAN, Hani Dimassi and Joumana El Aridi

*Lebanese American University*

Aflatoxin M1 (AFM1) and ochratoxin A (OTA) are hepatotoxin and nephrotoxin mycotoxins, respectively. Infants are considered a vulnerable population group more susceptible to mycotoxin exposure than adults. A plethora of studies have shown that cereals tend to be contaminated with mycotoxins and since infant formulas are based on cereals, they are a potential risk for children's health. An investigation on the occurrence of AFM1 and OTA in baby formulae marketed in Lebanon was conducted. A total of 42 brands were collected in two different production dates during 2017 and analyzed for AFM1 and OTA using competitive-enzyme-linked immunosorbent assay. Mean ( $\pm$ standard deviation) of AFM1 and OTA were  $62.9 \pm 4.1$  ng/kg and  $0.72 \pm 0.19$   $\mu$ g/kg, respectively. In terms of AFM1, level of contamination ranged between 8 and 141 ng/L; 37 (88%) brands had a level above the EC limit (25 ng/kg). In terms of OTA, level of contamination ranged between 0.0 and 1.91  $\mu$ g/kg; 29 (69%) brands had a level above the EC limit (0.5  $\mu$ g/kg). Twenty four (57%) brands had both AFM1 and OTA levels above EC limits. There was a significant ( $p < 0.05$ ) difference in AFM1 and OTA levels among 37 (88%) brands and 14 (33%) brands, respectively, compared to the average of all others. On the other hand, there was a significant ( $p < 0.05$ ) difference between production dates for AFM1, but not for OTA. No significant ( $p < 0.05$ ) difference was found between fall/winter and spring/summer for both AFM1 and OTA. This study is the first-of-its-kind concerning the safety assessment of infant formulas regarding mycotoxins in Lebanon.

Keywords: infant formulae, AFM1, OTA, mycotoxins, ELISA, Lebanon

## Influence of the extraction system on the organoleptic attributes and physico-chemical quality of olive oil in North Lebanon

Jessy Mattar and Mireille H. Serhan

*University of Balamand*

In order to define the authentication parameters of olive oil in Northern Lebanon, three districts were chosen: Batroun, Koura and Zgharta. From each district, five olive orchards cultivated with the local variety named “Baladi”, and without complementary irrigation were selected according to their altitude. Three periods of harvest were done in the fifteen olive orchards, once every two weeks.

This research studies the effect of the extraction system and the production area on the physicochemical and organoleptic attributes of olive oil (n=25) from five different North Lebanese districts. Analysis of the extraction system’s (pressure and three-phase) influence on the parameters determined presented statistical significant differences for acidity, peroxide index, K270, refractive index and oxidative stability. Olive growing area influenced olive oil fatty acid profiles and carotenoid levels, in which high altitudes produced oils with low saturated fatty acids and high unsaturated fatty acids. Total phenolic content was not influenced by neither the extraction systems or by the production area. Oxidative stability showed positive significant correlation with some parameters. Results from the sensory analysis showed general overall liking in the oils extracted by automated means. The effect of altitude and extraction methods was examined through tasting sessions conducted by trained and untrained panelists. The results appeared to confirm that the olive oil samples from Zgharta region had the highest quality of oil when analyzing appearance, texture, flavor and overall liking whereas Koura had the lowest quality.

Keywords: *Baladi* olive oil, Extraction system, Physicochemical parameters, Organoleptic attributes, Lebanon.

## Tracing of Genetically Modified Sequences in Adult and Infant Foods Commercialized in the Lebanese Market

Said J, Saad P, Al-Sayegh F, Mallah N, Abou-Sleymane G

*American University of Science and Technology*

With the advancement of biotechnology, plant breeders are attracted by the improvement of crops through genetic modifications, not aware of the potential consequences on the environment and human health [1-2]. Crops are being genetically modified (GM) and used in food production; this raises international conflicts and concerns regarding the impact of GM foods on human health in general, and on infants in particular.

Lebanon imports most of its food products from GMOs producing countries [3] and with the absence of GMOs legislations in the country, our research group has shown high quantities of GMOs in soybean feed imports [4], suggesting that GMOs are present in the food chain as well.

Accordingly, 70 adult and 48 infant food products were collected based on a representative scheme. DNA extraction was done using the CTAB extraction protocol [5]. The detection of the most frequently used transgenic sequences, p35S and T-Nos [6], was performed using conventional and Real-Time PCR. Surprisingly, 80% and 13% of adult food samples were positive for p35S and T-nos respectively. Moreover, 86% and 41% of infant food samples were positive for the same transgenic elements respectively. More interestingly, the results showed the presence of GMOs in some products labeled as organic. These sequences were detected in soybean, maize, rice, wheat, potato, tomato and quinoa samples. Further analysis is therefore being conducted on those samples.

The findings of this study strengthen the need for GMOs testing to monitor their status in Lebanon and aid in the development of corresponding regulations to protect consumer's rights in making an informed choice.

## **A novel technique for aflatoxin M1 detoxification using chitin or treated shrimp shells: In vitro effect of physical and kinetic parameters on the binding stability**

Jean claude Assaf; André El Khoury ; Ali Atoui ; Nicolas Louka ;  
Ali Chokr

*Saint Joseph University*

This study aimed to investigate potential ability of chitin and treated shrimp shells to bind aflatoxin M1 (AFM1) in liquid matrix. Several concentrations of chitin or shrimp shells (grinded and ungrinded) were incubated in AFM1-contaminated phosphate-buffered saline (PBS) at different incubation times and temperatures. The unbound AFM1 was then quantified by HPLC. The stability of the formed adsorbent-AFM1 complex was also tested in milk. Thereby, the percentages of the initial bounded AFM1 varied between 14.29 % and 94.74 %. Interestingly, in milk, an increase in incubation time coupled with a decrease in temperature affected positively the amount of bounded AFM1 to chitin and negatively those bounded to ungrinded shells. Results also revealed a partial reversibility in the binding of AFM1 to these adsorbents. These findings provided strong evidence on ability of chitin and shrimp shells by-product to bind AFM1 in milk and PBS.

## Lead, cadmium and arsenic in human milk and their socio-demographic and lifestyle determinants in Lebanon

Maya Bassil, Farah Daou, Hussein Hassan, Osama Yamani, Joelle Abi Kharma, Zouheir Attieh, Jomana Elaridi

*Lebanese American University*

**Introduction:** Exposure of newborns to toxic metals is of special interest due to their reported contamination in breast milk and potential harm. The aim of this study was to assess the occurrence and factors associated with lead, cadmium and arsenic contamination in breast milk collected from lactating mothers in Lebanon.

**Methods:** A total of 74 breast milk samples were collected from primiparas according to guidelines set by the World Health Organization. A survey was administered to determine the demographic and anthropometric characteristics of participating lactating mothers. Dietary habits were assessed using a semi-quantitative food frequency questionnaire. The milk samples were analyzed for the presence of arsenic, cadmium and lead using microwave assisted digestion and atomic absorption spectrophotometry.

**Results:** Arsenic contamination was found in 63.51% of breast milk samples (mean  $2.36 \pm 1.95$   $\mu\text{g/L}$ ) whereas cadmium and lead were detected in 40.54% and 67.61% of samples respectively (means  $0.87 \pm 1.18$   $\mu\text{g/L}$  and  $18.18 \pm 13.31$   $\mu\text{g/L}$ ). Regression analysis indicated that arsenic contamination was associated with cereal and fish intake ( $p = 0.013$  and  $p = 0.042$  respectively). Residence near cultivation activities ( $p = 0.008$ ), smoking status before pregnancy ( $p = 0.046$ ), potato consumption ( $p = 0.046$ ) and education level ( $p = 0.041$ ) were associated with lead contamination. Cadmium contamination was significantly associated with random smoke exposure ( $\beta: 242$ ;  $p = 0.002$ ).

**Conclusion:** Our study is the first in Lebanon to report toxic metal contamination in breast milk. Although estimated weekly infant intake of these metals from breast milk was found to be lower than the limit set by international guidelines, our results highlight the need for developing strategies to protect infants from exposure to these hazardous substances.

## The effect of actinobacteria on OTA production and detoxification by *Aspergillus carbonarius*.

Anthony El Khoury, Pr. Richard Maroun, Dr. Andre Khoury, Dr. Ali atoui.  
*Faculty of sciences, Saint Joseph University*

Ochratoxin A (OTA) is a fungal secondary metabolite classified as one of the most harmful mycotoxins to human health. It is produced by several species of filamentous fungi belonging to the *Aspergillus* and *Penicillium* genera. *A. carbonarius* being the most preoccupying producer of OTA in grapes and viticulture products. Traditional methods of prevention are currently limited to the use of fungicides. However, these practices are suspected to be harmful to the environment and human health. Therefore, strategies of biological control are sought as a solution to this problem. In this context, the use of actinobacteria, known as ubiquitous microorganisms belonging to different ecological niches, presents a great interest. This work primarily consists on identifying strains of actinobacteria that are capable of reducing OTA contamination in co-culture with *A. carbonarius*. Secondly, this work aims to characterize by RT-qPCR the molecular mechanism of action of these bacterial strains as well as highlighting their potential OTA-degrading and the OTA-adsorbing properties of their cell walls. Three actinobacterial strains (SN7, PH1 and ML5) revealed a marked reduction of Ochratoxin A concentration in medium by 77, 69 and 67 % respectively without a significant decrease of fungal growth. The SN7 strain was further examined for its effect on the expression of genes directly and indirectly involved in OTA production. The presence of this strain has reduced the expression of the currently known OTA cluster genes (pksOTA, nrpsOTA and halOTA) by 93%, 90% and 85% respectively. This is also accompanied by a mechanism of enzymatic degradation reaching 35% as well as a bacterial cell wall adsorption mechanism of 18%. Therefore, actinobacteria represent a promising route for developing biological control tools against Ochratoxin A.

Keywords: Ochratoxin A, *Aspergillus carbonarius*, actinobacteria, mechanism of action, genetic modulation.



## Promoting Evidence-Informed School Policies for Childhood Obesity Prevention in Lebanon through Knowledge Translation, Citizen Consultations and Advocacy

Rana Saleh, Rima Nakkash, Fadi El-Jardali  
*American University of Beirut*

Background: Childhood overweight and obesity in Lebanon has reached an alarming level of 34.8%; of which, 13.2% are obese. Currently, it is one of the highest percentages in the Eastern Mediterranean Region and has increased by approximately two folds in the past decade. Existing policies addressing this public health problem in schools are top-down, weak, fragmented and poorly implemented. This presentation outlines the work of the Knowledge to Policy- K2P-Center to push for the adoption of Evidence-Informed Policies by the Ministry of Education and Higher Education at the school level to prevent childhood obesity in Lebanon through Knowledge Translation (KT), citizen engagement and advocacy.

Methods: While applying the knowledge translation framework, we : 1) developed a Policy Brief, a KT tool, for effective school policies for childhood obesity prevention based on high quality international, regional and local evidence along with 10 key informant interviews with key stakeholder and decision makers, 2) conducted and evaluated 4 Citizen Consultation meetings in different Lebanese governorates to contextualize the policies, 3) implementing and evaluating an advocacy strategy to set the issue on the policy agenda and 4) holding a national Policy Dialogue with key stakeholders and decision makers for policy adoption. The final two steps are still ongoing and scheduled to be completed by May 2018.

Results: 1) A Policy Brief with two comprehensive policy elements on effective school policies for childhood obesity prevention was developed based on the international literature. The key informant interviews led to the contextualization and adaptation of the international literature on the policy elements to the local context. Element 1 includes: controlling the standards, availability, accessibility, affordability and marketing of the food and drinks in the canteens, vending machines and school cafeterias. It encompasses: a- banning sweetened beverages and reducing portion sizes, fat content and frequency of selling unhealthy snacks and competitive foods; b- Increasing the availability and accessibility of fresh fruits and vegetables, water and healthy snacks and reducing their prices in schools; c- Setting nutritional guidelines and providing school meals; d- Strict control of marketing and sponsorship by the private food sector. Element 2 includes: Incorporating nutrition and physical activity programs in the school curricula through: a- Integrated school curriculum with nutrition behavioral change programs; supported with extra nutrition, healthy eating and life skills sessions, b- Integrated school curriculum with physical activity education supported by extra physical activity sessions and opportunities; c- Support for the parents and teachers with knowledge and skills on how to approach children to be more active, eat healthy, and decrease screen time.

2) Four Citizen Consultation meetings across four Lebanese governorates, with 71 citizens from various backgrounds, resulted in the contextualization of the elements and the identification of key implementation considerations needed to enhance the uptake and implementation of the identified policy elements. Pragmatic barriers

were identified with their potential counterstrategies to ensure the impactful implementation of the elements. Around 90% of the participants in the citizen consultation meeting thought that it was successful in using the research evidence in a user-friendly manner to inform policy action. Furthermore, the participants thought that the citizen consultation can support in setting the issue on the policymakers' agenda (61%), allow for joint decision making (66%) and almost all participants wanted to be involved in further advocacy efforts on the issue. 3) An advocacy strategy was implemented across the initiative based on an advocacy framework previously developed at the center. As a result, an impact team was formed to decide on the roadmap needed to set the issue on the agenda of the policymakers, the influencers and the public. A number of different advocacy tactics were effective in influencing policymakers and influencers such as lobbying and media advocacy. Whereas the media advocacy (through audio-visual, written and social media) proved to be effective in reaching the public and influencing them to act upon this priority issue. 4) A Policy Dialogue convened key policymakers and decision makers to discuss the policy elements and their role in its uptake. The policy dialogue highlighted the importance of developing a legally binding law for school nutrition with sanctions to enforce it across both public and private schools. The stakeholders also discussed the importance of developing a coordinated implementation and monitoring plan across different actors to ensure consistent and effective implementation of the recommended policy elements.

Conclusion: Influencing health policy and decision making around the issue of childhood obesity prevention requires an integrated KT approach with KT tools, Citizen Engagement and advocacy as necessary steps for completing the policy cycle and adopting the preventative policies. While the Policy Brief promotes national evidence-informed policies, the Citizen Engagement strategies provide citizens with an opportunity to inform and influence the policy-making process based their values and needs. Advocacy strategies serve as a facilitator to set the issue on the policy agenda and to ensure the uptake of the policies. Finally, the policy dialogue serves as a platform for constructive deliberation among key stakeholders on the factors needed for the coordination of efforts for effective uptake, implementation and monitoring of the policies at the national level. This approach can inform other Non-Communicable Disease prevention efforts in influencing the policy and decision making process.

## Tackling Gaps in The Implementation of The Lebanon National Salt Iodization Policy

Chaza Akik, Carla El-Mallah, Fadi El-Jardali, Michael Zimmermann, Hala Ghattas,  
Omar Obeid

*American University of Beirut*

Despite a universal salt iodization law in Lebanon, a recent nationally representative study highlighted that the median urinary iodine concentration in schoolchildren was only 66 µg/L and almost 75% of 6 to 10 year old schoolchildren have mild iodine deficiency. As a result, identifying and addressing the existing gaps in the implementation of the salt iodization process became a crucial necessity. Herewith, we document the knowledge translation process initiated by researchers together with an international non-governmental organization, and its subsequent impact. In collaboration with the Knowledge to Policy (K2P) Center, a policy brief was developed to synthesize the local and international evidence and viable policy options. Despite a mandatory salt iodization law issued by the Lebanese government, implementation barriers including loopholes in the law, outdated infrastructure and capacity of salt producers were identified. The law was also poorly evaluated and monitored by the relevant authorities. Three policy options to address the issue were put forward 1) amending the law; 2) strengthening implementation of salt iodization by ensuring adequate standards, infrastructure and capacity; and 3) monitoring and evaluating the implementation of the law at the production, retail and consumer levels by building an efficient system for routine data collection. The policy brief was shared with relevant stakeholders and a national policy dialogue took place. Based on the policy deliberations, the following recommendations were put forward and implemented: (1) the Ministry of Public Health issued a ministerial decree providing clarifications on the existing law, including standards and mechanisms for monitoring and evaluation; (2) with support from international actors, salt producers were trained on monitoring protocols; (3) a one-year supply of potassium iodate for fortification has been guaranteed by the United Nations Children's Fund.

Once all actions are in place, program evaluation will be done at one year post-implementation through a market analysis of salt samples and the reassessment of national level iodine status. However, further engagement from governmental authorities is needed to develop mechanisms to ensure sustainability of external monitoring and overcome structural barriers salt producers encounter in importing potassium iodate.

This work was funded by the Iodine Global Network and supported by the K2P Center.

## The Food Security Situation of Syrian Refugees in Lebanon 2017

Maria Rehaime

### *UN-World Food Programme*

Lebanon hosts the second-largest population of Syrian refugees in the region, and the highest per capita population of refugees in the world with around one million registered refugees within its borders. Since the first assessment in 2013, the Vulnerability Assessment of Syrian Refugees in Lebanon (VASyR) has been key in providing a multi-sectoral overview and update on: shelter, protection, health, assistance, food security, nutrition, education and water, hygiene and sanitation. In 2017, and in its fifth edition, the VASyR surveyed a representative sample of 4,966 UNHCR-registered Syrian refugee households in order to identify situational changes and trends. The World Food Programme leads on indicators related to food security and infant & young child feeding practices. The study measures food security through a composite indicator comprising of the Food Consumption Score (FCS) which is a weighted Dietary Diversity score, the Coping Strategies Index and percent expenditures on food. The assessment also examined infant and young child feeding (IYCF) practices in Syrian refugee households and compared to the minimum dietary diversity and food frequency for this age group as recommended by the WHO. Information was collected on 1,433 children aged 6-23 months and 464 infants under six months old.

As an overview, VASyR results demonstrate that the economic vulnerability has worsened, with more than half of refugees living in extreme poverty, and that food insecurity rates are stable, but remain high. Over one third of Syrian refugee households reported borderline to poor food consumption; 38% in 2017, compared to 32% in 2016; where only 9.1% of young children were fed the minimum diet diversity. Important successes, however, have been achieved over the past year. Cash programmes have scaled up, a Common Card cash system has been put into place, significant strides were made in primary school education, and targeting has improved the ability to identify and support the most vulnerable refugee households in Lebanon.