

#### P146-21

##### FACTORS ASSOCIATED WITH BOTTLE FEEDING PRACTICES IN PAKISTAN

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**RATIONALE:** Research has shown that there is a statistically raised risk of not breastfeeding for all-cause mortality in infants aged <2 years. Demographic and Health Surveys (DHS) data can be used to identify the factors associated with high bottle-feeding.

**OBJECTIVE:** To identify the socio-demographic characteristics and other factors associated with bottle-feeding rates in Pakistan.

**METHODS:** Pakistan DHS 2006-07 data was used. The bottle-feeding rate is defined as the proportion of children <24 months of age who were receiving any food or drink from a bottle in the last 24 hours. A total of 3103 children, aged <24 months and living with their mothers were selected. A multilevel modeling was used to estimate the association of community-level factors with bottle-feeding.

**RESULTS:** Out of 3103,997 [32.1%] children were bottle-fed. Higher maternal education [OR 2.74], higher paternal education [OR 1.41], >4 antenatal care visits [OR 1.93], delivery at health facility [OR 2.00], caesarean section delivery [OR 2.08], highest socio-economic status [OR 2.41] and urban area [OR 1.71] increased the likelihood of a woman to bottle-feed her child. Conclusion: To decrease bottle-feeding practices strategies should target - urban women and higher socio economic strata.

#### P146-22

##### DETERMINANTS OF EXCLUSIVE BREASTFEEDING AMONG HOSPITALIZED INFANTS

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**RATIONALE & OBJECTIVE:** The low exclusive breastfeeding rate in Bangladesh (43%, 2007) indicates the need for a study finding the determinants to take appropriate measures.

**MATERIALS & METHODS:** A case control study was undertaken in 180 mothers and infants. The data was collected of socio-economic condition, reproductive history, feeding practice, history of disease, awareness about breastfeeding and pre-lacteal feeding of the mothers.

**RESULTS & FINDINGS:** Mothers aged less than 20 years had 11% more exclusively breastfed babies where as more than 20 years mothers had less infants (11%) exclusively breastfed. 67.8% of exclusively breastfeed and 50% non- exclusively breastfeed mothers received advice on breastfeeding during pregnancy

**CONCLUSION:** Younger aged mothers and those who received antenatal counseling on breastfeeding had more success in exclusive breastfeeding.

#### P146-23

##### CONDITIONS OF HEALTH AND NUTRITION OF CHILDREN OF BLACK COMMUNITY

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This work was the desire to know the conditions of health and nutrition of children of black community in Brazil. The sample had a total of 18 families and 33 children. The information was investigated on the socio-economic conditions of the family, and conditions of child health (nutritional status, diseases of childhood, food, health care). Data was also raised of the current situation of that community as autoidentificada, estimated population, economic activity, culture, sanitation and there is schools, health posts, church, electricity, public phone and associations. After examination it was found that the health conditions of children of 0-5 years is compromised and influenced by socio-economic condition of families and the precarious situation of medical and health care in Jacarequara since it came out of early breastfeeding, had short stature for age characterizing chronic malnutrition, the health care in illness is done mostly with alternative resources, the power is inadequate for the growth and development with low intake of protein, vitamins and minerals, important nutrients in childhood and most of them reside in homes with poor sanitary conditions and are vulnerable to illness.

#### P146-24

##### BREASTFEEDING PATTERN AND NUTRITION STATUS OF LACTATING MOTHER IN INDONESIA

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**RATIONALE AND OBJECTIVE:** The relationship between nutrition status of lactating mother and breastfeeding pattern is still controversial. The outcome of breastfeeding is not just for infant's health but also for the mother's health especially their nutrition status. Information about breastfeeding pattern and nutrition status of lactating mother are important to determine intervention programmed to lactating mother. In Indonesia, most mothers give partially and predominantly breastfeed. This study aims to know the relationship of breastfeeding pattern and nutritional status of lactating mother.

**MATERIAL AND METHOD:** We analyzed data from National Baseline Health Research (BHR) 2007-2008, and National Economics Survey (Susenas) 2007, using data breastfeeding pattern, age, parity, nutrition consumption, activity, and infection diseases of 20272 lactating mother using multiple logistic regression analysis.

**RESULT AND FINDING:** Breastfeeding pattern for infant 0 – 5 months does not significantly relate to nutrition status of lactating mother ( $P > 0,05$ ). Breastfeeding pattern for infant 6 – 23 months significantly relate to nutrition status of lactating mother ( $P < 0,05$ ) controlled by age, parity, nutrition consumption, activity, and infection diseases.

**CONCLUSION:** After six months, a nutrition program is needed for lactating mothers.

#### P146-25

##### MALNUTRITION AT EARLY STAGES AND ESSENTIAL MICROELEMENTS DEFICIT AMONG CHILDREN WITH CHRONIC INFLAMMATORY STOMACH AND DUODENUM DISEASES

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**RATIONALE & OBJECTIVES:** Nutrition is one of the main sources of microelements. To estimate the status

of microelements, the role of malnutrition in essential microelements (EME) supply among children.

**MATERIALS & METHODS:** The concentration of EME (zinc, iron, copper) in blood serum was investigated in 330 children aged 3-7 years with chronic inflammatory stomach and duodenum diseases, the nutrition was analyzed by the retrospective method. Attributive risk was calculated (AR), Spirmen correlation (R).

**RESULTS & FINDINGS:** It was discovered that zinc below the norm (81%) occurred more often than copper (44%,  $p=0,0001$ ) and iron (20%.  $p=0,0001$ ). Mother's poor nutrition during pregnancy increased the risk of zinc deficit development (AR=22%,  $p=0,04$ ), of copper (AR=75%,  $p=0,03$ ). Malnutrition at the first year of baby's life is interconnected with EME supply at preschool age: supplemental feeding at early stages with low content of zinc (R=0,54,  $p=0,03$ ), copper (R=0,43,  $p=0,03$ ); the usage of unspecialized milk formula – with iron deficit (R=0,43,  $p=0,03$ ).

**CONCLUSION:** Malnutrition at early stages, beginning with intrauterine life, contributes to EME deficit.

#### P146-26

### OBSTACLES TO EXCLUSIVE BREASTFEEDING PROMOTION IN HEALTHCARE FACILITIES IN THE CITY OF NIAMEY, NIGER: HEALTH PROFESSIONALS' OPINIONS

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Attitudes and medical norms are among the factors that determine the type of breastfeeding mothers choose. Mothers are also influenced by the advice given by health professionals (HP). The aim of this qualitative exploratory study was to document HPs' attitudes and practices with respect to the promotion of exclusive breastfeeding (EBF) in the city of Niamey, Niger. Direct observation of HPs' practices in frontline public healthcare facilities (HF) were followed by discussion groups with HPs working in HFs: nurses, midwives, social workers and doctors/pediatricians. The results indicate that HPs have a positive opinion of EBF but this is not reflected in their practices. The discrepancy appears to be due to mainly structural obstacles. Action is needed to improve EBF promotion in hospitals. Future research should focus on looking for ways to help health promoters working with HPs and decision-makers to succeed.

#### P146-27

### EVALUATION OF THE KNOWLEDGE AND THE PRACTICES OF THE MOTHERS CONCERNING

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**INTRODUCTION:** Breastfeeding (BF) is the most natural and most adapted mean for the infant nutrition supply. Several national and international authorities recommend exclusive breastfeeding until infant is 6 months. In Morocco, it is considered as a problem of public health because according to the last survey (investigation) ENIMSJ (2006), the "exclusive BF until 6 months" fell to 15%.

**OBJECTIVES:** To determine in a population of BF mothers: 1- The markers of difficulty of the premature BF establishment; 2- The various factors which hinder the pursuit of the BF.

**METHODOLOGY:** A sample of 186 women who have just given birth and who use the BF was selected in 15 maternity hospitals of 15 provinces covering the totality of the national territory. A questionnaire was established for the collection of the relative data in: The delivery, the state of the newborn child in the birth, the advices on the breast-feeding in room of delivery, the advices on the breast-feeding in continuation of layer, the practices and the knowledge of the mothers in

breast-feeding, the difficulties in the stake in the breast and the evaluation of the IBFAT score.

**RESULTS:** Concerning the 186 women: 1- 85 % of the pregnancies were followed; 2- 21 % of the women received breast-feeding advices in antenatal; 3- premature breastfeeding was practiced by 4,3 % of the women while 49 % knew that it was necessary to breastfeed within the hour after the childbirth; 4- 34,4 % of the women had received breast-feeding advices by a health professional in the consequences of layers and 15 % had received a practical assistance to breast-feed their children; 5- 49,2 % of the newborn children received other liquids than the maternal milk (herb tea more than 80 % of the cases) among which 50 % before the first sucking and 50 % after the first milky rise; 6- 29 % of the women had difficulties during the stake in the breast (27,8 % pains of nipples, 24,1 % refusal of breast by the child, 22,2 % flat nipple or umbilicated, 20,4 % milky incapacity); 7- The analysis of the state of the milky rise showed an unchanged state in one 1/3 of the cases and a light modification in 40 % of the cases while a considerable increase was registered in 16 % of the cases; 8- The position during the stake in the breast was correct in 49 % of the cases, the grip was it only in 43 % and the suction was effective in 55 % of the cases; 9- The distribution of the newborn children according to the IBFAT score objectified difficulties in 58 % of the cases.

**CONCLUSION:** The evaluation of the markers of difficulty relative to the starting up and to the driving of the BF shows incapacity as well at the level of the practices as the knowledge in the BF and as the involvement of the health staff is very modest. Therefore, training, information and sensitization initiatives have to target as well the mothers as health professionals to involve them of the promotion and the support of the breast-feeding advantages.

#### P146-28

### FOOD-BASED INTERVENTIONS FOR OPTIMAL HEALTH AMONG CHILDREN UNDER FIVE YEARS AND WOMEN IN RONGO DISTRICT, KENYA

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**BACKGROUND:** Study after study has demonstrated that certain foods have been credited with the power to heal. This fact is not only based on scientific evidences but also on traditional beliefs and customs (related to food, nutrition, and dietary) of many societies in the world today. No wonder in the early 19th century, Hippocrates (the presursor of modern medicine and a Greek thinker), coined the aphorism; "may your food be your medicine, and your medicine be your food". A successful food-based Strategy/Intervention for optimal health and nutrition should be the one which at all times is committed to: Food Availability, sufficient quantities of food form locally available production for household consumption and us; Food Access, adequate resources to obtain appropriate foods for a nutritious diet, which is based on the income of the household; Food utilization, proper Biological use of food, a diet providing sufficient energy and essential nutrients, safe drinking water and healthy sanitation and environment as well as knowledge within the household about food preparation, storage and processing techniques.

**AIMS OF THE STUDY:** The aim of the study was to assess and determine the appropriateness and relevance of the strategies used by Ramala Women Group in its endeavors to use food based strategies/interventions to combat malnutrition and micronutrients deficiencies/ disorders among children below five years of age and women of child bearing ages (between the ages of 17 and 32). Some of these women are single women while others are married. Yet all of them had a child or two below five years of age.

**STUDY METHODOLOGY:** Impact assessment was carried out within the group's Ramala Women Group in its endeavors to use food based strategies/ disorder among children below five years of age and women between the ages of 17 and 34.

**RESULTS OF THE STUDY:** The study revealed that 93% of the women could not access nutritious food staff easily hence anemia and other nutrition related deficiencies among them. While 96% and 97% of the women and children who could access nutritious foods showed no/minimal evidences of anemia and the related disorder respectively.

**CONCLUSION:** Nutritious foods locally available are a solution to anemia, malnutrition, nutrition deficiencies and related disorders in Rongo and its neighboring regions. Food based interventions/strategies should embrace and always be accompanied by public nutrition education focusing on rural household.

#### P146-29

### COMMUNITY MOBILIZATION THROUGH PEER COUNSELLORS FOR PROMOTING EXCLUSIVE BREASTFEEDING DURING THE FIRST SIX MONTHS OF INFANCY

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**RATIONALE AND OBJECTIVES:** Although breastfeeding is a cultural norm in India, but infant feeding practices like exclusive breastfeeding for the first six months is far from being optimum. This study aims to promote exclusive breastfeeding rates by addressing mothers during pregnancy through peer counselors drawn from the community.

**METHOD:** In this study conducted in urban slums of Delhi, local health/ nutrition workers (peer counselors) of an existing NGO were trained for promoting optimal infant feeding practices. A total of 213 pregnant mothers were enrolled; while 54 formed the non-intervention group (non-Igr), who were not given any counseling, 159 forming the intervention group (Igr) were divided into 3 sub-groups; one sub-group (Igr A) was imparted counseling by the researcher in the presence of peer counselors and the other (Igr B1, Igr B2) by the peer counselors only.

**RESULTS AND FINDINGS:** Baseline data indicated that all the sub-groups were almost similar with respect to most of the parameters. Data on infant's birth weight reflected that after counseling, in the intervention groups (Igrs), LBW deliveries were much lower (Igr A - 23.1%; Igr B1 - 25%; Igr B2 - 19.4%) than the non-Igr (33.3%). Initiation of breastfeeding within one hour of childbirth was significantly higher ( $p < 0.01$ ) in Igrs (Igr A - 63.4%; Igr B1 - 55.7; Igr B2 - 60.8%) than in non-Igr (3.8%). Similarly, data on prelacteal feeding practices indicate that in the Igrs ( $n=159$ ) majority of the infants (83.9 %) were fed mother's milk as their first feed whereas in the non Igr, 80.7 percent infants had received prelacteals. At 6 months PP, exclusive breastfeeding rates in the Igrs were 68.6 percent (Igr A), 66 percent (Igr B1), 68 percent (Igr B2) and only 4.2 percent in non-Igr ( $p=0.001$ ). Data on infants' morbidity patterns revealed that prevalence of common illnesses was significantly lower in Igrs than non-Igr at 1 month ( $p < 0.05$ ), 3 months ( $p > 0.001$ ) and 6 months PP ( $p < 0.001$ ). Further, mortality was also lower in intervention groups.

**CONCLUSION:** Appropriately trained peer counselors can help in enhancing the rate of exclusive breastfeeding till 6 months which along with other beneficial effects can also reduce the risk of infant's morbidity/mortality.

#### P146-30

### SAFETY ASSESSMENT OF EXOGENOUS NUCLEOTIDES ON EMBRYONIC AND INFANT DEVELOPMENT: A MULTIGENERATION STUDY IN RATS

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**RATIONALE & OBJECTIVES:** Nucleotides (NTs) are supplemented in infant formulas today for their beneficial

effects. However, no multigenerational data are available on the safety of exogenous nucleotides on the embryonic and infant development.

**MATERIALS & METHODS:** Weaning Sprague-Dawley rats were randomly divided into one control and four NTs supplementation groups with twenty rats (male:female=1:1) in each group (F0). The four NTs groups received 0.01, 0.04, 0.16 and 0.64g/kgbw/d NTs respectively. The rats in the same group were mated three months later. The physiological and neurological development in uterus, during lactation and after weaning of F1 generation was detected. F1 rats were treated just like F0 and mated three months after weaning and delivered F2 generation. F2 rats were treated like F1 and delivered F3 generation.

**RESULTS & FINDINGS:** No significance in any of the parameters mentioned above was found between control and the four NTs groups in each generation.

**CONCLUSION:** Within the dose range of this study, supplementation of exogenous nucleotides is safe on the development of SD rats.

#### P147: Food Fortification for Optimal Nutrition IV

##### P147-01

### DEVELOPMENT OF AN EFFECTIVE ELEMENTAL IRON FOR FOOD FORTIFICATIONS

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Elemental irons have been widely used for food fortifications for decades as they are more stable during storage/processing and more cost effective than other iron sources. However, elemental irons are generally less soluble so that they provide less bioavailability than iron compounds such as ferrous sulfate. Recent collaboration researches in industry, government and academia show elemental irons exhibit different solubility dependent on its manufacturing methods/processes, in which reduced irons have a dissolution rate ranged from 30% to 40% while electrolytic irons range from 50% to 75%. The former is less expensive so that they are widely used compared to the latter even though solubility is much lower. In order to improve the bioavailability of elemental iron with more dissoluble iron and competitive price, a new food grade elemental iron has been developed with at least 50% dissolution rate and is expected to meet with the requirement of 50% relative bioavailability suggested by WHO for elemental irons. With using dissolution test as a screening tool for predicting bioavailability, the new food grade iron powder has demonstrated a 56~66% dissolution rate and expected to be more cost-effective than conventional electrolytic irons.

##### P147-02

### DEVELOPMENT OF IRON-FORTIFIED CURRY POWDER FOR NEPALESE POPULATION

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**RATIONALE AND OBJECTIVES:** Curry powder is a potential vehicle for iron fortification for combating iron deficiency anemia in Nepal due to its widely use. This study aims to evaluate feasibility in developing iron-fortified curry powder.

**MATERIALS AND METHODS:** Serving size of curry powder was determined in 40 Nepalese households. Curry powders were fortified at the level of 5mg Fe/serving with FeSO<sub>4</sub>, Fe fumarate, NaFe(III)EDTA, H-reduced-, or electrolytic elemental iron and packed in LDPE or metalized bag. Samples were kept under accelerated condition (40±20C, 1 month) and tested for iron content, thiobarbituric acid value (TBARS),

peroxide value, Lab color, water activity, and sensory attributes against non-fortified powder. Sensory acceptabilities of cooked dishes were also evaluated.

**RESULTS AND FINDINGS:** Average serving size of curry powder in Nepalese was 4g. Significant changes in color, odor and TBARS after storage was found in powders packed in LDPE bag. Only stir-fried chicken cooked with powder fortified with H-reduced iron was rated slightly too dark.

**CONCLUSION:** It was feasible to fortified curry powder with the studied 5 iron sources by packing in metalized bag.

#### P147-03

##### IS VITAMIN A FORTIFIED-COOKING OIL EFFECTIVE? A CASE IN MAKASSAR CITY, INDONESIA

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**RATIONALE & OBJECTIVES:** We assessed the impact of vitamin A fortification in cooking oil distributed under real life setting on the improvement of vitamin A and hemoglobin status among school children in urban slum area.

**MATERIALS & METHODS:** The study was an intervention design (Before-After) without control. Healthy school children aged 7-10 years (n=394) were selected from schools and de-wormed before the intervention. Serum retinol and hemoglobin was measured at baseline and at 3 months. Fortified oil was made available through distribution at shops and accompanied with social marketing.

**RESULTS & FINDINGS:** The VAD prevalence is lower among children who consumed fortified oil  $\geq 12$  weeks (26.6%) compared to those who consumed  $< 12$  weeks (42%). Overall there was no change in VAD prevalence. Prevalence of anemia decreased from 21.8% to 11.6%. Fortified oil was not always available in shops where households frequently buy oil.

**CONCLUSION:** We recommended that fortified oil is made available either through mandatory or voluntary approaches.

#### P147-04

##### TEXTURE ANALYSIS AND STARCH DIGESTIBILITY OF PASTA ADDED OF FIBER-RICH INGREDIENTS

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Interest from both the food industry and consumers has focused on the possibility of adding non-starch polysaccharides into cereal products in order to increase the level of dietary fiber intake and reduce the potential glycemic index. The objective was to elaborate pasta added with two fiber-rich ingredients and evaluated their chemical composition, starch digestibility and textural characteristics. The wheat bran-containing sample showed the highest dietary fiber content, whereas the spaghetti added with banana flour showed the lowest protein and the highest ash contents. The cooking loss increased after the addition of the fiber-rich ingredients to the spaghetti, presumably due to their decreased the gluten content. The water absorption increased in the fiber-enriched samples due to combined effect of protein and starch content in the samples. The composite spaghetti with wheat bran showed the lowest total starch and available starch contents, but no difference was recorded in the resistant starch content. The p-amylolysis rate decreased with the addition of both fiber-rich ingredients. The results obtained showed the potential of composite spaghettis as low-calorie and slowly digestible pasta, which could be an alternative for people with special nutritional requirements.

#### P147-05

##### LYSINE FORTIFICATION OF MULTIPLE-FORTIFIED QUICK-COOKING RICE FOR IMPROVING PROTEIN QUALITY

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Although the micronutrient fortification of quick-cooking rice to improve its nutritional quality was successful, further fortification with lysine, a limiting amino acid in rice, may possibly correct specific nutritional deficiencies in underprivileged infant. This study aimed to determine the feasibility of producing lysine-fortified MFQCR and to assess the potential increase in lysine intake of Thai infants.

Lysine together with five micronutrients was fortified into broken rice to meet the requirements for infants aged 6 to 24 months. Lysine loss and quality changes upon storage were determined, while data from the Thai National Food Consumption Survey (2006) was used to assess the lysine intake.

Lysine-fortified MFQCR can be produced and used for preparing complementary feeding, whereas the lysine intake was shown to be adequate. It can be concluded that lysine fortification might not be of additional benefit to infants aged 6 to 24 months in Central Thailand. However, lysine-fortified rice may be useful in low-socioeconomic, cereal-consuming areas where there is less access to additional protein sources.

#### P147-06

##### EFFICACY OF VITAMIN A FORTIFIED COOKING OIL ON NUTRITIONAL STATUS AND INFECTION INCIDENTS OF VIETNAMESE CHILDREN AGED 3-5 YEARS OLD

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**RATIONALE AND OBJECTIVES:** Cooking oil is suitable food for fortification with vitamin A. This study was carried out to evaluate the effect of vitamin A fortified cooking oil on nutritional status of children.

**MATERIALS AND METHODS:** A double-blind trial was designed in 292 Vietnamese children aged 3-5 years old. Subjects were randomly allocated into two groups. Fortified group received daily 5 gram fortified cooking oil containing 150  $\mu$ g vitamin A. Non-fortified group received daily 5-gram unfortified cooking oil. Before intervention, subjects in both groups were de-wormed by a single dose of Albendazole 400 mg.

**RESULT:** After 6 months of intervention, children of fortified group had significantly higher increment of serum retinol:  $0.08 \pm 0.19$  ( $\mu$  mol/L) and hemoglobin concentration:  $6.11 \pm 8.59$  (g/L), weight:  $1.21 \pm 0.44$  (kg) than those of non-fortified group respectively:  $0.03 \pm 0.13$  ( $\mu$  mol/L);  $2.82 \pm 5.95$  (g/L);  $0.95 \pm 0.53$  (kg). Children of fortified group had less frequency of diarrhea episodes as compared to children of non-fortified group.

**CONCLUSION:** Regular consumption of vitamin A cooking oil improved serum retinol, Hb concentration, weight and reduced frequency of diarrhea episodes of children aged 3-5 years old.

**P147-07****BISCUIT MAKING PROPERTIES FROM CASSAVA FLOUR AND GROUNDNUT PASTE BLENDS**Ashaye, Olukayode A.<sup>1</sup>; Sowonola, O. A.<sup>2</sup>; Domi, J. A.<sup>2</sup><sup>1</sup>Institute of Agriculture Research and Training, Obafemi Awolowo University, Ibadan, Oyo, NGA; <sup>2</sup>Federal college of Agriculture, Ibadan, NGA

**RATIONALE AND OBJECTIVES:** Biscuit known to be nutritious are snack foods processed essentially from wheat flour. Processing of biscuit from cassava flour is yet to be fully exploited. This work investigates the biscuit making properties from cassava flour and groundnut paste blends.

**MATERIALS AND METHODS:** Biscuits were processed from cassava flour fortified with groundnut paste at 0%, 10%, 20%, 30% levels and compared with a popular commercial biscuit. They were then evaluated for chemical properties (HCN, crude protein, ash, crude fiber, moisture and carbohydrate). Sensory evaluation was done by a ten-member panel randomly selected from male and female adults.

**RESULTS AND FINDINGS:** There was a concomitant increase in crude protein, ash and crude fiber with increase in levels of fortification with biscuit at 30% level of fortification with groundnut paste being significantly higher at  $p < 0.05$  in crude protein (14.79%), ash (1.04%), crude fat (10.66%) and crude fiber (1.38%). However HCN and carbohydrate contents decreased with increase in levels of fortification. Sensory scores showed that all cassava/groundnut based biscuits were generally accepted. Thirty percent (30%) cassava/groundnut based biscuit was better accepted in color, taste and general acceptability more than the commercial biscuit.

**CONCLUSION:** Generally the cassava/groundnut-based biscuits were better nutritionally and none of them were rejected.

**P147-08****EFFECT OF PSYROTROPH BACTERIA ON PHYSICAL AND CHEMICAL PROPERTIES OF TRADITIONAL WHITE AND UF CHEESE**

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The dominant flora of stored raw milk in low temperature are Pscyrotroph bacteria and these bacteria as referred as to microorganisms that can survive and grow at 7C or lower. Pscyrotroph bacteria are not heat resistance and pasteurization destroy them, but their proteolytic and lypolytic enzymes are heat resistance. These enzymes save their activities in pasteurization temperature and also UHT processing. In this study, effects of number of Pscyrotroph bacteria on physical and chemical properties on UF and white cheese was investigated. The results showed that number of Pscyrotroph bacteria on white and UF cheese was significant, so with increasing Pscyrotroph bacteria the dry matter percent, percent of fat and firmness of texture was reduced. In spite of this, moisture of curd and softness of cheese texture increased by multiplying Pscyrotroph bacteria. These changes in the UF cheese were more than white cheese.

**P147-09****EFFECT OF IRON FORTIFICATION OF NURSERY COMPLEMENTARY FOOD ON IRON STATUS OF INFANTS IN THE DPR KOREA**

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**RATIONALE & OBJECTIVES:** The objective of this study was to determine the iron status of infants who consumed porridge cooked in water with added ferrous sulfate.

**MATERIALS AND METHOD:** Total of 234 infants, aged 6-12 months, were recruited from 36 nurseries in the Democratic Peoples Republic of Korea (DPR of Korea) and randomly divided into iron (Fe) and placebo groups. The Fe

group received rice porridge fortified with 10 mg of iron (as ferrous sulfate) per day, added to the water in which the rice was cooked and the placebo group non-fortified cereal for 6 months. After which, the hemoglobin (Hb), serum ferritin (SF) and packed cell volume (PCV) were measured

**RESULTS:** It was found that the proportion of children with anemia (Hb<110 g/L) was lower (24.3% v 48.1%  $p < 0.01$ ), the Hb levels (117.6 g/L v 109.8 g/L  $p < 0.001$ ) and serum ferritin were higher (40.7 v 26.8 mcg/L  $p < 0.001$ ); and iron deficiency anemia (Hb<110 g/L, SF<12 mcg/L) was lower in the Fe group (3% v 22%  $p < 0.001$ ) when compared to the placebo group.

**CONCLUSION:** Ferrous sulfate, added to the water in which rice was cooked, lowered the prevalence of iron deficiency anemia of infants in the DPRK with no adverse reactions. This simple fortification would be suitable as a nationwide program in the DPRK and other countries with large infant nurseries.

**P147-10****NUTRIENT-ENHANCEMENT OF BANANA FOR IMPROVED NUTRIENT INTAKE OF PEOPLE LIVING WITH HIV/AIDS IN RAKAI DISTRICT**

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**RATIONALE AND OBJECTIVES:** About 12.7% of Rakai's population is living with HIV/AIDS and the district suffers high malnutrition rates. Bananas form a major part of diet in Rakai. However, matooke (green cooking banana) is usually accompanied with nutritionally deficient stews yet it is inadequate in several nutrients. Therefore, the potential of nutrient enhancement of bananas to improve household nutrition and food security was evaluated.

**MATERIALS & METHODS:** A total of 173 PLHIV were purposively selected. Gibson's 24-hour recall method, food frequency and food security questionnaires were used. Matooke was processed, blended with soy flour and micronutrient premix, and fed to 15 PLHIV.

**RESULTS:** About 68% of respondents grew bananas in their gardens and 42% sold them for income. Overall, 85% of PLHIV ate banana the day before interviews and matooke was the most (88%) consumed food, at least 3 times/week. An average of 67g of nutrient-enhanced banana was consumed, and this significantly increased energy intake from 1594.7kcal (baseline) to 1732.89kcal.

**CONCLUSION:** Nutrient-enhanced banana potentially improves nutrient intake of PLHIV.

**P148: Dietary Diversification/Modification II****P148-01****KNOWLEDGE, ATTITUDE AND PRACTICE OF BALANCED DIET AMONG WOMEN IN BOTSWANA**Mizumoto, Kaori<sup>1</sup>; Nakamura, Yasuhide<sup>1</sup>; Nnyepi, Maria S.<sup>2</sup><sup>1</sup>Osaka University, Suita, Osaka, JPN; <sup>2</sup>University of

Botswana, Gaborone, BWA

**RATIONALE and OBJECTIVES:** Globalization and urbanization affect people's dietary intake in ways that may have serious health consequences. People in urban areas of transitioning economies are often most affected. The objective of this study was to examine dietary knowledge, attitude and practices of adults 25-54 years in some urban settings in Botswana.

**MATERIALS and METHOD:** A household-based cross-sectional study was conducted in Selibe-Phikwe, Botswana in January and February 2009. Data was collected from 200 subjects using a structured interview questionnaire and Focused Groups Discussions (FGD).

**RESULTS:** Over 95% of subjects were knowledgeable about

the importance of balanced diets. The accuracy rate of subjects' statements about a balanced was very high ( $\geq 95\%$ ). But subjects did not know how to plan balanced meals. In addition, 64.5% of adults said it was difficult to have balanced diets because of their unfavorable economic situation. Although 53.5% of subjects thought that vegetables were generally less expensive than other foods, it emerged from the FGDs that participants partly blamed their inability to eat balanced meals on the high cost of imported vegetables.

**CONCLUSIONS:** Future interventions for improving the dietary practices of adults should provide practical skills on planning balanced diets using more affordable local foods.

#### P148-02

##### DEVELOPMENT OF HEALTHY LOW-ENERGY DENSITY THAI DIETS FOR WEIGHT MANAGEMENT

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**RATIONALE/OBJECTIVE:** Obesity is a chronic disease with increasing prevalence worldwide. Diets of low energy density are effective for treating obesity since individuals can consume adequate amounts of food and not experience adverse feelings of hunger. This study aimed to develop low-energy density Thai recipes, both side dishes and one-plate dishes and evaluate the nutritive values and acceptance of the developed diets.

**METHODS:** Thirty popular Thai side dishes and 16 one-plate dishes were selected to develop low-energy density recipes to satisfy obese people's preference.

**RESULTS:** All developed Thai dishes had high fiber content (4-13 g/serving) and were low in energy level (84-299 kcal/serving), fat content (0.61-9.28 g/serving), and saturated fatty acid content. The energy density of the diets were 0.18-1.16 kcal/g with the mean of 0.56 kcal/g. Moreover, all developed dishes were acceptable in appearance and flavor. They also had large serving size (125-678 g with the mean of 356 g) and enhanced satiety. Kaeng Som Pak Ruam Kung and Ba-Mee Kiew Moo Dang had the highest sodium content.

**CONCLUSION:** These results suggest that the consumption of satisfying portions of diets low in energy density with nutrient-dense provides individuals with a way to meet their nutrient needs while avoiding the overconsumption of calories and it can also facilitate weight management.

#### P148-03

##### REGION-BASED HOME GARDENS FOR YEAR-ROUND HOUSEHOLD NUTRITION SECURITY AND DIET DIVERSIFICATION IN INDIA

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**RATIONALE & OBJECTIVES:** Home gardens are important sources of food and nutrition for poor households in. Structured home gardens can reap maximum yield with minimum space and resources. The present study tests and provides home garden models in Jharkhand, Punjab and Hyderabad aiming to develop region-based, year-round home gardens and evaluate their nutritional yields.

**MATERIALS & METHODS:** The designed home garden models for the three sites include five subplots on 6m<sup>2</sup> land incorporating easy to grow, nutritious and indigenous vegetables.

**RESULTS & FINDINGS:** The nutritional yield of the models based in Hyderabad revealed that all three models (1) met more than 100% of daily requirements for iron,  $\beta$ -carotene, folic acid and vitamin C continuously and (2) fulfilled the

daily requirements for protein 123%, 44%, 32% of Hyderabad, Punjab and Jharkhand models respectively and increased diet diversity.

**CONCLUSION:** The above models are being analyzed for the nutritional yield in respective regions. This study will further be integrated with aspects like nutrition education, community training centers and recipe demonstrations to give a holistic approach.

#### d.4 School Nutrition

#### P148-04

##### HOUSEHOLD FOOD SECURITY AND PHYSICAL ACTIVITY OF WOMEN LIVING IN OBUKPA RURAL COMMUNITY IN NIGERIA

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This study assessed the household food security and physical activity of women living in Obukpa rural community. A total of two hundred (200) subjects were randomly selected for the study.

Data was collected using structured and validated questionnaires consisting of 4 sections designed to obtain background information of the subjects, socio-economic status, food availability and accessibility and physical activity pattern, self perception assessment/awareness. The data collected was analyzed using frequency distribution, percentages and mean.

The results showed that households spent between 2000-4000 naira on food per week. Twenty three percent (23%) of households depended solely on home food production as the source of family food while 64.5% of the subjects reported that they also depended on low-cost food because of their low socio-economic level. The subjects reported that in other to be food secure in the household, 23.5% of the subjects bought food on regular basis, 16.5% practiced bulk buying, 25% used available piece of land for home garden/farm. Cassava (garri) was always available and had the highest frequency of 12.5%, followed by pumpkin leaf which had 10%. The result also showed the various levels of physical activity of the subjects. Most subjects spent more time in sleeping than other activities. About 70% of the subjects considered (perceived) themselves normal, 19.5% believed that they were moderately fat or overweight while only 10.5% considered themselves too fat or obese. Using the BMI assessment, 8.5% of the subjects were underweight, 52.5% had normal weight, 23.5% were overweight and 15.5% were obese, which contradicted their self-perception. Based on the findings, food and nutrition education is recommended to enlighten the respondents on the importance of household food security on their health status and also the importance of physical activity (exercise) for healthy living.

#### P148-05

##### MAJOR FOOD CONTRIBUTION TO CALORIC INTAKE AMONG THAI POPULATION: THAILAND'S NATIONAL FOOD CONSUMPTION SURVEY

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**RATIONALE:** Current dietary guidance recommends the intake of foods, but little is known about recent consumption patterns of these foods.

**OBJECTIVES:** To examine the contribution of energy intake among three different age groups: 6.0 – 19.9, 20.0 – 64.9 and  $\geq 65$  years.

**MATERIALS & METHODS:** Data from the first Thailand National Food Consumption Survey (n = 14456; age > 6 y) were used. Information on food and nutrient intake was collected using a semi-quantitative food frequency questionnaire (FFQ).

**RESULTS & FINDINGS:** In all 3 age groups, rice, chicken/

duck egg and marine fish were consumed by majority of the respondents (> 88%). Comparison of percentage of energy contributed from each food group revealed that Cereal and products provided the highest energy contribution in all 3 age groups, 64%, 63% and 54% respectively. The second food group that contributed to energy intake was meat and its products, 9% for all 3 age group. Milk and Dairy Products demonstrated to be a food group that contributed to energy intake in the 6.0 – 19.9 years-old group. In the elderly group, dessert and fresh water animals were the two food groups that contributed to their energy intake, 7% and 6% respectively.

**CONCLUSION:** The results showed that the major food contributions to caloric intake among Thai population were cereal & products and meat & products.

#### P148-06

##### **EFFECTS OF A LOCAL-BASED FOOD SUPPLEMENTATION PROGRAM INTEGRATED WITH POSYANDU TUMBUH KEMBANG ANAK ON NUTRITIONAL STATUS OF UNDERWEIGHT CHILDREN IN WEST JAVA, INDONESIA**

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**RATIONALE AND OBJECTIVE:** Daily food supplementation using local food integrated with Posyandu Tumbuh Kembang Anak, PTKA (integrated health post with pre-school activities) offered an opportunity to alleviate undernutrition problem in under five children. The study aimed to assess the effectiveness of 3mo daily food supplementation using local food integrated with PTKA (intervention group) compared to PTKA alone (control group) on nutritional status of underweight children in Pandeglang District, Banten Province, Indonesia.

**MATERIALS AND METHODS:** Underweight 6-59mo children (n=132) from two PTKA were recruited. Their nutritional status was assessed by anthropometry and repeated 24-hours food recall (baseline and endline). Hemoglobin concentration was assessed at endline.

**RESULTS AND FINDINGS:** The average consumption of food supplement contributed to 39% calorie, 35% protein, 70% vitamin A, 68% iron and 25% zinc based on Indonesian Recommended Dietary Allowance (AKG). Home diet (excluding from food supplement) in intervention group was significantly higher than control group for protein, iron and zinc (p<0.05). At endline, prevalence of underweight were 76.9% and 80.0% in intervention and control groups, respectively (p>0.05). In intervention group, hemoglobin was 8.7 g/l higher (p<0.01) and anemia lower (52.3% vs. 73.1%, p<0.05) compared to control group.

**CONCLUSION:** Daily food supplementation using local food integrated with PTKA can improve the nutrient intake and hemoglobin concentration of the underweight children

#### P148-07

##### **MICRONUTRIENT STATUS OF CHILDREN FED MUCUNA PRURIENS LEAF EXTRACT AS PART OF THE HOME GROWN SCHOOL FEEDING AND HEALTH PROGRAMME IN NIGERIA**

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**RATIONALE & OBJECTIVES:** Micronutrient malnutrition is a serious public health problem in the world. One out of three people in the world are affected by one or multiple micronutrient deficiencies. In Nigeria, 29.5% of the children have marginal vitamin A deficiency while 20% are iron and zinc deficient. The food based approach using locally available food crops

appear to be the most feasible strategy to combat micronutrient deficiencies in Nigeria. The Home Grown School Feeding and Health Programme practiced in some schools in Nigeria is a good way of introducing new dietary habit to children to prevent hunger and malnutrition. *Mucuna pruriens* is a tropical plant. The leaf is rich in micronutrients, which interact with each other for their effective utilization. The aim of the study was to evaluate the effect of daily administration of *Mucuna pruriens* leaf extract with school meal on the micronutrient status of school children.

**MATERIALS & METHODS:** *Mucuna pruriens* was cultivated in the school garden of Edem primary school in Enugu state of Nigeria. The leaf was used in an intervention program to tackle micronutrient malnutrition in the school children. One hundred and sixty four primary school children, 7 – 8 years were drawn by random sampling from the primary school for the study. The children were divided into two groups (n = 82) on the basis of hemoglobin level for the 12 – week intervention study with *Mucuna pruriens* leaf extract. One group served as the control (CG) and the other as the test group (TG). The children in the TG were given their school meal with 100 ml of *Mucuna pruriens* leaf extract while the other group consumed only the school meal. The hemoglobin (HB), serum ferritin (SF), serum retinol (SR) and serum zinc (SZ) levels of the infants were determined at baseline and at the end of the study.

**RESULTS & FINDINGS:** For children in the TG, the mean HB increased from 10.86 g/dl to 12.72g/dl, SF increased from 10.92µg/L to 38.45 µg/L, SR increased from 18.74µg/dl to 28.56µg/dl and SZ increased from 10.24µmol/L to 11.38µmol/L. There were no significant changes in the mean HB, SF, and SZ levels of the children in CG.

**CONCLUSION:** Daily administration of *Mucuna pruriens* leaf extract with school meal improved the iron, vitamin A and zinc status of primary school children. Large-scale cultivation of the crop for utilization of the leaf should be encouraged as an intervention program for tackling micronutrient malnutrition.

#### P148-08

##### **MICRONUTRIENT STATUS OF NIGERIA CHILDREN FED MUCUNA PRURIENS LEAF EXTRACT**

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**RATIONALE & OBJECTIVES:** Micronutrient malnutrition is a public health problem. The food-based approach appears to be a feasible strategy to combat micronutrient deficiencies. *Mucuna pruriens* leaf is rich in micronutrients. The study evaluated the effect of *Mucuna pruriens* leaf extract on the micronutrient status of school children.

**MATERIALS & METHODS:** 164 primary school children (7 – 8 years) were divided into two groups (n = 82) on basis of hemoglobin level for a 12-week study. Test group (TG) consumed school meal with 100ml of *Mucuna pruriens* leaf extract and the control group (CG) consumed only the school meal. The hemoglobin, serum ferritin (SF), serum retinol (SR) and serum zinc (SZ) levels of the children were determined at baseline and end of the study.

**RESULTS & FINDINGS:** For children in the TG, the mean hemoglobin increased from 10.86g/dl - 12.72g/dl, SF increased from 10.92µg/L - 38.45µg/L, SR increased from 18.74µg/dl - 28.56µg/dl and SZ increased

#### P148-09

### DIETARY DIVERSIFICATION AND CONTRIBUTION OF COMPOSITE YELLOW MAIZE SNACKS TO NUTRIENT INTAKE OF NIGERIAN CONSUMERS

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**RATIONALE and OBJECTIVES:** Consumption of indigenous diets is being promoted as means of dietary diversification in meeting household nutrition security. Maize used for staples and snacks plays important role in diets of Nigerians. Little is documented on nutrient composition of maize snacks. This study determined nutrient composition and contribution of yellow maize snacks to nutrient intake of Nigerian consumers.

**MATERIALS and METHODS:** Fresh, boiled, roasted and composite samples of yellow maize with coconut or native pear was analyzed for proximate, mineral and vitamin composition using standard methods of AOAC, AAS, and spectrophotometry, respectively.

**RESULTS and FINDINGS:** Fresh maize was low in crude protein, lipid, fiber and ash (9.2, 4.0, 2.7, and 3.0 g/100g respectively), moderate in iron (3.9mg/100g) and high in  $\beta$ -carotene (383.0  $\mu$ /100g). Maize composite snacks showed significant increase ( $p<0.05$ ) in nutrient content compared with raw, boiled and roasted samples. 100grammes of composite maize snacks can contribute 15.1 – 16.9 %protein, 17.9 – 19.2% energy, 22.5 - 28% iron, and 29.5 – 33.4%  $\beta$ -carotene to RDAs, **CONCLUSION:** Yellow maize consumed with fruits can serve as source of meeting part of consumers' micronutrient needs.

#### P148-10

### CHINESE WOMEN DIETARY BEHAVIOR IN DIFFERENT LACTATING STAGES AND BREAST MILK LEVELS OF FATTY ACIDS AND IRON

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“Doing-the-month” is a popular traditional behavior for Chinese mothers after delivery. During this period, lactating women prefer to meat and egg, and have a sedentary traditional habit. These unusual behaviors of mothers make a possible of change in fatty acids and iron compositions in human milk during the early stage of lactating, compared with follow-up months.

Therefore, forty volunteers were recruited and assigned into two groups, the postpartum first month group (n=13) and postpartum 2-6 months group (n=27), respectively. The data were analyzed using SPSS version 10.0. This protocol and procedure were approved by Peking University Ethics Committee.

The special changes in diet were assessed with indicators of protein, fat, and carbohydrate. Higher protein and lower carbohydrate intakes were indicated in the postpartum first month group, compared with that in postpartum 2-6months group. The fat intakes are similar between the two groups. Compared with “Chinese Dietary Reference Intakes”, over 60% of women exceeded the standard in the intake of protein and fat in the postpartum first month group. However, there were over 20% women who had under standard intakes in energy, protein, and carbohydrate in the postpartum first month. For the postpartum 2-6months group, more than 50% of lactating women had lower intakes in protein and carbohydrate than the standard. Furthermore, the individual average content of 13 fatty acids and iron from human milk in different lactating stages were identified. There are no significant differences in the concentration of reported breast milk fatty acids in two groups, except for LA. There is significantly higher concentration of LA in the postpartum first month group than that in postpartum 2-4months group. The decrease in the content of iron was indicated in postpartum 2-6 months group, comparing with the postpartum first month group, from 126.82 $\mu$ g/100ml to 80.85 $\mu$ g/100ml. However, there is no statistical significant

difference from two groups.

In this pilot study, the unreasonable dietary behavior of lactating women was revealed. The assessment of nutrient requirement for lactating mothers and the effect of human milk nutrients on infant growth and development are not indicated in this pilot study, which will be provided in the next paper.

#### P148-11

### FOOD BELIEF AND MATERNAL HEALTH

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**RATIONALE & OBJECTIVES:** Demographic Health Survey (2006) pointed out that many women in Nepal suffered from malnourishments, particularly during pregnancies and lactation period. The problem is often related to inadequate access to food due to poverty. There are however many food and health related beliefs and traditional practices that also seem to have direct impact on nutritional status. This study was undertaken with the main objective of exploring and analyzing different food and health beliefs with implications on maternal health in Futung, a hill village of Nepal.

**MATERIALS & METHODS:** Interview with respondents followed by focus group discussion and selected household observations were carried out for the study. Key informant provided basic information and helped identify important cases.

**RESULTS & FINDINGS:** The study showed that there are many traditional food beliefs and practices particularly relating to pregnancy, delivery and lactation. Some beliefs are religious defining pure and impure food, some relate to custom, ritual and special occasion. Many food beliefs relate to the perceptions of hot and cold food, and curative food. The beliefs varied by social and caste groups.

**CONCLUSION:** Obviously, there is scope for better maternal health and nutrition status through critical awareness.

#### P149: School Nutrition IV

##### P149-01

### EFFECT OF A NUTRITION EDUCATION ON REDUCING CONSUMPTION OF DIETARY SODIUM IN SCHOOL CHILDREN

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This study was to develop and evaluate a nutrition education program to reduce dietary sodium. The school children (218 boys, 226 girls), from 8 elementary schools in the city of Daegu, Korea, were involved in this study. This research was based on the data from two groups of elementary school children, the “education” group (n=240), and “no-education” group (n=204). Educational media and programs were developed to educate the education group for four weeks and were presented on the web (www.saltdown.com). After education, the preference for an unsalty taste in the education group increased 10%, compared with those who preferred an unsalty taste before education. There was a significant change away from a preference for a salty taste and a rise in the mean score for nutrition knowledge and dietary attitude in the education group, compared to the no-education group ( $p<0.05$ ). Therefore, this study indicates that school children can reduce their dependency on preference for a salty taste after the education.



#### P149-02

### A CONTENT ANALYSIS OF DIETARY AND PHYSICAL ACTIVITY GUIDELINE FOR ELEMENTARY SCHOOL CHILDREN: STUDY IN URBAN AREA OF JAKARTA, INDONESIA

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**RATIONALE & OBJECTIVES:** To assess children understanding and the use of message of Dietary and Physical Activity Guideline for elementary school children as nutrition education tools for Indonesian Children. The guideline use pyramid graphic presentation modified from Indonesia Dietary Guideline for general population which is designed based on cultural and age-appropriateness content.

**MATERIALS & METHODS:** Six focus groups were conducted with 18 boys and 18 girls from 3rd and 4th grader at 3 elementary schools in urban area of Jakarta. Focus group sessions were audio-taped and transcribed. Content analysis was examined to identify emerging themes and patterns on children comprehension of the written messages and graphic presentation in the Dietary and Physical Activity Guideline.

**RESULTS:** Finding showed that children had general ability to understand written messages and graphic presentation of Dietary and Physical Activity Guideline, but had limited knowledge on serving, food group categorization, types and intensity of physical activity.

**CONCLUSION:** Children are aware of general concepts about healthy eating using Dietary and Physical Activity Guideline, but they lack specific knowledge to help them to put the recommendation into practice. Nutrition education can assist the children by giving them with concrete example and specific information.

#### P149-03

### NUTRITIONAL STATUS IN MEXICAN STUDENTS AGED 12 - 18 WITH DIFFERENT PHYSICAL ACTIVITY LEVELS

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A normal diet combined with a high level of physical activity is essential for boys on a growth stage to have a healthy lifestyle and to prevent disease such as overweight and obesity. Guidelines for physical activity as well as adequate intake of nutrients are means to promote health and prevent diseases. The aim of this study was to investigate how overall physical activity is associated with healthy and dietary habits. A sample of 120 male students of a public school aged 12 to 18 were studied as well as foods and nutrients intake was estimated from self administrated 7 days dietary record. Diet was divided in total carbohydrates, added sugars, dietary fibre, fat saturated SFA and polyunsaturated PUFA, proteins and non-alcohol beverages, nutrients used as group food indicators. Information of self reported physical activity was obtained from a personal interview. Students were divided into four groups according to their physical level, sedentary, light, moderate and strenuous. Energy intakes were correlated with level of physical activity. Fat energy decreased with light physical activity, carbohydrates substituted the lower content of fat in the diet, and higher physical activity level was associated with a different diet composition. A higher intake of dietary fiber and a lower consumption of fatty acids were found with increasing physical activity level. Lower intake of fats and higher consumption of bread and cereal products as well as density in fruit, sugar and sweets was also observed with increasing physical activity level. In conclusion, physical activity is correlated with a healthy diet that optimizes

development and health maintenance of Mexican students

#### P149-04

### ANIMAL SOURCE FOOD SNACKS IMPROVE SCHOOL TEST SCORES

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**RATIONALE & OBJECTIVES:** School feeding in rural Kenya is sporadic, both in quantity and quality, which may adversely affect school performance. A randomized, controlled feeding intervention study was undertaken to examine the impact of animal source food (ASF) snacks on standardized end-term scores.

**MATERIALS & METHODS:** Twelve primary schools were randomized to one of the following isocaloric feeding groups: plain traditional vegetable stew, stew plus milk, stew plus meat, or a Control group (no snack). Children (n=393) averaged 7.1 years and had multiple micronutrient deficiencies at baseline. End term multi-subject zone-wide identical tests were administered for 5 consecutive terms. Longitudinal analysis controlled for home food intake, attendance, age, gender, SES, cognitive test scores, maternal education, and body size.

**RESULTS & FINDINGS:** The Meat group, followed by the Milk group, showed steepest statistically significant gains in test scores compared to the Energy or Control groups. The Meat group scored the highest in total score and in Math, English, Geography, and Art. The Milk group scored next best in the above subjects.

**CONCLUSION:** ASF, particularly meat, have a positive impact on academic achievement. Improved school feeding is needed for children to better benefit from future education opportunities.

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#### P149-05

### SEASONAL AND SEX VARIATION IN UNDERNUTRITION AMONG NIGERIAN ADOLESCENTS: A CASE STUDY OF RURAL SECONDARY SCHOOLS IN OSUN STATE, NIGERIA

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Under-nutrition is prevalent among Nigerian adolescents but little is reported on gender and seasonal variation in rural areas. This study aims to bridge the gap. Selected adolescents (n= 589) from 15 rural secondary schools in Osun state were assessed for height and weight in dry and rainy seasons (November, 2005 - July, 2006 and prevalence of stunting and thinness were estimated by WHO age- and sex- specific references. The prevalence of stunting (height for age < 5th percentile) and thinness (BMI for age < 5th percentile) were determined as 37.4 and 14.7% in dry and 37.6 and 13.7% in rainy seasons. The odds ratio (OR) for stunting (OR 2.79, 95% CI (2.18-3.56), P < 0.05) and thinness (OR 3.82, 95% CI (2.60-5.64), P < 0.05) was higher in boys while odds for thinness (1.60 95% CI 1.22-2.10, P < 0.05) but not significantly different in both seasons. Stunted adolescents were also more likely to be thin (OR 2.72, 95% CI 1.94-3.82, P < 0.05). Adolescents in the studied area are at risk of under-nutrition: worse in boys and in the dry season.

#### P149-06

### NUTRITION KNOWLEDGE, ATTITUDE AND PRACTICE (KAP) AMONG SCHOOL CHILDREN IN MALAYSIA

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<sup>2</sup>Universiti Tunku Abd. Rahman, Selangor, MYS

This presentation reports the nutrition KAP among schoolchildren in Malaysia. A representative sample of 11,371 children aged between 6 and 12 years old from 6 regions in Malaysia took part in this study. Height and weight were measured and body mass index (BMI) was calculated. Children completed a set of questionnaire that evaluated nutrition knowledge, attitude and dietary habits (practices), through face-to-face interviews. For the purpose of this presentation, we only report breakfast habits to represent their nutrition practice. The study found that 64% of the children had normal weight and 26% are overweight/obese. The percentage of overweight/obese was higher among boys (30%), older children (29%) and in urban areas (28%). The nutrition knowledge and attitude score showed that most of the children had high nutrition knowledge but poor attitude score. The result also showed that most of the overweight/obese children had high nutrition score as compared to normal and underweight children. However, the trend for nutrition attitude score was comparable among overweight/obese, normal and underweight children. For the breakfast habits, 68% of them eat breakfast daily, and 7.5% of them never had breakfast. The results are similar among overweight/obese, normal and underweight children. This study concludes that even the nutrition knowledge was high among the Malaysian schoolchildren, most of them had poor nutrition attitude score and still a few of them skipped breakfast. Therefore, nutrition education and promotion are significant to improve these situations.

#### P149-07

### ASSOCIATION BETWEEN ANTHROPOMETRIC MEASUREMENTS AND DENTAL CARIES IN SCHOOL CHILDREN

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**RATIONALE & OBJECTIVES:** With today's increasing attention being paid to disease prevention, the connections between oral health and other health issues become all the more important to understand. The aim of our study was to evaluate the association between anthropometric measurements and dental caries.

**MATERIALS & METHODS:** Study was conducted on a 245 primary school children (49.8% girls, 50.2% boys), aged 5 to 9 years. Dental caries prevalence and severity were measured using the decayed, missing or filled surfaces (dmfs) and teeth (dmft) indices. WHO Child Growth Standards were used to evaluate anthropometric measurements.

**RESULTS & FINDINGS:** Prevalence of underweight, risk of underweight, normal weight, overweight and obese were 8.0%, 12.7%, 61.2%, 17.6% and 5.3%, respectively. Mean ( $\pm$ SD) dmfs and dmft indices were found  $5.3 \pm 3.78$  and  $10.5 \pm 9.67$ , respectively. Correlations between anthropometric measurements (weight, height, triceps, subscapular skinfold thickness, waist, hip and mid upper arm circumference, BMI, percent of fat) and dental indices were analyzed. Only height, weight, BMI and percent of fat mass were found negatively correlated with dental indices ( $p < 0.05$ ). Underweight children had higher dmft and overweight children had higher dmfs than other children.

**CONCLUSION:** In conclusion, dental caries is a multifactorial disease. Underweight and overweight children have higher risks of dental caries. For these reasons, nutritional status of the

children should be monitored.

#### P149-08

### ARE THE FOODSERVICE MENU'S APPROPRIATE FOR THE DAY CARE CENTERS?

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**RATIONALE & OBJECTIVES:** The day care centers are social institutions that provide education and principles of good health. In this sense, food assistance in these places should promote adequate child development. Thus, in this study, in a cross-sectional design, was evaluated the menu's offered adequacy based on the food guide pyramid and the DRI's of the eight day care centers in a specific city of Brazil.

**MATERIALS & METHODS:** The documental analyses of the 80 menus served in the day care for breakfast, lunch, snacks and dinner was performed for 10 days. After that, the data were analyzed and Tukey's test was performed at 5% level of the probability.

**RESULTS & FINDINGS:** It was found that the nutrients in the menus do not attend to the DRI and Food Guide Pyramid recommendations, and the monotony of the menus and low offer of fruits and vegetables to the child pose a concern with the child nutrition food habits and nutritional status.

**CONCLUSION:** The menu's inadequacy in the day care centers investigated suggest urgent reformulation considering their impact in the child's nutritional status.

#### P149-09

### DOES THE SCHOOL ENVIRONMENT CONTRIBUTE TO OBESITY IN TERENGGANU STATE, MALAYSIA?

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**RATIONALE & OBJECTIVES:** Malaysia is experiencing an increase in childhood obesity/overweight. This study investigated whether the school environment was a contributing factor that could potentially mediate healthier eating and physical activity.

**MATERIALS & METHODS:** A tool was developed to map the school environment on 4 levels: physical; economic; political; and socio-cultural, by interviewing teachers and observation in 12 randomly selected schools (6 rural; 6 urban) in Terengganu, Eastern Peninsular Malaysia.

**RESULTS & FINDINGS:** Findings indicate that there is room for improvement in the school environment on all 4 levels: For physical environment, whilst all schools taught nutrition and physical activity, this was not backed up with actual facilities for practising physical activity or food preparation. For economic environment, 11/12 schools had mobile caterers outside their front gates selling energy-dense food/drink. For policy environment, all teachers were aware of the existence of national catering nutrition guidelines but they reported a lack of manpower for implementation and monitoring. For socio-cultural environment, all schools used sweet foods / drinks as rewards at large events.

**CONCLUSION:** The findings suggest potential avenues exist for intervention in schools to provide a more supportive environment that promotes healthier eating and physical activity to prevent obesity.

#### P149-10

### MILO DRINK IMPROVES PHYSICAL ENDURANCE, COGNITIVE PERFORMANCE OF PRIMARY SCHOOL CHILDREN

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**OBJECTIVES:** To assess the effects of MILO (Nestle) micronutrient-fortified malted milk beverage on physical and cognitive performance of primary schoolchildren living in rural Vietnam.

**METHODS:** 4 classes of 6-7 year old primary schoolchildren (~30 children/class) were randomly assigned to two groups: MILO group (MILO, n=59): children received MILO drink 150 ml/day; Control group (CTR, n=59): children received full-cream milk 150 ml/day, the 2 drinks (equal energy 108-110 kcal) were given mid-morning 5 days/week for 16 weeks. Physical performance (sprint time and lifting 2 kg weight), and cognitive performance (visual attention, auditory attention, touch sensation and image analysis) were assessed at baseline and after 16 weeks.

**RESULTS:** After 16 weeks, MILO children gained 0.4 kg more than control (p<0.05) and had greater improvement in sprint and weight lifting performance compared with control. MILO improved cognitive performance, particularly in tasks requiring short-term memory after listening to a recorded song and interpretation of visual displays.

**CONCLUSION:** After 16 weeks, MILO drinks improved physical and cognitive performance of primary schoolchildren

#### P149-11

### ROLE OF WOMEN BASED SELF HELP GROUPS IN THE SUPPLEMENTARY FEEDING PROGRAMMES : AN INTERVENTION STUDY IN DELHI

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**RATIONALE:** In India, developmental programs like ICDS and MDMP aim at bridging the nutrient gap in the diets of beneficiaries. Earlier, dry snacks / fruit were provided; however, after the Apex Court's verdict, there has been a switch over to cooked food prepared by SHGs / community members to generate employment and eventual community ownership.

**OBJECTIVES:** To train community members / SHGs in the preparation of supplementary foods and undertake intervention studies in their units.

**METHODS AND MATERIALS:** 100 members of an NGO were trained in the production of nutritious food supplements and encouraged to form SHGs to undertake orders for food production. In addition, suitable educational material was developed for training them in quantity food production.

**RESULTS AND FINDINGS:** Earlier, owing to logistic problems, both programs were serving dry RTEs to their beneficiaries; however, after the Court's verdict, from July 2003, MDMP switched over to hot cooked meals prepared by caterers / NGOs in 72 small-scale kitchens. Therefore, 100 community members of an NGO were trained in the production of hot cooked supplementary foods so as to augment their income and also avail of loans / facilities. Success stories like this can be emulated for community ownership.

#### P149-12

### MID-DAY MEAL PROGRAMME IN GOVERNMENT SCHOOLS (MCD/NDMC) OF DELHI

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**RATIONALE:** Mid-Day Meal Programme (MDMP) aims to boost enrolment, retention, attendance, and impact nutritional status of schoolchildren (up to class VIII). In Delhi, earlier dry RTEs / fruits were served, but since 2003 there has been a switch over to hot cooked mini meals providing 450 Kcals and 12g proteins.

**OBJECTIVES:** To undertake an in-depth study of the Mid-day meal program in Delhi, both prior to and after switchover to hot cooked meals.

**METHODS and MATERIALS:** Interviews / FGDs were held with the teachers, students and their parents to elicit suggestions for improving the MDMP. Dietary practices and nutrient intake of the beneficiaries were assessed both prior to and after the transition. The revised scheme has been tracked carefully to study the operational aspects / teething problems; and propose necessary modifications from time to time.

**RESULTS and FINDINGS:** Dry RTEs met the energy/protein norms but were not relished; fruits though liked could not meet the nutrient norms; while the hot cooked meals were relished, met the nutrient norms and encouraged community participation. Despite substituting the home food, nutrient intake was better during the Cooked Meal Phase as compared to the RTE / Fruit Phase or the non-school day. Initially, the program suffered various bottlenecks - sporadic food poisoning due to poor hygiene, cumbersome distribution procedures and poor menus; however, this paved way for semi-automated units for quantity production of hygienic meals making Delhi's MDMP one of the most successful school feeding program in India.

#### P149-13

### HEALTH FOOD IN SCHOOLS, BRASILIA, CAPITAL OF BRAZIL

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**RATIONALE:** The national policy of health promotion by the Brazilian Ministry of Health presents as one of its strategies, the construction of sponsoring actions towards healthy alimentation in schools.

**OBJECTIVES:** To diagnose the situation of the Healthy Food Promotion (PFS) in the Federal District (DF) schools.

**MATERIALS & METHODS:** Transversal study with directors of 290 schools. It used the tau c Kendall and chi-squared tests.

**RESULTS & FINDINGS:** With the increase of meetings boarding healthy alimentation, and the variable with the insertion of this theme in the school curriculum, there was a major involvement of the school community in the construction of the political and pedagogic project (p<0,05). There is a significant and positive correlation among the presence of healthy environment (refectory, canteen, vegetable-garden, culinary spaces, etc.) and the healthy alimentation promotion (p< 0,005). The greater the number of partnership with the health sector, the greater will be the monitoring of the students height and weight.

**CONCLUSION:** The involvement of the community and partnerships with the health sector stimulates the construction of healthy environments and the promotion of healthy alimentation in school.

## P150: Elderly Nutrition II

### P150-01

#### DEVELOPMENT OF LOCAL RECIPES FOR THE ELDERLY

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Aim is to identify and develop nutritious local Thai recipes for healthy elderly--based on their nutrient requirements.

Community leaders were identified and were asked to identify community cooks within their communities. A listing of 74 local food experts was obtained through interviews. In-depth interviews identified 201 local menus that had the potential to improving its overall nutritious quality, for instance substituting coconut cream with cereal cream and/or soymilk. From that list, 40 local menus were selected and sensory evaluated by the elderly in their communities. Average (min-max) % RDI nutrient results of 40 menus were 6 (5-24), 20 (12-61) and 7 (4-24) of energy, iron and fiber respectively. Sodium value was 576 (122-1108) mg. Khanom Chin Nam Prik had the highest iron and fiber content. The study devised four sets of menus that were designed to rotate once a week. The set menus were based on the pattern that the elderly would consume three meals per day including 2 snacks/in-between meals. The study demonstrated local participation and wisdom of the communities with close collaboration with the research team.

### P150-02

#### AN IRON-BASED BEVERAGE, HYDRO-FERRATE FLUID (MRN-100), PROTECTS AGAINST OXIDATIVE STRESS IN AGING RATS

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**RATIONALE & OBJECTIVES:** The present study was carried out to examine the protective effects of Hydro-Ferrate fluid (MRN-100), an iron-based solution composed of bivalent and trivalent ferrates against oxidative stress in aging rats.

**MATERIALS & METHODS:** 24 young (4-month-old) and aged (22-month-old) rats were divided into two major groups: Group I: Normal young and Group II: Normal aged rats. Each group was further subdivided into two groups: one control, and one MRN-100 treated group. Control and treated groups had free access to tap water or MRN-100, respectively for 40 days. Oxidative stress markers were investigated.

**RESULTS & FINDINGS:** High significant levels of total free radicals, NO and MDA and low significant levels of GSH, total thiols, the activities of the antioxidant scavenging enzymes SOD, CAT and GPx were recorded in blood, liver and brain of aged animals as compared to the control ones. Supplementation of aged rats with MRN-100 demonstrated a normalization of abnormally elevated lipid peroxidation markers and subnormal antioxidant status.

**CONCLUSION:** From our observations we conclude that hydro-ferrate fluid (MRN-100) showed effectiveness in modulating age-associated alterations and may be implemented in the aged to minimize age-associated disorders where free radicals and oxidative stress are the major cause.

### P150-03

#### CHEWING ABILITY IN CONJUNCTION WITH FOOD INTAKE IN LATER LIFE AFFECTS SURVIVAL IN TAIWANESE WITH THE METABOLIC SYNDROME

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**OBJECTIVE:** We examined the relationship between self-assessed chewing ability and all cause mortality in elderly subjects after 8 years follow-up and considered interaction with the metabolic syndrome (MS).

**METHODS:** The representative Elderly Nutrition and Health Survey in Taiwan (NAHSIT) which was performed during 1999-2000 provided an analytic cohort of 1407 (728 men and 679 women), who were aged 65 and over. We linked these subjects to the National Death Registry up to 2006. Chewing ability was ascertained by questionnaire, as was food intake, supplemented by 24-hour dietary recall. The presence of the MetS was judged using the modified NCEP-ATP III criteria for.

**RESULTS:** A total of 367 subjects died during the 1999 to 2006 period. Those who had unsatisfactory chewing ability were at higher risk of mortality than those who had satisfactory chewing ability [Hazard ratio (HR)=1.59, 95% confidence interval (95% CI)=1.22-2.07]. Chewing might have been a surrogate in predicting mortality for age, gender, health status or appetite and so we adjusted for these. Moreover, since chewing could affect mortality in various ways, we also adjusted for those to do with food (dietary diversity score, DDS) and body composition in the presence or absence of the MS. After these adjustments the HR was 1.19 (95% CI=0.86-1.65). Jointly, those who had unsatisfactory chewing ability and the MS were at higher risk of mortality than those who had satisfactory chewing ability without the MS (HR=1.67, 95% CI=1.11-2.50).

**CONCLUSION:** Chewing ability is a predictor of mortality in elderly Taiwanese, and the MS increases this risk.

### P150-04

#### SALIVA SECRETION BY GUSTATORY STIMULI FOR THE ORAL HYGIENE

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**OBJECTIVES:** Oral intake of foods is not only a way for the ingestion of nutrition but also a life's pleasure. Particularly for the elder people's QOL, it is important to maintain oral functions for oral intake of foods. Saliva contains various molecules for oral hygiene and is essential for the maintenance of oral functions. Hence, the objective of this study is to know the properties of taste stimuli on the saliva secretion, especially temporal properties.

**METHODS:** Healthy adult volunteers held 3ml of solution for each basic taste having "moderate" taste intensity for 30 seconds in their mouths. They spat it and/or saliva in their mouths every 30 seconds for 10 minutes, then, the weights were measured. Resting saliva was also measured.

**RESULTS:** In the cases of all basic tastes, total amount of saliva was significantly larger than the resting. Saliva secretion rate increased transiently immediately after stimulation followed by gradual decrease. Umami and sweet stimuli showed significantly sustained salivation in comparison with sour and salty stimuli.

**CONCLUSION:** Because the oral stimulation with umami compound, which has low caries risk and low pungency, induced sustained salivation, umami stimulation can be applied to the clinical use to keep oral hygiene.

#### P150-05

### INADEQUATE DIETARY INTAKE AMONG THE ELDERLY IN LAKE VICTORIA BASIN AND THEIR CORRELATION WITH INDIVIDUAL CHARACTERISTICS AND HEALTH RELATED FACTORS

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Inadequate dietary intake, with associated imbalances of needed nutrients and energy from food is a potential health risk. The aim of the study was to assess the extent of inadequate dietary intake of the key nutrients among the elderly and examine the associations of individual characteristics, food and health related factors. A cross sectional study was carried out in Kisumu, Jinja and Mwanza to collect data from 247 elderly men and 341 elderly women aged 55 years and above. A questionnaire was administered to capture information on socio-demography, living conditions, living arrangements, food and health related factors. Dietary intake was collected using a 24-Hour Dietary Recall. The results indicated that lower intakes of specific nutrients were associated with the elderly who live alone, limited education, low socio-economic status, irregular eating patterns and consume fewer meals. The energy intake of 58.5% men and 37.9% women was not adequate. Fat intake was significantly low ( $p < 0.05$ ) though majority (52-57%) met their protein requirements. The intakes of vitamin A zinc and iron was inadequate in more than a third of the elderly. Calcium intake was significantly low. Poor dietary intake among the elderly is influenced by individual characteristics health and food related factors.

#### P150-06

### MALNUTRITION IN VEGETARIANS AND NON-VEGETARIANS ELDERLY PEOPLE RESIDING IN SENIOR HOMES

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**OBJECTIVE:** Previous studies showed that serum vitamin B-12 and serum ferritin were significantly lower in vegetarian compared to omnivores. Malnutrition may be an issue in elderly people. This research aims to investigate the nutrition status of vegetarians and non-vegetarians residing in senior homes.

**DESIGN:** Elderly residents who were 65 years or older were recruited from two senior apartments in County. Their nutritional status was assessed by the Mini Nutritional Assessment (MNA) by a dietitian. Subjects in one apartment were exclusively vegetarians ( $n=39$ ) and the subjects in other apartment were exclusively non-vegetarians ( $n=93$ ). Mann-Whitney test was used to compare the continuous variables between the two vegetarians and non-vegetarians. Fisher Exact test was used to compare the binary variable sex.

**RESULTS:** Both the vegetarians and the non-vegetarians were well nourished with mean MNA scores of greater than 23. MNA scores were not significantly different ( $p=0.155$ ) between vegetarians and non-vegetarians. The MNA scores were not different between sex ( $p=0.119$ ) or BMI ( $p=0.149$ ). Age was significantly older in the non-vegetarian group ( $p=0.024$ ).

**CONCLUSION & DISCUSSION:** The results showed the nutritional status was similar between vegetarians and non-vegetarians. The present study on residents from two senior apartments indicated that the nutritional status, as assessed by the MNA scores, was not significantly different between vegetarians or non-vegetarians. Future studies should further investigate the relationship between specific nutrient intakes and vegetarianism and take into the account of potential selection bias.

#### P150-07

### FACTORS AFFECTING THE NUTRITION STATUS OF VEGETARIANS AND NON-VEGETARIANS OF THE ELDERLY PEOPLE IN TAIWAN

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**Rationale & Objective:** Malnutrition in elderly people is thought to be a common issue. Whether dietary pattern, vegetarians or non-vegetarians, is the contribution factor of malnutrition is still unknown. The objective of the present study is to investigate the nutrition status of the two groups residing in senior homes.

**Materials & Methods:** Elderly residents who were 65 years or older were recruited from two senior apartments in Kaohsiung County. Forty exclusively vegetarians and 113 non-vegetarians were recruited. Their nutritional status was assessed using the Mini Nutritional Assessment (MNA) by a trained dietitian. General Linear Regression and Analysis of Covariance were used to test the associations of variables.

**Results:** Both the vegetarians and the non-vegetarians were with mean MNA scores of greater than 23. 2.5 % of the vegetarian elderly were malnourished, 5 % were at risk of malnutrition and 92.5 % were normal whereas 1.1% of the non-vegetarians were malnourished, 22.8 % were at risk of malnutrition, and 76.1 % were normal. Most of the vegetarians are the normal group compare to non-vegetarian (92.5 % vs. 76.1%). Independent test was used to assess in the analysis of both group. Sex ( $p=0.026$ ), BMI ( $p=0.006$ ), and income source ( $p=0.002$ ) were significantly different ( $p=0.054$ ) between vegetarians and non-vegetarians. However, education level was significantly lower in the vegetarian group ( $p=0.000$ ).

Linear Regression-ANOVAs test were used. Diet ( $p=0.114$ ), sex ( $p=0.723$ ), age ( $p=0.191$ ), income source ( $p=0.719$ ) were not affecting the MNA score significantly, which means those factors did not affect the nutrition status of elderly. BMI ( $p=0.000$ ), education ( $p=0.003$ ) affects the score of MNA significantly.

**CONCLUSION:** Vegetarians are not at a higher risk of malnutrition compared to non-vegetarians residing in senior homes. Education level contributed to the concern about the nutrition knowledge might be an important factor on the nutrition status in elderly population.

#### P150-08

### IMPACT OF REPLACING LAXATIVES BY DIETARY-FIBER ON BODY-WEIGHT IN GERIATRIC-PATIENTS

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**RATIONALE & OBJECTIVES:** Constipation is a frequent problem in elderly; laxative-usage is very common without consideration of its impact on the gut-health and body fluids.

To investigate whether the addition of fiber to standard oral diet reduces laxatives-usage and stabilizes bodyweight.

**MATERIALS & METHODS:** Subjects: 30 frail nursing homes inhabitants (57-98 years)

Design: A controlled parallel intervention study.

2 groups ( $n=15$  intervention/control) both consuming the ward's habitual diet were formed. The intervention group additionally received fiber (5-8g/d) for 12 weeks.

Bodyweight and fluid intake (weighing records) were taken at day 01, 42 and 84, laxative use was recorded.

**RESULTS & FINDINGS:** Mean (SD) energy intake in both groups at the test-time-points: 5.4 (1.5), 4.8 (1.3) and 4.8 (1.4) MJ/d; mean (SD) fluid intake: 1751 (248), 1830 (269) and 1750 (307) ml/d respectively.

Intervention group: bodyweight remained constant and laxatives decreased by 59%

Control group: bodyweight decreased significantly ( $p < 0.005$ ) and laxatives increased by 8%

**CONCLUSION:** Although energy-intake was low, dietary-fiber as a replacement of laxatives stabilizes body-weight in the intervention group, probably as a positive result of reducing the fluid loss.

#### **P150-09**

##### **APPLYING SENSORY EVALUATION TESTING IN THE COMMUNITY FOR THE ELDERLY**

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The aim of the study was to apply sensory evaluation testing in the community for the elderly. The process in sensory evaluation to improve local menus would play an important part in communicating its benefit into actual practice. Forty developed nutritious local Thai recipes for healthy elderly were sensory evaluated. Each respondent group evaluated a food-tasted for overall acceptance of 4 menus. The mobile sensory station would set up tables and chairs for the volunteers to sit and evaluate each menu behind a metal cubical--borrowed from the local election committee, that was portable and easily assembled. A 5-Smiley face gradient scale printed in large print on an A4 sized paper was developed. Results of the taste preference (5-point scale) for 40 developed recipes received a scale from 3.60-4.84. Preference for coconut cream, cereal cream, and cereal cream with soymilk was not statistically significant ( $p=0.01$ ). The five highest scored menus ( $> 4.0$ ) all had coconut cream as one of its main ingredients, and were relatively sweet to the taste and were not spicy/hot. Overall, the elderly respondents demonstrated that they were able to understand the concept used in the 5-Smiley face gradient scale.

#### **P150-10**

##### **NUTRITION STATUS OF ADULT MEN AND THE ELDERLY**

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Environmental changes and escalating poverty have led to malnutrition and poor health among populations in. Even though health professionals have perceived children and women as most vulnerable groups, the elderly are increasingly becoming a nutritionally vulnerable group due to social and economic deprivation. This study sought to investigate the nutritional status of the elderly. A cross sectional survey design was used on 588 elderly persons. The study was carried out in Kisumu District (Kenya), Mwanza region (Tanzania) and Jinja District (Uganda). Anthropometric, dietary intakes and biochemical data were gathered to determine the nutritional status of the target group. Results showed that nutritional intakes for the elderly were below the RDA for calories, fat, iron and zinc. About 23% of the elderly persons were underweight however there was evidence of over nutrition especially among elderly women. The prevalence of malnutrition was however higher in the rural areas at 19%, 16% and 18.3% in Kenya, Uganda and Tanzania respectively. The overall prevalence of anemia in the elderly men and women was 32.6% and 33.1% respectively. The study has demonstrated that the elderly are an emerging nutritionally vulnerable group and therefore there is need to incorporate this group in policies and programs in order to enhance the community's overall nutritional status.

#### **P150-11**

##### **NUTRITIONAL STATUS OF THE ELDERLY YORUBA IN IDIKAN COMMUNITY OF IBADAN, SOUTHWEST NIGERIA**

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The research focused on nutritional assessment of the elderly with the aim of improving the elderly state of health in the ancient city of Ibadan. 100 elderly from idikan community of Ibadan Oyo state Nigeria were assessed. By means of oral interview, food frequency questionnaire, checklist for nutritional vulnerability, biochemical analysis and anthropometric measurements, the elderly nutrition situation was determined. The demographic characteristics revealed that 39% were Male and 61% were female. About half (48%) were between 60-64 years. 74% were married and 23% windowed. Majority had no formal education (75%). The results of food frequency showed that roots and tubers were in high consumption while legumes and animal products had low consumption. The 78% of the elderly met the RDA(Recommended Dietary Allowance) for calcium but only 22 % met the RDA for iron. The Body Mass Index revealed that 38% were in normal nutritional status, 34% were underweight while 27% were overweight. The vulnerability checklist put 36 % of the male and 48% of the female to be highly nutritionally vulnerable. The hip to waist ratio among female showed that 46% were normal. The biochemical analysis of the blood samples for calcium ranged from 2.29 to 2.57 $\mu\text{mol/L}$ . On the whole elderly were found to be nutritionally vulnerable, underweight with diet very poor in animal products, dairies and fruits. The elderly Yoruba's need nutrition and social intervention for healthy living.

#### **P150-12**

##### **VITAMIN A AND E DEFICIENCY IN LOW INCOME SOUTH AFRICAN ELDERLY**

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**RATIONALE & OBJECTIVES:** Adequate dietary intake of antioxidants is vital for promoting health, well being and longevity in the elderly. The study assessed the prevalence of vitamin A and vitamin E deficiency in low income South African elderly.

**MATERIALS & METHODS:** Serum vitamin A and E concentrations were determined in 235 elderly in Sharpeville, South Africa. 24-hour recall was used for dietary assessment.

**RESULTS & FINDINGS:** Mean serum level in the elderly was  $1.41\pm 1.4 \mu\text{mol/L}$  for vitamin A and  $2.1\pm 1.1 \text{ mg/l}$  for vitamin E. The proportion with deficient serum vitamin A was 28.2% and 26.5% for men and women respectively, 20.5% of the men and 20.9 % of the women had deficient vitamin E concentrations. Almost one-third of the subjects consumed less than 100% of the Estimated Average Requirement for both vitamins.

**CONCLUSION:** Findings indicate poor dietary intake and high prevalence of vitamin A & E deficiency among these elderly. Sustainable community interventions are needed to address this observed nutritional vulnerability.

#### **P150-13**

##### **RISK FACTORS ANALYSIS ON ANEMIA AMONG RURAL ELDERLY WOMEN AGED 50-75Y IN MIDDLE CHINA**

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**OBJECTIVE:** To study the risk factors for anemia of rural elderly women in middle China.

**METHODS:** Xiuning in Anhui province was selected as working field and where elderly women aged between 50~75y were selected as subjects. Finger Hemoglobin (Hb) was measured and basic health survey was face-to-face questioned. 220 anemia elderly women entered into case group; and by age-matching, 220 with normal Hb concentration entered into control group. Dietary survey, health and lifestyle questionnaire were undertaken, and related blood indexes were tested.

**RESULTS:** Between case and control group, weight was 49.4±7.3 kg vs. 52.5±8.4kg( $t=3.97, P<0.01$ ), waist circumference was 75.8±7.8 cm vs. 79.1±9.3cm ( $t=3.85, P<0.01$ ), BMI was 21.8±2.6 kg/m<sup>2</sup> vs. 22.9±3.2kg/m<sup>2</sup> ( $t=3.775, P<0.01$ ), respectively; total protein was 76.4±5.0 g/L vs. 78.4±5.6g/L ( $t=3.83, P<0.01$ ), albumin was 45.7±3.1 g/L vs. 47.3±2.9g/L ( $t=5.24, P<0.01$ ), serum iron was 10.3±4.1μmol/L vs. (12.7±4.6) μmol/L ( $t=5.48, P<0.01$ ), saturation of transferrin was 19.0±7.6% vs. 23.1±9.1% ( $t=4.90, P<0.01$ ), respectively. Multifactor conditioned logistic regression analysis showed that the odd ratio (OR) for anemia with staple food, BMI and vitamin A was 1.54, 1.89, 1.69, respectively. Multifactor conditioned logistic regression analysis showed that the odd ratio (OR) for anemia with BMI, staple food, animal food, carbohydrate and vitamin A was 2.0, 1.6, 1.6, 1.4, 1.6, respectively; their confidence interval (CI) was 1.3~2.9, 1.1~2.3, 1.0~2.3, 1.0~2.1, 1.1~2.4, respectively.

**CONCLUSION:** The quality of diet, health status and related blood indexes in Anemia elderly women were lower than that in control group; lower BMI, less staple food and animal food, less carbohydrate and vitamin A intake were risk factors of anemia.

## P151: Biotechnology

### P151-01

#### ISOLATION AND SCREENING OF *Bacillus* spp. FROM THUA NAO TO PRODUCE HIGH ISOFLAVONE IN FERMENTED SOYBEAN

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Thua Nao is the traditional fermented soybean product from the northern part of. *Bacillus* spp. is the dominant bacteria in the fermentation. This study was to isolate the important microbes from Thua Nao in 8 provinces of northern part of Thailand. It was found that there were 29 isolates which could be separated into 3 groups. The first group was 23 isolates of *Bacillus subtilis* which could not produce the polymer. The second group was 3 isolates of *Bacillus subtilis* which could produce the natto-like polymer. And the last group was 3 isolates of *Bacillus megaterium*. Each group was screened on the basis of high isoflavones content (total of genistein and daidzein) in Thua Nao. The fermented soybean was inoculated by each isolation at 30 °C for 3 days. The most suitable isolate, from each group, for producing fermented soybean were *Bacillus subtilis* LG01, *Bacillus subtilis* CR04 and *Bacillus megaterium* PY03. The isoflavones content were 172.0, 110.4 and 148.5 mg/100g dry weight respectively.

### P151-02

#### OPTIMISATION OF THE AMPLIFICATION OF ZEA MAYS ZEIN GENE, GLYCINE MAX LECTIN GENE, CAMV 35S PROMOTER AND NOS 3' TERMINATOR FOR THE DEVELOPMENT OF A PCR-BASED DETECTION KIT FOR GENETICALLY MODIFIED ZEA MAYS AND GLYCINE MAX

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**RATIONALE & OBJECTIVE:** To optimize polymerase chain reaction (PCR) for the development of an easy, rapid and

less time-consuming molecular biology-based method for the screening of genetically modified (GM) *Zea mays* (maize) and GM *Glycine max* (soybean) found in local market.

**MATERIALS & METHODS:** Their entire genomic DNA were extracted by QIAGEN® DNeasy Plant Mini Kit, after which PCR was carried out using the different primer pairs. The PCR product were then separated by agarose gel electrophoresis.

**RESULTS:** The expected fragment size 277 base pair (bp) for zein and 414 bp for lectin were observed for all maize and soybeans respectively, whereas the expected fragment size of 195 bp for CaMV 35S promoter was observed for the GM-maize and GM-soybeans. However the amplicon size of 180 bp for nos3' terminator was not observed for GM-maize but result was obtained for GM-soybeans.

**CONCLUSION:** The PCR products obtained from both GM-maize and GM-soybean for CaMV 35S promoter were sent for DNA sequencing and the results indicated that the presence of GM-crops. Whereas the sequence of the PCR product for GM-soybeans cannot be confirmed yet for Nos' 3 terminator.

### P151-03

#### EFFECTS OF COWPEA FLOUR FRACTIONATION ON SENSORY QUALITIES AND ACCEPTABILITY OF KPEJIGAOU: AN INDIGENOUS, HIGH-PROTEIN, LOW- FAT, COWPEA-BASED GRIDDLED FOOD FOR COASTAL WEST AFRICA

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Cowpea based food products are good sources of inexpensive protein, especially for the rural poor communities. Kpejigaou is a griddled cowpea paste food that is popularly consumed in some countries in the West coast of. As its processing does not involve the use of fat, it has the potential of meeting consumers' demand for healthy, low fat vegetable food. The particle size of cowpea flour may have influence on the final product quality and acceptability. This study investigated the effects of cowpea flour fractionation on quality of kpejigaou. Processed samples of kpejigaou using whole and fractionated (fine, medium, and coarse) flours from both dehulled and undehulled cowpea were evaluated for sensory quality and acceptability. The protein content (23±2.14%) of cowpea flour was not significantly influenced by fractionation. Extractable starches increased with decreasing particle size of flour. Functionality of fractionated flour significantly correlated with final product texture and acceptability. Medium particle size flour showed higher water absorption and air incorporation during mixing and consequently yielded spongier and less dense kpejigaou that was most preferred and acceptable by the consumers. Coarse flour was the least preferred and was rejected because of poor performance in kpejigaou production. Dehulling improved the color of kpejigaou. Good quality kpejigaou can be processed from dehulled cowpea flour, contrary to traditional practices. Dehulled medium cowpea flour (Particle size: 150-450μm) could be recommended for the production of nutritious kpejigaou acceptable to the consumers.

### P151-04

#### EXTRACTED AND INCORPORATED LEAF PROTEIN OF POTATO AND TARA GREEN TOPS

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Leaf protein was prepared from Potato and Tara green tops which were chopped and pressed. The clarified juice was cooled down to 10C for 4 hours centrifuged at 10,000 RPM for 15 min. for separation of chloroplast protein. The supernatant was adjusted to pH 4 and centrifuged for 15 min at 10,000 RPM

to separate the cytoplasmic protein. Heat precipitation method was also used. Functional properties like solubility as a function of pH was determined. The isoelectric point of all products was found to be around pH 4.5-5. The solubility at alkaline side was much higher. Fat absorption capacity of tara and potato cytoplasmic protein was high. On contrary water absorption capacity was low and emulsification capacity was high in all leaf protein except potato leaf protein precipitated by heat. The cytoplasmic protein had higher foam capacity than chloroplastic protein. In Vitro digestibility indicated that the cytoplasmic for both Tara and potato had higher values by all enzymes followed by chloroplastic protein. Tara cytoplasmic protein contained higher amount of non-essential amino acids than that of potato cytoplasmic protein. The latter had higher amount of threonine, valine, isoleucine, leucine, tyrosine, phenylalanine and lysine than tara cytoplasmic protein. However both proteins were very poor source of sulphur amino acids. When incorporated both extracted protein in the dough. A definite increase in dough development time was obtained. Bread characteristics had no effect either on loaf volume or relative density. Supported by NARB GRANT (food from waste)

**P151-05**  
**MICROBIAL CONDITION OF YOGURT (PASTEURIZED & TRADITIONAL) IN TABRIZ-IRAN**  
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**RATIONALE:** Yogurt is one of the most important components of Middle East's food which has healing benefits in people cultures and one of the most sources of microbial contamination. Therefore, it is necessary to apply microbiological controls to raise their durability and conserve their quality.

**OBJECTIVE:** Determination of microbial condition of yogurt (pasteurized & traditional).

**METHODS:** In this cross sectional study, 100 samples of yogurt (50 pasteurized, 50 traditional) were collected and tested for microbial contamination (Coliform, Mold).

**RESULTS:** The contamination rate of yogurt samples to Coliform and Mold were 49% (pasteurized : 30%, traditional : 68%) and 22% (pasteurized : 12%, traditional : 32%) respectively.

**CONCLUSION:** In conclusion, the average of microbial contamination of yogurt samples were 35.5% that the most contamination related to traditional yogurt samples. Therefore, we must be considered healthy methods in several processes of production for prevention of contamination.

**P151-06**  
**MONITORING OF GENETICALLY MODIFIED FOOD IN POLAND**  
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**INTRODUCTION:** European Union (EU) legislation ensures that relevant information concerning genetic modification is available at each stage of the placing on the market of food and should thereby facilitate accurate labeling. Consumers should have the possibility to make an informed choice of products placed on the market.

**AIM:** The aim of monitoring is to check the compliance with EU law regarding the labeling of food that may contain, consist of or may be produced from genetically modified organisms.

**METHODS:** The potentially genetically modified food samples were taken from the market and analyzed by State Sanitary Inspection's laboratories (using PCR method) paying special attention to presence genetically modified (GM) material in such food.

**RESULTS:** 2315 food samples were analyzed in the years 2005 - IX 2008 within the framework of monitoring. 26 products i.e.

1.1% of food samples contained GM material (Soya Roundup Ready), approved in EU and they did not have information about genetic modification on the label. Moreover 3 GM products (potatoes – 1 sample, rice – 2 samples) were identified as containing unauthorized GM material in EU.

**CONCLUSIONS.** Continuation of monitoring of food concerning presence of GM material and correctness of food labeling is necessary and should be conducted regularly.

**P151-7**  
**DESIGNING VEGETABLES WITH SUPERIOR CONSUMER APPEAL AND NUTRITIVE VALUE**  
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In spite of the inherent nutritive value and need for enhanced consumption to address global obesity epidemic, there is not enough consumption of vegetables due to perceived poor taste, appeal, and convenience. Significant opportunity exists to integrate advances in science to address the global demands and needs of growers and consumers to design vegetables with improved productivity, shelf life, convenience, and nutritive value. Examples of product that are in the 3-5 yr launch include; raised head broccoli creating significant labor savings to growers, improved nutrition broccoli, Rugby lettuce with superior shelf-life, taste, and nutrient density, etc. In addition, Seminis is well poised to implement an integrated approach using crop analytics and bioassay tools to expand on the opportunistic Generation 1 products to design a pipeline of traits with superior consumer benefits that are in concordance with market need and consumer pull. This includes HTS assays for aroma, nutrient density profiling as well as identifying proprietary cultivars with health benefit properties for cholesterol, glucose, and body fat lowering benefits. Germplasm diversity along with cutting-edge tools such as Marker Assisted Molecular Breeding, High Throughput Crop Analytics and Molecular Nutrition enable rapid innovation and a pipeline of crop traits with grower profitability and enhance consumption by delivering benefits to consumer with better nutrition, taste, and convenience.

**P152: Food Safety / Food Borne Diseases II**

**P152-01**  
**INFLUENCE OF PROTECTIVE CHARACTERISTICS OF PACKAGING MATERIAL**  
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All food products have specific composition which causes its biochemistry changes under the influence of environmental factors. Barrier properties of package materials have a big influence on the changes of quality and preservation of the packed food products.

At the anhydrous products which are susceptible on water and fotooxydations, the influence of barrier properties of packaging materials is very important.

In this paper were given results of examinations of changes in quality of dried celery, which was packed in selected packaging materials and their combinations.

Food with medium moisture content, 10 - 50%, like dried celery, due to drying process, is in hygroscopic range and is sensitive to biochemical changes.

The components in celery are proven to have numerous positive effects on human health, and dried celery has long been widely used in both the food industry and private households. Its components have profound antihypertensive and bactericidal effects in humans, and have preventive and curative, antimicrobial, antioxidative and anticarcinogenic effects.

The shelf life of dried celery packaged in packaging materials of different barrier properties and protective atmosphere was



examined. Over the 12 months storage period, changes in water content and nonenzymatic browning process (HMF) of the packaged product were monitored.

The results implied that the used of packaging materials can prevent the quality stability of dried celery, and could alleviate the consequences and contribute to longer shelf life of the product.

#### **P152-02 HEALTH WORKERS KNOWLEDGE AND PERCEPTION ON SUPPORTS AND BARRIERS TOWARDS FOOD SAFETY IMPLEMENTATION**

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Health worker has responsibility in preventing foodborne disease through food safety dissemination and ensuring food safety control implementation in the community. Understanding their perceptions on supports needed and perceived barrier would be useful to improve their performance. This study was aimed to assess the knowledge and perception on food safety implementation among health workers.

Cross sectional design and 128 health workers in East Java province were employed in this study. Health workers knowledge and perception on supports needed and perceived barrier on food safety implementation were assessed using tested questionnaire.

The proportion of health worker who has score test at least 80% was 70 %. Health workers who have perceived problems to disseminate food safety and ensure food safety control application were 55, 5% and 64, 8% respectively. The existing problems they faced mostly were related to the target group characteristics. The required supports were on micro level characteristics on health system & facilities as well as personal factors (health worker characteristics).

Health workers have satisfactory food safety knowledge; however necessary provision on micro level facilities and community appreciation would be required to improve their performances.

#### **P152-03 SMALL AND MICRO ENTERPRISES (SMEs) IN THE WESTERN CAPE - ASPECTS OF KNOWLEDGE, ATTITUDES AND PRACTICES OF FOOD SAFETY**

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**OBJECTIVE:** This study determined HACCP (Hazard Analysis Critical Control Point) awareness among managers of food producing SMEs and aspects of knowledge, attitude and practices of food handlers regarding food safety.

**METHODS:** A descriptive, analytical study design was used, representing two categories of SMEs: providing food to clients at risk of illness (n=64) or healthy clients (n=81). SMEs were randomly selected, 145 managers and 159 food handlers completed validated questionnaires.

**RESULTS:** Only 6% of managers reported awareness of HACCP being mandatory in South Africa. More than 70% of managers and food handlers received no formal training regarding food safety. The perception that food safety control should focus on general cleanliness still prevailed amongst managers (57,2%). Food handlers achieved an unsatisfactory score (46,0%) on the basic principles of food safety. There was no significant difference in the results obtained between food handlers in SMEs providing food to healthy clients or clients at risk of illness.

**CONCLUSION:** Creating awareness and understanding of HACCP amongst managers of SMEs and education regarding control of risk factors, remains crucial.

#### **P152-04 EXPOSURE TO DIETARY OCHRATOXIN IN EGYPT AND HONGKONG**

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Ochratoxin A (OTA) is a mycotoxin with worldwide occurrence in a variety of foods and feeds. This carcinogenic and teratogenic mycotoxin has been linked to human endemic nephropathy in several countries. The study aims to evaluate whether populations in Egypt and Hong Kong are exposed to OTA. OTA from Egyptian serum (50) and Hong Kong plasma (10) samples were analyzed by solid-phase extraction and HPLC detection. OTA was detected in 64 % (32/50, mean 0.5ng/ml, range 0.3 - 1.1ng/ml) and 60% (6/10, mean 0.3ng/ml, range 0.2-0.3ng/ml) of the samples from Egypt and Hong Kong, respectively. The level in Egyptian sample is similar to those previously reported confirming that this population is frequently exposed to this carcinogen. This is the first study of the OTA exposure in Hong Kong and raises the question on the contribution of OTA to kidney related diseases in Hong Kong and further investigations are warranted to explore this relation.

#### **P152-05 CONTENT OF TRANS FATTY ACIDS IN AUSTRIAN FOODS**

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Due to reported detrimental health effects of diets high in trans fatty acids (TFA) particularly on blood lipids approximately 350 products of the Austrian market were analyzed on their TFA and total fat content.

About half of bakery products contained more than 2 % TFA/total fatty acids. In around three-quarters of children products and half of the fats less than 1 % TFA were found. Only margarines for pastry production exceeded levels of more than 20 % TFA. Regarding convenience products half of them contained less than 1 %, one-third less than 5 %, but almost 5 % more than 20 % TFA. This allocation was similar with fast food products. Around 80 % of snacks had TFA levels of less than 1 %, but 10 % more than 30 %.

Compared to previous investigations the TFA contents were reduced. About half of the products contained less than 1 % TFA/total fatty acids and one-third ranged between 1-5 %. However, amounts of more than 20 % TFA were still detected in 3 % of the products.

#### **P152-06 CO-OCCURRENCE OF AFLATOXIN AND DEOXYNIVALENOL BIOMARKERS IN PREGNANT EGYPTIAN WOMEN**

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Mycotoxins are highly toxic naturally occurring secondary metabolites that frequently contaminate cereal crops throughout the world. Aflatoxin B1 is a human liver carcinogen, and exposure during pregnancy and/or during infancy has additionally been associated with subsequent growth faltering of the child. Deoxynivalenol (DON) causes gastrointestinal toxicity, reduced weight gain and immune toxicity in animals, though the potential health consequences of exposure remain

poorly explored. In this biomarker survey we assessed the prevalence and level of aflatoxin-albumin (AF-alb) in sera, and aflatoxin-M1 (AFM1) and DON in urine, from 98 pregnant Egyptian women during the third trimester of pregnancy. AF-alb was present in 35% (mean 4.8pg/mg albumin, range 3.0-35.2pg/mg), AFM1 in 47% (19.7pg/mg creatinine, 6.0-407.5pg/mg), and DON in 68% (2.8ng/mg creatinine, 0.5-59.7ng/mg) of the women; mean of positives presented throughout. Aflatoxin biomarker level and frequency were high compared to more developed regions, though moderate compared to rural sub-Saharan Africa. This is the first biomarker survey for DON in Africa, and it was notable that 41% of the subjects were positive for both DON and aflatoxin exposure. To our knowledge this represents the first study to report the co-occurrence of these biomarkers in any human survey.

#### **P152-07**

##### **A SURVEY ON FOOD SAFETY BEHAVIOR AND PERSONAL HYGIENE IN UAE**

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ARE

There is little information available about incidence and causes of food borne illness that can help government to develop policies to prevent it at UAE. This study includes 200 persons (males and females) their age ranged between 20-45 years in Al Ain, UAE. Data showed that two fifth of high educated people have good information about microbes and its diseases and basic level of personal hygiene, whereas 83% of those who took food borne illness didn't understand the real reason lead of vomiting and diarrhea. While less than 40 % exerted the correct way of hand washing before and after eating (more than 65% of them were females). In addition, less than 26% of people interesting to read articles about food poisoning (90 % of them were mothers). Most of the people in that survey was Muslims and they depended on their daily attitude which it affect their personal hygiene because they must wash before praying. Data generally referred that people need awareness programs or training.

#### **P152-08**

##### **AN EXPLORATION OF LAY PERSPECTIVES ON FOOD SAFETY ISSUES DURING PREGNANCY**

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**RATIONALE & OBJECTIVES:** Food safety is critically important in contributing to a successful pregnancy outcome. Lay perceptions of food-related risks, as socio-cultural constructions based on individual understandings of scientific knowledge, play an important role in the ways these risks are avoided. This study aimed to explore pregnant women's perceptions of food-related hazards and the decision-making processes that shaped their strategies to avoid the risk.

**METHODS:** An exploratory design was used within a qualitative framework. Issue-focused, in-depth, semi-structured interviews with 26 pregnant women were carried out in three hospitals in New South Wales, Australia. Analysis was conducted using the constant comparative method.

**RESULTS:** Decision making processes to avoid food borne illness during pregnancy were formed within the context of an existing classification system, based on the nature of food and its organoleptic characteristics that helped women judge the safety of their food in their eating routines. While women's notions of control and trust were found to influence this system, most

women had added another layer to their eating practices through coping strategies such as elimination, reduction or moderation to ensure the safety of their baby.

**CONCLUSION:** Identifications of the ways in which lay women conceptualize food safety issues has implications for future educational initiatives to prevent negative consequences of food borne infections during pregnancy.

#### **P152-09**

##### **THE USE OF A VALIDATED DIETARY ASSESSMENT TOOL IN A HUMAN MYCOTOXIN EXPOSURE STUDY**

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**RATIONALE:** Determining dietary mycotoxin exposure provides assessment challenges. In rural areas of Eastern Cape in South Africa, maize is the staple diet which increases fumonisin exposure. A culturally specific assessment method was developed and validated.

**METHODS:** A cross sectional study was conducted. 319 Participants (males and females) from different villages participated.

**RESULTS:** Mean dry weight maize of 511 g per person/day was consumed. Participants used either homegrown maize, commercial maize or both, thus fumonisin exposure differs. Dry weight maize intakes for homegrown and commercial maize were 115g/day and 424g/day, respectively. Together with the use of total mean fumonisin levels determined in both homegrown maize (1142µg/kg) and in commercial maize (222µg/kg), it provides accurate probable daily intakes (PDI's). The PDI's for homegrown maize (1.9µg/kg/day) and commercial maize (1.3µg/kg/day) were lower than the recommended group provisional maximum tolerable daily intake for fumonisins of 2µg/kg/day. PDI's for homegrown maize is higher amongst males. Moldy homegrown maize is preferred for traditional beer and has higher fumonisin levels. Males consumed more beer and maize-based dishes and therefore higher PDI's are expected.

**CONCLUSION:** Accurate data can only be determined with validated methods, especially in vulnerable populations with specific habits and traditions. Planning and implementation of preventative strategies depends on the translation of accurate risk assessment.

#### **P152-10**

##### **IDENTIFICATION OF HAZARDS AND CRITICAL CONTROL POINTS (CCP) FOR CASSAVA 'LAFUN' PROCESSING IN SOUTH-WEST NIGERIA**

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A hazard analysis survey of cassava 'lafun' processing was carried out for five processors around. This analysis consisted of observing the raw materials and environment, watching all steps of the processing, recording pH during steeping/fermentation, and collecting of samples from diced cassava, washed cassava, soaked cassava and 'lafun' for total viable count, Coliform, Staphylococcal and Bacillus counts. The pH of steeping/fermentation for the processors varies between 4.08 and 4.58. The total viable count increases with increase in pH level of the 'lafun' sample and Coliforms, Bacillus cereus and Staphylococcus aureus were isolated from the 'lafun'. The presence of Coliforms, S. aureus and B. cereus indicates that the processing is carried out in a highly contaminated environment. Education of processors on the hazards, critical control point (CCP) and the importance of hygienic environment is imperative. Therefore, control measures and proper monitoring procedures for 'lafun' processing are suggested.

## P153: Food Processing for Improved Nutrition IV

### P153-01

#### PROBIOTIC GOAT'S MILK YOGURT: A NOVEL APPROACH TO ADDRESS UNDER-NUTRITION

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**RATIONAL & OBJECTIVES-** Goat's milk plays a significant role in nutrition among many Asian and African countries where under-nutrition among children and mothers is common. Incorporation of novel probiotic *Propionibacterium jensenii* 702 (PJ702) to goat's milk would bring more benefits beyond the nutritional value of goat milk due to their potential health benefits.

**MATERIALS & METHODS:** Yogurt containing PJ702 was produced from goat's milk by inoculating 108 cfu/g initial population together with lactic acid bacteria. Survival of probiotics at 40C and physico-chemical properties were assessed according to standard methods over 35 days.

**RESULTS & FINDINGS:** Viability of PJ702 were decreased to 107cfu/g during storage. They demonstrated better survival rate compared to lactic acid bacteria ( $P < 0.05$ ). The initial pH ( $4.52 \pm 0.02$ ) was decreased to  $4.36 \pm 0.01$  over the shelf life. The other physico-chemical properties fell within the following averages: syneresis  $32.65 \pm 0.55\%$ , water holding capacity  $19.33 \pm 0.67\%$ , texture  $1222.33 \pm 1.67$  cP, total solids  $16.91 \pm 0.24\%$  and titratable acidity  $1.35 \pm 0.15\%$ .

**CONCLUSION:** Due to higher viability of PJ702 which is a vital factor, this product is suitable in combining nutritional value of goat's milk with health benefits of probiotics.

### P153-02

#### MACRONUTRIENTS COMPOSITION OF SEAWEED-CONTAINING CUISINES

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Traditionally seaweeds are very familiar, but special food items in Korea. It has been accustomed to postpartum women as medicinal food or to children at birthday or picnics. Nowadays people often consider it as functional food containing special bioactive components for reduction of body weight or for preventing cancer. In fact seaweeds contain many nutrients such as dietary fibers, minerals, carotenoids etc. However the nutrients availability in cuisines are changed according to processing or serving pattern of cuisines. This study was conducted to analyze the nutrients contents from Korean cuisines containing seaweeds, primarily sea mustard, sea tangle, sea lettuce. The five cuisines were prepared following traditional recipes and then analyzed macronutrients by AOAC methods. All cuisines contained seaweeds in the range of 11~40g, in which carbohydrate contents were 1.6~4.65g, protein 0.18~1.06g, lipid 0.05~0.50g and ash 0.136~0.497g, even though one serving size of dishes were quite different (14~300g). From the results it was possible to expect that Korean people enjoying seaweeds daily might consume total minerals up to 1g or dietary fiber up to 15g from seaweed-containing cuisines.

### P153-03

#### EFFECT OF ACETIC ACID ADDED TO SOAKING WATER AND BOILING ON THE DECREASING ALLERGEN IN RICE

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**RATIONALE & OBJECTIVES:** Rice is usually soaked and boiled before eating. We revealed that 14-16 kDa rice allergens

in grains are decreased by soaking the grains in acid solution. So, in this study, we investigated the effects of soaking in acetic acid buffer or rice vinegar and subsequent boiling on the decrease of rice allergens.

**MATERIALS AND METHODS:** Rice grains were soaked in 0.1M acetic acid buffer (pH3, 4, 5, 6) or diluted rice vinegar (pH3) for 16 hours. After wash, rice grains were boiled for 45 minutes. The allergens eluted into soaking solution, extracted from rice grains after soaking and extracted from boiled rice grains were analyzed by immunoblotting.

**RESULTS & FINDINGS:** The allergens were markedly eluted into acetic acid buffer (pH3) and decreased to no more than 20% of total allergens in the grains. However, additional decrease of allergens wasn't observed by subsequent boiling. Furthermore, to apply these findings into daily life, the soaking solution was changed acetic acid buffer into rice vinegar and analyzed in the same way. As a result, the allergens were also decreased in a similar manner.

**CONCLUSION:** These results suggest that decrease of rice allergens is affected pH of soaking solution more than subsequent boiling.

### P153-04

#### INFLUENCE OF PARTIAL REPLACEMENT OF BRINE NaCl WITH KCl ON THE CHARACTERISTICS OF IRANIAN WHITE CHEESE

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Iranian White cheese has some nutritional risks because of its high NaCl levels and we tried to reduce its levels by substituting NaCl with KCl.

Iranian White cheese samples were prepared using pasteurized cows milk, ripened in the brines containing different salt composition. The brine was either composed of NaCl alone (control) or in mixture with KCl (in 3:1 and 1:1 ratios of NaCl/KCl). The effect of partial substitution of NaCl by KCl was investigated on chemical composition, proteolysis, lipolysis as well as physical properties of the cheese samples in the term of textural hardness, during their ripening up to 56 days.

We observed that the reduction of NaCl, up to 50% is feasible, with partial replacement of NaCl by KCl, without an adverse effect on its physicochemical quality parameters. Cheese samples ripened in the brines including mixtures of NaCl and KCl did not have significant effects on cheese properties such as moisture, salt, pH, and acidity, in comparison with the control cheese sample. Evaluation of proteolysis in the cheeses was determined using Kjeldal method, measuring soluble nitrogen fraction, and Urea-poly acryl amid gel electrophoresis. Our results showed that proteolysis was similar in control and experimental cheese samples at various periods of ageing (3, 7, 14, 28, 42 and 56 days). Lipolysis of cheese during aging was assessed measuring Acid Degree Value (ADV) method. It showed that the ADVs were similar in ripened control and experimental cheese samples at various sampling times from aged cheeses. There were no significant differences ( $p < 0.05$ ) in the textural properties of control and experimental cheese samples.

Our results showed that we can substitute up to 1/3 of NaCl with KCl.

#### P153-05

### ABILITY OF A VIETNAMESE VERY-LOW COST EXTRUDER TO PRODUCE INFANT FLOURS USING VARIOUS STARCHY RAW MATERIALS

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**RATIONALE & OBJECTIVES:** To test the ability of a “very-low cost extruder” (VLCE) designed for the production of rice-based infant flours to be used with other African starchy raw materials.

**METHODOLOGY:** Five cereals (rice, white corn, yellow corn, millet, sorghum) were mixed with soybean in appropriate proportions to obtain blends with three lipid/starch ratios. Expansion ratio, starch gelatinization rate and instant index of extrudates were determined as well as their apparent viscosity after preparation into gruel.

**Results:** The effect of extrusion cooking depended on the nature of the starchy raw materials and on the lipid/starch proportion in blends. When prepared from blends having medium or high lipid content, rice-based extrudates had higher expansion ratio and starch gelatinization rate than other extrudates. In addition, they gave gruels with significantly lower apparent viscosity and better instant index.

**CONCLUSION:** With the exception of millet, which produced dark extrudates with low starch gelatinization rate, the VLCE allowed the production of ready-to-cook infant flour with all cereals tested. However, instant flour production was possible only with rice-based blends.

#### P153-06

### THE EFFECTS OF RAT CHOW, COMMERCIAL VEGETABLE SALAD AND VEGETABLE SALAD WITH DRESSING ON BODY WEIGHT AND LIPID PROFILE OF RATS

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Plasma lipid profile can be greatly influenced by diets and diet components. Commercial vegetable salads with or without dressing are commonly consumed. In this study, the effect of consumption of rat chow, commercial vegetable salad with or without dressing on body weights and lipid profile of rats were determined. Thirty-two rats were divided equally into baseline, rat chow, vegetable salad and vegetable salad with dressing and fed respective diets for five weeks. Body weight changes, total cholesterol, triglycerides, HDL-cholesterol and LDL-cholesterol levels were determined using standard methods. The three diets supported weight gains in rats. Total plasma cholesterol, triglycerides, HDL-cholesterol and LDL-cholesterol values were highest in rats fed vegetable salad with dressing. This might be due to components of salad dressing. Vegetable salad-fed rats had the least LDL-cholesterol and higher HDL-cholesterol than those of rat chow and baseline groups. The atherogenic and coronary risk indices were lowest in the vegetable salad group. Salad dressing should be used with caution.

#### P153-07

### PROCESSING AND QUALITY EVALUATION OF VALUE ADDED PRODUCTS PREPARED FROM CORDIA DICHOTOMA

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*Cordia dichotoma* is a very common fruit tree growing all over India except high hills. The tree bears fruit known as Indian Cherry. Fruits are sweet with varying medicinal properties. Green fruits are eaten as vegetable whereas, ripe fruits are eaten as delicacy and used as spirituous liquor. Keeping in view the medicinal profile of the fruit, an attempt was made to explore the post harvest potential of Indian cherry for preparation of value added products viz. pickle, chutney and dehydrated products at different stages of maturity i.e. mature and immature. The study revealed that pickle with Galgal juice and 12 per cent salt concentration and chutney blended with green mango pulp (25:75) were adjudged better in terms of chemical and sensory characteristics. Samples dried at 50°C in mechanical drier after treating with KMS were the best in terms of rehydration, chemical characteristics and cooking quality. Storage studies revealed safe storability of the developed products for six months at ambient temperatures without affecting chemical and sensory characteristics much.

#### P153-08

### EFFICIENCY AND RIPENESS OF TRADITIONAL WHITE AND ULTRAFILTRATION CHEESE AS AFFECTED BY PSYCROTROPHIC BACTERIA

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During cheese ripening, some of water insoluble casein change to water soluble nitrogen which are included intermediate hydrolysate protein and free amino acids. In this work, ripening and efficiency of traditional white and UF cheese as affected by psychrotroph bacteria was investigated. The result of this research showed that the amount of psychrotroph bacteria on the white and UF cheese was significant. Also, there was a good correlation between psychrotroph bacteria and ratio of soluble nitrogen to total nitrogen during ripening period. In fact, as the psychrotroph bacteria increase, the ratio of soluble nitrogen to total nitrogen will be increased during ripening period. The percent of N recovery (efficiency index) for UF and traditional white cheese was 88.01-90.45 and 77.23-80.52, respectively. The effect of changing above parameter on UF cheese is more than white cheese.

#### P153-09

### MODEL EXPERIMENT FOR PRODUCTION OF FERMENTED RICE-NOODLE WITH HIGH NUTRIENT BY ISOLATED BACTERIA

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Fermented rice-noodles have traditionally been consumed for centuries in Asia, such as Kha Nhom Jeen in Thailand. Various bacteria have been involved in fermentation. Although rice proteins cause allergy problems, fermented rice-noodles were found to be hypoallergenic and provide a large amount of  $\gamma$ -aminobutyric acid (GABA). However, due to the fact that the productions are practiced locally, the product quality still cannot be controlled.

This study is an attempt to establish effective model technique for producing a high nutrient fermented rice-noodle in term of

digestion of rice allergenic protein and GABA production using isolated bacteria.

Rice proteins were digested separately by *Bacillus subtilis* DB and SR isolated from cereal products. It was found that these strains could digest 33-kDa allergenic proteins. Besides, this digestion also increased amino acid content, especially Leu, Val, and Glu, which was the same result previously found in Thai traditional fermented rice-noodle. These bacteria were, therefore, the promising bacteria for Glu production in fermented rice-noodle processing. *B. subtilis* SR gave the more effective potentials; it was selected for further investigation with lactic acid bacteria in order to produce GABA. This study can be used as a model experiment for applying isolated bacteria as starter cultures to produce fermented rice-noodle with high nutrient availability and quality.

#### P153-10

##### **PROXIMATE COMPOSITION AND ORGANOLEPTIC CHARACTERISTICS OF BREAD AND BISCUIT PRODUCED FROM CO-FERMENTED BAMBARA BUT (VIGNA SUBTERRENEA) AND WHEAT FLOUR BLENDS**

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**BACKGROUND:** In this study, we developed and evaluated the nutrient and sensory properties of bread and biscuit produced from co-fermented Bambara nut and wheat flour blends.

**OBJECTIVES:** To evaluate the nutrient and organoleptic characteristics of breads.

**MATERIALS AND METHODS:** The seeds of cream variety Bambara nut was soaked in water, cooked, dehulled, ground and sieved to produce flour. The flour was blend with wheat flour in equal proportion and fermented together (co-fermentation). Breads and biscuit samples were produced from the blend. The nutrient and sensory properties were compared between samples from fermented Bambara nut flour, wheat flour and the combined flour blend of fermented Bambara nut and wheat flour.

**RESULT:** The result showed that bread and biscuit samples from co-fermented flour had significantly higher ( $P<0.05$ ) crude protein (bread =  $26.41\pm 0.58\%$ , biscuit =  $25.13\pm 1.68\%$ , dry matter basis), thus indicating that bread and biscuit with high protein content and energy value could be produced from co-fermented Bambara nut and wheat flour. The energy equivalent of the bread and biscuit sample from co-fermented flour were found to be  $1780.96\pm 1.15$  KJ and  $1882.71\pm 1.81$  KJ respectively. In all the sensory attributes studied for bread and biscuit however, samples from co-fermented flour were scored low and were generally less liked (score 4) by human volunteers who took part in the taste panel.

**CONTRIBUTOR:** In spite of its energy density and the high protein content of the Bambara-wheat blend, poor organoleptic characteristics may limit the utilization of such products hence further study is needed to improve the organoleptic properties of products made from such flour.

#### P153-11

##### **STUDY ON MINIMALLY PROCESSED STEVIA BASED SWEETENER - EFFECT ON SENSORY PROPERTIES, NUTRITIVE VALUE AND ANTIOXIDANT PROPERTY OF BISCUITS**

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**RATIONALE AND OBJECTIVES:** Stevia rebaudiana contains sweetening compounds which do not contribute to calories and are being developed as alternatives to sugar and synthetic sweeteners. Stevia based sweeteners are available

as purified glycosides from the leaves. The leaves are rich in minerals and antioxidants which are lost during processing. We studied the use of whole Stevia leaf, powdered to pass through 100-mesh sieve, in biscuits. The objective was to evaluate the utility of whole Stevia as a sweetener in baked products and its effect on the sensory and nutritive properties of the food matrix.

**MATERIALS AND METHODS:** Whole Stevia leaf was powdered to pass through a 100-mesh sieve. This Stevia leaf powder (SLP), purified stevioside (enzymatically modified steviol glycosides from Stevian Biotech, Malaysia) and table sugar were used to bake biscuits. Biscuits containing SLP were additionally modified with tannic acid to mask the bitter taste of the leaf powder. The proximate composition of the biscuits were determined. DPPH assay was used to determine free radical scavenging activity. Sensory study was designed to evaluate the right formulation to mask the bitter taste and leafy odor of the product. Scanning Electron Microscopy of the biscuit was used to evaluate microstructure and its influence on texture of the biscuit.

**RESULTS AND FINDINGS:** Sensory analysis revealed that biscuits containing sugar were the most preferred among the three samples. Biscuits with Stevia Leaf Powder and Tannic Acid had very low bitterness when compared to biscuits made with only Stevia Leaf Powder. The overall acceptability of biscuits with Stevia Leaf Powder and Tannic acid was close to that of Sugar biscuits. Stevia leaf powder and tannic acid contributed to higher antioxidant activity of the biscuit when compared to biscuits made with sugar or purified stevioside. Proximate values revealed that biscuits with Stevia Leaf Powder contain higher amount of essential minerals like Calcium and Iron. Micrographs of the biscuits obtained through Scanning Electron Microscope (SEM) and it was found that biscuits made with Stevia Leaf Powder were similar in structure to the biscuits made with Commercial white Stevioside powder.

**CONCLUSION:** Stevia leaf powder is a versatile product, which is minimally processed to retain its nutritive value. It can be used as such in food products, with some changes in the formulation to mask its inherent bitterness and leafy odor. Stevia leaf powder is cost effective when compared to synthetic sweeteners or purified Stevia-based products. An added advantage of not purifying the glycosides from the leaf is the retention of the antioxidant activity and mineral content. This versatility and health benefit is unique to Stevia leaf powder.

#### P153-12

##### **CONTRIBUTION TO IMPROVEMENT OF THE SHEA (*Butyrospermum parkii*) BUTTER EXTRACTION PROCESS IN CAMEROON**

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Cooking and drying, two process of shea butter extraction use traditionally for extraction are critical stages for butter quality. If cooking parameters are controlled and improved drying systems used, quality could be improved. We approached women in order to contribute to the better development of butter compare to their extraction methods. We carried out different tests of cooking and drying on nuts harvested in Bangangté-Cameroon according to centred composite experimental design. We varied time, temperature and nut/water weight ratio for cooking and time, temperature for drying. Iso-responses curved established by Statistica and StatGraphics Plus software obtained permits us to highlight a following range of controlling parameters: for cooking, temperature between 60-90°C (just before boiling), time between 60-120 minutes and nut/water ratio between 100-400 g/l, drying temperature between 55-60°C during 50-72 hours.

## P154: Food Composition and Biodiversity III

### P154-01

#### EFFECTS OF COOKING ON PHYTOSTEROL CONTENT, FATTY ACIDS AND TOTAL FAT IN SOME COMMONLY CONSUMED THAI NUTS, SEEDS AND LEGUMES

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Nuts, seeds, and legumes are excellent sources of protein, essential fatty acids, fiber, complex carbohydrates, vitamins, minerals and phytochemicals especially phytosterols. There was no data on phytosterol content in Thai nuts, seeds, and legumes were reported. Therefore, this study aimed to determine phytosterols, fatty acid profile, and total fat and the effect of boiling, roasting, and frying on the phytosterol content, fatty acid profile and total fat in nuts, seeds, and legumes. Samples were purchased from markets in Bangkok and the metropolitan areas and in northern Thailand. The phytosterol content of nuts, seeds, and legumes ranged from 12.24-120.44 mg per 100 g wet weight. Raw and cooked Kra-bok contained the highest phytosterol content. Beta-sitosterol was the major phytosterol in all nuts, seeds, and legumes. The phytosterol content of mung bean and red kidney bean was decreased after boiling while that of the other samples remained unchanged. The phytosterol content of fried cashew nut was increased while that of fried board bean was decreased. Roasting significantly increased phytosterol content of Ko-duei, Ko-paen, Nga-kee-mon seeds, and dehulled sesame seed ( $p < 0.05$ ). The total fat content of samples ranged from 0.25-71.67 g per 100 g wet weight. The highest total fat content was found in raw and cooked Kra-bok. Boiling had no effect on the total fat while frying significantly increased the total fat in almost samples ( $p < 0.05$ ). Roasting had no effect on total fat, except in Ko-duei, Ko-paen, and dehulled sesame seed were significantly increased. The fatty acid profile showed that cashew nut, Nga-kee-mon, and Kra-bok had the highest monounsaturated fatty acid (MUFA), polyunsaturated fatty acid (PUFA), and saturated fatty acid (SFA), respectively. The PUFA, MUFA, and SFA of samples tended to increase after cooking. These results provided information that will be benefit to consumers, academics and health professionals.

### P154-02

#### NUTRITIVE VALUE AND PHYTOCHEMICAL CONTENT OF THE TRADITIONAL THAI RECIPE

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Thai food has been widely recognized as one of the best cuisine in the world, however, there is little in the way of standard practice. To raise the potential and bring standardization to a cuisine, this research has created and developed the standard recipes of traditional Thai cuisine, together with evaluation of nutrients and phytochemical content. Twenty popular Thai dishes were developed by Rajabhat Suan Dusit University and National Food Institute. Then each food was prepared as three single samples for analysis and evaluation by INMU. High level of protein, fat and energy were found in thick red curry with beef and stir-fried pork and long bean with curry paste. Most Thai dishes contain dietary fiber with the highest level in papaya salad, stir-fried pork and long bean with curry paste and Thai stir-fried noodles. Spicy mixed salad contained highest amount of vitamin A (3238 mg%). All studied recipes had various content of minerals. Stir-fried pork with holy basil had the highest total flavonoid (107 mg%). Sticky-rice mango contained highest beta-carotene (1223 mg%) while papaya salad had the highest level of lutein and zeaxanthin. The highest

lycopene was found in sweet and sour prawns. Total phenolic compounds in all dishes were found in the range of 4-177 mg gallic acid equivalent with the highest level in fish cakes. In conclusion, traditional Thai dishes contained various amount of nutrients and phytochemicals. The variation depended mainly on their recipes, methods of cooking and the variation of each ingredient. Thai foods showed potential to be considered as healthy diet, however, research on specific health benefit is also encouraged.

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### P154-03

#### CAROTENOIDS CONTENT AND ANTIOXIDANT PROPERTIES OF UNDERUTILISED TROPICAL FRUITS

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Southeast countries are rich in diversity of underutilized fruits that wildy grown, and some of these fruits are rarely eaten. Due to a broad of spectrum of their flesh and skin color, and may have potential benefits to human health. These fruits can be used as alternative sources to combat hidden hunger such as vitamin A deficiency. However substantial information is still lacking. The study aimed to determine the carotenoids content and antioxidant properties of these fruits. 14 of the fruits were collected randomly from the selected sampling lots and were screened for total carotenoid content. Out of six were selected for determination of  $\beta$ -carotene content and antioxidant properties by HPLC and in-vitro methods, respectively. The total carotenoid content was ranged between 1.4 – 16 mg/100 g, and  $\beta$ -carotene content was in the range of 6 – 17 mg/100 g. Cerapu (*Garcinia prainiana*) had the highest content of  $\beta$ -carotene and antioxidant properties compared to other fruits studied.

### P154-04

#### IN VITRO ANTIOXIDANT AND ANTIPROLIFERATIVE ACTIVITIES OF VARIOUS EXTRACT OF *Chaetoceros* sp AND *Nannochloropsis* sp MICROALGAE

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**RATIONALE & OBJECTIVES:** *Chaetoceros* sp and *Nannochloropsis* sp microalgae which contain substantial amount of polyunsaturated fatty acids are widely used in aquaculture. However, their potentials as a natural source of antioxidant and anticancer are not known. The aim of this study is to determine the antioxidant and antiproliferative activities of the various extract of these two microalgae.

**MATERIALS & METHODS:** The microalgae were extracted with dichloromethane, chloroform, methanol, hexane and amyloglucosidase. Determination of the antioxidant activities was carried out using 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging assay, ferrous ion chelating assay and ABTS radical cation decolorization assay. Antiproliferative activities of microalgae extract on tumor cells were measured by evaluating cell viability using the MTT assay

**RESULTS & FINDINGS:** Polar solvent extracts for both *Chaetoceros* sp and *Nannochloropsis* sp showed strong antioxidant effect compared with the non-polar other solvent extract in DPPH radical assay. However, non-polar solvent showed better chelating activity in ferrous ion chelating assay and ABTS radical cation decolorization assay. Methanol extracts of *Nannochloropsis* sp had higher antiproliferative activity against MCF7 (70%) and MDA (67%) cells at a concentration of 1.0 mg/ml.

**CONCLUSION:** The results suggest that extracts from these microalgae might have significant health-promoting effects, having good antioxidant and anticancer activities.

**P154-05**  
**ANTIMUTAGENIC SUBSTANCES ISOLATED FROM**  
**WOODY VEGETABLES OF THAILAND**

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Young leaves, flowers, fruits and seeds of various woody plants are consumed as vegetables in throughout the year. And, at the same time, they are used as folk medicine among local people. We previously reported that many of these vegetables exhibit potent antimutagenic activities against heterocyclic amines in the Ames' preincubation test. Aiming to elucidate chemical structure, we purified individual active components from the edible part of selected woody plants. From the young leaves of a shrub *Micromelum minutum* (Rutaceae, local name: mui man) consumed mainly in the Southern part of Thailand, we isolated a carbazole alkaloid mahanine as a major active constituent. Large bean pod-shaped fruits and leaves of *Oroxylum indicum* (Bignoniaceae, local name: pe-ga) contained a flavonoid baicalein and its glycosides as anti-mutagen with high concentration. Flowers of *Azadirachta indica* (Meliaceae, local name: sadao, known as neem tree) are consumed in the most part of Thailand. We found that prenylated flavanones such as sophoraflavanone B in the flower show potent antimutagenic activity. *Citrus hystrix* (Rutaceae, local name: ma krut, known as kaffir lime) leaves are common ingredient of various typical Thai recipes. This aromatic vegetable contains prenylated coumarins as strong antimutagens.

**P154-06**  
**JERUSALEM ARTICHOKE (*Helianthus tuberosus* L.)**  
**VARIETIES AS HIGH SOURCES OF FRUCTANS AND**  
**INULIN MAIN FRACTIONS**

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**RATIONALE & OBJECTIVES:** Jerusalem artichoke (*Helianthus tuberosus* L.) or Kaentawan as Thai common name is a tuberous annual crop which is known as the excellent source of fructans and inulin-type fructans. The objective of this study was to determine the amounts of fructans and fructo-oligosaccharides (1-kestose (1-kestotriose; GF2), nystose (1,1-kestotetraose; GF3), and 1F- $\beta$ -fructofuranosyl-nystose (1,1,1-kestopentaose; GF4) in different parts of Jerusalem artichoke varieties in order to select potential sources of these components.

**MATERIALS & METHODS:** Sixteen varieties of Jerusalem artichoke were planted and harvested from Khon Kaen University. Each single sample was separated into 2 portions: one prepared as edible part with skin and another without skin. Fructans and fructo-oligosaccharides were determined of individual sugars, before and after hydrolysis, by high-temperature gas chromatography.

**RESULTS & FINDINGS:** The fructans content in all varieties of Jerusalem artichoke, with or without skin, were in the same range, varied from 14.1 to 20.1 g/100 g fresh weight. The skin contributed small amount of fructans content (<1 g/100 g FW). The fructo-oligosaccharides in all studied samples ranged from 3.4 to 6.6 g/100g FW which contributed 19-40% of the total fructans.

**CONCLUSION:** The best variety of Jerusalem artichoke in terms of fructans and inulin main fractions will be used for further food development.

**P154-07**  
**BEHAVIOR OF ANTHOCYANINS IN CALIFORNIA**  
**BLACK RICE (*ORYZA SATIVA* L. *JAPONICA* VAR.**  
**SBR) DURING VARIOUS COOKING**

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Black rice is produced mainly in Japan, South Asia, China and California in USA. Its dark purple pigment consists of anthocyanins. Anthocyanins show potential roles in preventing chronic and degenerative diseases. In the present study, the composition and thermal stability of anthocyanins in the black rice produced in California were investigated. Six anthocyanin pigments were identified and quantified by high performance liquid chromatography using photo diode-array detection (HPLC-PDA) and electrospray ionization mass spectrometry [LC-(ESI)MS/MS]. The predominant anthocyanins are cyanidin-3-glucoside (572.47  $\mu$ g/g; 91.13% of total) and peonidin-3-glucoside (29.78  $\mu$ g/g; 4.74% of total). Minor constituents included three cyanidin-dihexoside isomers and one cyanidin hexoside. Thermal stability of anthocyanins was assessed in rice cooked using a rice cooker, pressure cooker, or on a gas range. All cooking methods caused significant ( $P < 0.001$ ) decreases in the anthocyanins identified. Pressure-cooking resulted in the greatest loss of cyanidin-3-glucoside (79.8%) followed by the rice cooker (74.2%) and gas range (65.4%). Conversely, levels of protocatechuic acid increased 2.7 to 3.4 times in response to all cooking methods. These findings indicate that cooking black rice results in the thermal degradation of cyanidin-3-glucoside and concomitant production of protocatechuic acid.

**P154-08**  
**STABILITY OF LYCOPENE AND BETA-CAROTENE**  
**IN TOMATOES VARIETIES IN MOROCCO AND ITS**  
**DERIVED PRODUCTS DURING PROCESSING AND**  
**STORAGE**

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**BACKGROUND:** Lycopene and  $\beta$ -carotene are two kinds of important fat soluble carotenoids. Accumulating epidemiological evidence continues to show that Lycopene is associated with a reduced risk of developing certain chronic diseases and cancers. Being highly unsaturated, carotenoids are susceptible to isomerization and oxidation during the processing and storage of food.

**AIMS:** Effect of cooking and storage on stability of Lycopene and beta-carotene of varieties fresh tomatoes and its products derived. Methods: Five varieties of tomatoes the most consumed in and tomatoes sauces. The sauce samples underwent a treatment culinary according to the Moroccan traditions and with five different types of temperature. The quantification of Lycopene and beta-carotene was performed with method HPLC.

**RESULTS:** 1- Lycopene and beta-carotene depends significantly on the varieties of tomatoes. Indeed, this difference varies between 4.04 and 12.9 mg/100g for Lycopene and of 1.53 and 3.2 mg/100g for beta-carotene. 2- Heat induces isomerization of the all-trans to cis forms. 3- Less than approximately 10% isomerisation of all-trans-Lycopene to the cis form.

**CONCLUSIONS:** 1- Lycopene is stable in the tomato; sample-handling techniques should be carefully evaluated to minimize the formation of cis isomers. 2- Tomato is good source of Lycopene for prevention and therapy of human cancers and chronic diseases.

**P154-09****ANTIOXIDANT CAPACITY OF MELIENTHA BEVERAGE DURING ONE YEAR OF STORAGE**Swatsitang, Prasan<sup>1</sup>; Srisuk, Pimchano<sup>1</sup>; Tanpanich, Sayan<sup>2</sup><sup>1</sup>Department of Biochemistry, Faculty of Science, Khon Kaen University, Khon Kaen, THA; <sup>2</sup>Thailand Institute of Scientific and Technological Research, Bangkok, THA

Melientha *suavis* Pierre. is a native plant of Southeast Asia. Its young leaves have been widely used for cooking. The youngest extended leaves are used to produce Melientha beverage which shows higher antioxidant capacity than those of Mulberry leaf beverage and Safflower beverage. The objectives of this study were to determine the antioxidant capacity and the related compounds of Melientha beverage during one year of storage. The results showed that antioxidant capacity of Melientha beverage significantly decreased after 6 and 9 months of storage determined by DPPH assay and deoxyribose assay, respectively. The vitamin C content was constant at 22mg/100g. The total phenolic content was 1,000 mg GAE/100 g, whereas the carotenoid content showed a trend of decrease after 6 months. Data from this study can be used to develop Melientha beverage and estimate its shelf life.

**P154-10****A STUDY OF CABBAGE VARIETIES AND THEIR CONSUMPTION AND COMPOSITION IN GHANA BROWN, Norkor**

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Previous studies on Iodine Deficiency Disorders (IDD) show that some cabbages are goitrogenic (they enlarge the thyroid gland). Cabbage has however gained popularity among Ghanaians because of its nutritional and health benefits. There is unfortunately scanty information on the varieties in and no information whatsoever on which of them may be goitrogenic. This study is set out to identify the varieties of cabbages, the most common ones consumed in Ghana, preferred state for consumption and their composition. A follow-up animal study will later examine the effect of these cabbages on thyroid size, thyroxine TSH and body weight. This study therefore reports the common varieties in Ghana along with their phytochemical and proximate analysis characteristics. Three hundred semi-structured questionnaires were administered in the Accra Metropolis. The peak age of the study subjects was 31-40 yrs, comprising 64.7% females and 35.5% males. Oxylys was perceived by most people (47.3%) to be the most consumed, followed by KK cross (15%) and Chinese cabbage (1%). Six other less popular varieties followed. About 98.7% of the 300 subjects interviewed said they consumed cabbage. 45.3% preferred it cooked, 15.2% preferred it raw while 39.5% took it cooked or raw. The three (3) common varieties were screened qualitatively for phytochemicals: Saponins, Reducing sugars, Polyuronides, cynogenic glycosides, Anthracenosides, Triterpenes, Phytosterols, Flavonosides. The 3 varieties were found to have similar phytochemical content (saponins, reducing sugars and polyuronides). Proximate analysis showed Oxylys to contain 94.76% ± 0.0021 Moisture, 0.95% ± 0.014 Protein, 0.096 ± 0.001 Crude Fat, 0.89 ± 0.007 Ash. KK cross contained 95.09% ± 0.04 Moisture, 2.32% ± 0.021 Protein, 0.23% ± 0.003 Crude Fat, 1.76% ± 0.001 Ash. Chinese cabbage contained 94.53% ± 0.46 Moisture, 1.88% ± 0.007 Protein, 0.34% ± 0.23 Crude Fat, 2.73% ± 0.014 Ash. For the physical characteristics, Oxylys and KK cross looked alike, with KK cross being lighter green and Oxylys having a relatively smaller head, more compact and heavier. The third variety Chinese cabbage looked more like a lettuce than cabbage and greener than other two.

**P154-11****ANALYSIS ON NUTRIENT COMPOSITION DATA: POTATO AS A SOURCE OF COMPOUNDS WITH ANTIOXIDANT ACTIVITY**Mouillé, Béatrice; Burlingame, Barbara  
FAO, Rome, ITA

Diets rich in antioxidants have been associated with health benefit. Potato cultivars (*Solanum tuberosum* L.) can be a source of antioxidant compounds, including vitamin C, tocopherol (vitamin E), carotenoids (yellow to red pigments) and polyphenols.

A literature search was performed to gather information on antioxidant properties for common cultivated potatoes, Andean cultivars and wild *Solanum* species (pigmented or non-pigmented), in order to identify potatoes especially rich in antioxidants. Our compilation reported large differences for the highest and lowest nutrient values within varieties. The vitamin E content ranged from 0.07 to 0.52 mg/100g, the total anthocyanins ranged from 1.2 to 52.2 mg/100g in the flesh, and the total phenolic content (higher in the skin), ranged from 55 to 624 mg/100g. Total carotenoids were found to be the highest in deep yellow fleshed potatoes.

The values obtained for antioxidants contents highlight the importance of potato as a dietary source of antioxidants, depending on the species or variety. Additional characterizations of antioxidant profiles will make possible to select nutritionally interesting cultivars with high antioxidant activity.

**P154-12****ANTIOXIDANT ACTIVITY AND POLYPHENOLIC CONTENTS OF APPLE PEELS**Vieira, Francilene<sup>1</sup>; Nunes, Eduardo C.<sup>2</sup>; Fett, Roseane<sup>1</sup><sup>1</sup>Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, BRA; <sup>2</sup>Empresa de Pesquisa Agropecuária e de Extensão Rural de Santa Catarina S.A, São Joaquim, Santa Catarina, BRA

Consumption of apple (*Malus domestica* Borkh) has been associated with the prevention of chronic diseases. Apples are large contributors of phenolic compounds in European and American diets. The peels of apples, in particular, are high in phenolics and antioxidant activity. The total phenolic, flavanol and anthocyanin content and antioxidant activity were measured in the peel of three apple varieties (Epagri COOP24 and Epagri F5P283) cultivated in Southern Brazil. The values of the peels were compared to flesh and whole fruit components of the apples. Within each cultivar, the total phenolic content assayed by Folin-Ciocalteu method, the flavanols content measured by p-dimethylaminocinnamaldehyde method, the anthocyanin content determined by pH-differential method and antioxidant activity measured by ABTS assay were significantly higher in the peels than the whole fruit and flesh. Epagri F5P283 apple peel had the highest total phenolic contents (640.8±7.41mg.100-1g) and the highest total antioxidant activity (2099.1±28.2mg.100-1g), while that Epagri COOP24 peel was highest in flavanols (27.4±1.3mg.100-1g) and anthocyanins (150.4±2.4mg.100-1g). The consumption of apple unpeeled must be recommended to supply health benefits of the antioxidants.

**P154-13****ANTIOXIDANT DIVERSITY AMONG FRUIT SPECIES GROWN IN CORUH VALLEY IN TURKEY**

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Ataturk University, Erzurum, TUR

Total antioxidant capacity, total phenolic and anthocyanin content of a group of fruits sampled from Coruh valley which accepted one of the 34 hotspots for plant biodiversity in the world were investigated. A total of 23 fruit species (rose hip, elderberry, black mulberry, red mulberry, olive, bayberry, wild



strawberry, wild raspberry, wild blackberry, wild sweet cherry, wild fig, hawthorn, wild plum, mountain ash, strawberry tree, wild apple, wild pear, cornelian cherry, sea buckthorn, wild persimmon, pomegranate, walnut, apricot) were considered. Total antioxidant capacity of samples were determined in both FRAP and DPPH assays by using spectrophotometric method. In both methods, rose hip showed the highest total antioxidant capacity (297.35  $\mu\text{mol TE/g}$  fresh weight in FRAP assay and 323  $\mu\text{mol TE/g}$  fw in DPPH assay, while the wild apple had the lowest value (1.35  $\mu\text{mol TE/g}$  fresh weight in FRAP assay

#### **P154-14 PHENOLIC COMPOUNDS AND ANTIOXIDANT ACTIVITY OF FUJI APPLE VARIETIES**

Vieira, Francilene<sup>1</sup>; Nunes, Eduardo C.<sup>2</sup>; Fett, Roseane<sup>1</sup>  
<sup>1</sup>Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, BRA; <sup>2</sup>Empresa de Pesquisa Agropecuária e de Extensão Rural de Santa Catarina S.A, São Joaquim, Santa Catarina, BRA

The content of phenolic compounds and the antioxidant activity in apples (*Malus domestica* Borkh) varies considerably among cultivars and also within different tissues. In this work, the total phenolic, flavanol and anthocyanin content and antioxidant activity were measured in the flesh, whole fruit and peel of apples Fuji Standard, Fuji Supreme and Fuji Kiko 8 widely consumed in . Within each cultivar, the total phenolic content assayed by Folin-Ciocalteu method, the flavanols content measured by p-dimethylaminocinnamaldehyde method, the anthocyanin content determined by pH-differential method and antioxidant activity measured by ABTS assay were significantly higher in the peels, followed by whole fruit and flesh. Fuji Supreme had the highest total content of phenolic (179.6 $\pm$ 1.58mg.100-1g flesh; 218 $\pm$ 3.57mg.100-1g whole fruit; 588.0 $\pm$ 6.51mg.100-1g peel), flavanol (22.0 $\pm$ 0.699mg.100-1g flesh; 26.6 $\pm$ 0.2mg.100-1g whole fruit; 94.0 $\pm$ 0.8mg.100-1g peel), anthocyanin (30.2 $\pm$ 2.3mg.100-1g peel) and antioxidant activity (638.4 $\pm$ 5.13mg.100-1g flesh; 1008.95 $\pm$ 6.6mg.100-1g whole fruit; 2013.7 $\pm$ 16.9mg.100-1g peel). These results indicate that phenolic compounds and antioxidant activity varies considerably depending of the cultivar and tissue and, the peels when consumed may impart health benefits and should be regarded as a valuable source of antioxidants.

#### **P154-15 STUDY ON ANTIOXIDANTS IN CHILLI (CAPSICUM ANNUUM VAR. LONGUM)**

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**RATIONALE AND OBJECTIVE:** In order to improve the antioxidant quality of green chili through selection or breeding and also to improve human diet, biochemical screening of ten selected cultivars were performed.

**MATERIALS AND METHODS:** Chili cultivars were grown following randomized block design in BCKV research farm, BCKV, WB, with three replications. Samples collected from each replicate were analyzed in laboratory for the contents of vitamin C, carotene, phenol, capsaicin and activities of peroxidase and catalase. Data obtained from biochemical analyses were subjected to ANOVA followed by principal component analysis to select the performing cultivar(s) among the ten.

**RESULTS AND FINDINGS:** All the cultivars differed significantly among themselves with respect to all antioxidant parameters studied. Pearson's correlation matrix of all variables indicated some association between pairs of measured variables.

**CONCLUSION:** Mean results of the experiment along with principal component analysis revealed that 'AC-588-1' was the best performing cultivar followed by 'AC-173' and 'Sel-23'

from which improved lines can be developed.

#### **P154-16 ASCORBIC ACID CONTENT AND CHEMICAL COMPONENT IN THAI EDIBLE PLANTS**

Sakong, Pornkamon; Cha'on, Ubon; Khampitak, Tueanjit; Boonsiri, Patcharee  
Khon Kaen University, Khon Kaen, THA

**OBJECTIVE:** To examine ascorbic acid, energy, moisture and ash contents in the edible plants.

**METHODS:** The 23 local edible plants from Sakon nakhon province were collected. Plant extractions were analyzed following AOAC (1999) method, including moisture by air oven, ash by muffle furnace. Energy was analyzed by Bomb calorimeter and ascorbic acid was determined by aluminum molybdate spectroscopy method.

**RESULTS:** The 23 studied edible plants had moisture content 59.7-94.4 %, ash 0.29-4.83 g/100 g dry wt, energy 335.36-470.96 Kcal/100 g dry wt, and ascorbic acid 14.24-199.46 mg/100 g dry wt. Five of 23 species of local edible plants have high vitamin C content. They are Song-fa[ *Clausena harmandiana* ( ) Pierre ex Guillaumin], Ma-kok [*Spondias pinnata* (L.f.)Kurz], Dee-pla-chon [*Tacca chantrieri* Andrè], Mok-Khruea [*Aganosma marginata* (Roxb.) G.Don] and Foi-Thong [*Cuscuta chinensis* Lam.]

**CONCLUSION:** The result suggested that 5 local edible plants, Song-fa, Ma-kok, Dee-pla-chon, Mok-khruea and Foi-thong could be the potential vegetables for a good source of vitamin C consumption.

#### **P154-17 CONTENT OF TOTAL PHENOLS IN LEAVES OF BRASSICA RAPA L. FRESH IN AND COOKED**

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**RATIONALE & OBJECTIVES:** Phenolic compounds present a great interest for its nutritional contribution to the maintenance of human health. The objective is to assess the content of these compounds in leaves of *Brassica rapa* L. to analyze the influence of the state of the plant (turnip greens and turnip tops), the production area (and Santiago) and cooking.

**MATERIALS & METHODS:** The samples were produced in Santiago and Lugo (Galicia, NW Spain). The method for determination of phenols is based on the use of reactive Folin-Ciocalteu and subsequent spectrophotometric measurement.

**RESULTS & FINDINGS:** The data obtained were analyzed by two-way ANOVA and T-Student tests. The results indicate that turnip tops have a higher content of phenols and cooked samples show values slightly lower.

**CONCLUSION:** There is an effect of the state of the plant and heat treatment on the total phenol content

#### **P155: Agriculture & Food Systems: Others**

##### **P155-01 EFFECTS OF WHEAT STARCH EDIBLE FILMS ON RANCIDITY AND MOISTURE UPTAKE OF PISTACHIO KERNELS AS A NEW PACKAGE**

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<sup>1</sup>Young Researchers Club-Islamic Azad University-Sabzevar branch, Sabzevar, IRN; <sup>2</sup>Iranian Research Organization for Science & Technology (IroSt), Tehran, IRN

Pistachio kernels were packed in wheat starch/glycerol (Gly) and polyethylenglycole (PEG) films. Wheat starch films were prepared by dispersing 4gr starch in distilled water, and

plasticized with Gly and PEG in different levels (Gly =2 and 3 ml/100ml and PEG = 0.0, 0.2, 0.3 and 0.4 ml/100ml). The emulsion films were evaluated for mechanical properties, water vapor transmission rate (WVTR). Peroxide value and moisture uptake of control (unpacked) and packed pistachio kernels were evaluated for 56 days during storage in ambient temperature (25°C) for 8 weeks.

Increasing Gly content of films led to slight increase in Elongation (EL). Increasing the PEG ratio further resulted in an increase in EL for all films. No significant difference in WVT was observed between films made from mixtures of various proportions of Gly with increasing PEG (addition) at all levels of plasticizer.

Maximum moisture uptake was found (6.83± 0.08percent) in unpacked (control) pistachio kernels but packaging pistachios in wheat starch films led to minimize moisture uptake. Wheat starch bags reduced the rate of oxidation in pistachio kernels. Incorporation of Gly and PEG in wheat starch films had no significant effect on the PV of packed pistachios.

These results suggest that a wheat starch based films is a viable alternative packaging process for pistachio kernels and improvement of shelf life.

#### **P155-02 HOUSEHOLD ASSETS AND FOOD SECURITY IN MAIZE-GROWING AREAS OF EAST AFRICA**

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**RATIONALE & OBJECTIVES:** Characterization of households and livelihoods can improve the targeting of research to improve food security. This paper describes relationships between household assets and food security in maize-growing rural areas of Ethiopia, Kenya, Tanzania, and Uganda and discusses implications for effective targeting of research and interventions.

**MATERIALS & METHODS:** A survey of 962 households was conducted using a multi-level sampling design. Data were collected on household characteristics and assets (land, livestock, farm implements, housing, and consumer goods) and on food insecurity using the Household Food Insecurity Access Scale (HFIAS) for the month preceding the main harvest.

**RESULTS & CONCLUSION:** Households were significantly more food insecure ( $p < 0.05$ ) if household heads derived their income primarily from the family farm, the household had less cultivated land, or the household owned fewer or no livestock or farm implements (plows, machetes, wheelbarrows). More food insecure households also had poorer dwellings (thatched roof, wood and mud walls, traditional pit latrine) and fewer consumer goods (bicycles, radios, telephones). Household and farm characteristics will be used to describe livelihood typologies and their relation to food security and to discuss the targeting of research.

#### **P155-03 OPTIMIZATION OF RHUBARB DRYING PROCESS FOR PREPARATION OF RHUBARB POWDER**

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<sup>1</sup>Young-Researchers Club of Islamic Azad University, Sabzevar, IRN; <sup>2</sup>Islamic Azad University, Sabzevar, Sabzevar, USA

Drying process for seasonal products such as rhubarb, which are available only a few months in a year for consumers, is very important because this process not only prevents the spoiling of these products but also makes this consumption possible throughout the year. In this study, after drying rhubarb's stems and determining kinetic parameters of drying and finally preparing rhubarb powder, the quality indices including: acidity, humidity, pH, color intensity and density, were measured for samples which had been dried in a cabinet tray drier at 50, 60 and 70°C, and also those dried in the sun. The results of the study showed that the drying process at 70°C was the optimal condition because it had the least time and most rate of drying. The comparison of the samples dried under different condition in terms of quality indices revealed that in the sun drying condition had the least suitable methods.

#### **P155-04 MORPHOLOGICAL CHANGES OF TISSUES DURING THE WATER-SWELLING PROCESS OF DRIED HIJIKI**

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Commercial dried Hijiki samples were soaked in water, and the morphological changes of the fine structures during the water-soaking process were observed with freeze-fractured samples under a scanning electron microscope in a low vacuum.

In the dried Hijiki, the palisade cells of the tissue surface retained their recognizable shapes in spite of their shrinkage, in contrast to the parenchyma cells, which became flat in parallel to the tissue surface. During the water soaking, their morphological structure could be slowly restored, although non-uniformly. The palisade cells underneath the surface layer recovered faster than the parenchyma cells. Into the soaked water were elute two major compounds, arsenate and an arsenobetaine-like compound, in different manners (1), suggesting that the latter may exist in the cells in a more easily extractable state than the former.

These results suggest that the respective arsenic compounds may exist at different sites of the Hijiki tissues.

#### **P155-05 EFFECTS OF GLYCEROL AND POLYETHYLENGLYCOLE ON PHYSICAL PROPERTIES OF WHEAT STARCH EDIBLE FILMS**

Ahangari, Rozhin<sup>1</sup>; Javanmard, Majid<sup>2</sup>; Tavakolipour, Hamid<sup>3</sup>  
<sup>1</sup>Young Researchers Club-Islamic Azad University-Sabzevar branch, Sabzevar, IRN; <sup>2</sup>Iranian Research Organization for Science & Technology (IROST), Tehran, IRN; <sup>3</sup>Islamic Azad University, Sabzevar Branch, Sabzevar, IRN

Wheat starch edible films were prepared by dispersing 4% starch in tap water, and plasticized with different levels of glycerol (Gly) and polyethyleneglycole (PEG) (Gly =2, 3 % and PEG = 0.0, 0.2, 0.3 and 0.4 %).

The emulsion films were measured for mechanical properties and water vapor transmission (WVT). Glycerol or polyethyleneglycole in the films led to decreases in Elastic Modulus (EM) and Tensile Strength (TS). Increasing Gly content of films led to slight increase in Elongation (EL). Increasing the PEG ratio further resulted in an increase in Elongation (EL) for all films. No significant difference in WVT was observed between films made from mixtures of various proportions of

Gly with increasing PEG (addition) at all levels.

#### P155-06

##### **CORNSILK (*Zea mays* Hairs): A POTENTIAL HEALTHY FOOD INGREDIENT**

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Corn silk or *Zea mays* hair consists of various chemical including proteins, vitamins, tannin, minerals, carbohydrate, flavanoids and volatile components. Corn silk has often been used as a tea and powdered as a food additive in Mexico. In Malaysia, it is estimated that more than 10000 tons of corn silk were discarded yearly. The study was conducted to determine the nutritional compositions of corn silk and its related extracts. Corn silk were collected from local wet market and then extracted with water at different time. Aqueous corn silk extract residue was recorded the highest total dietary fiber (54.2g/100g) significantly higher than Soxhlet extract residue (41.8g/100g) and dried corn silk (38.4 g/100g). The highest protein content was found in aqueous corn silk residue extracted for 30 mins and 4 hours (16.9% and 14.9%) significantly higher than dried corn silk (13.0 %). Corn silk extracted for 30 min recorded the highest concentration of natural sugars (85.4 mg/100g) compared to the corn silk extracted for 4 hrs (65.0mg/100g) and prepared with Soxhlet (79.6 mg/100g). The data obtained in this study suggested that corn silks be able to be a good alternative source of nutrients. Further research need to be done to study the possible application of corn silk into various food products like bakery, confectionery and beverages.

#### P156: Indigenous Diets in Transition

##### P156-01

##### **NUTRITIONAL IMPROVEMENT IN VIENTIANE CITY (LAO PDR) IN A CONTEXT OF RAPID ECONOMIC GROWTH**

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**RATIONALE:** The city is experiencing rapid urban and economic growth. How these changes are impacting on the nutritional status and health of mother and babies? In order to answer these questions a health and demography study was set up in 2007.

**MATERIAL AND METHODS:** A sample of 122 mothers who had given birth in 2007 completed a questionnaire on their food intakes. In addition anthropometric measurements on both the mothers and their babies were taken. The results were then compared with those of previous studies.

**RESULTS AND FINDINGS:** Cereals were the main source of energy (39%) while meat provided 38% of protein. Vegetables represented an important source of Vit. C, B2 and folates. Energy content was suboptimal (96% of fulfilment) and there existed deficiency in calcium, folates, and vit B6. Fish contribution was noticeable. Prevalence of thinness in mothers (BMI < 18.5 kg/m<sup>2</sup>) was equal to 7.3% (CI: 3.4 ~13.5%) and 16.4% of them were overweighted (10.8 ~ 23.9%). In children (11 ± 6 months), 4.9% (1.8 ~10.3%) were wasted and 12.3% (7.0 ~ 19.4%) were stunted.

**CONCLUSION:** In comparison with previous survey, our results suggest there has been an improvement in the nutrition status of mothers and babies.

#### P156-02

##### **DIETARY PATTERNS AND THEIR ASSOCIATIONS TO BMI AND SOCIOECONOMIC VARIABLES OF RURAL WOMEN IN TANZANIA**

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In order to gain more knowledge about nutritional attitudes and their association with health and socioeconomic factors, three semi-quantitative 24-hour recalls were conducted with 252 women in rural Tanzania during three different seasons within one year. From these recalls the mean intake of twelve main food groups was calculated and used within a principal component analysis (PCA) to establish five dietary patterns. Next to a „traditional-coast“ pattern dominated by fruits, nuts, starchy plants and fish, and a „traditional-inland“ pattern composed of cereals, oil/fat and vegetables, also a “purchase” pattern was found, characterized by the consumption of bread/cakes (usually fried in oil), sugar and tea. Within a “pulses” pattern mainly pulses and only little or no vegetables were consumed, while an “animal products” pattern could be distinguished by a high consumption of meat, eggs and/or milk. These five dietary patterns show differences between traditional and modern or changing nutritional attitudes. They further indicate that the early stage of the nutrition transition is already taking place in rural Tanzania. In fact, significant positive associations were found between the “purchase” pattern and the BMI of participating women ( $\rho=0.192$ ;  $p=0.005$ ) as well as between the “animal products” pattern and wealth ( $\rho=0.168$ ;  $p=0.002$ ).

#### P156-03

##### **HISTORICAL BACKGROUND, CUISINE, CHEMICAL ASPECTS & SENSORY ACCEPTABILITY OF INCUBATED DUCK EGG**

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**RATIONALE AND OBJECTIVES:** This study was aimed to investigate the historical background and free amino acids of incubated duck egg. Sensory evaluation was conducted employing

Japanese who are not familiar with the product to determine acceptability of the product and cuisines were introduced.

**MATERIALS AND METHODS:** Osaka duck strain eggs were purchased from the Agricultural, Food and Environmental Sciences Research Center, Osaka, Japan were incubated at 37°C in our laboratory for a specified time during that time the eggs were identified into fertilized (Balut) and unfertilized (Penoy). Sensory evaluation was conducted employing 20 panelists of Ochanomizu University.

**RESULTS AND FINDINGS:** It was known that Balut and Penoy making is not native to the Philippines but introduced by Chinese merchants who brought the idea of eating the egg products in the 17th century. However, the knowledge and craft of balut-making has been localized by the balut makers in the Philippines and has not been industrialized in favor of production by hands. The FAA contents of the incubated samples were higher than the non-incubated ones. Taurine significantly increased in both the samples. Sensory evaluation of the product is underway and will be discussed in due time.

#### P156-04

### NUTRITIONAL STATUS AND DIETARY DIVERSITY AMONG INDIGENOUS PEOPLE (ORANG ASLI) IN KRAU WILDLIFE RESERVE, PAHANG, MALAYSIA

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This was a cross-sectional study on dietary diversity and nutritional status of Orang Asli adults ( $\geq 18$  years old to 60 years old) in Krau Wildlife Reserve. Two hundred households were purposively selected which comprised 149 men and 211 women from three ethnic groups – Jahut (81.7%), Che Wong (8.6%) and Temuan (9.7%). Dietary diversity was assessed using food frequency questionnaire. Weight, height, waist circumference, and skinfold thickness were measured using standard instruments. Based on Body Mass Index, 59.2% were normal, 11.9% underweight, 29% were overweight or obese. More females were overweight and obese (33.2%) as compared to men (22.8%). About 10.7% males ( $\geq 90$ cm) and 31.3% ( $\geq 80$ cm) of females had abdominal obesity, respectively. Body fat percentage revealed 13.4% ( $\geq 25\%$ ) and 20.9% ( $\geq 32\%$ ) of men and women were obese, respectively. Salted, canned fish and anchovies were taken three times in a week. Condensed milk was used to mix drinks (tea and coffee) daily. Sugars, ketchups, sauces, stocks and coconut milk were used in daily cooking as flavor enhancers. A multivariate analysis will be carried out to determine the relationship between nutritional status and dietary diversity. It is hoped that this study will provide insights into the increasing rates of obesity and non-communicable diseases among the Orang Asli adults in Malaysia.

#### P156-05 The Contribution of Veldt Foods to the Dietary Diversity Scores of Rural Households along the Okavango Delta

#### P156-05

### THE CONTRIBUTION OF VELDT FOODS TO THE DIETARY DIVERSITY SCORES OF RURAL HOUSEHOLDS ALONG THE OKAVANGO DELTA

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**INTRODUCTION:** Communities in the Okavango Delta (OD) depend on seasonal rain-fed arable and pastoral farming for their livelihoods. Consequently, households experience fluctuations in their access to food and dietary diversity (DD). Veldt foods (VFs) may cushion households from food insecurity and improve household DD.

**OBJECTIVES:** The objective of this study was to quantify the contribution of VFs to DD in communities along the OD.

**METHODS:** Using a cross-sectional survey methodology, the DD of 296 randomly selected households were studied. Household DD Questionnaires (DDQ), which assess household diet quality were administered in October-November. The DDQ returns a possible DD Score (DDS) of 0 - 12, where 12 means that all food groups FGs were represented in the diet. The proportion of FGs in which VFs were represented was calculated and this was equated to the contribution of VFs to the DDS.

**RESULTS:** The mean DDS for households was 5.2. Furthermore, 34% of households had  $DDS \leq$  lower tercile. Thus, only 23.2% of households had a more diversified diet ( $DDS \geq$  upper tercile). Excluding fish, the mean number of FGs in which VFs were represented was 3. This makes VFs contribution to be 60% of DDS.

**CONCLUSION:** VFs contribute significantly to households DD.

#### P156-06

### EFFECT OF PROCESSING METHODS ON NUTRIENT RETENTION AND CONTRIBUTION OF CASSAVA DIETS TO NUTRIENT INTAKE OF NIGERIAN CONSUMERS

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**RATIONALE and OBJECTIVES:** Indigenous foods are being promoted for nutrition security of people living traditional lifestyle. Cassava diets constitute staple energy source to most Nigerians. Little is documented on nutrient composition and contribution of these diets. This study investigated effect of processing methods on nutrient retention and contribution of some diets from cassava.

**MATERIALS and METHODS:** Fresh cassava tubers were purchased from a farm. Raw and processed (amala, eba, fufu and abacha) samples were analyzed for proximate and mineral composition alongside market samples using standard methods of AOAC and AAS respectively.

**RESULTS and FINDINGS:** Cassava tubers were very low in crude protein, lipid, fiber and ash (2.5, 0.8, 1.3 and 1.1g/100g respectively). Processing cassava tubers into various diets improved nutrient availability significantly ( $p < 0.05$ ). Prolonged soaking of cassava ( $> 2$  days) resulted in significant reduction of nutrients (especially minerals). 100g portion of raw, 'amala', 'eba', 'fufu' and 'abacha' yielded 140.5, 289.0, 284.0, 312.0, and 358.3 Kilocalories energy respectively.

**CONCLUSION:** 100g Cassava diets contribute between 13.7 to 25.4% energy, 10% iron, and up to 32% zinc to %RDAs of consumers.

#### P156-07

### NUTRITION TRANSITION OF THAI WOMEN MIGRANTS IN AUSTRALIA:

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**RATIONALE & OBJECTIVES:** Thai migrants are at risk of nutritional change as a result of their transition to new social/cultural environments and exposure to new foods. They face change to culture, language and their socio-economic situation. Despite this reality there is no research being conducted Thai living abroad. The research aims to analyze the nutrition transition experiences of Thai women migrants in order to generate theoretical propositions about the nutrition transition of migrants as well as the goal of searching for factors influencing dietary practices and perceptions of the impact on health and well-being.

**RESULTS & FINDINGS:** This paper reports on research in progress and seeks to contribute to understanding migrants' experiences, demands and recommendations concerning nutrition, health and well-being.

**METHODOLOGY & METHODS:** Symbolic interactionism and grounded theory are the theoretical frameworks directing the research. In-depth interviews are to be undertaken with approximately 30 Thai women in Brisbane.

**CONCLUSION:** The study reveals the culture and socio-economic context that Thai migrants experience with tracing to significant future needs. Insight into the process of nutrition transition contributes to the appropriate intervention strategies to promote nutrition for Thai women and other migrant groups.

**P156-08**  
**CONSUMPTION PATTERN AND CHEMICAL EVALUATION OF INDIGENOUS WILD FRUITS AMONG YORUBAS IN SOUTHWEST NIGERIA**

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**OBJECTIVE AND RATIONAL:** The Study Was Carried Out To Determine The Consumption Pattern , Nutrients, Phytonutrients And Anti Nutrients Of Four Indigenous Wild Fruits Among Yoruba's In Southwest Nigeria.

**MATERIALS AND METHODS:** By means of food frequency questionnaire and oral interview the consumption pattern was determined. Using AOAC methods of 2005, chemical composition and mineral analysis were carried out. Following Rodriguez Amaya's method Carotenoids were determined on Africa star apple ( *Chrysophyllum.albidum* ) Hon plum ( *Spondious. mombin*) bush Mango ( *Irvingia.gabonensis* ) and monkey cola ( *Cola.mellenti* ). The total phenolic content, anthocyanin and tannin were determined using spectrophotometer.

**RESULTS AND FINDINGS:** The consumption pattern revealed that Africa star apple had the highest intake when in season and the school age children ate more wild fruits than others. The chemical analysis in mg/% for vitamin C ranged from 15- 76; Total carotenoid (ug/%) ranged from 172- 1380 with *C.albidum* had the highest carotenoid. The Tannin content was high (123-222mg/ %). The analysis of variance revealed that vitamin C content was significantly higher in *I.gabonensis* and *C.mellenti* than *C.albidum*. (p<0.05). Significant differences were found in the micronutrient and phytonutrient content of these fruits. However the wild fruits can be good sources of carotene, and vitamin c as the contribution to RDA(Recommended Dietary Allowance) of children was more than 50%.

**CONCLUSION:** On the whole wild fruit are major sources of moisture vitamin C and carotenoids and tannin an important antioxidant.

**P156-09**  
**NUTRITION TRANSITION OF THAI WOMEN MIGRANTS IN AUSTRALIA: A GROUNDED THEORY STUDY**

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**RATIONALE & OBJECTIVES:** Thai migrants are very likely to experience nutritional change as a result of their transition to new social-cultural environments and exposure to new foods. These migrants also face significant change to their cultural, linguistic and the socio-economic situations. Despite this reality there is a dearth of research on Thais living abroad. This research seeks to analyze the nutrition transition experiences of Thai women migrants in Australia. The objective is to explore factors influencing dietary practices and perceptions of the impact on health and well-being in order to generate theoretical propositions about the nutrition transition of this group of migrants.

**METHODOLOGY & METHODS:** Symbolic interactionism (drawing on Mead and Blumer) and grounded theory (the Straussian version and constructivism) are the theoretical frameworks directing the research. In-depth interviews are to be undertaken with approximately 30 Thai women in Brisbane. A constructionist grounded theory analytical approach is applied to data interpretation.

**RESULTS & FINDING:** The study provides theoretical insight into process of nutrition transition as experienced by Thai women migrants in Australia.

**CONCLUSION:** The knowledge gained from this research may contribute to more strategic programs to promote the overall health of Thai women and other migrant groups in Australia.

**P156-10**  
**FOOD HABITS AND EATING PATTERNS OF GHANAIS LIVING IN ACCRA AND LONDON**

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The rise in the incidence of various diet related diseases has been attributed mostly to poor eating habits. Migration can cause major changes in the food and eating patterns of migrants. This study compared the food habits of Ghanaians living in Accra (GA) and Ghanaian immigrants in London (GL).

Questionnaires were used to collect information on eating habits from 240 participants: 80 from London and 160 from Accra. Foods consumed were determined using food frequency questionnaire. Chi-squared test were used to test for differences between the groups. The results showed differences in snacking behaviors: GL 80% and GA 57% (p<0.05). Other differences observed in food consumption include whole meal bread; GL 31%, GA 12% (P=0.001), Skimmed milk; GL 15%, GA 4% (P<0.05), Palm oil GL 15%, GA 51% (P=0.001), Fish GL 30%, GA 68% (P<0.05). Nutrient supplement intake was found to be higher in GL (36%) as compared to GA (13%) (p=0.001).

The differences observed confirmed that migration can affect food habits.

**P156-11**  
**EFFECT OF MIGRATION ON FOOD CONSUMPTION PATTERNS AMONG INDIAN FACTORY WORKERS**

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**RATIONALE AND OBJECTIVES:** The demographic, epidemiological and nutrition transition in India has resulted in distinct changes in food consumption. This paper assessed the role of rural to urban migration on western food consumption.

**METHODS:** Data from a multi-site, cross-sectional study involving 7068 participants, (41.7% female) was analyzed . Food frequency questionnaire was applied for 184 food items. Frequency distributions of 24 western food items was examined by sex, age groups and rural to urban migration status.

**RESULTS:** Proportion of individuals consuming western foods was significantly higher in the urban, intermediate in the migrant and lowest in the rural group. For example, noodles/pasta was consumed by 7.5% of the urban workers, 3.2% of the migrants and 1.5% of the rural workers ( p-value<0.001). Salted biscuits and flavoured milk were consumed to similar levels in urban and migrant groups but were lower in the rural group ( p-value<0.001). Significant differences were observed for the consumption of western foods by age and gender.

**CONCLUSION:** In this study, migration status, age and sex were found to have significant effects on consumption patterns of western foods.

**P156-12**  
**MIGRATION EFFECTS ON TRADITIONAL FOOD CONSUMPTION AMONG INDIAN FACTORY WORKERS**

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**RATIONALE AND OBJECTIVES:** Variations in food consumption exist between rural, urban and migrant populations

as a result of the nutrition transition in India. This paper analysed the role of rural to urban migration on traditional food consumption.

**METHODS:** Cross-sectional data of the urban, rural and migrant groups consisting of 4124 men and 2944 women from 4 Indian States, was analysed. Frequency distributions of 14 most commonly consumed, traditional foods were examined by migration status.

**RESULTS:** Migration status was shown to significantly effect the consumption of 10 of the 14 traditional foods examined. The 57.3% of the urban, 50.1% of the migrant and 45.9% of the rural group consumed tandoori roti (Indian bread) on a daily basis while rice was consumed by 85.8%, 89.5% and 89.4% of the groups respectively ( $p$ -value  $\leq 0.001$ ). Variety in the intake of green leafy vegetables and fruits among the participants was limited. No clear trend in food consumption patterns emerged.

**CONCLUSION:** In this study, migration status was found to have a significant effect on consumption patterns of traditional foods.

#### P156-13

##### **RELATIONSHIP BETWEEN ANTIOXIDANT PHYTOCONSTITUENTS AND LINOLENIC ACID OF SOME WIDELY CONSUMED INDIGENOUS VEGETABLES IN NIGERIA**

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**RATIONALE AND OBJECTIVE:** High consumption of traditional low-fat, plant protein-rich diets has been associated with a lower incidence of chronic diseases of lifestyle. Many indigenous vegetable-rich diets in Nigeria are a rich source of unsaturated fatty acids with high antioxidant activities. We explored the relationship between the fatty acid composition, antioxidant capacity and selected antioxidant phytoconstituents of widely consumed indigenous vegetables in Nigeria. Materials and methods: Freeze-dried samples of twelve (12) vegetables were analyzed for their fatty acid composition and vitamin E content ( $\alpha$ -,  $\beta$ -,  $\gamma$ - and  $\delta$ -tocopherol) using HPLC analysis. Total phenolic content (TPC) and antioxidant capacities were estimated using Folin-Coicalteu reagent and Ferric-ion Reducing Antioxidant Power (FRAP) respectively. The data was analyzed by principal component analysis (PCA) to allow correlation of the parameters and classification of the vegetables.

**RESULTS:** The unsaturated fatty acid ( $\alpha$ -linolenic acid) content was strongly correlated with  $\alpha$ -,  $\beta$ - and  $\delta$ -tocopherol concentrations ( $R = 0.9$ ). The antioxidant capacities also correlated well with the TPC,  $\alpha$ -linolenic acid and tocopherol contents ( $R=0.7$ ). However, none of the saturated fatty acids correlated positively with the antioxidant capacity, TPC and tocopherol contents of the vegetables.

**CONCLUSIONS:** This result provides useful information for identifying antioxidant-rich indigenous vegetables with possible health benefits for populations with high prevalence rate of chronic diseases of life style.

#### P156-14

##### **AGE AND SEX DIFFERENCES IN WESTERN FOOD CONSUMPTION AMONG INDIANS**

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**RATIONALE AND OBJECTIVES:** India is undergoing a nutrition transition, characterized by a shift away from traditional diets. This paper assessed age and sex differences in the consumption of western foods in an Indian sample.

**METHODS:** The sample consisted of 7068 factory workers,

their siblings and spouses (58.3% male) from four Indian states. Cross-sectional data on the consumption of 24 western food items (out of a total of 184 items) were assessed for age and sex effects.

**RESULTS:** There was a significant decreasing trend, from the lowest to the highest age groups, in the weekly consumption of most western foods. For instance 50.9%, 36.1%, 30.6% and 26.8% of 0-30, 31-40, 41-50 and 51 and above year olds consumed bread on a weekly basis ( $p \leq 0.001$ ). No difference in overall western food intake was observed between males and females. However, the consumption of certain potentially unhealthy beverages (aerated drinks, alcoholic spirits and beer) was significantly more common among males ( $p \leq 0.001$ ).

**CONCLUSION:** Age and sex significantly affect western food consumption in this sample.

#### P157: Right to Food and Adequate Nutrition II

#### P157-01

##### **HOUSEHOLD FOOD INSECURITY AMONG PRESCHOOLERS FROM US-MEXICO BORDER: THE INFLUENCE OF INTERNAL IMMIGRATION**

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**RATIONALE & OBJECTIVES:** Household food insecurity (HFI) among Mexican internal immigrants has been poorly studied although its impact on the nutritional status of children from low-income households is widely known.

**MATERIALS & METHODS:** 1,000 households with at least one child  $< 6$  y were screened for HFI using a previously validated experienced-based questionnaire. Anthropometric (weight/age, height/age, weight/height Z-scores), food frequency intake (FQ) and socioeconomic data (monthly income, immigration status) were recorded and associated with the level of HFI: Secure (S), low- (L), mild- (M) or severe-insecure (S).

**RESULTS & FINDINGS:** 86.1% of all households were food secure (S) while 6.5, 6.4 and 1.0% were HFI-L to S, respectively. Low overweight/obese prevalence was observed in M-S groups as compared to secure group. Stunting and underweight cases were more commonly observed in HFI-M to S groups than in HFI-L or food secure groups. HFI was significantly and inversely associated with socioeconomic, dietary in multivariate analysis. Recent immigrants were twice more likely to suffer from HFI-M to HFI-S than that observed in no-immigrants

**CONCLUSION:** Moderate to severe forms of HFI accounts for less than 10% in this population but its impact in children's nutritional status is strongly associated to food access, mainly in internal immigrant families.

#### P157-02

##### **HOUSEHOLD FOOD INSECURITY AMONG PRESCHOOLERS FROM US-MEXICO BORDER: THE INFLUENCE OF DOMESTIC IMMIGRATION**

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**RATIONALE & OBJECTIVES:** Household food insecurity (HFI) among domestic immigrants has been poorly studied although its impact on the nutritional status of children from low-income households is widely known.

**MATERIALS & METHODS:** 1,000 households with at least one child  $< 6$  y were screened for HFI using a previously validated experienced-based questionnaire. Anthropometric, food frequency intake (FQ) and socioeconomic data (monthly

income, immigration status) were recorded and associated with HFI level: Food secure (S), low- (L), mild- (M) or severely insecure (SI).

**RESULTS & FINDINGS:** 86% of all households were food secure (S) while 7, 6 and 1% were HFI-L to HFI-SI, respectively. Low prevalence of overweight/obese but more stunted children were observed in M and SI groups as compared to group S. HFI was significantly and inversely associated with socioeconomic status and diet quality in a multivariate analysis. Recent immigrants were twice more likely to suffer from M-to-SI HFI than that observed in no-immigrants.

**CONCLUSION:** HFI- (M-SI) accounts for less than 10% in this population but its impact in children's nutritional status is strongly associated to food access, mainly in domestic immigrant families.

#### P157-03

**MEASURING FOOD INSECURITY IN WOLLONGONG**  
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This study aimed to establish a standard assessment measure of the extent of food insecurity in Australian communities. The extent of food insecurity in developed nations such as Australia is unclear. The United States Food Security Survey Module (FSSM) was modified to suit local application in Australia. Information on food security, socio-demographic and food shopping patterns was collected through telephone surveys in two Wollongong postcode areas (2502, 2505), NSW. One thousand household telephone numbers were randomly sampled from the telephone directory. Altogether, 296 respondents completed the survey. The adult food insecurity items had reasonable internal consistency reliability (Cronbach's alpha .79). For children's items, analysis could not be computed because there were too few cases. The results indicate that 8.4% households were food insecure. This occurred prior to the current world financial crisis and thus the rate may now be greater. This study suggests that the instrument was easy to administer, suitable and reliable to measure food insecurity at the population level. Future studies of a larger scale are now required to confirm the validity and reliability of this instrument. A well validated measurement and effective monitoring system, is necessary to inform the development of policies to address food insecurity.

#### P157-04

**FOOD AND NUTRITION SECURITY OF HIV AFFECTED HOUSEHOLDS IN NAKURU, KENYA**

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**RATIONALE & OBJECTIVES:** Identify associations among socio-demographic factors and food and nutrition security status of HIV affected households in Nakuru at baseline prior to an urban agriculture intervention.

**MATERIALS & METHODS:** The baseline survey of 154 households with children participating in HIV affected self-help groups included socio-demographic, Household Food Insecurity Access Scale (HFIAS), and Household Dietary Diversity Scale (HDDS) questionnaires. Dietary (24 hour recall) and anthropometric (height, weight, mid-upper-arm circumference and skinfold) measures were collected on an index child aged 2-5 years.

**RESULTS & FINDINGS:** 73% were severely, 24% moderately and 2% mildly food insecure. 34% reported access to land for urban farming. Prevalence of stunting (33%) and underweight (26%) approached national averages

and mean body composition z-scores were negative. HFIAS was statistically significantly correlated inversely with most nutrients. Nutrient intakes and dietary quality (diversity and animal source foods) were statistically significantly positively correlated with body composition (ZMUAC and ZTSF) but not growth (HAZ, WAZ, ZBMI) indices. Backward multivariable regression observed reduced HFIAS with smaller households, and increased education and income ( $r^2=0.18$ ). Higher animal source food intake was associated with reduced HFIAS and higher HDDS ( $r^2=0.07$ ).

**CONCLUSION:** Food and nutrition security was compromised in these HIV affected households.

#### P157-05

**PRIORITIES FOR ATTRIBUTES VERSUS FOOD SECURITY**

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**RATIONALE AND OBJECTIVES:** Food security is of global importance. The purpose of this investigation was to identify the food product attributes of importance during purchasing choice of staples foods. Both the South African food industry and low-income consumers were involved.

**METHODS:** Experts in food product development were identified from the food environment ( $n=32$ ). Structured interviews were conducted.

In a pilot study ( $n=60$ ) low-income consumers were sourced to establish the level of importance perceived for different food product attributes, using a six point hedonic rating scale. Ranking and correlation were applied. These results were tested in three informal and one formal urbanized settlements ( $n=501$ ).

**RESULTS:** The food industry indicated satiety value (65%), meeting of nutrient requirements (65%), affordability (59%) and taste (59%) as the food product attributes most needed by the target consumers. However, affordability (82%), nutrient content (65%) and taste (59%) were indicated as important to industry during food product development.

The pilot study identified 14 attributes, indicating satiety value, packing size, value for money, followed by taste, as most important. During target market testing, consumers with the lowest income indicate satiety value, affordability, taste, product acceptability and convenience as priorities in order of importance, with nutrient content as the attribute of least importance (ranked 14th). Consumers of slightly higher income reported taste, satiety value, appearance, packaging size, convenience and nutrient content in sequence, as priorities, allocating a much higher important to nutrient content (ranked 6th).

**CONCLUSION:** Within a setting of constant hunger, satiety value and affordability were identified as the most important drivers during purchasing choice. Hedonic and related attributes are perceived as "nice to have", applicable only after survival needs are met. It seems that the critical level has been reached for household income beyond which the necessity for nutrient intake fades away under the pressure to survive.

#### P157-06

**FROM UNKNOWN TO THE RECOMMENDED LEVELS OF SODIUM IN THE HOSPITAL MEALS**

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**RATIONALE & OBJECTIVES:** To lead a change in the cooking quality standard of the hospital kitchen staff;

To test the sodium levels of the different meals, pre intervention; and to achieve the recommended levels of sodium in the hospital meals, as the standard in practice.

**MATERIALS & METHODS:** All meal were collected during whole days, blended and sent to food laboratories to test for sodium levels. The results in the regular diet were higher than

the 2300 mg recommendations. Observations were made on the full cooking process, from the products orders by the cooks to the food tray the patient received. The intervention included a course for the cook staff - Evidence based healthy nutrition, theory and practice, for cooking tools to tasty, healthy and low sodium menus. A fixed amount of salt was determined to each menu as the standard of cooking.

**RESULTS & FINDINGS:** The average salt content of a daily menu was over 3500 mg/day pre-intervention and lowered to less than 2300 mg/day after the intervention, without change in the patient's satisfaction mark.

**CONCLUSION:** The Urgent Need to Reduce Sodium Consumption is an evidence-based consensus and even more so in hospital food. The change should and can be done.

#### P157-07

##### HOUSEHOLD FOOD SECURITY IN TEHRAN CITY, IRAN

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**RATIONALE AND OBJECTIVES:** Iran was among five countries which were assigned the mission of piloting cities equity assessment by World Health Organization. Health equity which could be assessed by a range of measures including household food security is one of the key elements of parity. This cross sectional study was carried out to explore household food security in 22 districts of Tehran city, Iran.

**Materials and methods:** Using a valid 24 hour food recall, trained undergraduate nutrition students and nutritionists interviewed families to collect dietary data in all the 22 districts of Tehran during 4 months (September- December 2008). Sample size was figured out based on estimating calorie intake. Cluster sampling was applied and sample size was modified considering design effect of 1.5. MS Access, SPSS 14.0, and EPI Info 2000 were applied to create data bank and to complete data entry and analysis. Data checking and cleaning were completed prior to analysis.

**RESULTS:** Mean intake of food groups in studied households (gram/person/day): Household (N) 2347 Bread, rice, and cereal 336±135; Vegetables 307±226; Fruits 384±317; Meat 111±89; Dairy 296±251; Legumes 52±45; Fat and oil 41±37. Household food security based on calorie intake was as follow: 15.1% of households < 70%

25.9% between 70 to 90%, 25.5% between 90 to 110%, and 33.5% of households had calorie intake more than 110% of calculated average calorie needs of each household member. The highest rate of insecurity (intake <70%) was observed in districts 1, 3, and 13. In districts 9, 10, 16, 19, and 20 the percentage of households who consumed more than 110% of energy need was higher than other districts.

**CONCLUSION:** Inequity in household energy intake was identified among studied population. Food and nutrition plans need to be included in interventional programmes aiming at reducing inequity in metropolises.

#### P157-08

##### HOUSEHOLD FOOD SECURITY AND CHILD MORTALITY IN RURAL SOUTH AFRICA

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**RATIONALE & OBJECTIVES:** In food insecurity and its multiple negative effects are among the most urgent social issues affecting households and their children. The study investigated the association of household food security (HFS) with under-five mortality in the Agincourt Health and Socio-demographic

Surveillance Site (AHDSS).

**MATERIALS & METHODS:** A secondary cross-sectional analysis of 2004 AHDSS census data was conducted, involving 7790 black children under the age of five years. Indicators of HFS were analysed with respect to child mortality using logistic regression.

**RESULTS & FINDINGS:** Household food insecurity was experienced by 37% of the study population. Limited dietary diversity and insufficient food quantities were supplemented by local crops and gathering of food from the bush. Deaths were HIV-related (24%), followed by diarrhoea, respiratory infections and malnutrition. Future predictive food availability was significantly associated with mortality; less food was associated with increased mortality compared to the same amount of food (OR 2.0, 95% CI 1.07-4.35), and more food (OR 4.4, 95% CI 1.18-16.67) in multivariate analyses. Food insecure households were more often female-headed, less self-sufficient with regard to subsistence production and ownership of livestock, with lower educational attainment and socio-economic status.

**CONCLUSION:** Future HFS was inversely related to under-five mortality in rural South Africa in 2004, suggesting that policies to reduce child mortality should be aimed at ensuring HFS.

#### P157-09

##### COMPARISON OF FOOD SECURITY STATUS, NUTRIENT INTAKES, BODY MASS INDEX, AND MULTIPLE DISEASES AMONG SELF-REPORTED DEPRESSED AND NON-DEPRESSED FEMALE FOOD STAMP RECIPIENTS IN SOUTHEAST LOUISIANA

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**RATIONALE AND OBJECTIVES:** The objectives of this study were to explore the relationships among depression and food security status, dietary nutrient intakes, socio-demographic characteristics, body mass index (BMI), and the presence of chronic diseases in a female food stamp recipient population (n = 66) in Southeast Louisiana.

**MATERIALS AND METHODS:** Women were dichotomized by stated depression and descriptive statistics on socioeconomic characteristics and mean nutrient intakes were presented for each group. Logistic regression models were used to determine the relationship of stated depression with food security status, selected socio-demographic characteristics, nutrient intakes, body mass index, and the number of chronic diseases reported.

**RESULTS AND FINDINGS:** The percentage of women with reported depression was 31.8%. A strong relationship was observed between depression and the number of chronic diseases reported (p = 0.005). Women with stated depression had more physical chronic diseases reported than those without stated depression. Most study participants were unemployed (68.18%), and the odds of stated depression for unemployed women was four times higher than employed women (p = 0.05). Food security status was classed as: food secure, food insecure, and food insecure with hunger. For the depressed women, 52.4% were food secure; 38.1% were food insecure; 9.5% were food insecure with hunger. No relationship was found between depression and food security status. Low intake of folate and iron was common in both depressed and non-depressed women. No relationship was found between depression and nutrient intake (e.g., energy, protein, carbohydrate, fat, folate, vitamin B12, or iron). Mean BMI of depressed and non-depressed groups fell within the obese range. No relationship was seen between depression and BMI. Further, there was no relationship between depression and marital status or medical insurance.

**CONCLUSION:** Low-income women had a low intake of folate and iron and a high BMI, but no association was seen between depression, food security status, and weight in low income women; depression was associated with the number of chronic disease reported and unemployment in low income women.



#### P157-10

##### QUALITATIVE APPROACH FOR THE DEVELOPMENT OF MEASURE OF HOUSEHOLD FOOD INSECURITY

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Cognitive testing is a useful tool for the development of questionnaire items. This study used cognitive testing to develop a tool to measure the degree of past food insecurity (FI) in Korean population. Using retrospective verbal probing techniques, we conducted semi-structured interviews on 54 purposefully selected low-income mothers with children 15<yr. Korean translated versions of FI measures developed by the U.S. Agency for International Development and U.S. Food Security Survey Modules were tested. Misunderstood words or confused concepts were described. Commonly confused concepts were “preferred food”, “a limited number of foods”, “. . . foods that . . . did not want to eat” mainly due to the feeling of comparative poverty, and “smaller meal than you felt” due to incorrect nutrition information regarding diet and longevity. Respondents tended to perceive their children’s dietary quality worse than actually what it was. Social network appeared to be important in determining severe FI. Cognitive testing is useful to evaluate sources of response error in FI questionnaire. (Supported by grant of Korea Research Foundation, 2008)

#### P157-11

##### FOOD SECURITY AND NUTRITION PROFILES OF UGANDAN POPULATIONS

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**BACKGROUND:** Linking malnutrition to household socio economic characteristics using data from different assessments that have collected data on food security and nutrition would give better analysis of causes of malnutrition at different levels of the conceptual model.

**OBJECTIVE:** Provide information on malnutrition considering different socio-economic characteristics of Ugandan populations.

**METHODOLOGY:** Analysis of data collected using different models to explore underlying causes and individual level predictors of having nutrition problems

**RESULTS:** Underweight and Acute Malnutrition; variables that were found to be significantly associated include: Younger and male children were found more likely to be underweight/wasted than older children.

Experiencing diarrhea was resulting in higher odds of being underweight

Children in household with no access to improved toilet were more likely to be underweight/wasted than children in household with better toilet facilities.

The wealth proxy was found to be significantly related to underweight/wasting in children under five.

Male-headed households, households headed by unpaid-family workers as well as those households whose head has no formal education are more likely to be stunted or underweight as compared to those from female-headed households.

**CONCLUSION AND RECOMMENDATION:** Nationally, food insecurity, wealth and nutritional outcomes are related. Advocacy at national and sub-national levels to address nutrition and food security issues in order to improve address illness, food insecurity and ultimately poverty is of paramount importance.

#### P157-12

##### FOOD INSECURITY AMONG SOUTH AFRICAN FARM WORKERS - EXAMINING THE RIGHT TO FOOD FROM A MICROSOCIAL AND GENDER PERSPECTIVE

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**OBJECTIVES:** South Africa’s Constitution declares the right to food for everyone. This right, however, has difficulties reaching people living and working on commercial farms.

**METHODS:** Qualitative research was carried out from 2004 to 2008 among 44 households on three commercial farms in the North West Province, South Africa. Structured open-ended interviews, observation, focus group discussions and key-informant interviews were conducted.

**FINDINGS:** The isolated setting, inadequate infrastructure, social exclusion, high illiteracy and low wages are barriers that limit farm dwellers’ access to sufficient food. Particularly women are in a vulnerable position, having limited income sources and thus being dependent on their partner not only financially, but also on housing and food subsidies provided by the farmer. This further perils them to domestic violence, alcohol abuse and HIV/AIDS, negatively affecting food security. Mistrust and differing perceptions in most conjugal households result in food insecurity (58.3%), whereas more women led households are food secure (75.0%).

**CONCLUSION:** Food security programmes need to consider microsocial and gender-specific factors, including education, skills development and empowerment of men and women, to enable them to voice their right to food.

#### P157-13

##### COPING MECHANISM OF RURAL AND URBAN POOR HOUSEHOLDS TO MAINTAIN FOOD SECURITY DURING FOOD CRISIS

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Economic crisis, worsened by disasters (drought), largely affected food security of the poor, which is characterized by high prevalence of PEM among children under-five. This research was aimed to study coping strategy of poor household during food insecurity. This observational research was done in Kediri, East-Java, using cross sectional design and qualitative approach, involving fifty poor households having children aged under-three.

There were variations of coping strategy during food insecurity: find additional job for additional income, migrate to urban area, reduce menu variation, changing staple food (corn and cassava), re-consume leftover of food by re-processed it, and reduce the amount of food consumed by the adults. In severe insecure, they sell assets or borrow food from neighbor or family. The mothers acted as the “gate-keeper” to maintain food security.

The findings suggested that income generation activities for the poor during food shortage, is essential to maintain food purchasing power. Food formulation based on local food and health nutrition education may help them to develop better coping strategy.

**P157-14**  
**ECONOMIC INEQUALITY AND UNDERNUTRITION IN WOMEN IN URBAN INDIA**

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**RATIONALE & OBJECTIVES:** One-quarter of India's urban population lives in poverty, often with limited access to nutrition services. Often urban average data is used which camouflages economic inequalities in nutrition status of the urban poor. Hence, the recent national-wide representative data set providing indicators for urban India was re-analyzed to highlight inequalities of nutrition status/services in urban poor married reproductive-aged women, India.

**MATERIALS & METHODS:** The data set uses a composite asset-based index of poverty. For re-analysis, the lowest quartile of this index for urban areas was taken as representative of urban poor.

**RESULTS & FINDINGS:** As expected, compared to the urban average, acute undernutrition (BMI <18.5 Kg/m<sup>2</sup>) among women was 13 percentage points higher (25% vs. 38%) and anemia was 8 percentage points higher (51% vs. 59%). Only slightly over 50% urban poor women reside in catchments covered by India's largest flagship nutrition program.

**CONCLUSION:** Urban poor specific data needs to be presented and disseminated with key program and policy makers to prevent camouflaging their grave situation and improve reach and coverage of nutrition services to them.

**P157-15**  
**PILOT STUDY IN DETERMINING THE EATING PATTERN AMONG JORDANIANS**

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<sup>1</sup>The Hashemite University, Zarqa, JOR; <sup>2</sup>Jordan University of Science and Technology, Irbid, JOR; <sup>3</sup>Royal Medical Service, Aqaba, JOR

**BACKGROUND:** This study was conducted as a pilot study to determine the trends in food consumption among Jordanians.

**METHODS:** Design: Cross-sectional study.

**SUBJECTS:** About 701 subjects were selected from four different governorates in Jordan. Samples were selected randomly from Maternal and Health Centers of the Ministry of Health. An interview was conducted by a professional dietitian to fill a created food frequency questionnaire (FFQ). The FFQ was validated using 3 days record. The questionnaire included demographic characteristics, household income, and eating pattern from the four food groups and oils and sweets.

**RESULTS:** the results showed that the salary of 70% of the selected samples was below 700\$. The education level of 51% of the study housewives and husbands was mainly high school or less. About 93.3% of our sample used to consume bread on daily basis on an average of 6 servings/day; the majority (83.3%) of them consumed white bread. Regarding fruit consumption, 36% ate fruits on daily basis in which 99.7% consume them as fresh fruits (1.7 servings/day, on the average). A higher percentage (57.3%) could be seen in participants who consume vegetables on daily basis; 47% of total participants ate raw vegetables (2.2 servings/day, on the average). Forty percent of total participants consume meat 2-3 times/week and the more consumed type of meat was chicken (62%) followed lamb meat (18%) and the least consumed type was fish (2.9%). Average consumption of meat was 3.1 servings/day. Most of the chosen meats were low fat meat (60%) and skinless chicken (87%). Whole milk consumed by 72%, while skim milk was only 18%. The average milk and yogurt intake was 1 cup/day for each one. The most consumed fat types are vegetable oil and olive oil. Average fat intake was about 4.3 servings/day. Forty and fifty percents of total participants ate sweets weekly and monthly, respectively.

**CONCLUSION:** Jordanian eating pattern show a shortage in

fruit and vegetable consumption, whereas the amount of bread, meat and fat thought to be adequate. The type of bread and milk should be changed.

**P157-16**  
**CAUSES AND CONTROL OF FOOD INSECURITY: THE DESIGN OF A PILOT MODEL IN THE NORTHWEST OF IRAN**

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**BACKGROUND:** Food insecurity is frequent in both developed and developing countries, affecting from 5% to 25% of the general population.

**MATERIAL AND METHODS:** We have started this interventional program on a sample of 3000 households in the districts of the study area in the northwest of Iran to assess the food insecurity, its influencing factors and control measures.

A validated short questionnaire is used for the screening of food insecurity and energy intake in the district. After the screening program (as first part of the study), those families identified as having food insecurity will be recruited for the second part of the study which is a "community based interventional program". In the second part, we organize small training campaigns among community leaders, health care workers and public. This will take place through peer education programs in the context of short-term courses for target population. Six months after the intervention, the group will be recruited again to compare their attitude and practice before and after the intervention.

**IMPLICATIONS:** The study will provide some essential data and identifies local influencing factors of food insecurity and proper interventions that could help to prevent and control food insecurity in the study population and similar areas.

**P158: Nutritional Benefit-Risk Assessment of Foods and Food Consumption Patterns II**

**P158-01**  
**THE INTAKE OF ARTIFICIAL SWEETENERS BY DUTCH YOUNG CHILDREN**

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**OBJECTIVES:** To get more insight in the exposure to artificial sweeteners by young children and to elucidate the potential health risk due to this exposure.

**METHODS:** A food consumption survey among Dutch children, 2-6 yrs, was carried out in 2005/2006. Based on this survey and concentration data on relevant foods, supplements and toothpaste, the habitual dietary exposure to 5 main artificial sweeteners was estimated. The habitual intake distribution per kg body weight was assessed using statistical modeling and compared with the health based limit value.

**RESULTS:** Almost all children are exposed to artificial sweeteners. Beverages are the main source. Mean intakes of artificial intense sweeteners aspartame, acesulfame-K, saccharin and sucralose do not exceed the acceptable daily intake (ADI). The intake of cyclamate is closer to the ADI, but the health risk is negligible.

**CONCLUSION:** At the moment, the young children do not have a health risk due to intake of artificial sweeteners. However, as the trend of adding sweeteners to products is ongoing, it is important to monitor the intake of especially the sweetener cyclamate.

### P158-02

#### EATING OUT-OF-HOME IN BELGIUM: CURRENT SITUATION AND POLICY IMPLICATIONS

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**RATIONALE AND OBJECTIVES:** The increased importance of out-of-home eating has been highlighted while national representative studies from European countries are scarce. In Belgium, substantial out-of-home (SOH) eaters were characterized, the nutritional quality of their diet was assessed and the quality of meals consumed at different places was determined.

**MATERIALS AND METHODS:** Information on food intake was collected with two 24-hour recalls. SOH eaters were defined as individuals consuming at least 25% of their daily energy out-of-home. A representative sample (n=3245) of the Belgian population was randomly selected from the National Register using a multistage stratified procedure.

**RESULTS:** 35.2 % of the population was defined as a SOH eater. Energy intake, energy density of the total diet and consumption of most foods, except for fruits and vegetables, were substantially higher among SOH eaters compared to others. Out-of-home eating was more common among men and decreased with age. There were considerable differences in portion sizes and diversity of meals according to different places of consumption.

**CONCLUSION:** Out-of-home eating is a significant nutritional issue in Belgium and is associated with an adverse dietary profile. Out-of-home eating, places of consumption and specific population groups, should be considered when designing and evaluating nutrition policies.

### P158-03

#### A TIERED APPROACH FOR RISK-BENEFIT ASSESSMENT OF FOODS

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<sup>1</sup>National Institute for Public Health and the Environment (RIVM), Bilthoven, NLD; <sup>2</sup>Food and Consumer Product Safety Authority (VWA), Den Haag, NLD

**INTRODUCTION:** Risk-benefit assessments (RBA) are carried out when foods, or compounds in foods, have health-threatening and health-promoting properties. Until recently, RBAs were mainly carried out qualitatively, but new developments permit a potentially more informative quantitative RBA. However, quantitative assessments are time-consuming and require (high-quality) data.

**OBJECTIVE:** A decision tree facilitating a tiered approach to move from a qualitative into a full quantitative RBA has been developed.

**RESULTS:** The tiered approach, visualized in the form of a decision tree, mimics the risk assessment paradigm: hazard and benefit identification, hazard and benefit characterization, exposure assessment and risk-benefit characterization, albeit in a different order. The exposure assessment has been given a higher priority and the dose-response modeling as part of hazard and benefit characterization is moved to a later stage. The decision tree identifies several 'stops'; at these stages the RB question is answered. This approach has been tested for two food ingredients: nitrate in vegetables and folate/folic acid.

**CONCLUSION:** The decision tree is a useful and efficient instrument for RBAs and it supports risk managers in making informed choices when to continue or discontinue a RBA.

### P158-04

#### IMPACT OF SUBSTITUTING ADDED SUGAR IN CARBONATED SOFT DRINKS WITH INTENSE SWEETENERS IN YOUNG ADULTS IN THE NETHERLANDS

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**RATIONALE:** Substituting added sugar in carbonated soft drinks with intense sweeteners potentially has both beneficial and adverse health effects.

**OBJECTIVE:** To assess and weigh up the benefits and risks associated with substituting added sugar in carbonated soft drinks with intense sweeteners in young adults in the Netherlands.

**METHODS:** Two extreme scenarios were compared: 100% intake of intense sweeteners versus 100% intake of added sugar in carbonated soft drinks. A tiered approach was followed analogue to the risk assessment paradigm: benefit and hazard identification, exposure assessment and finally benefit and risk characterization and comparison.

**RESULTS:** Benefits identified were reduction of dental carries and body weight reduction. The difference in energy intake between the scenarios was 357 kJ for women and 542 kJ for men, corresponding to an average BMI decrease of 0.8 in women and 1.2 in men. Identified risks were negligible. Intense sweetener intake remained below the ADI in the substitution scenario.

**CONCLUSION:** Substitution of added sugar with intense sweeteners in carbonated soft drinks has a limited beneficial effect on BMI and no clear adverse health effects, in young adults in the Netherlands.

### P158-05

#### MATERNAL FISH CONSUMPTION DURING PREGNANCY: A BENEFIT-RISK ANALYSIS ON NEURODEVELOPMENT

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<sup>1</sup>RIVM, Bilthoven, NLD; <sup>2</sup>Fera, York, GBR

**RATIONALE AND OBJECTIVES:** DocosaHexaenoic Acid (DHA) and methylmercury (MeHg) from fish affect positively and negatively respectively, the neurodevelopment of the embryo (IQ score). The EU-FP6 project Qalibra quantified the risk-benefit effect of increased fish consumption on IQ.

**MATERIAL AND METHODS:** The DHA /MeHg intake of 100 gram of fish was calculated. Kinetic modelling led to an estimation of the accumulated amount of MeHg in pregnant women. The DHA intake and MeHg amount were quantitatively linked to the IQ score. Various sources of uncertainty (human MeHg kinetics, efficacy of DHA /MeHg on the IQ score) were taken into account through Monte-Carlo simulation.

**RESULTS:** Given 17 different fish species the 95% confidence intervals of the net effect of consumption of 100 grams of fish per day on the IQ score ranged between -2 (tuna) and +2 (mackerel), with the majority of the species showing no discernable effect.

**CONCLUSION:** An active policy to increase the population's fish consumption is unlikely to disturb neurodevelopment of the embryo during pregnancy.

#### P158-06

##### QUANTIFIED HEALTH EFFECTS OF PHYTOSTEROL CONSUMPTION

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<sup>1</sup>National Institute for Public Health and the Environment (RIVM), Bilthoven, NLD; <sup>2</sup>The Food and Environment Research Agency, York, GBR

**RATIONALE AND OBJECTIVES:** Within the 6th EU Framework, the QALIBRA project quantified the benefits and risks on a population level in case an active policy regarding margarine enrichment with phytosterols/-stanols would be pursued.

**MATERIALS AND METHODS:** Intake scenarios of phytosterol enriched margarine (usage rates of 20, 50 and 100%) were used to calculate the public health impact of phytosterol intake. The associated beneficial health effect was calculated as follows:

- 1) phytosterol intake (g/day) → LDL cholesterol reduction (%)
- 2) LDL cholesterol reduction → IHD reduction (%) (using baseline IHD risk)
- 3) IHD reduction → Disability Adjusted Life Years (DALY)

As a potential negative effect, night blindness based on marginal vitamin A status was chosen.

**RESULTS:** Enrichment of 20% of all margarines would result in a prevention of new IHD cases of 1%, while 1.3% of IHD are postponed. A grossly overestimated 0.4% of the population might become night blind. This results in a total health gain of 74.5 DALY per 1000 persons.

**CONCLUSION:** Enrichment of margarine with phytosterols results in net health benefits.

Information may be found on the project website: [www.qalibra.eu](http://www.qalibra.eu).

#### P158-07

##### NUTRITION DURING EARLY LIFE IN RESOURCE POOR AREAS IN ETHIOPIA

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**OBJECTIVES:** To investigate the importance of injera (Ethiopian staple food based on *eragrostis tef*) in the daily diet of young children living in resource poor areas in Ethiopia. Special focus was on the contribution of injera to meet iron requirements of young children.

**METHODS:** Dietary intake of children (6-18 months) was assessed using 3-day weighed food records and injera samples were analyzed for iron and the iron absorption inhibitor phytate.

**RESULTS:** For most children studied, injera provided most of the energy in their diets (up to 73% per day). Iron content of injera varied widely at very high levels (29.0 - 164.9 mg/100g). High iron content was shown to be mainly due to soil contamination and iron bioavailability is therefore estimated to be very limited.

**CONCLUSION:** These results contribute to the interpretation of a previous longitudinal study in the same area which reported a high prevalence of anemia, iron deficiency and iron deficiency anemia in young children (68, 60, and 49% respectively). Further studies to increase the iron bioavailability from injera are needed to improve the iron status in Ethiopian children.

#### P158-08

##### COMMON FOOD HABITS AMONG STUDENTS OF HEALTH COLLEGES AND ITS RELATION TO SOCIOECONOMIC AND HEALTH FACTORS

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Food habits of Gulf societies changed dramatically during the last three decades. So, we aimed to identify the common food habits among students of health colleges. Sample of 645 students (401 male and 244 female, 18 to 24 years) were chosen from health colleges in Dammam. Data about socioeconomic, health, and anthropometric measurements were collected. Moreover, a suggested questionnaire was used for classifying students according to their food habits. The results showed that 55.96% had bad food habits (BFH), 35.97% had acceptable food habits (AFH), and 8.07% had excellent food habits (EFH). Bad food habits were more common among males than females (66.8% vs. 38.1%). Father's education of the majority of BHF and AHF were less than university degree (79.3% and 82.4%) while fathers of the majority of EHF had university certificate. In conclusion the majority of health college students had bad food habits particularly males, and father's education determine the acquired food habits

#### P158-09

##### RISK MARKERS FOR ANEMIA AND OVERWEIGHT IN 0 TO 5 YEARS CHILDREN. BRASÍLIA, FEDERAL DISTRICT, BRAZIL

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**RATIONALE & OBJECTIVES:** To monitor the nutrition status is necessary data about child nutrition. National household surveys are costly, time consuming and do not provide information about child food intake. To overcome this difficulty, researches used the windows of opportunity offered by National Immunization Days (NID), which are held regularly since the 1980s.

**MATERIALS & METHODS:** This study describes a cross-sectional large-scale food consumption survey simultaneously with immunizations. The methodology involved data collection to identify risk markers for infant obesity and anemia. In a unique day, 1,282 children were investigated. The questionnaire was composed by a role of questions, which had particular values and the sum generates a score, provided information of high risk for obesity and/or anemia. The respondent was the kid responsible person.

**RESULTS & FINDINGS:** In children from 6 months to 2 years old: the prevalence of anemia high risk was 4.9%, and the overweight high risk was 2.1%. Meat consumption was present in 61, 9% of children. 19, 1% received rich sugar foods before the six months of age. The frequency of the industrialized juice consumption or soda in the last month was of 31,8%. Children from 2 to 5 years old: It was found 35% of overweight risk. The prevalence of anemia risk was 6.5%. The usual food consumption is characterized by high consumption of industrialized foods, low consumption of fruit and meat. This population also presents insufficient milk consumption.

**CONCLUSION:** The results suggest that anemia and obesity risk are linked with inadequate alimentary practices. The child was exposed to bad alimentary patterns at an early age. It shows that it is necessary health promotion actions and policies to prevent those diseases.

**P158-10**  
**NUTRITIONAL KNOWLEDGE, NUTRITIONAL PERFORMANCE AND EATING DISORDERS RELATED TO OVERWEIGHT IN PREUNIVERSITY STUDENTS, AHVAZ, IN 2007**

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**RATIONALE & OBJECTIVE:** Useful prevention way of obesity knows relative risk factors. This study planned for assessment relation between Nutritional knowledge, nutritional performance, eating disorders and overweight in preuniversity students of Ahvaz city.

**MATERIALS & METHODS:** In this cross sectional study 372 girl preuniversity students of Ahvaz city were sampled. Anthropometric data were measured and relative self-report questionnaire to collect data were filled out. Data were analyzed by spss software.

**RESULTS:** The mean of age, weight and high was 17.48±0.6 year, 54.6±0.05 Kg and 1.58±0.05m respectively. 15.6% of subjects were at risk of overweight (BMI between 85th and 95th percentiles age and gender of NCHS) and 2.7% were overweight (BMI at 95th percentile or greater for age and gender of NCHS). Nutritional knowledge was 16.9% low, 70.7% moderate and 12.4% high. Nutritional performance was 35.8% low, 55.9% moderate and 8.3% high. 4.6% had eating disorder, 64% at risk for eating disorders and 31.5% of subjects without eating disorders. There was significant relation between nutritional knowledge and overweight ( $p<0.05$ ) also eating disorders and overweight ( $p<0.01$ ).

**CONCLUSION:** Nutritional knowledge and eating disorders are risk factors for overweight in preuniversity students, so learning basic of healthy nutrition and normal range of BMI for age could be effective for prevention of overweight.

**P159: Increasing Food Costs, Food Aid and Malnutrition**

**P159-01**  
**HUNGER, MALNUTRITION, AND POVERTY: AN ASSESSMENT OF COMPLEMENTARITY BETWEEN THE INDICATORS**

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**BACKGROUND:** Proportion of population undernourished and prevalence of underweight children under five years of age are employed as the indicators for monitoring the progress towards the target 3 of the Millennium Development Goals 1 "Halving the proportion of people suffering from hunger by 2015". The objectives of this study are to assess the level of complementarity and the difference between those hunger-related indicators.

**MATERIALS & METHODS:** The country-level data of three hunger-related indicators were collected: (i) P1: proportion of population undernourished; (ii) P2: prevalence of underweight children under five-years of age; and (iii) P3: proportion of population living below \$1 ppp per day. To examine the relationship between those indicators, weighed Pearson's correlation coefficient and weighted least squares were applied.

**CONCLUSION:** A significant Pearson's correlation both between P1 and P2, and between P1 and P3 ( $p<0.001$ ) indicated linearity between each two indicators. The results of weighed least squares showed  $P2=0.77P1+13.7$  ( $R2=0.29$ ) and  $P3=0.89P1+8.0$  ( $R2=0.24$ ). The intersections imply that 13.7% of underweight were caused not by food insecurity but by other factors (i.e. poor living environment and inappropriate feeding practice), and that 8.0% of those living below \$1ppp either belong to subsistent farming/fishing households or obtain foods through bartering.  
(198 words)

**P159-02**  
**THE POSSIBLE IMPACT OF INFLATION ON NUTRITIONALLY VULNERABLE HOUSEHOLDS IN A DEVELOPING COUNTRY WITH SOUTH AFRICA AS THE CASE STUDY**

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Food is a basic human physiological need that is important for survival, growth and health. Without an adequate supply of food a human being cannot grow or develop optimally, nor utilize energy for sustained livelihood, thereby implying food insecurity. South Africa (SA) is classified as a developing country, with developing countries representing a third of the world population. It is recognized that the current rate of food inflation is a worldwide phenomenon and it is argued that the case study is presenting a much wider insight than just an individual country. About 35% of the SA population is food insecure and categorized as being poor. With the current increase in food prices, especially staple food prices, most households need to employ food coping strategies (FCS) to survive. Some of these FCS have significant negative impact on their often already deprived nutritional status. The possible added impact of inflation on the nutritional status of vulnerable SA households is discussed. A consequent potential reduction in portion sizes consumed due to increased food prices, as well as a snapshot of the cost of a balanced varied diet compared to average household income, are argued in the context of SA's prevailing inadequate nutritional situation.

**P159-03**  
**GROWTH OF CHILDREN RECEIVING A DEHYDRATED POTATO-SOY PROTEIN BLEND OR A CORN-SOY BLEND AS PART OF A FOOD AID PROGRAM**

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**RATIONALE & OBJECTIVES:** There are a limited number of rations being used in food aid programs and few studies comparing their effect on the growth of children. The objective was to determine the growth of children who received one of two blended foods within the setting of an on-going food assistance program.

**MATERIALS & METHODS:** Malnourished Senegalese children 18-56 months old were randomized to receive a corn-soy blend or a dehydrated potato-soy protein blend. Both fortified foods provided an equivalent density of key micronutrients when cooked as porridge. Some families obtained additional food rations if mother was pregnant or lactating. Monthly anthropometric measures and data on retrospective morbidity were recorded over a four-month period.

**RESULTS & FINDINGS:** 350 children entered the study. There were no differences in the mean baseline anthropometric measures between the two groups. Anthropometric measures improved in both groups at 2 months and no differences in the change of growth were identified between groups. Illness and additional household rations were associated with the changes. Data at 4 months are forthcoming.

**CONCLUSION:** The amount of food rations given to families should be predicated on more than family size and should include other demographic and health issues.

#### P159-04

### DISPARITIES IN CHILD NUTRITION STATUS AND SERVICES IN URBAN INDIA: ANALYSIS OF RECENT NATIONAL-LEVEL DATA

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**RATIONALE AND OBJECTIVES:** National Family Health Survey, conducted on a representative sample provides indicators on child nutrition status, behaviors, service access, etc. The latest round conducted in 2005-06, presents indicators disaggregated by urban and rural areas only. Hence, this was re-analyzed to unmask disparities existing within urban areas.

**MATERIAL AND METHODS:** This data's wealth index factor scores for urban household were divided into quartiles. Bottom quartile was selected to represent urban poor.

**RESULTS AND FINDINGS:** All nutrition indicators were worse-off for urban poor compared to urban average. For instance, chronic undernutrition (stunting) among urban poor under-fives was 54.2%. Urban average was 39.6%. Alarmingly, only 53.3% urban poor children under-six years were covered by Integrated Child Development Services, the largest nutrition program. Of those covered, only 5% were weighed in last 3 months preceding the survey.

**CONCLUSIONS:** There is an urgent need to use urban poor specific data both at national and district level to improve quality and reach of existing nutrition services to this segment.

#### P159-05

### INCREASING FOOD COST A CHALLENGE A TYPICAL AFRICAN FACES

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**PURPOSE OF THE STUDY:** study is to enlighten us about the challenges souring increase in general food prices has brought fourth on our livelihood and nutritional well being

**METHODOLOGY:** Evaluation survey in local markets in kampala interviewing residents in slums and middle class, statistics from ministry of health Food and Agricultural organization

**RESULTS:** Increased prices for processed products, Drastic change in diet as result of increased food prices, 70%Consumption of one particular type of food basing on its cost 60%Reduced number of meals per day due to high cost of food 80%interviewed didnt know balanced diet 60%say Poverty lead cause nutritional deficiencies

**RECOMMENDATIONS:** governmrmnt should, regulate food prices as some individuals are using situation to make huge profits, Storage facilities be extended to rural ares so as to store food in season of plenty limit exportation of food stuff, to cater for food accessibility domestically, Teach people about the need for proper nutrition, subsidize farmer so as to increase their out put and sell at lower price, Set up bufferstores for food scarcity Increase funding to agricultural research That 25000 people including 11000childeren die each day world wide due to hunger and mulnution according to FAO, we can not sit and watch!

#### P159-06

### SOCIOECONOMIC DIFFERENCES IN ACCESSIBILITY OF HEALTHIER FOOD CHOICES IN THE CITY OF SANTOS, BRAZIL

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Recent evidence point to the role of nutritional environment in determining nutritional status. The objective of this study was to assess the socioeconomic differences in access to food in urban areas of Brazil. All places selling food and meals in

two distinct socioeconomic areas were evaluated thought direct methods using validated questionnaires (NEMS). Availability of healthy foods and their relationship with the socioeconomic characteristics of the regions were assessed between 2008 and 2009. Socioeconomic data were collected from the Population Census of the IBGE (Brazilian Institute of Geography and Statistics) and integrated to observation data in a Geographic Information System (GIS). The higher concentration of bars and unhealthy food places were found in the poorest area. The market of fruits and vegetables were more concentrated in the area with higher income. The neighborhoods of lower socioeconomic status have less access to healthy foods that can have effect in the nutritional status of the local population. Thus it is necessary to implement public policies that encourage the marketing of healthy food in less favored regions.

#### P159-07

### WOMEN WHO HEAD HOUSEHOLDS FROM RURAL SOUTH INDIA ARE FOOD INSECURE

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Women head households in rural India primarily by default and are likely to have a lower socio economic status. Hence, this study ascertained the socio economic status in women heads of households and if they were food insecure as compared to male heads of households. Two hundred and eighty women and 2394 male household heads were studied. Dietary intakes, using a validated food frequency questionnaire and body mass index were used to ascertain food insecurity. Per-capita household income was comparable but standard of living index and land holdings were lower in women in comparison to male household heads. Women who headed households had an increased risk of being in the lowest tertile of total energy intake (odds ratio 2.9; 95%confidence interval (CI), 1.9-4.6), meat intake (2.2; CI, 1.4-3.2) and were more likely to be chronically energy deficient (2.3; CI, 1.5-3.7) than their male counterparts, after adjusting for weight, age and physical activity. These data confirm that women who head households are at a greater risk of food insecurity in comparison to male household heads.

#### P160: Nutrition & HIV/AIDS IV

#### P160-01

### INFLAMMATION AND ANTHROPOMETRIC STATUS IN A MICRONUTRIENT INTERVENTION AMONG HIV+ ADULTS IN KENYA

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Poor anthropometry is a feature of HIV/AIDS, especially in developing countries. Inflammation, a facet of HIV impacts anthropometry negatively. Nutrition interventions frequently use anthropometry to evaluate impact. Here, we investigate associations between inflammation and anthropometry among 75 HIV+ adult men and women who participated in a 12-week placebo-controlled double-blinded randomized nutrition intervention. Inflammation; classified using AGP> 1g/l, (INFL+= yes/ INFL=no). In paired analysis, significant changes in weight (p = 0.022) and BMI (p = 0.028) among supplement-group INFL-. Inflammation associated with poorer anthropometry at baseline (BL) and month 3 (M3), especially in men. Significant sex differences in INFL+ for BMI (BL&M3; p

< 0.05), MUAC (BL  $p = 0.032$ ; M3  $p = 0.042$ ) and TSFT (BL & M3  $p < 0.001$ ); and in INFL – for BMI and TSFT. Inflammation may counteract anthropometric responses to intervention.

**Acknowledgements:** UNICEF & The Dutch Government

#### P160-02

##### **METABOLIC SYNDROME AMONG PLHIV RECEIVING ARV MEDICATION AT A PUBLIC HOSPITAL IN MALAYSIA**

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**RATIONALE & OBJECTIVES:** Metabolic syndrome is the one of most commonly quoted adverse nutritional side effect of antiretroviral therapy (HAART). This study was designed to determine the prevalence of the metabolic syndrome, defined in accordance to the standards set by the National Cholesterol Education Program.

**MATERIALS & METHODS:** In this cross-sectional study, 340 HIV-infected patients managed at the outpatient infectious disease clinic during 2008 completed the study protocol consisting of anthropometric measurement and laboratory analysis after a 12-h overnight fast.

**RESULTS & FINDINGS:** Metabolic syndrome prevalence was 27.9% among those above 20 years. Only BMI > 25.00 (crude OR=2.465, CI=0.994-6.114) was independently associated with the metabolic syndrome significantly. After adjusting for other covariates, BMI > 25.00 (adjusted OR=3.93, CI=1.22-12.63), high energy intake (adjusted OR=1.020, CI=1.0-1.04), high percentage energy from carbohydrate (adjusted OR=1.488, CI=1.125-1.97) and high percentage energy from fat (adjusted OR=1.52, CI=1.09-2.14) were independently associated with the metabolic syndrome using logistic regression analysis. Furthermore, BMI < 18.50 (adjusted OR=0.22, CI=0.10-0.4), total fat intake (adjusted OR=0.80, CI=0.65-0.98), and high potassium intake (adjusted OR=0.99, CI=0.90-1.00) the high CD4 cell count (adjusted OR=0.99, CI=0.91-1.10) were identified as significant protective factors against metabolic syndrome.

**CONCLUSION:** Of specific concern is the association of higher macronutrients intakes with the metabolic syndrome and in line with the findings, it is pertinent that dieticians be part of the team to manage PLHIV in order to improve their quality of life.

#### P160-03

##### **ANEMIA IN HIV-INFECTED PATIENTS RECEIVING ARV MEDICATION AT A PUBLIC HOSPITAL IN MALAYSIA**

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**RATIONALE & OBJECTIVES:** Anemia as the most frequent hallmark of HIV infection diagnoses whether before or after ARV therapy with different etiologies that impacts on their quality of life intensely. The incidence of anemia has reduced or increased since the era of Highly Active Antiretroviral Therapy (HAART).

**MATERIALS & METHODS:** In this cross-sectional study, anemia identified based on the WHO (2001) definition as Hb < 130 g/l in adult male and Hb < 120 g/l in adult female among 340 HIV positive subjects.

**RESULTS & FINDINGS:** The prevalence of the anemia was 52.8% at start of medication and 27.1% at observation. The proportion of female patients (41.7%) who had anemia was

higher than proportion of males (23.1%) significantly (Pearson  $\chi^2$  (1, N = 340) = 9.876,  $p = 0.002$ ) at observation. The result of logistic regression analysis showed that increasing in years of age (Adjusted OR=1.05, CI=1.01-1.09) and being female (Adjusted OR=4.32, CI=1.92-9.70) significantly increased the risk of anemia with but higher duration of ARV medication (Adjusted OR=0.98, CI=0.96-0.99), absent of anemia before start of ARV medication (Adjusted OR=0.40, CI=0.21-0.78) protected them against anemia occurrence of anemia significantly.

**CONCLUSION:** To optimize the immunological, clinical and nutritional status, the clinician should consider the preventing anemia occurrence by focusing on specific factors.

#### P160-04

##### **NUTRITIONAL STATUS AND CARE OF HIV-POSITIVE WOMEN IN HANOI, VIETNAM**

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**RATIONALE & OBJECTIVES:** HIV-infection and nutrition are closely related, with HIV-infection significantly increasing nutrient requirements, and deficiency of micronutrients associated to disease progression. Many studies on micronutrients and HIV have been conducted in developed countries and in sub-Saharan Africa, but data from SE-Asia is scarce. In Vietnam, there is no data on nutritional status of HIV patients. It is estimated that in Hanoi, around 12000 people are HIV infected. This study investigated KAP, nutritional status and nutrient intake in HIV-positive women living in Hanoi, Vietnam.

**MATERIALS & METHODS:** A cross-sectional survey of 170 women of reproductive age living in Hanoi, Vietnam.

**RESULTS & FINDINGS:** Women ranged in age from 20 - 35 yrs, and educational level was high, with 50% finishing at least grade 10. Sixty percent of the women had once been married, but only 27.5% was still married, the remaining either divorced or widowed. The majority of the women lived with their parents. Mean time since diagnosed with HIV was 48 months. CD4 cell counts were mainly between 200 - 500 c/mL, with only 6% having CD4 counts >500 c/mL. Of the women, 15% had a BMI <18.5, whereas 6% had a BMI >25. Average energy intake was low at 1785 KCal/d. Forty women (24%) took vitamin supplements, and 7 women (4%) took iron supplements. Yet, average vitamin A intake was only 65% of RDI. Knowledge on nutritional issues in HIV was low in care-takers of PLWHA.

**CONCLUSION:** There is an urgent need to increase KAP on nutritional care in HIV in Vietnam. A multi-sectoral approach is needed to increase the capacity for health care providers to provide comprehensive care and support for PLWHA.

#### P160-05

##### **THE EFFECTS OF ZINC SUPPLEMENTATION ON T-LYMPHOCYTE PROFILES IN PATIENTS WITH AIDS**

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**BACKGROUND:** AIDS is a worldwide threat specially in developing countries. Powerful arguments have been advanced for treatment with antioxidants to slow progression of AIDS but, using zinc supplements in these patients is controversial.

**METHODS:** In a clinical trial study, 20 patients with AIDS after at least three months using antiviral therapy came into study. They were randomly divided into two equal groups: cases and controls. In cases, zinc sulfate at dosage of 220 mg/day concomitant with antiretroviral therapy (ART) and in

controls, only ART therapy was prescribed for 60 days blindly. During this period, dosage and type of their medications were being constant. CD4+, CD8+ cells and Lymphocyte counting were measured using Flucytometry test and CD4+/CD8+ was calculated in both of groups before and after study and compared with each other using paired-t-test and t-student in SPSS-15 and P-value $\leq$ 0.05 was considered as significant.

**RESULTS:** There was no statistically differences in age or sex in two groups. In case group, CD4+ and CD8+ cells increased significantly (211.4  $\pm$  93.7 vs. 280.3  $\pm$  106.9, P=0.02 and 1018  $\pm$  316.7 vs. 1157.9  $\pm$  303.6, P=0.04 respectively) but there was no statistical difference in lab parameters neither in control group nor between cases and controls.

**CONCLUSION:** This study indicated that zinc supplementation has no prominent effects on immunological status in patients with AIDS but it might be improved by larger cases or longer period.

#### P160-06

##### **FOOD CONSUMPTION AND NUTRITION STATUS OF ADULTS LIVING WITH HIV AND AIDS: A CASE OF THIKA AND BUNGOMA DISTRICTS**

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**RATIONALE AND OBJECTIVE:** Feeding practices of HIV positive persons are a challenge especially to the rural communities in Kenya. The objective of this research was to establish the food consumption, care practices and nutrition status of PLWHAs and those whose HIV status is not known.

**MATERIALS AND METHODS:** A cross sectional descriptive study of 439 adults; 174 HIV positive and 265 adults whose HIV status was not established in Thika and Bungoma districts, Kenya.

**RESULTS AND FINDINGS:** Majority of HIV persons consume foods that are low in nutrients, have low knowledge on nutrient content of the foods they consume and are challenged by poor feeding due to absence of caretakers to prepare meals for them especially women. More adults with BMI  $\geq$  18.5 are malnourished 23.6% in comparison to those whose status is not known 13.9% at p=0.000.

**CONCLUSION:** Adults who are HIV positive are more likely to be malnourished than those whose HIV status is not known. Majority of HIV persons face challenges of food preparation that impacts negatively on their nutrition status especially women.

#### P160-07

##### **FOOD CONSUMPTION PATTERNS, DIVERSITY OF FOOD NUTRIENTS AND MEAN NUTRIENT INTAKE IN RELATION TO HIV/AIDS STATUS**

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As the causes and consequences of AIDS epidemic become clearer, so does the fundamental importance of food and nutrition security. Even as food insecurity remains a major problem in poor households, its effects are worsened in disease states like HIV/AIDS. Food deficiency or inadequacy of food compromises an individual's nutrients status and work capacity. It will also diminish their resource base and household provisioning. Though there are many chronic diseases in Kenya, HIV/AIDS is presently having a devastating effect in Kenya by threatening the food production systems, intensifying poverty prevalence, increasing nutritional implications, creating more orphans than the existing social networks can cope with and basically affecting all indicators of socio economic development in the country. The objective of this cross sectional study was to assess food and nutrient intake in the households. A comparative approach was adopted to address this objective. Purposive sampling technique was used to select 160 respondents. To

collect the information a consolidated questionnaire that included food frequency checklist and 24-hour dietary recall was used. Data was analyzed quantitatively to address the research objectives. Descriptive statistics were mainly measures of central tendency and inferential statistics were chi-square and independent samples t-test. Food composition table was used to compute the nutrient intake of the households. Data revealed that there is a significant relationship between HIV/AIDS status and nutrient intake. The study thus concluded that HIV/AIDS status affects nutrient intake of a household. Most affected households had most productive persons affected by HIV/AIDS. Thus people living with HIV/AIDS, their families and communities are overcome by the effects of the pandemic. It is recommended that, the Ministries of Health, Planning and Development and Agriculture can save families from the effects of HIV/AIDS by instituting food security interventions based on sound, sustainable agricultural practices.

#### P160-08

##### **SERUM AND COLOSTRUMS ZINC AMONG HIV/AIDS POSITIVE PREGNANT AND BREASTFEEDING MOTHERS AT THIKA DISTRICT HOSPITAL**

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**RATIONALE & OBJECTIVES:** The aim of this study was to determine the levels of serum and colostrums zinc in pregnant and breastfeeding mothers and to establish the correlation between zinc deficiency and HIV/AIDS status among the mothers.

**MATERIALS & METHODS:** In a cross sectional study at Thika District Hospital, Maternal blood, cord blood and colostrums were obtained from 160 HIV positive mothers and 160 HIV negative mothers. Zinc was determined using AAS.

**RESULTS & FINDINGS:** The serum zinc ranged from 11  $\mu$ g/dl to 48  $\mu$ g/dl, and 20  $\mu$ g/dl to 83  $\mu$ g/dl, among HIV positive and negative mothers, respectively. Among the HIV positive mothers, 90% were zinc deficient while only 15% of HIV negative mothers were deficient. The zinc levels in cord blood were similar to that of the maternal blood (P<0.05). Colostrums zinc levels ranged from 13 to 50  $\mu$ g/dl, and from 22 to 84  $\mu$ g/dl, among HIV positive and negative mothers, respectively.

**CONCLUSION:** HIV negative mothers had significantly higher serum zinc levels and also higher colostrums zinc than HIV positive mothers.

#### P161: Obesity IV

#### P161-01

##### **FAMILY-BASED LIFESTYLE MODIFICATION PROGRAM FOR OVERWEIGHT ADOLESCENTS IN HONGKONG, PILOT STUDY**

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**RATIONALE & OBJECTIVES:** The increasing prevalence of overweight adolescents in Hong Kong has captured much of healthcare professionals' attention. A pilot intervention study co-organized by The Chinese University of Hong Kong and Hong Kong Polytechnic University emphasizing overall lifestyle modification with family involvement was carried out to evaluate the differences in weight, dietary habit and physical activity changes among two groups of overweight adolescents



in a group intervention with and without parent's intervention involvement.

**MATERIALS & METHODS:** Twenty-four Chinese adolescents aged 12 – 14y in which the Intervention Group, with 12 overweight or obese adolescents and their parents and the Control Group, with 12 overweight or obese adolescents alone without parental involvement, were given a series of eight 90-minute lessons over six months. The lessons were executed by two dietitians, a family therapist, a physical education specialist, and a physical trainer and focused mainly on diet, exercise and behavior modification.

**RESULTS & FINDINGS:** A significant weight gain was found among the female Control Group in the post-test, and the percentage of body fat was also found to have increased significantly in the female Intervention Group. Otherwise there were no significant changes found in the anthropometric measurements, physical activity level, or dietary habits in either group of subjects. The BMIs of males in both groups decreased and the dietary habits measured by the 1-min dietary behavior assessment revealed that the subjects in both groups obtained a non-significant increase at the post-test.

**CONCLUSION:** These outcomes suggested that family-based lifestyle modification program with parental involvement is worth developing further in Hong Kong to combat adolescent obesity

#### **P161-02**

### **OBESITY AND CARDIOVASCULAR RISK FACTORS IN SECONDARY SCHOOL-AGED STUDENTS OF PRINCESS CHULABHORN'S COLLEGE CHIANGRAI**

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**RATIONALES & OBJECTIVES:** The increasing prevalence of obesity and cardiovascular risk factors in adults may result from the food habits and lifestyles in the adolescent period. The study was designed to assess nutritional status, prevalence of obesity and cardiovascular risk factors (excess body fat, BMI, waist circumference, blood sugar, and serum lipid profiles) in secondary school-aged students of Princess Chulabhorn's college Chiangrai.

**MATERIALS & METHODS:** This study consisted of 820 students (62% girls, 38 % boys), age ranged from 12 to 18 years. We collected their socio-demographic characteristics, health behaviors, and dietary habit by questionnaires, assessed the anthropometric variables, dietary intake, and analyzed blood biochemical markers.

**RESULTS & FINDINGS:** Based on NCHS/WHO 2007 criteria, BMI for age > 95th percentile is considered as overweight, 165 (20%) were overweight, whereas 330 (40%) had excess total body fat. In this study, we showed the distribution of body fat by segmental analysis with BIA (TANITA BC-418). The prevalence of dyslipidemia and diabetes mellitus: 173 (21%) had serum LDL-cholesterol > 130 mg/dL, 20(2.4%) had serum TG > 150 mg/dL, 64 (8%) had fasting blood sugar 110-125 mg/dL, and 27 (3.3%) > 126 mg/dL. More than 10 % of total subjects had > 2 cardiovascular risk factors.

**CONCLUSION:** From these results, we found that the prevalence of cardiovascular risk factors related to nutrition were not different from the adult-age group. The early intervention for controlling these cardiovascular risk factors in school-aged children is necessary at the population level.

#### **P161-03**

### **WEIGHT MANAGEMENT BY VARIOUS METHODS OF DIETARY ADVICE WITH MEAL REPLACEMENT**

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**BACKGROUND:** To achieve weight loss goal in obesity, easy to follow dietary advice is essential. This study has created a simplified dietary advice for easy weight reduction.

**OBJECTIVES:** To evaluate the effectiveness in weight reduction of simplified structured dietary advice (Sim) by comparing to the standard calorie-counting method (Std).

**METHODS:** 50 women aged 20-37 years and BMI of >25 kg/m<sup>2</sup> were randomly divided into 4 groups based on 2 different weight management principles. Standard dietary advice (Std1 n=14, Std2 n=12) and Simplified dietary advice (Sim1 n=12, Sim2 n=12) for 12 wk (phase I) and a further 24 wk (phase II). All Std groups received altogether 1200 kcal/d as sensible meals with/without a meal replacement (MR) product containing 250 kcal/serving. Std1 consumed 3 meals/d in phase I followed by 2 meals with 1 MR/d in phase II. Std2 received the same diet as in Std1 but vice versa. Sim1 consumed 3 Sim meals/d in phase I, and consumed 2 Sim meals with 1 MR/d in phase II, whereas Sim2 received the same diet as in Sim1 but vice versa.

**RESULTS:** Forty-four subjects completed the study. Total weight loss was 1.2 kg (2.0%) for Std1, 4.0 kg (4.0%) for Std2, 5.7 kg (7.2%) for Sim1, and 0.2 kg (1.1%) for Sim2. Greater weight loss and body fat mass loss were found in Sim1 (p<0.05). Physical fitness showed improvement in all groups when the subjects reached 5% loss of initial weight.

**CONCLUSIONS:** Simplified structured dietary advice is easy to follow and more effective than standard dietary advice for weight reduction. After practicing simplified dietary advice for 12 week, the use of 1 MR/d help to improve dietary compliance and maintain weight loss.

#### **P161-04**

### **ALCOHOL BEVERAGE DRINKING IN RELATION TO MACRONUTRIENTS AND THE RISK OF OBESITY**

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**RATIONALE & OBJECTIVES:** Alcohol is the second most energy-dense macronutrient and it is metabolized very effectively. At the same time, abstinence has been associated with obesity, and high alcohol consumption with lower BMI (MEOS-system).

The aim was to determine associations of alcohol patterns (amount, type and frequency) with energy, quality of diet and body size (BMI and waist circumference).

**MATERIALS & METHODS:** The data consist of 6300 participants (25-74yrs) from the national FINRISK 2007 Survey, who were invited to more detailed examination including, e.g., questionnaires and anthropometric measures.

**RESULTS & FINDINGS:** The daily alcohol consumption (=ethanol) was 4.2g for women and 11.4g for men. In women, total energy increased with rising alcohol consumption but there were no differences in the non-alcoholic energy between alcohol consumption categories. In men, non-alcoholic energy intake also increased with rising alcohol consumption. The U-shaped association between alcohol consumption and BMI were observed, especially in women.

**CONCLUSION:** Alcohol consumers did not habitually substitute food items with alcohol beverages. The participants with low and moderate alcohol consumption, however, had the lowest BMI.

**P161-05****PHENOTYPIC EFFECTS OF BILBERRIES IN A HIGH-FAT DIET MOUSE MODEL OF OBESITY**

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Obesity is a significant risk factor in development of metabolic syndrome and T2D. These are characterized by decreased insulin sensitivity, impaired glucose tolerance, dyslipidemia, hypertension and chronic low-grade inflammation. Growing evidence indicates that polyphenols, especially anthocyanins, may influence glucose, insulin and lipid metabolism and low-grade inflammation. Berries are an important source of polyphenols in the Nordic diet and especially bilberries contain high levels of anthocyanins.

This study focused on the effect of bilberries (*Vaccinium myrtillus*) in the development of obesity using a high-fat diet mouse model. Mice (C57BL/6) were fed for 2 months with control diet (10% kcal fat) or high fat diet (45% kcal fat) with or without 5% or 10% (w/w) freeze-dried bilberries. We measured glucose, insulin and lipid metabolism, inflammation-related parameters, blood pressure, energy expenditure and body fat (%).

Our preliminary findings show that the intake of bilberries increases insulin sensitivity and reduces blood pressure and low-grade inflammation in mice. Additionally, an indication of reduced weight gain and adiposity were found (10% w/w berries). In conclusion, bilberries can decrease some of the complications related to weight gain in a high-fat diet mouse model of obesity.

**P161-06****ASSOCIATION OF BODY MASS INDEX WITH GLUCOSE AND BLOOD PRESSURE ON INDIGENOUS**

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This study aims to measure and describe the shape of the relationship between BMI, fasting plasma glucose and blood pressure on indigenous. We studied 297 adults across the ethnic Kaip, Araweté, Parakanã, Arara and Asurini located in the State of Pará, northern Brazil. The relationship of BMI with the other variables was tested by linear regression method by adopting a significance level of 5%. Mean BMI (23.7 kg/m<sup>2</sup>), fasting plasma glucose (83.4 mg / dL), diastolic blood pressure (60.0 mmHg) and age (49 years) showed no significant difference between genders and for men only systolic blood pressure (98.0 mmHg) was higher. The prevalence of overweight was 23.6% and obesity from 5.7%. Were not identified new cases of diabetes mellitus type 2, but four cases (1.3%) of the disease were reported. The impaired glucose tolerance was present in 2.4% of the population and hypertension in 1.3%. The BMI associated with the glucose, systolic blood pressure and diastolic blood pressure (DBP), is better explained from diastolic blood pressure (BMI = 20590 +0.52 DBP). The relationship of BMI with blood glucose levels and blood pressure was positive, but further studies are needed to have more clarity between cause and effect.

**P161-07****PREVALENCE OF OVERWEIGHT AND OBESITY AMONG SCHOOLCHILDREN IN SUBURB THAILAND**

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**RATIONALE AND OBJECTIVE:** Obesity is an emerging problem among children worldwide. Body mass index (BMI) is widely used to define overweight and obesity as it correlates well with high accuracy to measure body fatness. Aim of the present study is to determine the prevalence of overweight and obesity in Thai schoolchildren.

**MATERIAL AND METHODS:** The school based cross-sectional study was conducted in 1,140 children aged 6-15 years in Ongkharuck, Thailand. Anthropometric measurements including weight and height were obtained to determine BMI. Regarded to the International Obesity Task Force, BMI >85th and >95th percentiles for age and sex were considered as overweight and obese, respectively. The results were analyzed statistically by applying student t-test and Chi-square test.

**RESULTS:** Prevalence of overweight and obesity among schoolchildren in Ongkharuck, Thailand was 12.8% and 9.4% respectively. There were no significant differences in prevalence of overweight and obesity between genders and age-specific groups.

**CONCLUSIONS:** The prevalence of overweight and obesity has been dramatically increasing among Thai children. Further long-term follow-up studies are required to determine the growth pattern and obesity-related co-morbid condition in Thai children.

**P161-08****CHANGE IN PREVALENCE OF OVERWEIGHT/OBESITY AMONG PRESCHOOL CHILDREN IN SARABURI BETWEEN 1997 AND 2008**

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**RATIONALE & OBJECTIVES:** To compare the prevalence of overweight/obesity among preschool children between 1997 and 2008 in the same areas in Saraburi province.

**MATERIALS & METHODS:** We measured height and weight of the children at eight preschools from July to September in 2008. The nutritional status was assessed by using the z-scores values of the weight for height index based on the Thai growth curve released in 2000.

**RESULTS & FINDINGS:** The total number of 1381 children (capital area 528; other areas 853) were included into the analysis. The percentages of children with the z-score of < -2SD, -2SD - -1.5SD, -1.5SD - +1.5SD, +1.5SD - +2SD, and >+3SD were 1.1, 2.8, 76.5, 4.9 7.6 and 7.0 in capital area whereas 2.8, 4.7, 79.4, 3.8, 4.3 and 5.0 in the other areas. According to the 1997 survey using weight-for-height percentile table of the Thai growth curve 1994, the percentages of the children with more than 90 percentile, were 38.8% in capital area and 16.1% in the other areas. It is hard to compare the prevalence of overweight/obesity between 1997 and 2008, since the assessment criteria changed.

**CONCLUSION:** We are going to assess in several methods and present the results at ICN.

**P161-09**  
**IDENTIFICATION OF MELANOCORTIN-4 RECEPTOR GENE VARIANTS IN SCHOOL CHILDREN WITH EARLY ONSET OBESITY**

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Melanocortin - 4 receptor (MC4R) is a seven - transmembrane G protein coupled receptor (GPCR), involved in the control of appetite and energy balance. This study is aimed to identify single nucleotide polymorphisms (SNPs) or mutations in the MC4R gene in children with early onset obesity. Thirty obese children from a primary school in Bangkok that joined the Bright and Healthy Thai Kid Project, aged 10 - 12 years who voluntarily participated in this study were screened the entire coding sequences of the MC4R gene using direct sequencing of the polymerase chain reaction products. Two polymorphisms in MC4R gene were identified as follows: The nucleotide change from G to A at position 307 (307 G>A), was detected in a 12 year old girl (A allele frequency = 0.01), and A to C at position 178 within the 5'untranslated region (-178 A>C) was found in an 11 year old girl (C allele frequency = 0.01). Both were in the heterozygous state. This finding indicates that variations in the MC4R gene might be found in obese subjects. Further studies with larger sample sizes on these polymorphisms are required to evaluate their possible significance.

**P161-10**  
**POOR DIETARY PATTERN IN THAI OBESE**

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**OBJECTIVE:** To evaluate the eating pattern of 1017 Thai obese patients.

**MATERIALS AND METHODS:** Twenty-four hour dietary intake recall was performed in 1017 obese who visited the Nutrition Clinic at Ramathibodi Hospital by using food-exchange list.

**RESULTS:** The BMI (mean±SD) were 36.7±9.2 and 34.6±6.9 kg/m<sup>2</sup> in 259 males and 758 females, respectively. Protein, fat and carbohydrate intake distribution for males and females were 13:36:51 and 12:33:55, respectively. The average energy intake was 2,605±1110 and 2,039±852 kcal/d and protein intake was 83.4±39.4 g/d and 60.4±28.8 g/d in men and women, respectively, whereas more than 30% of total calorie in both sexes came from fat. The daily intake of high biological value protein/low biological value protein (HBV/LBV) for males and females were 57.4±30.8g/25.9±14.2g and 40.9±23.4g/19.5±9.4g (8.9%/4.0% and 8.0%/3.9%). The average amount of rice eaten by male and female was 12 and 9 exchanges/d, respectively.

**CONCLUSION:** The average daily energy intake in both sexes was higher than Thai RDA for average persons. Though the energy distribution looked normal, their protein intake was in the low side and the protein quality was rather poor since a considerable portion came from rice.

**P161-11**  
**DISEASE BURDEN IN THAI OBESITY**

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**OBJECTIVE:** To examine the prevalence of obesity-associated health-risks in Thai obese patients.

**MATERIALS AND METHODS:** 1017 obese patients visiting

the Nutrition Clinic at Ramathibodi Nutrition Clinic were studied.

**RESULTS:** The BMI (mean±SD) of 259 males and 758 females were 36.7±9.2 and 34.6±6.9 kg/m<sup>2</sup>, respectively. Protein, fat and carbohydrate intake distribution for males and females were 13:36:51 and 12:33:55. While 47% of men carried only the obese problem, 27% suffered from 1 other disease, and 17% from 2 other diseases, only 20 obese males (8%) were suffered from 3 additional diseases. The common additional diseases were dyslipidemia and diabetes mellitus. In 366 females, 48% had only the obese problem, 30% had 1 other disease, and 17% carried 2 other diseases, 5% were suffered from 3 additional diseases, moreover, 3 obese females (1%) encountered 4 other diseases. The most common additional diseases in obese women were dyslipidemia, diabetes mellitus and hypertension.

**CONCLUSION:** Half of Thai obese patients in this study were complicated with additional diseases as occurred in western countries. Dyslipidemia and diabetes mellitus were the two most prominent problems. Obese women also tended to suffer from hypertension.

**P161-12**  
**THE ASSOCIATION AMONG CAROTID ARTERY DISTENSIBILITY, INTIMA-MEDIA THICKNESS AND OBESITY IN THAI CHILDREN**

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Childhood obesity has an impact on adverse cardiovascular outcomes in adults. The intima-media thickness (IMT) and arterial stiffness are indicators of early atherogenesis. We conducted a study to determine IMT and arterial stiffness in obese children with various degree of obesity compared to normal ones. Twenty-two children with mild/moderate obesity, 18 with severe/morbid obesity, and 21 normal weight children were recruited. C-reactive protein (CRP), fasting lipid profile, glucose and insulin levels were measured. Ultrasonography of common carotid artery was performed. IMT was not different among the three groups. Arterial distensibility in obese subjects was significantly lower than controls (p=0.001). The obese subjects had significantly higher values of lumen cross-sectional area, wall cross-sectional area, and incremental elastic modulus than controls. Arterial stiffness among various degrees of obesity were not different. There were positive correlations between arterial stiffness and LDL-C, insulin resistance, CRP and inverse correlation with HDL-C. Obese children, even mild/moderate degree, have increment in carotid arterial stiffness in the absence of structural change. Vascular function should be assessed in taking care of obese children.

**P161-13**  
**SINGLE NUCLEOTIDE POLYMORPHISMS OF MICROSOMAL TRIGLYCERIDE TRANSFER PROTEIN (MTTP) AND APOLIPOPROTEIN B (APOB) GENES IN OBESE THAI CHILDREN**

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Childhood obesity has become the public health problem worldwide. It is an important risk factor of many chronic diseases. Dyslipidemia, which is a risk factor of cardiovascular disease, is a serious complication of childhood obesity. Dyslipidemia results from disorder of lipoprotein metabolism. Microsomal triglyceride transfer protein (MTTP) and apolipoprotein B (APOB) genes have important roles in lipoprotein metabolism. The aim of this study was to study the

association between single nucleotide polymorphism (SNP) of MTTP and APOB genes and plasma low-density lipoprotein cholesterol (LDL-C) level in obese Thai children. Subjects were children aged between 4 to 18 years. Their BMI for sex and age were above the 95th percentile. Polymerase chain reaction (PCR), restriction fragment length polymorphism (RFLP) and amplification-refractory mutation system (ARMS) were used for gene analysis. This study found that the presence of 891C/G SNP in MTTP gene was significantly associated with plasma LDL-C level but it found no significant association of APOB SNP with plasma LDL-C level in obese children. The MTTP and APOB SNPs had no effect on abnormal LDL-C level.

**P161-14**  
**HEALTH RISK AND QUALITY OF LIFE AMONG OVERWEIGHT AND OBESE HOUSEWIVES IN KELANTAN, MALAYSIA**

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Obesity is a worldwide problem affecting both urban and rural population. The objective of this study was to assess the extent of overweight and obesity among rural housewives in Kelantan, Malaysia. A total of 421 respondents participated in the study which constituted 36.6% in the overweight and 63.4% in the obese categories, respectively. Results on self-perception regarding fatness and thinness among respondents show common similarities, particularly in self-reporting on health and dietary habit. Respondents were aware of fast foods and a significant number had frequented fast food outlets. Anthropometric and body composition results indicated the respondents are within the disease risk group. The proportion of respondents with measurements above cut-off point for waist circumference and waist to hip ratio, were 73% and 73.8%, respectively. In terms of body fat, 69.3% have body fat above 40%, and 52.4% carried more than 30 kilograms of fat. The results on the quality of life using the ORWELL 97 instrument show that the quality of life of respondents was moderate. It can be concluded that the problem of obesity among housewives in the rural areas is a serious problem that require immediate attention, particularly in relation management of risk factors for chronic diseases.

**P161-15**  
**A LIFE COURSE APPROACH IN EXPLAINING SOCIAL INEQUITY IN OBESITY AMONG YOUNG ADULT MEN AND WOMEN**

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**OBJECTIVE:** To examine the cumulative influence of adverse behavioral, social, and psychosocial circumstances from adolescence to young adulthood in explaining social differences in overweight and obesity at age 30 and if explanations differ by gender.

**DESIGN:** A 14-year longitudinal study with 96.4% response rate.

**SUBJECT:** Data from 547 men and 497 women from a town in north Sweden who were baseline examined at age 16 and prospectively followed-up to age 30.

**MEASUREMENTS:** Overweight and obesity were ascertained at ages 16 and 30 years. Occupation and education were used to measure socioeconomic status. The explanatory measurements were: age at menarche, smoking, physical activity, alcohol consumption, TV viewing, home and school environment, social support, social network, and work environment.

**RESULTS:** No gender or social difference in overweight was observed at age 16. At age 30, significantly more men than women (OR = 2.81, 95% CI 2.14–3.68) were overweight or obese. Educational level was associated with overweight at age 30 but not occupational class. Both men (OR = 1.55, 95% CI

1.10–2.19) and women (OR = 1.78, 95% CI 1.16–2.73) with low education ( $\leq 11$  years) were at risk of overweight. The factors that explained the educational gradient in overweight among men were low parental support in education during adolescence, and physical inactivity, alcohol consumption and non-participation in any association during young adulthood. The educational gradient in overweight in women was explained mostly by adolescence factors, which include early age at menarche, physical inactivity, parental divorce, not being popular in school and low school control. Restricted financial resource during young adulthood was an additional explanatory factor for women. All these factors were significantly more common among men and women with low education than with high education.

**CONCLUSION:** Social inequities in overweight reflect the cumulative influence of multiple adverse circumstances experienced from adolescence to young adulthood. Underlying pathways to social inequity in overweight differ between men and women. Policy implications to reduce social inequity in overweight should include reduction of social differences in health behaviors and social circumstances that take place at different life stages, particularly psychosocial circumstances during adolescence.

**P161-16**  
**POTENTIAL DETERMINANTS OF OBESITY AMONG SCHOOLCHILDREN**

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**RATIONALE & OBJECTIVES:** Obesity among children is a growing public health problem. The aim of the research is to identify some potential determinants of obesity in schoolchildren.

**MATERIALS & METHODS:** A cross-sectional design study was held in two primary schools on 441 children 5-9 years aged and parents in Ankara, Turkey. Associations between parental socio-demographic factors (parental ages, education, occupation, monthly income etc) and BMI of children and their parents were analyzed. Body height and weight were measured and body mass index (BMI) was classified according to WHO 2007 growth charts.

**RESULTS & FINDINGS:** The prevalence of overweight (including obese) ( $\geq 85$ th BMI percentile) was 32.0% in boys and 23.7% in girls, respectively. Significantly positive correlations were found between birth weight, parents BMIs and ages, monthly income and children's BMI ( $p < 0.05$ ). Children of working mothers and education more than eight years had higher BMI values ( $p < 0.05$ ). Father's educational status was not found effective on children's BMI ( $p > 0.05$ ).

**CONCLUSION:** In conclusion parental socio-demographic factors and BMIs were found important determinants that influence the development of overweight and obesity in children.

**P161-17**  
**A DIETARY INTERVENTION PROGRAM FOR PSYCHIATRIC PATIENTS BASED ON THE MEDITERRANEAN DIET**

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**RATIONALE AND OBJECTIVES:** Psychotropic drugs are frequently associated with weight gain. The results of a long-term dietary intervention program in psychiatric patients are presented in this study.

**METHODOLOGY:** 665 psychiatric patients (mean age 40,3

+/- 11,2 years) participated in the study (79% women and 21% men). Anthropometric measurements, measurement of Basal Metabolic Rate (BMR) using indirect calorimetry, dietary intake, clinical and biochemical data (total cholesterol, LDL cholesterol, triglycerides, etc.) were collected. A personalized diet, based on the Mediterranean diet, was given for weight control in each patient by a dietician. Results were analyzed after three and six months of intervention.

**RESULTS:** According to the results, mean BMI of the participants was 34,3 +/- 6,9 and mean % body fat was 38,5 +/- 7,7. The mean body weight decrease was 4,7 +/- 0,9 Kg after three months and 8,1 +/- 1,8 Kg after six months. The mean body fat decrease was 3,8 +/- 0,7 Kg and 6,08 +/- 1,8 Kg respectively. Mean weight loss was higher for patients with depression compared with patients with psychosis, schizophrenia etc. Mean total cholesterol, LDL cholesterol, triglycerides and blood sugar values were also decreased.

**CONCLUSION:** The dietary intervention program for psychiatric patients has been very successful in reducing body weight, body fat and improving specific biochemical parameters.

#### **P161-18 TARGETING SCHOOL HEALTH PROGRAMME AS A POSSIBLE INTERVENTION FOR REDUCING CHILDHOOD OBESITY**

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**RATIONALE & OBJECTIVES:** Childhood obesity is one of the most challenging issues facing healthcare providers today. Obese infants are at increased risk of becoming obese children and are very likely to remain obese as adults. Preventing childhood obesity appears to be the most feasible approach for decreasing the prevalence of the condition. The objective of the paper was to identify the school health program as a possible means of reducing childhood obesity.

**MATERIALS & METHODS:** Evidence-based studies provided the information used for the paper.

**RESULTS & FINDINGS:** The paper highlighted the importance of Nutrition and Health Education in the school curriculum. Some of the strategies that could be included in the School Health Program to reduce obesity were outlined. The need for sensitive school children of predisposing the risk factors associated with obesity as well as development of good lifestyles were discussed.

**CONCLUSION:** Schools were challenged to include Nutrition and Health Education in their curriculum.

#### **P161-19 ETHANOLIC EXTRACT OF RAMBUTAN'S LEAVES (*Nephaleum lappaceum* L.) IMPROVES LIPID METABOLISM IN RATS FED HIGH FAT DIETS**

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Dietary fat and its relation to obesity has been a controversial issue for several years. The effect of ethanolic extract of rambutan's leaves on lipid metabolism was investigated in 30 male Wistar rats adapted to basal diet or high fat diet (5% cow fat). The rats were divided in 6 groups of 5. The normal control group consumed the basal diet. The negative control group consumed the high fat diet. The positive control group was given with simvastatin. There were three groups of ethanolic extract 50, 100 and 200 mg/kg body weight. Experimental data showed that animals consuming a high fat diet become obese and have high level of total cholesterol, triglyceride, and LDL in plasma, 206.88%, 156.10% and 179.47% respectively. In addition, the HDL level decreased 59.80%. Rambutan's leaves extract daily intake for 4 weeks had ability returned the LDL level into

normal. Rambutan's extract 200 mg/kgBW had the best ability to decrease total cholesterol, triglyceride and LDL, 47.05%, 31.29% and 35.75% respectively. It also increased HDL level 41.30%. In conclusion, ethanolic extract of rambutan's leaves possess hypolipidemic properties

#### **P161-20 RELATIONSHIP BETWEEN PHYSICAL ACTIVITY AND NUTRITIONAL INTAKE WITH WAIST CIRCUMFERENCE**

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Obesity is currently an increasing health problem in Thailand. It is considered as a potential risk for developing cardiovascular disease, hypertension, dyslipidaemia and type 2 diabetes mellitus. The aim of this study was to investigate abdominal obesity and the factors associated with it.

**Methods:** 272 Volunteers living in Khon Kaen province, Thailand participated in this cross-sectional study. Anthropometry and occupational status were assessed. Dietary intakes and physical activities were investigated using 5-day food diaries and physical activity records.

**Results:** The mean overall daily energy intake was 1815.0+958.9 calories and the mean total energy expenditure was 2594.4+585.3 calories. The average daily carbohydrate, protein, fat intakes were 199.8+144.2, 91.7+53.3 and 68.2+42.5 grams. Waist circumferences was negatively related to daily energy expenditure ( $r=0.5$ ,  $p<.001$ ) and was independent of daily total intake of energy and macronutrients.

**Conclusion:** The study indicates the larger waist circumferences in Thai people might have been due more to lower levels of activity and energy expenditure than to the effect of diet. This linkage suggests that the active physical activity would result in the reduction in abdominal obesity.

#### **P161-21 CHILDREN'S SUGARY FOOD INTAKE DIFFERS BY SEASON AND AGE**

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**RATIONALE & OBJECTIVES:** Concerning for the increasing childhood obesity in Korea, a study was conducted to find differences in sugary food intake among children by age and season.

**MATERIALS & METHODS:** With a nationwide stratified multistage cluster sampling of 120 survey sites, more than 3,500 households were contacted for a primary interview to locate households with residing children for each season. Among children (19 years and under) subjected to interview for sugary food intake frequency, 1, 829 and 1,761 responded for summer and fall, respectively.

**RESULTS:** The mean intake frequency (IF) of sugary foods (30 food types) by children was 4.1/day and 3.1/day for summer and fall. Dairy product group including ice cream showed the highest mean IF in every age class and was followed by cookies in preschool and school-age children but by drinks & beverages in adolescents. Seasonal difference in IF was most evident in dairy product group due to high consumption of ice cream and frozen sweets, and least evident in bread/bun/roll group.

**CONCLUSION:** With nutrition labeling, nutrition education and advocacy customized to children of different ages is necessary for better choice of snacks and ultimately, obesity prevention.

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#### P161-22

### DIETARY INTAKE PATTERN OF OBESE CHILDREN DIFFERS FROM THAT OF THEIR COUNTERPARTS: 2007 SPECIAL DIETARY INTAKE SURVEY FOR CHILDREN (SDISC) IN KOREA

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**RATIONALE & OBJECTIVES:** With 70% increase (5.8% to 9.7%) in the obesity prevalence among children in Korea during 8 years from 1997 to 2005, we look into dietary factors which might differentiate obese children from normal weight counterpart.

**MATERIALS & METHODS:** Data from the Special Dietary Intake Survey for Children conducted from November 2007 to February 2008 was used in the analysis. Food and nutrient intake data obtained by non-consecutive 2 day 24hr recalls was compared among 4 groups (underweight, normal, overweight, and obese) for 1,503 children of 3 age categories, 0-6 years, 7-12 years and 13-19 years

**RESULTS:** Among adolescents, while meats & poultry intake of the obese group was 67 % higher than that of the normal weight group, fruit intake was only 36 % of that of normal group. Similar trend was evident in school-age children but not in preschool children. Accordingly, vitamin C intake of the obese adolescents was 40% lower than that of the normal adolescents with consistently higher protein and fat intake.

**CONCLUSION:** It revealed that obese children eat less fruits compared to their leaner counterparts and this was more pronounced among adolescents than school-age children. Encouraging children to eat more fruits is advised.

#### P161-23

### NUTRITIONAL STATUS AND ATTITUDES OF NUTRITION PROFESSIONALS TOWARDS BODY WEIGHT MANAGEMENT

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**RATIONALE AND OBJECTIVES:** Due to a high prevalence of obesity and its co-morbidities, nutrition professionals have an important role in guiding people towards adopting healthy dietary practices and attitudes to maintain proper body weight. Therefore, they must themselves exhibit positive attitudes towards weight management. The present study assessed the nutritional status of nutrition professionals and their attitudes towards body weight management.

**MATERIALS AND METHODS:** A total of 70 professionals in teaching and in practice as dietitians were taken. Information was collected on their physical activity, weight consciousness and dietary patterns. Attitudes regarding weight management were judged through responses to 10 statements on a 5-point Likert Scale. Anthropometric measurements like height, weight and waist circumference were recorded.

**RESULTS AND FINDINGS:** Majority of subjects had healthy dietary practices like good consumption of fruits and vegetables and avoiding high calorie foods. Regular physical exercises were reported by 62.8%. Most of them exhibited positive attitudes towards prevention of obesity. Dietary intakes and anthropometry, however, revealed that 20-28% had a high-energy intake and 40 -60% were overweight /obese. Android obesity was present in more than 40%.

**CONCLUSION:** The study revealed that although health professionals showed positive attitudes towards management of obesity, it was not being put into practice by many.

#### P161-24

### OVERWEIGHT AND OBESITY PREVALENCE BY SOCIO-ECONOMIC STATUS AMONG WOMEN IN NAIROBI, KENYA

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**RATIONALE:** Overweight and obesity are an escalating problem in Africa yet extensive data is lacking.

**OBJECTIVE:** To determine the prevalence and distribution of overweight and obesity by socio-economic status.

**MATERIALS AND METHODS:** This was a cross-sectional analytical study using an interviewer-administered questionnaire to collect data on socio-economic status and anthropometric measurements. 336 women aged 25-54 years were sampled from five socio-economic groups, using the stratified random sampling. Three indicators [body mass index (BMI), body fat percentage (BF%) and waist circumference (WC)] were used to determine the prevalence.

**RESULTS AND FINDINGS:** The combined prevalence of overweight and obesity was high using the three indicators (68.6% by BMI, 76% by BF% and 67.5% by WC). The differences between the prevalence of overweight and obesity in the various socio-economic groups were statistically significant ( $P=0.003$ ) by BMI with increasing levels in higher socio-economic groups. Prevalence increased as income and total household expenditure increased. Married women had the highest prevalence (74.7% by BMI).

**CONCLUSION:** The findings give credence to earlier reports of an increase in prevalence of overweight and obesity in urban areas in Africa among women, hence the need for preventive strategies and interventions.

#### P161-25

### ASSOCIATION OF INFANT NUTRITION AND CHILDHOOD OBESITY

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Childhood obesity is the most serious public health challenge of this century. The forerunner of many diseases, childhood obesity is strongly affected by maternal health, prenatal and postnatal factors. Lifestyle is also a major contributing factor. To find out the prevalence and to associate the impact of infant nutrition the study was undertaken. One thousand six hundred and thirty boys and girls of 6-11 years were selected and the prevalence of childhood obesity was studied. Maternal weight gain during gestation, birth weight of child, breastfeeding, weaning and family history details were elicited. Dietary habits and lifestyle information was collected and counseling was imparted to the parents. The prevalence rate of childhood obesity was thirty per cent among the selected population. Over weight women gave birth to heavy babies and early weaning practices were followed. Family history, very low physical activity combined with high screen time and snacking pattern was observed. Lifestyle factors have a strong association with childhood obesity than infant nutrition.

#### P161-26

### EFFECT OF MODEST WEIGHT LOSS ON INFLAMMATORY PROTEINS IN OBESE WOMEN

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**RATIONALE & OBJECTIVES:** The World Health Organization recognizes obesity as the greatest health threat of the twenty-first century. It is one of the most important risk

factors in chronic diseases, like coronary heart disease and diabetes mellitus. It is believed that secreted inflammatory proteins from adipose tissue contribute to the incidence of these disorders. The object of this study was to assay the effects of weight loss on plasma inflammatory proteins in obese women.

**MATERIALS & METHODS:** Anthropometry measurement, inflammatory proteins including IL-18, IL-6, IL-10, fasting glucose, insulin and lipid profile were measured at baseline and after 12 weeks weight loss diet in 29 obese women.

**RESULTS:** Weight, BMI, fasting blood glucose, cholesterol and triglyceride had significant reductions. HDL-C had increased significantly. No significant changes were observed in LDL-C and insulin concentrations. Plasma concentration IL-6 and IL-18 were significantly decreased and antiinflammatory IL-10 increased but the changes weren't significant

**CONCLUSIONS:** Weight loss is associated with favorable changes in plasma inflammatory proteins.

#### P161-27

##### **WEIGHT LOSS REDUCES C- REACTIVE PROTEIN and FIBRINOGEN LEVELS IN OBESE WOMEN**

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**INTRODUCTION:** Obesity is one of the most important risk factors in chronic diseases, like coronary heart disease and diabetes mellitus. It is believed that elevated levels of C- reactive protein (CRP) and fibrinogen are associated with increased cardiovascular risk.

We examined the hypothesis that weight loss would reduce plasma CRP and fibrinogen levels in obese women.

**METHODS:** Body weight, fasting glucose, insulin, triglyceride, total cholesterol, high- density lipoprotein cholesterol (HDL-C), low- density lipoprotein cholesterol (LDL-C) and acute phase proteins were measured at baseline and after 12 weeks in 29 obese women.

**RESULTS:** Weight, BMI, fasting blood glucose, cholesterol and triglyceride had significant reductions. HDL-C had increased significantly. No significant changes were observed in LDL-C and insulin concentrations. Plasma acute phase proteins levels decreased significantly.

**CONCLUSIONS:** Weight loss may represent an important intervention to reduce acute phase proteins levels, which may mediate part of its cardioprotective effects in obese women.

#### P161-28

##### **HAIR TRACE ELEMENTS ANALYSIS IN OBESE AND NORMAL KOREAN SUBJECTS**

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**BACKGROUND:** Levels of trace elements were related with metabolic disturbance. The aim of this study was to investigate the association between trace elements and obesity by analysis of hair trace elements.

**METHODS:** We evaluated hair minerals in obese (n=8, 43.3±12.0 years) and normal (n=91, 38.5±10.5 years) men and women (n=14, n=46; 40.2±12.4, 35.4±9.6 years, respectively). We analyzed fifteen essential elements (Fe, Zn, Cu, Ca, Mg, Mn, P, Na, K, Cr, Se, Li, V, Co, Mo) and eight harmful elements (Pb, Al, Hg, As, Cd, Ba, Bi, U) by inductively coupled plasma-mass spectrometry. We compared for the trace elements concentrations in obese and normal subjects.

**RESULTS:** The concentration of Mo was lower in obese male (0.03± 0.01 micro/g) than those of the normal male (0.04± 0.01 micro/g; p=0.003). The levels of Zn in obese female were significantly lower (120.66± 23.68 micro/g) than those of the normal group (142.496± 24.86 micro/g; p=0.01), whereas the amounts of Pb (1.21± 0.96 micro/g) and Hg (0.88± 0.43 micro/g) in the obese female were significantly higher than

those of the normal female (0.56± 0.52 micro/g, 0.58± 0.44 micro/g; p=0.04, p=0.03, respectively).

**CONCLUSION:** Our study demonstrates that the levels of Zn and Mo in hair may reflect obesity, and high lead and mercury concentrations may be associated with increased risk of obesity.

#### P162: Metabolic Syndrome IV

##### P162-01

##### **THE mRNA EXPRESSION OF LIPID METABOLISM RELATED GENES ARE ALTERED IN BITTER GOURD (MOMORDICA CHARANTIA) SUPPLEMENTED MICE**

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Bitter gourd (BG) has been shown to have health benefit. This study examined mRNA expressions of lipid metabolism related genes in liver and adipose tissue of mice supplemented with BG. Five groups of adult C57BL/6J mice were respectively fed a control diet (AIN-76, C), C supplemented with 5%(w/w) of BGP (freeze-dried BG powder, BGP), C and gavigated with BG ethyl acetate extract (1000 mg/kg body weight/day, HEAE), Wy14643 (10mg/kg body weight/day, Wy) or rosiglitazone (10mg/kg body weight/day) for two weeks. Compared to C group, BGP and HAEA groups of mice had lower body weight gain, BGP and WY groups showed lower plasma glucose, BGP and Ros groups had higher plasma adiponectin (p<0.05). The mRNA expression of hepatic ACO, ACS, PPAR a, adipose LPL of the BGP group was lower than the C group; but hepatic CYP4A14 mRNA expression was higher (p<0.05). In addition, both 5% BGP and HEAE groups had lower body weight gain, down-regulated hepatic L-FABP, ACS and up-regulated adipose PPAR g mRNA expression (p<0.05). The present results show that the hypoglycemic effect of BGP supplementation is associated with a lower expression of adipose LPL mRNA and hepatic PPAR a mRNA.

##### P162-02

##### **PREVALENCE OF THE METABOLIC SYNDROME IN A THAI-MUSLIM POPULATION**

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**RATIONALE & OBJECTIVES:** Currently, no studies have reported the prevalence of metabolic syndrome among adult Thai-Muslims. To ascertain and compare prevalence of metabolic syndrome using International Diabetes Federation (IDF) and American Heart Association and National Heart, Lung and Blood Institute's Adult Treatment Panel III (AHA/NHLBI modified ATP III) definitions among urban Thai-Muslims.

**MATERIALS & METHODS:** This was a cross-sectional study of participants 35 y and over residing in four large Thai-Muslim communities in and around Bangkok.

**RESULTS & FINDINGS:** 1,445 persons participated in the study. Prevalence of metabolic syndrome was 34.5% and 39.8% for IDF and AHA/NHLBI modified ATP III definitions, respectively. Prevalence was higher among women for IDF and AHA/NHLBI modified ATP III definitions, 46.5% and 48.8%, than in men, 21.8% and 30.4%, respectively. The agreement rate for both definitions was 94.7% ± 1.16% (Kappa = 0.886, p < 0.001).

**CONCLUSION:** The prevalence of metabolic syndrome was high among adult Thai-Muslims, especially among women, using both definitions. This study had a higher prevalence for metabolic syndrome than similar studies conducted in the general Thai population or among Thai-Buddhists. Further

studies are needed to ascertain whether modifiable risk factors (lifestyle, behavior, etc.) or genetic predisposition (ethnicity) was the underlying factor for metabolic syndrome in this population group. Increase public health campaign on this specific group of people is warranted.

**P162-03**  
**THE ROLE OF APOLIPOPROTEIN A-II IN THE DEVELOPMENT OF INSULIN RESISTANCE FOLLOWING CHRONIC HIGH FAT FEEDING**

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**RATIONALE & OBJECTIVES:** Transgenic mice over-expressing human apolipoprotein A-II (hapo A-II) display characteristics of metabolic syndrome (MS) dyslipidemia. The relationship between hapo A-II expression level and insulin resistance, a main feature of MS, is unclear. We aimed at investigating the susceptibility of transgenic mice with varied expression levels of hapo A-II to insulin resistance.

**MATERIALS & METHODS:** We performed oral glucose tolerance tests (OGTT) to study insulin resistance with a chow or high-fat (HF) diet in mice with physiological (line  $\beta$ ) or 2-3 fold higher plasma levels of hapo A-II (line  $\lambda$ ), as compared to apo A-II knockout mice (KO-A-II).

**RESULTS & FINDINGS:** With a chow diet, OGTT yielded normal insulin and glucose curves and comparable among the three mouse groups. After 2-month of the HF diet, all mice developed insulin resistance, the lowest being in  $\beta$  mice. Both absence and over-expression of hapo A-II induced the greatest insulin resistance.

**CONCLUSION:** Human apo A-II, when expressed at optimal levels, is not associated to insulin resistance.

**P162-04**  
**PROTECTIVE EFFECTS OF BREASTFEEDING AND GHERLIN ON METABOLIC SYNDROME IN WOMEN IN EARLY POSTPARTUM**

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Women with a history of breastfeeding exhibit a lower odds ratio of developing metabolic syndrome (MS) in later life. The purpose of this paper was to determine the incidence of MS in women in early postpartum and to assess its relationship to breastfeeding. Since gherlin is a regulator of body fat and decreased in elderly with MS, a secondary goal was to explore associations between gherlin, MS and breastfeeding. 164 women at 31-120 days postpartum were recruited from a nutrition program for low-income women. Anthropometrics (height, weight, waist circumference) and % body fat (via bioimpedance) were measured. Fasting blood was analyzed for whole blood glucose, serum HDL cholesterol and triglycerides, and plasma gherlin (via ELISA). MS was assessed via National Cholesterol Education Program – ATP III guidelines. The incidence of MS was 44.3%, 41.7% and 22.4% for formula, combination and breastfeeding women, respectively. Gherlin was lower in women +MS vs. -MS (567 vs. 424 pg/ml,  $p < 0.001$ ), after controlling for BMI or % body fat, and weeks postpartum. After controlling for gherlin, logistic regression revealed that relationships between lactation status and MS were attenuated to nonsignificance. Thus, the protective effects of breastfeeding in MS may be mediated partly through gherlin. #UTA00-377.

**P162-05**  
**MOMORDICA CHARANTIA WATER EXTRACT IMPROVES GLUCOSE UPTAKE OF PALMITIC ACID-INDUCED INSULIN RESISTANT ADIPOCYTES**

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To examine possible mechanisms of hypoglycemic effects of *M. Charantia* L., differentiated 3T3-L1 adipocytes were co-treated with 1mM palmitic acid and water (WE), ethanol or ethyl acetate extract of *M. Charantia* L. for 12 hours. The <sup>3</sup>H-labeled 2-deoxyglucose uptake of cells was then measured by counting the intracellular radio-isotope activity. It was found that the WE was the most active fraction which increases both 0 and 100 nM insulin-induced glucose uptake of adipocytes in a dose-dependent manner. The low molecular weight fraction (<3kD) of WE also improved insulin-induced glucose uptake. The activity of WE was inhibited by wortmannin (a PI3K inhibitor) but not compound c (an AMPK inhibitor). Besides, neither AMPK nor Akt phosphorylation was changed after the treatment. Noticeably, the improvement could not be observed in insulin-induced insulin resistant adipocytes. These results suggest that *M. Charantia* water extract can potentially ameliorate insulin resistance of adipocytes, and the mechanism is worth further investigation.

**P162-06**  
**A CULTURALLY APPROPRIATE PROGRAM TO TREAT METABOLIC SYNDROME IN FEMALE PAKISTANI IMMIGRANTS**

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**RATIONALE & OBJECTIVES:** Lifestyle modification is the key defence against Metabolic Syndrome. To date, no intervention has specifically targeted Metabolic Syndrome in Pakistani migrants. The current study applied the principles of cultural competence to overcome cultural barriers and sustain the behavioural change needed to treat Metabolic Syndrome in Pakistani women.

**MATERIALS & METHODS:** 60 female Pakistani migrants completed the 12 week culturally appropriate, convenient and financially feasible education program called 'Step to Good Health'. The efficacy of the program was monitored via collection of anthropometric, biochemical and dietary data.

**RESULTS & FINDINGS:** After 12 weeks the program significantly decreased body weight by 6%, BMI by 7%, waist circumference by 4%, blood pressure by 9%, glucose, insulin, improved the blood lipid profile and increased physical activity. In addition a positive shift towards a healthier dietary pattern was observed.

**CONCLUSION:** A culturally appropriate program can be used to treat components of Metabolic Syndrome in Pakistani women.

**P162-07**  
**METABOLIC SYNDROME(MS) AFTER RENAL TRANSPLANTATION(TX)**

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Prospective randomized study was to assess an effect of ghrelin variants Arg51>Gln and Leu72>Met asymmetric dimethylarginine (ADMA) and adiponectin (ADPN) on metabolic parameters after dietary/exercise intervention. We monitored for 24 months, 68 obese pts with MS after Tx (Gr I). Control group (Gr II) consisted of 70 non-MS kidney



transplant pts.

After this period significant differences were found (Gr I vs Gr II, t-test, ANOVA) in plasma: ADMA  $3.65 \pm 0.47$  vs.  $2.01 \pm 0.36$   $\mu\text{mol/L}$ , ADPN  $22.30 \pm 10.2$  vs.  $14.3 \pm 7.2$   $\mu\text{g/mL}$ ,  $p < 0.01$ , leptin  $56.6 \pm 10.3$  vs.  $24.6 \pm 8.3$  (ng/L),  $p < 0.01$ , total homocystein  $37.2 \pm 12.4$  vs.  $22.8 \pm 4.9$  ( $\mu\text{mol/L}$ ),  $p < 0.025$ , and in fat (visc/sc), ADPN  $p < 0.025$ , leptin  $p < 0.01$ , resistin  $p < 0.02$  proteinuria  $2.1 \pm 0.8$  vs.  $0.9 \pm 0.7$  (g/24 hod),  $p < 0.01$  and inulin clearance (Cin)  $48 \pm 8$  vs.  $60 \pm 12$  (mL/min),  $p < 0.025$ . There were significant correlations between BMI and ADMA ( $r = 0.520$ ,  $p < 0.001$ ), ADPN ( $r = -0.570$ ,  $p < 0.001$ ) and between ADMA and ADPN in visceral fat ( $r = -0.504$ ,  $p < 0.001$ ). The ghrelin variant Leu72>Met was associated with elevated levels of plasma HDL-cholesterol.

In interventional part of the study, carriers of Leu72 allele lost a mean of 7kg whereas Met72Met homozygotes only 1.9 kg ( $p < 0.05$ ).

In conclusion, MS after Tx represents high risk factor for cardiovascular events.

### P162-08

#### METABOLIC SYNDROME IN TYPE 2 DIABETES MELLITUS

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**AIM:** The incidence of metabolic syndrome (MS) are increasing in Japan. We investigated the incidences of the each combination group with the constructed diseases of MS with type 2 diabetes mellitus (DM) and the prevalence of the ischemic heart disease and cerebrovascular disease from the these combination groups in rural hospital.

**METHODS:** The patients consisted of 343 males and 271 females aged average 57 years with DM in whom the nutritional instruction were already given by the dietician were recruited for the study. These subjects were divided into 4 groups by complicated disease combinations with DM such as none complicated disease with DM as group 0, 1 disease as G 1, 2 diseases as G 2, and 3 diseases as G 3.

**RESULTS:** The G 0 is consisted of 120 subjects, the G 1 of 275, the G 2 of 164, and the G 3 of 55. There were significant differences in levels of FBS, SBP, DBP when compared the G 0 with the G 1, G 2 and G 3 ( $p < 0.0001$ ), and also TG in G 3 was significantly higher than that in G 0 ( $p < 0.05$ ).

**CONCLUSION:** For prevention of atherosclerotic diseases in MS, the management of DM and HT seemed to be the most important.

### P162-09

#### DIETARY CAPSAICIN AMELIORATES OBESITY-INDUCED INFLAMMATION AND INSULIN RESISTANCE IN OBESE DIABETIC KKAY MICE

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**OBJECTIVES:** Our previous study has demonstrated that capsaicin, a spicy component of hot peppers, can modulate adipocytokine release from and macrophage infiltration in obese adipose tissues. In this study we investigated whether dietary capsaicin can reduce obesity-induced inflammation and improve insulin resistance in obese diabetic KKAY mice model.

**MATERIALS AND METHODS:** Male KKAY mice fed a high-fat diet for 2 weeks received a supplement of 0.015 % capsaicin for a further 4 weeks and were compared with unsupplemented controls. Fasting glucose levels were determined using an enzymatic calorimetric quantification method. The levels of MCP-1, IL-6, adiponectin and insulin responsive gene in adipose tissue were measured by RT-PCR.

**RESULTS:** Dietary capsaicin markedly lowered fasting glucose levels in plasma, the levels of MCP-1 and IL-6 expression, and macrophage infiltration, while it increased the expression of adiponectin and insulin responsive genes in adipose tissue from the obese diabetic KKAY mice.

**CONCLUSION:** Our data suggest that dietary capsaicin can improve insulin sensitivity by suppressing inflammatory responses in obese diabetic KKAY mice. Capsaicin may be useful as a dietary phytochemical for reducing obesity-induced inflammation and insulin resistance.

### P162-10

#### PREVALENCE AND RISK FACTORS OF METABOLIC SYNDROME AMONG WORKING AGE GROUP WITH SEDENTARY LIFESTYLE IN BANGKOK

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The aim of this study was to determine the prevalence of metabolic syndrome (MS) and odds ratio between MS and the risk of health behavior among Thais working age with sedentary lifestyle in Bangkok. A cross-sectional study of 1,737 samples (284 males and 1,453 females) with age range from 35-60 years was conducted from May to August 2007. The National Cholesterol Education Program ATP III (NCEP) defines MS by the presence of three or more of these components: increased waist circumference (WS); blood pressure; fasting glucose; triglycerides; and reduced HDL cholesterol. International Diabetes Federation (IDF) defines MS by the presence of central obesity plus at least two of the rest components. The study found the prevalence of MS by the NCEP and IDF criteria that WS-M at midpoint between the lowest rib and the top of iliac crest was 18.6% and 16.5% respectively, WS-I at the top of iliac crest level was 21.9% and 22.4% respectively, WS-U at umbilicus level was 20.6% and 19.8% respectively. By comparison of visceral fat area >100 cm<sup>2</sup> with 4 model eating patterns it found that eating meat and low carb, eating equally meat, cereal, vegetables and fruits, eating vegetarian style with high fish and rice but low fat, and vegetarian with low meat, milk, egg were 44.2%, 31.9%, 28.1% and 25.7% respectively. In conclusion to prevent MS ones should eat more cereal, vegetables, fruits and low meat milk, egg and fat.

### P162-11

#### PALM LEAF TEA AS A NEW FUNCTIONAL FOOD FOR THE PREVENTION AND MANAGEMENT OF METABOLIC SYNDROME

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**RATIONALE & OBJECTIVES:** Metabolic syndrome (diabetes, hypertension and hypercholesterol) is a degenerative disease affecting about 1/4 of population over the age of 40 years and is a risk factor for cardiovascular disease. Our study reports on the anti-diabetic, anti-hypertension and anti-hypercholesterol properties of palm leaves extract (PLE).

**MATERIALS & METHODS:** PLE were fed to normal, diabetic, hypertensive and hypercholesterol rats at 50-500mg/kg for 8-12 weeks.

**RESULTS & FINDINGS:** PLE helped normalise blood glucose levels, reduced blood pressure, reduced blood cholesterol and maintained the body weight, lipid profile, antioxidative status and improved the mortality of these rats in a dose dependent manner. Oral and topical applications of PLE on 2cm x 6mm incision wounds in normal and diabetic rats showed improved wound contraction by 25-50% compared to untreated rats. Histological observations also showed PLE provided organ protective effects to the heart, liver, and kidneys and prevented against macro vascular complication in the pathological rats.

**CONCLUSION:** At most of the doses used PLE showed

beneficial effects and no adverse or chronic toxicity effects in these rats. However at 500mg/kg body weight dosage, the glomerulus of normal rats begin to show slight changes after 12 weeks.

#### **P162-12 METABOLIC SYNDROME AND ITS COMPONENTS IN THAI MEDICAL STUDENTS**

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**RATIONALE AND OBJECTIVE:** Early detection of metabolic syndrome and its components may be helpful in preventing the development of cardiovascular disease. This study aimed to determine the prevalence of the metabolic syndrome and its component in Thai medical students who are in the period of developing healthy lifestyles that persist until adulthood and would have influence on their patients in the future.

**MATERIAL AND METHOD:** A total of 99 second-year medical students at Phramongkutklao College of Medicine participated in a cross-sectional survey. Weight, height, waist circumference and blood pressure were measured using standard techniques. Fasting blood sample was drawn for analysis of lipid profile and glucose. The metabolic syndrome was identified using the National Cholesterol Education Program Adult Treatment Panel III Age-Specific Adolescent Criteria with the modified waist circumference for the Asian population.

**Results:** The participating students were on average aged 18.9 years. The overall prevalence of metabolic syndrome was only 1%. The prevalence of one and two abnormalities of metabolic syndrome components was 16.2 and 1 %, respectively.

**CONCLUSION:** The findings show that metabolic syndrome as well as the abnormality of its components is already present among medical students. Thus, appropriate action should be initiated before unhealthy lifestyles are established.

#### **P163: Diabetes IV**

#### **P163-01 IMPACT OF PLANT OILS ON ADIPONECTIN LEVELS OF TYPE 2 DIABETICS**

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Since decreased adiponectin (Acrp30) levels are discussed as a risk factor for cardiovascular events, adiponectin levels of insulin- (IDDM) and non-insulin- (NIDDM) dependent type-2-diabetics were investigated before and after PUFA-rich plant oil intervention. 92 participants were randomized (34 IDDM and 58 NIDDM) into a pure single oil (SO) and a mixed oil (MO) group and instructed to consume 3 teaspoons of oil/day for 10 weeks. Blood samples were taken before (T0), after 4 (T1) and 10 weeks (T2) of intervention, and 8 weeks (T3) after finishing intervention. Triglycerides (TG), Acrp30, insulin and  $\gamma$ -tocopherol were analyzed. Compliance was confirmed by a significant increase of  $\gamma$ -tocopherol in both intervention groups. Acrp30 increased in the MO-IDDM group from T0 to T1 (7.98%;  $p=0.051$ ) and in the MO-NIDDM group from T0 to T2 (6.98%,  $p<0.05$ ) respectively. The IDDM-group (MO+SO) showed a 5.36% increase ( $p=0.071$ ) from T0 to T1, whereas Acrp30-levels in the NIDDM-group remained constant. A significant increase of 5.5% could be observed in the MO-group from T0 to T2. Furthermore, Acrp30 was inversely associated with TG and insulin during the whole study period ( $p<0.05$ ). Small amounts of plant oil daily showed increasing Acrp30 concentrations which seem to have positive influence on the lipid profile.

#### **P163-02 DEVELOPMENT OF MULTIMEDIA WEBSITE EDUCATIONAL TOOL FOR SELF-HELP MEAL PLANNING IN TYPE 1 DIABETIC ADOLESCENTS: CARBOHYDRATE COUNTING CONCEPT**

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**RATIONALE:** Carbohydrate counting is the most interesting meal planning approach that focuses on carbohydrate as the primary nutrient affecting postprandial glycemic response and insulin requirement. Technology approach can be the appropriate educational tool for meal planning in diabetic adolescents, for learning to allow a variety of food choices and flexibility for their lifestyle to prevent diabetic complications and increase quality of life.

**OBJECTIVE:** Primary objective was to evaluate the effectiveness of a developed educational multimedia management as well as a subject's satisfaction was also assessed.

**METHOD:** In a quasi-experiment study, 36 subjects, recruited from pediatric endocrine clinic at Ramathibodi Hospital with mean age of 15 years, were enrolled to assess the impact of using KinPorDee center, a web-based diabetes management application. They were asked to be a member to transfer their food daily intake and blood glucose data electronically. Diabetes, nutrition, and exercise news were also available as well as interactive games and communication with the researcher. Subjects were assigned to practice e-learning exercise at least 3-5 hours every week continuously within 1 month. Parameters and self-report survey using validated questionnaires were obtained at baseline and the end of the study.

**RESULT:** Most individuals showed the significant improvement in the knowledge and understanding of meal planning using carbohydrate counting, while also increased perception and conceptualization in this approach significantly. Their satisfaction tends to be at a high level.

**CONCLUSION:** These results demonstrate a significant effectiveness of web-based diabetes management and may prove to be the attractive self-learning tools for all diabetes.

#### **P163-03 FACTORS ASSOCIATED WITH INSULIN RESISTANCE IN KOREAN URBAN CHILDREN**

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**RATIONALE & OBJECTIVES:** The epidemic of childhood obesity and westernization of lifestyle habits make a great number of children with genetic predisposition exposed to risk of type 2 diabetes. This study was conducted to investigate parental, physiologic, behavioral and environmental factors associated with insulin resistance in Korean urban children.

**MATERIALS & METHODS:** This study is a cross-sectional study using data from 117 children aged 7 years and their parents. Homeostasis model assessment of insulin resistance (HOMA-IR) was calculated using fasting glucose level and fasting insulin level as a marker of insulin resistance.

**RESULTS & FINDINGS:** All children's adiposity indices ( $r=0.217-0.265$ , all  $P$ -value $<0.05$ ) and parental levels of fasting insulin (mothers:  $r=0.334$ , fathers:  $r=0.355$ ; both  $P$ -value $<0.001$ ) and HOMA-IR (mothers:  $r=0.334$ , fathers:  $r=0.356$ ; both  $P$ -value $<0.001$ ) were positively correlated with children's HOMA-IR level. Children with lower frequency of fruits intake ( $P$ -value=0.028) or physical activity (moderate:  $P$ -value=0.006; vigorous:  $P$ -value=0.009) had higher HOMA-IR level.

**CONCLUSION:** This study showed that children's adiposity and parental insulin resistance were positively associated with children's insulin resistance and children with lower frequency

of fruits intake or physical activity had higher insulin resistance.

#### P163-04

##### **A COMMUNITY-BASED DIABETES PREVENTION PROGRAM FOR AT-RISK PEOPLE IN MAETANG DISTRICT, CHIANG MAI PROVINCE**

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**OBJECTIVE:** To evaluate 6 -month community-based intervention to prevent the risk of developing diabetes and its complication with at-risk community members in MaeTang district, Chiang Mai province.

**METHODS:** Two hundred and forty at-risk populations, aged more than 35 years from 8 sub-districts will be collected at baseline data by questionnaire and fasting blood sugar. One-day diabetes prevention education training applied from Sranacharoenpong K, 2008 will be provided by community health care workers (CHCWs). Culturally and knowledge appropriate health messages address diet, physical activity, and knowledge improvement. The follow data will be collected at 2, 4, and 6 months. Data will be analyzed and compared at baseline, following month, and post-intervention.

**RESULTS:** Baseline, follow up and post-intervention data will be reported. Diabetes risk score and pattern of food behavior of populations will be described. Comparing baseline and after 6 months follow up data will be compared.

**CONCLUSION:** At-risk people with diabetes have been increasing overtime in MaeTang district in Chiang Mai province. Health education and health promotion program are crucial to educate at-risk people in reducing some of diabetes risk factors by CHCWs. Supporting knowledge to CHCWs is the most important channel for sustainability to prevent diabetes in Thailand.

#### P163-05

##### **MULBERRY 1-DEOXYNOJIRIMYCIN FOR SUPPRESSION OF POSTPRANDIAL BLOOD GLUCOSE**

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**RATIONALE & OBJECTIVES:** Mulberry 1-deoxynojirimycin (DNJ), a potent glucosidase inhibitor, has been hypothesized to be beneficial for the suppression of abnormally high blood glucose levels. To evaluate the hypothesis, we carried out two following studies.

**MATERIALS & METHODS:** (1) Production of food-grade mulberry powder containing a high DNJ content. (2) Determination of the optimal dose of the DNJ-enriched powder for the suppression of the postprandial blood glucose through clinical trials.

**RESULTS & FINDINGS:** (1) Young mulberry leaves taken from the top part of the branches in summer contained the highest amount of DNJ. After optimization of the harvesting and drying processes for young mulberry leaves, DNJ-enriched powder (1.5%) was produced. (2) A human study indicated that the single oral administration of 0.8 and 1.2 g of DNJ-enriched powder significantly suppressed the elevation of postprandial blood glucose and secretion of insulin, revealing the physiological impact of mulberry DNJ (effective dose and efficacy in humans).

**CONCLUSION:** This study suggests that the newly developed DNJ-enriched mulberry powder can be used as a dietary supplement for preventing diabetes mellitus.

#### P163-06

##### **NUTRITIONAL STATUS IN PEOPLE WITH TYPE 2 DIABETES IN DOI TUNG DEVELOPMENT PROJECT AREA**

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Doi Tung project area was established by Her Royal Highness Princess Srinagarindra to carry out development activities to increase the quality of life. The incidence of type 2 diabetes in the ethnic minorities of Doi Tung project area is rising. A cross-sectional study was conducted to determine the nutritional status of type 2 diabetes in Doi Tung area. Sixty-four type 2 diabetics aged 44-80 years with 6 different ethnics were recruited and their anthropometric data, fasting blood sugar (FBS), 24-hour dietary recall, and food frequency questionnaire were performed.

The results showed that average FBS was  $132.0 \pm 32.7$  mg/dl (mean  $\pm$  SD) and 59.1% of participants had hypertension. Most participants (82%) had body mass index  $\geq 23$  kg/m<sup>2</sup> with 92.2% having abdominal obesity and the mean percentage body fat was  $35.6 \pm 6.6$ . An average energy intake was  $896.9 \pm 396.5$  kcal/day with 66%, 17%, 17% of kcal derived from carbohydrate, protein, and fat respectively. The intake of sugar, dietary fiber, cholesterol and sodium were  $10.3 \pm 10.3$  g,  $5.9 \pm 3.3$  g,  $79.9 \pm 78.2$  mg and  $2986.5 \pm 1286.7$  mg respectively. The most commonly consumed food was tomato chili paste.

Majority of type 2 diabetes in Doi Tung area had overnutrition problem with inappropriate food consumption leading to increase risk of diabetes complication. Nutrition education should be conducted to control blood glucose and prevent diabetes complication.

#### P163-07

##### **LDL-BOUND FLAVONOIDS INCREASE THE RESISTANCE OF LDL TO OXIDATION AND GLYCATION UNDER PATHOPHYSIOLOGICAL CONCENTRATIONS OF GLUCOSE IN VITRO**

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**RATIONALE & OBJECTIVES:** The higher susceptibility of LDL to oxidation and glycation in diabetic patients has been shown to be related to poor glycemic control. The aim of this study was to determine whether LDL-bound flavonoids (catechin, epicatechin, kaempferol, luteolin, naringin, naringenin, quercetin, and rutin) attenuated high glucose-mediated LDL oxidation and glycation.

**MATERIALS & METHODS:** Human plasma was preincubated with individual flavonoids for 3 h, followed by sequential ultracentrifugation, and extensive dialysis to remove unbound flavonoid samples. LDL was subsequently isolated and challenged for its resistance to oxidation and glycation.

**RESULTS & FINDINGS:** Results showed that glucose (5-30 mM) dose-dependently accelerates copper (Cu<sup>2+</sup>, 2.4  $\mu$ M)-mediated LDL oxidative modification, as measured by conjugated dienes, TBARS, fragmentation of ApoB, and relative electrophoretic mobility. The enrichment of flavonoids such as luteolin, naringenin, and kaempferol, significantly increased the resistance of LDL to oxidation caused by HG/Cu<sup>2+</sup> ( $p < 0.05$ ). LDL-bound flavonoids prevented endogenous  $\alpha$ -tocopherol consumption during oxidation, and luteolin was more efficient than other flavonoids. Moreover, the long-term glycation of LDL, which was measured by advanced glycation end products-related fluorescence and boronate affinity chromatography, was found to be inhibited by LDL-bound flavonoids.

**CONCLUSION:** Our study is the first report shows that introduction of flavonoids into LDL particles protects the lipoprotein against glycotoxin-mediated adverse effects.

#### P163-08

### BETAINE SUPPLEMENTATION IMPROVES INSULIN SENSITIVITY AND ANTIOXIDANT ACTIVITY IN DIABETIC MICE

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**RATIONALE & OBJECTIVES:** Betaine has been shown to reverse steatosis, prevent apoptosis and reduce both damaged protein accumulation and oxidative stress in high-fat induced obesity animal study. In the present study, we investigated whether insulin sensitivity and antioxidant enzyme activities could be improved by betaine in diabetic db/db mice.

**MATERIALS & METHODS:** Male C57BL/KsJ-db/db mice and lean non-diabetic db/+ mice were used and diabetic db/db mice were fed with or without 1% betaine for 5 weeks (db/+, db/db, and betaine-supplemented db/db groups). The levels of blood glucose and serum insulin were measured. Triglyceride concentrations (serum and liver), the activities of antioxidant enzymes (liver and kidney), and lipid peroxidation level (liver) were also determined.

**RESULTS:** Betaine reduced blood insulin and triglyceride levels. Hepatic TG levels were also reduced in the betaine-supplemented db/db group than in the db/db group. The activities of hepatic catalase, glutathione peroxidase, and glutathione reductase were increased by betaine supplementation. The similar results were found in the kidney. The hepatic lipid peroxidation level was lowered in the betaine-supplemented db/db group.

**CONCLUSION:** Our findings indicate that betaine improves insulin sensitivity and the activities of antioxidant enzymes in diabetic db/db mice.

#### P163-09

### MISCONCEPTION AND BELIEFS ABOUT RISK FACTORS OF DIABETES AMONG INDIVIDUALS ATTENDING A TERTIARY CARE HOSPITAL IN BANGLADESH

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**RATIONALE & OBJECTIVES:** Incidence of diabetes and its complications are increasing worldwide at an alarming rate and prevention is necessary to combat the epidemic. Misconception and irrational beliefs represent significant barriers in preventing diabetes. The present study aimed to explore the existing misconception and beliefs regarding risk factors of diabetes among individuals attending a tertiary care hospital.

**MATERIALS AND METHODS:** Four hundred nondiabetic individuals (male 44% and female 56%, age 41±10 years, M ± SD) were selected purposively from the Out-Patient Department of BIRDEM (the tertiary care hospital of Bangladesh Diabetic Society). A pre-designed, pre-tested, interviewer-administered questionnaire was used to explore the misconception and beliefs regarding risk factors of diabetes.

**RESULTS & FINDINGS:** Among the subjects 24% thought that soft drinks do not contain sugar and 18% thought it is good for health. Regarding oily foods about 8% believed that it is not harmful for diabetes because it does not contain sugar. About 11.2% individuals said that meat, fish and egg do not contain fat, and 27% thought sour fruits are not good for diabetes management because it decreases cholesterol. Around 10% individuals believed that overweight, lack of exercise and mental stress are not risk factors for developing diabetes. Regarding smoking and mental stress people thought these factors develop in other diseases except diabetes.

**CONCLUSION:** There are a number of misconception and nonscientific beliefs regarding risk factors and management of diabetes among individuals attending tertiary care hospital. The proportion of subjects with such misconception may be higher in other hospitals and general community where facilities of health education (like that in BIRDEM) are nonexistent.

#### P163-10

### EPIDEMIOLOGY OF DIABETES IN PREGNANT RURAL TEHRANI WOMEN

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**RATIONALE & OBJECTIVES:** Pregnancy diabetes is one of the most prevalent metabolic diseases in the world. As the disease entails serious consequences for the fetus and the mother, screening is very important. This study, therefore, was carried out to determine diabetes prevalence among pregnant mothers in rural areas of Tehran.

**MATERIALS & METHODS:** Altogether 820 pregnant mothers in their 20-28th weeks of conception, were selected by simple stepwise random sampling from among 108 villages in Tehran province. After filling out an individual questionnaire, anthropometric measurements were done and BMI calculated. Sedentary blood pressure was measured. An oral glucose tolerance test with 50g glucose was carried out. For screening, glucose level of 140 mg/dl was taken as the cut-off point. Those with higher serum glucose levels were referred for 3-hour glucose tolerance test. Diagnosis criteria for pregnancy diabetes were those of NDDG.

**RESULTS & FINDINGS:** Based on which 19 subjects (2.3%) were judged to be diabetic. Mean age of the diabetic subjects was 29.4 ± 6.2 which was significantly higher than the normal subjects 24.2 ± 6.2 (P<0.001). Mean BMI in the diabetes was 29 ± 4.8 versus 26.5 ± 4.5 in the healthy subjects (P<0.02). Diabetes was twice higher in women with the history of children with macrosomia and almost three times more prevalent in those with stillbirth. Positive familial diabetes history raised the chances of diabetes two folds. Pregnancy diabetes was 4 times higher in those with 5 deliveries and more. Mean diastolic blood pressure was 64 ± 14.6 mmHg in diabetics as opposed to 59 ± 10.9 in the healthy ones (P<0.05), while no systolic difference was observed. Out of 106 subjects with positive screening test 18(17%) were free of risk factors. Of 19 diabetic women 12(63%) were below 30 years of age.

**CONCLUSION:** Based on these findings it is suggested that screening be carried out, irrespective of risk factor signs, on all pregnant women, for diagnosis and treatment of the people.

#### P163-11

### ANTIDIABETIC AND WOUND HEALING EFFECTS OF OIL PALM FRONDS AND RED SEAWEED IN STREPTOZOTOCIN- INDUCED DIABETIC RATS

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Type II diabetes is a degenerative disease affecting about 1/4 of population over the age of 40 years and is a risk factor for compromised wound healing. This study reports on the anti-diabetic and wound healing properties of *Elaeis guineensis* (oil palm fronds OPL) and *Eucheuma cottonii* (red seaweed EC), the important commodity crops of Malaysia. OPL and EC aqueous and alcoholic extracts were fed to normal and STZ-induced diabetic rats at 50-200mg/kg for 8 weeks. OPL and EC helped normalize blood glucose levels, maintained the body weight, lipid profile, antioxidative status and improved the mortality of diabetic rats in a dose dependent manner. Oral and topical applications of OPL and EC on 2cm x 6mm incision wounds in normal and diabetic rats showed improved wound contraction by 25-50% compared to untreated rats. Histological observations also showed OPL and EC provided organ protective effects to the heart, liver, kidneys and prevented against macro vascular complication in diabetic rats. At the doses used OPL and EC showed no adverse or chronic toxicity effects in normal or

diabetic rats.

### **P163-12 GLYCEMIC RESPONSES AND GLYCEMIC INDEXES OF 12 THAI FRUITS**

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Fruits are important sources of carbohydrate, fiber, minerals and vitamins and are generally thought to be good for health. Fruits contain monosaccharides and polysaccharides and may result in worsening of blood glucose and serum triglycerides.

**OBJECTIVE:** Glycemic response and glycemic indexes of 12 popular tropical fruits eating by type 2 Diabetes Mellitus (DM) were determined.

**METHODS:** Nineteen female type 2 DM participated in eating 12 fruits containing 50 g of carbohydrate (CHO) and a 50g glucose drink in random order. The test fruits were durian, mango, longan, pineapple, medium ripe guava dragon fruit, tangerine, rambutan, pomelo, rose apple, banana and papaya. Postprandial plasma glucose was measured over a period of 5 hours after ingestion of each of these fruits.

**RESULTS:** Pomelo gave the highest whereas guava gave the lowest glycemic responses. The glycemic indexes of guava, banana, tangerine, dragon fruit, papaya, durian, longan, pineapple, rambutan, rose apple, mango and pomelo were 17, 26, 30, 37, 38, 39, 43, 45, 47, 50, 51 and 59, respectively.

**CONCLUSION:** It can be mentioned that type 2 DM should avoid ingestion of three servings (50g CHO) of mango or pomelo at a time because of their potential hyperglycemic effect.

### **P164: Cardiovascular Diseases IV**

#### **P164-01 EFFECTS OF CONSTITUENT AND EXTRACTED SOY ISOFLAVONES ON BLOOD LIPID PROFILES: META- ANALYSIS OF RANDOMIZED CONTROLLED TRIALS**

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**RATIONALE & OBJECTIVES:** Clinical trials have reported the cholesterol-lowering effects of soy protein intake, but the components responsible are not known. We conducted meta-analyses to clarify the effects of ingesting soy isoflavones for 1-3 months on lipid profiles.

**MATERIALS & METHODS:** PUBMED was searched for English-language articles of randomized controlled trials (RCTs) evaluating the effects of constituent isoflavones in soy protein isolate. PUBMED, EMBASE, CENTRAL, ICHUSHI, and CNKI were searched for English, Japanese, and Chinese articles of RCTs evaluating extracted soy isoflavones alone (not ingested concurrently with soy protein).

**RESULTS & FINDINGS:** Soy protein that contained enriched isoflavones (average of 48 g soy protein containing 108 mg isoflavones per day intake) significantly decreased total cholesterol by 0.10 mmol/L (3.9 mg/dL or 1.77%;  $P = 0.02$ ) and LDL cholesterol by 0.13 mmol/L (5.0 mg/dL or 3.58%;  $P < 0.0001$ ), compared with isoflavone-depleted soy protein (average of 48 g soy protein containing 6 mg isoflavone); no significant effects of constituent soy isoflavones on HDL cholesterol and triacylglycerol were found. Isoflavone-depleted soy protein and soy protein that contained enriched isoflavones significantly decreased LDL cholesterol by 0.10 mmol/L (3.9 mg/dL or 2.77%;  $P = 0.03$ ) and by 0.18 mmol/L (7.0 mg/dL or 4.98%;  $P < 0.0001$ ) compared with animal protein, respectively. The reduction in LDL cholesterol was larger in

hypercholesterolemic participants than in normocholesterolemic participants. Extracted soy isoflavones did not significantly affect total and LDL cholesterol.

**CONCLUSION:** When ingested as a constituent of soy protein for 1-3 months, soy isoflavones exert synergistic or additive cholesterol-lowering effects, especially in the hypercholesterolemic subgroup. However, supplementation of extracted soy isoflavones alone does not appear to have the beneficial effects on cholesterol.

#### **P164-02 COPING STRATEGIES DURING THE ECONOMIC CRISIS: A QUALITATIVE STUDY AMONG PREGNANT WOMEN IN CENTRAL JAVA, INDONESIA**

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**RATIONALE & OBJECTIVES:** Starting in August 1997, Indonesia experienced a radical and rapid deterioration in its economic situation.

**MATERIALS & METHODS:** The survey during 1996-2000 in Purworejo District, Indonesia, 450 pregnant women were interviewed about dietary intake. FGD and in-depth interviews with women traditional birth attendants and midwives were carried out, respectively. Chi-square tests were used to analyze quantitative data and qualitative content analysis was used to analyze the qualitative data.

**RESULTS AND FINDINGS:** During the crisis, rich women and rural, poor, who had access to rice fields had fewer reasons to worry. The vulnerable groups received some foods from relatives and neighbors and were allowed to pick vegetables and fruits in the fields of relatives and neighbors. Many poor families collected fish and shellfish from rivers and the sea. Almost all families used home gardens for vegetables, fruits and husbandry. Rich women sold jewelry, and rural poor women engaged in extra work in the fields. A few women borrowed money through relatives or the government credit program.

**CONCLUSIONS:** In the short run of the crisis, receiving foods from own rice fields or home gardens, relatives and neighbors were common. Some women also developed long-term adaptive strategies.

#### **P164-03 HEALTH RISK BEHAVIOUR ASSOCIATED WITH CHRONIC HEALTH CONDITIONS IN COOPERATE ORGANIZATIONS IN KENYA**

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**OBJECTIVE:** To determine the prevalence of health Risk behaviours associated with the leading causes of CVD, cancer and premature death.

**MATERIALS AND METHODS:** A questionnaire with 5 questions on Physical activity, fruit, vegetable meat and alcohol intake was developed to collect data on health risk behaviour. This was administered in five different organizations, 593 responses were analysed. Cholesterol, Blood glucose, BMI and waist circumference were also checked.

**RESULTS AND FINDINGS:** 210 (35.4%), intended to be physically active between 3-6 months and 184 (31%) did not intend to be physically active in the next six months, 117 (19.7%) and 218 (36.8%) do not eat fruits and vegetables regularly. 100 (16.9%) ate meat with every meal while 225(37.9%) ate meat very regularly. 35 (5.9%) took alcohol everyday and 152 (25.6%) drank alcohol on the weekend. Men got involved in physical activity more regularly than the females. Females ate more fruits and vegetables as compared to the males.

**CONCLUSION:** Health promotion on physical activity and nutrition should be targeted at worksites to reduce risk of chronic diseases and premature death.

**P164-04**  
**SERUM TOCOPHEROLS IN CARIOVASCULAR DISEASE**

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**RATIONALE AND OBJECTIVE:** Cardiovascular disease (CVD) is the leading cause of morbidity and mortality in most countries. Extensive experimental data have revealed a central role for oxidative stress and inflammation in several manifestations of CVD. Vitamin E is a potent antioxidant with anti-inflammatory properties which has a potential role in the prevention of CVD, however, the data are still inconsistent. The present study was to determine tocopherol status in the Thai CVD patients.

**MATERIALS AND METHODS:** Forty patients with documented CVD and 40 healthy volunteers were enrolled in the study. Serum alpha-tocopherol and delta-tocopherol determined by HPLC were compared between groups.

**RESULTS:** Alpha-tocopherol in CVDs was significantly less than those in controls (565.9 and 993.6 ng/ml, respectively;  $p=0.03$ ). There was no significant difference in delta-tocopherol between CVD patients and controls (1079.6 and 1021.0 ng/ml, respectively;  $p=0.36$ ).

**CONCLUSIONS:** The decreasing of serum alpha-tocopherol in CVD may imply that CVD patients are in the states of inflammation and oxidative stress which caused of the over utilization of alpha-tocopherol. Further research into potential benefit of alpha-tocopherol in CVD is warranted.

**P164-05**  
**LEPTIN ANTHROPOMETRIC INDICES AND CARDIAC INDICES IN SICKLE CELL ANAEMIA PATIENTS**

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**BACKGROUND:** Leptin is a peptide hormone which promotes weight loss by decreasing food intake, increasing metabolic rate and energy expenditure. Elevated serum leptin has been associated with cardiovascular disease including stroke, chronic heart failure, acute myocardial infarction, coronary heart disease and left cardiac hypertrophy.

In sickle cell anemia (SCA), elevated resting energy expenditure and elevated protein turnover have negative effect on accretion of body weight particularly free fatty mass. This will lead to poor nutritional status and growth. It is not known whether leptin contributes to the poor nutritional status seen in SCA patients.

**OBJECTIVE:** To determine serum leptin levels in SCA patients and its relationship to: body mass index (BMI), and triceps skin fold thickness (TSFT), Heart rate, Systolic and diastolic blood pressure

**RESULTS AND FINDINGS:** One hundred and fifty three subjects participated in the study, 77 were SCA patients while 76 were age and sex matched controls. Males were 78 and females 75. Mean weight of SCA was  $30.9\pm 10.6$ kg and controls  $41.6\pm 13.1$   $p=0.000$ ; Mean height SCA patients  $134.6\pm 22.8$ cm, controls  $150.8\pm 15.6$ cm  $p=0.000$ ; BMI for SCA  $16.0\pm 2.8$  controls  $20.5\pm 3.1$   $p=0.000$ . TSFT SCA  $8.5\pm 4.9$ mm controls  $9.7\pm 4.9$   $p=0.1$ .

Mean heart rate SCA  $95.6\pm 11.0$  Controls  $85.6\pm 14.0$   $p=0.000$   
Mean SBP SCA  $110.1\pm 10.5$ mmHg Controls  $109\pm 12.2$   $p=0.6$   
Mean DBP SCA  $60.0\pm 9.5$ mmHg Controls  $62.1\pm 10.8$ mmHg  $p=0.22$ .

When adjusted by age mean TSFT in SCA <10years old was  $5.9\pm 1.6$ , controls  $8.6\pm 3.2$   $p=0.02$  no statistically significant difference in other age groups. Similarly for BMI in <10years old, mean for SCA  $15.2\pm 2.9$  controls  $16.0\pm 0.8$   $p=0.4$ .

Mean serum leptin for SCA was  $1.6\pm 1.0$  controls  $2.9\pm 2.5$   $p=0.000$ . Age adjusted mean leptin in <10yrs SCA was  $1.5\pm 0.5$  controls  $2.3\pm 1.2$   $p=0.07$  in those <10yrs, there was significant

differences between the sexes in SCA and Controls. In those between 10yrs and 14yrs and 15-19yr olds, differences in serum leptin levels exist only among the females with no differences among the males 10-19yrs old.

Multivariate analysis of leptin, the anthropometric indices and the cardiac indices showed positive correlation with BMI, TSFT, SBP and DBP but not with HR.

**CONCLUSION:** It was generally observed that SCA patients had lower leptin levels and anthropometric indices than the controls. This differs however in those less than 10yrs. While mean HR differs among the groups, mean SBP and DBP were not significantly different. Leptin levels show positive correlation with SBP, DBP, BMI, TSFT, height, and weight. No correlation between leptin and HR in this subjects, though some authors have documented relationship between leptin and HR. Further research is needed to establish the role of leptin in the cardiac functions of SCA patients

**P164-06**  
**EFFECT OF ALCOHOL METABOLIZING GENE VARIANTS ON CARDIOVASCULAR RISK FACTORS**

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**RATIONALE & OBJECTIVES:** Dietary alcohol intake has been associated with cardiovascular disease (CVD) in a J-shaped fashion. The mechanism is unclear. The aim of the study was to examine the influence of genetic variation in alcohol metabolizing enzymes on blood pressure and lipids.

**MATERIALS AND METHODS:** Cross-sectional population-based study including a random sample of 6,405 Danish men and women aged 30-60 years invited to a health examination during 1999-2001. The health examination included a self-administered questionnaire, a physical examination, and various blood test and DNA. SNP's were genotyped by TaqMan allelic discrimination. The individual and joined effects of dietary alcohol intake and the respective gene variants were examined in regression models including tests for interaction.

**RESULTS:** The ADH1b (rs1229984) and the ADH7 (rs1573496) minor allele variants were associated with an unfavourable lipid profile in heavy drinkers, but not in non-drinkers and light/moderate drinkers (pinteraction<0.05). No effects were seen on blood pressure. The ADH1c (rs1693482), ALDH1b1 (rs2228093), ALDH1b1 (rs2073478) and ALDH2 (rs886205) gene variants were not significantly associated with any of the outcomes.

**CONCLUSIONS:** Genetic variations in the alcohol metabolizing enzymes ADH1b and ADH7 may modify the increased risk of CVD associated with heavy drinking through an effect on the lipid profile.

**P164-07**  
**THE EFFECTS OF BARLEY PROTEIN ON SERUM LIPIDS AND OXIDATIVE STRESS**

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**RATIONALE:** Vegetable proteins may decrease heart disease risk possibly by lowering LDL-C and reducing oxidative damage.

**OBJECTIVE:** To determine whether barley protein may improve serum lipids and oxidative stress.

**METHODS:** 23 hyperlipidemic men and post-menopausal women followed a randomized cross-over design study with a 2 week washout between treatments. Subjects consumed either 30 g of dairy protein as casein or 30 g of barley protein as an air-classified flour in the form of bread per 2000 Kcal of diet for 4 weeks.

**RESULTS:** There were no significant changes in LDL-C and

TC:HDL-C ratio following barley protein ( $-0.05 \pm 0.12$  mmol/L,  $P=0.685$  and  $0.19 \pm 0.15$  mmol/L,  $P=0.216$ , respectively) or dairy protein consumption ( $-0.08$  mmol/L,  $P=0.507$  and  $0.08$  mmol/L,  $P=0.372$ , respectively). In addition, oxidized LDL, assessed by conjugated dienes and TBARs in the LDL fraction, and protein thiols, a marker of overall oxidative stress, were similar during both treatments. Body weight reduction was observed during the dairy ( $-0.5$  kg,  $p = 0.003$ ) but not the barley protein phase. **CONCLUSION:** Barley protein, although not promoting weight loss, has similar lipid and antioxidant effects as dairy protein. This may serve as a basis for its future use in therapeutic diets where variety is needed.

#### **P164-08 PURIFICATION AND CHARACTERIZATION OF NATTOKINASE FROM BACILLUS SUBTILIS NATTO B-12**

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**RATIONALE & OBJECTIVES:** According to the report by WHO, 17 million people die of cardiovascular diseases every year. Although some of enzymes are widely used in thrombolytic therapy currently, they have undesirable aspects such as high price, short half-life, allergic reactions and excessive bleeding risk within the intestinal tract. Nattokinase can both hydrolyze fibrin in blood clots directly and activate plasminogen into active plasmin. The research and development of nattokinase as a functional additive of food are very important.

**MATERIALS & METHODS:** Nattokinase produced by *Bacillus subtilis* nattoB-12 was purified by a series of column chromatography and characterized by proteomic and chemical methods. The activity was determined with the purification procedures.

**RESULTS:** As a result, the enzyme was purified to homogeneity and 56.1 folds, with a recovery of 43.2% of the initial activity. The purified enzyme in its native state was identified as a monomer of 29, 000 Da, and showed high stability within the range of pH 6.0~9.0 and thermostability range from 30°C~50°C. Its activity was stimulated by Zn<sup>2+</sup>, and obviously inhibited by Fe<sup>3+</sup> and Al<sup>3+</sup>.

**CONCLUSIONS:** It has high safety for thrombi therapy, and is hopeful to be developed a new oral thrombolytic medicine.

#### **P164-09 OMEGA-3 IN THAI FOOD**

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Omega-3 is polyunsaturated fatty acid that can not be produced in human being, the major kinds are EPA (Eicosapentaenoic acid) and DHA (Docosahexaenoic acid). Omega-3 decreased risk of heart disease and synthesized cell of brain and retina. Due to lack of database of omega-3 in Thai food, therefore, this research was to determine Omega-3 in 118 food samples i.e. marine fish, fresh-water fish, shrimp, shellfish and roe. Samples were collected from markets in Bangkok and Nonthaburi for a single composite sample and were analyzed by gas chromatography. The result indicated that 100 g of marine fish, fresh-water fish, shrimp, shellfish and roe composed of 225-1414, 142-1596, 209-253, 196-822 and 1097-2060 mg Omega-3. The highest level was found in short bodied mackerel, Sawaii fish, Giant tiger shrimp, fresh oyster and striped-snake-head fish roe. By comparison of Omega-3 content between Thai food and international food it found that the content in Sawaii fish was similar to Salmon and Tuna (1596:1700) and roe of

striped-snake-head fish was similar to Sardine (2060:2500).

#### **P164-10 EFFECT OF LUTEOLIN ON THP-1 MONOCYTE TRANSMIGRATION AND FOAM-CELL FORMATION**

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**RATIONALE & OBJECTIVES:** The leukocyte recruitment and transmigration across the endothelial barrier into the vessel wall are crucial steps in promoting atherosclerosis. Cell adhesion molecules mediate the attachment of monocytes and facilitate their migration into the subendothelial space, thus contributing to accumulation of mononuclear cells in the vascular wall that is one of the initial steps in the development of atherosclerosis. Oxidatively modified LDL (ox-LDL) involved in development of atherosclerosis has been shown to facilitate leukocyte transmigration. The present study examined whether luteolin blocks the monocyte-endothelium interaction through integrin molecules of THP-1 monocyte and inhibits the foam cell formation of monocyte-derived macrophages.

**MATERIALS & METHODS:** The luteolin inhibits the monocyte transmigration and foam cell formation.

**RESULTS & FINDINGS:** We found that nontoxic luteolin dampened TNF- $\alpha$ -activated integrin expression and ECM-degrading MMP-9 secretion in THP-1 monocytes. When monocyte-derived macrophages were treated with 10  $\mu$ g/mL ox-LDL or acetyl LDL, luteolin attenuated expression of lectin-like oxidized LDL receptor-1 and scavenger receptor-A.

**CONCLUSION:** These findings suggest that luteolin was effective in disturbing TNF- $\alpha$ -promoted monocyte-endothelium interaction and inhibiting modified LDL uptake. Therefore, dietary luteolin qualifies as anti-atherogenic agents in LDL systems, which may have implications for strategies attenuating atherosclerosis pertaining to monocyte-macrophage-transmigration. Supported by Brain Korea 21

#### **P164-11 VITAMIN D STATUS AND THE RISK OF CARDIOVASCULAR DEATH**

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**RATIONALE & OBJECTIVES:** Accumulating evidence suggests that inadequate vitamin D status may predispose to chronic diseases. The study aimed to investigate whether serum 25-hydroxyvitamin D (25(OH)D) level predicts mortality from cardiovascular diseases (CVD).

**MATERIALS & METHODS:** The study was based on Mini-Finland Health Survey and included 6,219 men and women, aged  $\geq 30$  years and free from CVD at baseline (1978-1980). During the 29-year follow-up, 640 coronary and 293 cerebrovascular deaths were identified. 25(OH)D levels were determined from serum samples collected at baseline. Cox's proportional hazards model was used to assess the association between 25(OH)D and the risk of CVD death.

**RESULTS:** After adjustment for potential confounders, the relative risk (RR) of CVD death was 0.81 (95% confidence interval (CI): 0.64-1.02) for the highest versus lowest quintile of 25(OH)D. The association was evident for death due to cerebrovascular disease (RR 0.51, 95% CI: 0.33-0.79), especially ischemic stroke (RR 0.58, 95% CI: 0.37-0.93), but not to coronary heart disease (RR 0.97, 95% CI: 0.74-1.28).

**CONCLUSION:** A low vitamin D status may be associated with a higher risk of a fatal CVD event, particularly cerebrovascular death. Further studies from different populations with repeated vitamin D measurements are needed to confirm the finding.

**P164-13**  
**THE CORRELATION BETWEEN BODY MASS INDEX AND CORONARY ARTERY DISEASE IN AGED**

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**RATIONALE:** Coronary artery diseases cause 600000 death in the world and is one of the most common cause of death that large number of old patients who are more than 60 years old are at risk of one or more their risk factors.

**METHOD:** This is a cross sectional study on 100 inpatients under angiography. Data were collected from their medical files and severity of diseases was assessed with number of damaged vessels, percent and size of stenosis. Total score of this scale was 21. Outcomes were analyzed by spss software (Pearson's correlation test).

**RESULT:** Patients contained 58.8% men and 41.2% women with mean age of 63±11.5 years old. 48% were suffered from dislipidemia, 38% from hypertension, 19% from diabetes mellitus. Their mean BMI was 27 with no gender difference. The Pearson's test showed a strong correlation between BMI and power of participating CAD (P<0.05).

**CONCLUSION:** There is a strong correlation between BMI and power of participating CAD (P<0.05) which is about 27% and can clearly shows the role of improving lifestyle & diet in decreasing the number of diseases.

**P164-14**  
**THE ASSESSMENT OF FASTING AND POST PRANDIAL PLASMA TRIGLYCERIDE IN PATIENTS SUFFERING FROM CORONARY ARTERY DISEASE**

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**RATIONALE:** Coronary artery disease (CAD) causes 33 deaths per seconds that contains 45% of total deaths in Iran, so finding a way to control it's risk factors is critical and I study postprandial TG levels as a new index to prevent CAD.

**METHOD:** This is a case-control study on 60 inpatients & 60 healthy persons. Their suffering from CAD was assessed by angiography. Fasting and postprandial TG levels 30 minute after consuming 20 gram butter were checked (because half life of lipid in plasma is 45-60 minute). Data were analyzed with spss software (paired t-test).

**RESULT:** The mean fasting and postprandial TG levels of control group were 140.97 and 163.38 mg/dl & of CAD group were 162.17 and 256.47 mg/dl. The comparison showed a strong relation between postprandial TG and suffering from CAD.

**CONCLUSION:** Checking fasting TG levels causes missing patients who are diagnosed as hyperlipidemic patients in postprandial and may be at risk of CAD, so fat tolerance test seems necessary to screen dyslipidemia and risk factors of CAD.

**P165: Nutrition & Cancer IV**

**P165-01**  
**EFFECT OF DIETARY SOY AND ISOFLAVONES ON BREAST CANCER RISK**

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We investigated the effects of soy and isoflavone intake on breast cancer risk according to menopausal and hormone receptor status among Korean women. Intake of soy products was examined among 358 cancer patients and 360 cancer-free controls using a quantitative food frequency questionnaire. We found a significant inverse association between soy or isoflavone intake and breast cancer risk, mostly in postmenopausal

women. In a multivariate logistic regression model, the highest quartiles of total soy and isoflavone intake showed 86% (OR (95% CI) = 0.14 (0.05 - .36); P for trend < 0.001) and 94% (OR (95% CI) = 0.06 (0.02 - 0.18); p for trend < 0.001) risk reduction respectively, compared to the lowest quartiles in postmenopausal women. High sprout intake was associated with a reduced risk of breast cancer in both pre- and postmenopausal women. The inverse association was more pronounced in tumors positive for both estrogen and progesterone receptor, with a dose-response relationship. Our findings suggest that the high consumption of soy and isoflavone might be related to lower risk for breast cancer, and that the effect of soy intake could vary depending on menopause, hormone receptor status, and the type of soy food consumed.

**P165-02**  
**NUTRITIONAL COUNSELING PROGRAM IMPROVES DIETARY INTAKE IN CERVICAL CANCER PATIENTS UNDERGOING CHEMORADIATION THERAPY**

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Cancer wasting is common in advanced stage cancer and in cancer patients undergoing treatment. This study was aimed to investigate the impact of dietary counseling on nutrition status, maintenance of body weight and skeletal muscle mass in cervical cancer patient during and three months after chemoradiation therapy. A total of 41 cervical cancer stage II and III patients were enrolled in the study. All received at least 25 radiations and 2 chemotherapies during 2 months of treatment period. Patients were randomly assigned into 2 groups, Nutrition Intervention (NI, n=19) and Usual Care (UC, n=22). Individual dietary counseling was provided every two weeks to patients in NI group. Dietary intake, subjective global assessment (SGA) and body composition were evaluated at baseline (BL), at the end (ET) and three months after concurrent therapy (FU). Energy intake of NI group at ET and FU significantly increased from that of baseline. For the UC group, energy intake tended to decrease at ET, but increased significantly at FU. No change in protein intake was observed in NI, whereas it was decreased in UC after treatment. At ET, body weight and skeletal muscle mass decreased significantly in both groups. At FU, skeletal muscle mass of both group returned to the same level at BL, but body weight of the UC group was still lower than that of baseline. In conclusion, nutrition counseling can improve overall energy intake and maintain protein intake in cervical cancer patients undergoing chemoradiation therapy.

**P165-03**  
**THE EFFECTS OF INOSITOL HEXAPHOSPHATE ON CELL CYCLE**

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**OBJECTIVE:** To investigate the effects and mechanisms of inositol hexaphosphate on cell cycle of HT-29 human colon carcinoma cell line.

**METHODS:** cells were exposed to various concentrations of IP6 for certain time. The effect of IP6 on cells proliferation was evaluated by MTT assay. Flow cytometric analysis was performed for cell cycle progression; Immunocytochemical stain was used to detect the expression of p53 protein, p21 protein.

**RESULT:** A significant dose- as well as time-dependent growth inhibition was observed in IP6-treated HT-29 cells, which was associated with an increase in G1 arrest; The immunocytochemical stain showed that different concentration of IP6 decreased the abnormal expression of p53 gene and



strongly increased the expression of p21.

**CONCLUSION:** IP6 had an inhibition effect on proliferation of HT-29 cells. The mechanisms of the effect might be related many links, such as inhibiting the abnormal expression of p53 gene, inducing the expression of cell cycle inhibitor p21 which blocking the cell cycle.

#### P165-04

##### EFFECTS OF BLACK RICE BRAN EXTRACTS ON PROLIFERATION AND APOPTOSIS OF CANCER CELLS

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Rice bran is rich in nutrients and anti-oxidative compounds. The pigmented black rice, especially, has proved higher anti-oxidative activities than the non-pigmented varieties. Recently, our group has developed a Thai cultivar of black rice, Riceberry, to accomplish the highest nutrition. We, therefore, evaluate the chemoprevention effects of this rice bran extracts (BRB) on different cancer cell lines. The percent inhibition of cell survival and percent incorporation of BrdU for DNA synthesis were determined after 48h treatment with BRB extracts. The apoptosis was evaluated by DAPI staining and DNA fragmentation. Cell cycle inhibition was performed by FAC analysis and caspase-3 mediation of cell death was analyzed by Western blot. The results demonstrated that BRB extracts could inhibit cancer cell proliferation and induce apoptosis in a dose-dependent manner. The hexane extract was a potent inhibition on promyelocytic leukemia cell (HL-60), IC<sub>50</sub>= 0.21 mg/ml. The DCM extract was effectively inhibited growth of breast adenocarcinoma cell (MCF-7) and colonic carcinoma cell (Caco-2)(IC<sub>50</sub> = 0.32 and 1.54 mg/ml, respectively). The methanol extract was least effective in all tested. The compounds mechanisms of activation will be discussed.

**CONCLUSION:** Bioactive components in the BRB extracts are interesting to further development as anti-cancer agents.

#### P165-05

##### ANTIOXIDANT STATUS, LIPID PEROXIDATION, AND DNA DAMAGE IN PEDIATRIC PATIENTS WITH ACUTE LYMPHOBLASTIC LEUKEMIA

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Many of the components given to treat leukemia are associated with free radical production. We conducted this study to determine the oxidative stress and antioxidant status in pediatric patients with acute lymphoblastic leukemia (ALL) at the time of diagnosis and during chemotherapy. Ten pediatric patients who were newly diagnosed with ALL and 10 age-matched healthy children were recruited in the study. The activities of superoxide dismutase (SOD), glutathione peroxidase (GPx), and catalase (CAT) in erythrocytes were assessed at baseline (the time of diagnosis), at 3 and 6 months during treatment. Plasma levels of reduced glutathione (GSH), vitamins C (VC) and E (VE), malondialdehyde (MDA) as well as 8-hydroxy-2'-deoxyguanosine (8-OHdG) from DNA were also evaluated. At baseline, patients with ALL had significantly higher activities of SOD, GPx, CAT as well as MDA and 8-OHdG levels than

controls ( $p < 0.001$ ) but lower levels of GSH, VC, and VE than their counterparts ( $p < 0.001$ ). During treatment, VC and VE levels in the patients decreased but 8-OHdG levels increased ( $p = 0.04$ ) from baseline. In conclusion, pediatric patients with ALL had increased oxidative stress but low antioxidant status at the time of diagnosis and during treatment.

#### P165-06

##### STRUCTURALLY RELATED CYTOTOXIC EFFECTS OF FLAVONOIDS ON HUMAN CANCER CELLS IN VITRO

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**RATIONALE & OBJECTIVES:** To evaluate cytotoxicity of different flavonoids in human cancer cells and analyze the structure-activity relationship.

**MATERIALS & METHODS:** The cytotoxic effects of 23 flavonoids on breast cancer cells (MDA-MB-231 and MCF-7), colorectal carcinoma cells (LoVo and DLD-1) and prostatic cancer cells (PC3) were detected by MTT methods. The structure-activity relationship was analyzed by comparing the cytotoxicity (EC<sub>50</sub>) of selected molecules that differ in only one structure element.

**RESULTS & FINDINGS:** Flavonoids with different chemical structures showed differential cytotoxic effect on cancer cells. Several structural properties of flavonoids were associated with enhanced cytotoxicity, including the presence of the 2,3-double bond, appropriate hydroxyl numbers, 3-OH, 6-OH and ortho-hydroxylation in ring B. Flavonoids with a 5-OH exhibited lower cytotoxicity than their non-hydroxylated counterparts.

**CONCLUSION:** The 2,3-double bond, 3-OH and ortho-hydroxylation in ring B were key structural elements for anti-cancer activity of flavonoids.

#### P165-07

##### DIALLYL TRISULFIDE INDUCED APOPTOSIS VIA P53 IN MCF7 BREAST CANCER CELLS

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Garlic and the organosulfur compound from garlic have antitumor effects, but the mechanisms have yet to be investigated. The present study was undertaken to determine the effect of garlic constituent diallyl trisulfide (DATS) on growth of MCF-7 (breast cancer cells) and MCF12a (normal breast cells) which is never reported. The effects of DATS were investigated by MTT assay, clonogenic survival assay, ELISA based apoptotic assay, TUNEL assay, immunofluorescence staining, flow cytometry, RT-PCR and western blot analysis. DATS induced apoptosis in MCF-7 cells more than in MCF-12a cells through abrogation of cell cycle checkpoints. The results from semi-quantitative and real-time RT-PCR indicated that DATS increased the level of FAS and cyclin D1 and decreased the level of Akt and Bcl-2. DATS increased Bax expression and also expression and translocation of p53 from cytoplasm to nucleus in MCF-7 cells. This work suggested that DATS and its analogs may offer a novel strategy for the treatment of breast cancer.

**P165-08**  
**DOES THE INCREASE OF ENDOGENOUS STEROID HORMONE LEVELS ALSO AFFECT BREAST CANCER RISK IN CHINESE WOMEN? A CASE-CONTROL STUDY IN CHONGQING, CHINA**

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**RATIONALE & OBJECTIVES:** Accumulating epidemiological evidence suggests that sex steroid hormones are positively associated with the development of breast cancer. However, most of these studies were conducted among Caucasian women and few have been carried out in China. To determine whether the associations of sex steroid hormone levels with breast cancer risk observed by and large in Caucasian populations are also evident in Chinese women, we conducted a case-control study in Chongqing, China.

**MATERIALS & METHODS:** The study included 367 incident breast cancer patients and 367 healthy controls matched on menstrual status, age and periods of blood collection in the menstrual cycle. Plasma concentrations of estradiol, progesterone, testosterone, dehydroepiandrosterone sulfate (DHEAS) and sex hormone binding globulin (SHBG) were determined by electrochemiluminescence immunoassay (ECLIA). Conditional logistic regression analysis was performed to examine their associations with breast cancer risk.

**RESULTS & FINDINGS:** From comparisons of upper and lower tertiles, we observed statistically significant positive associations with breast cancer risk for plasma estradiol levels in follicular phase (adjusted odds ratio [OR] 5 5.48, 95% confidence interval [CI] 5 1.58–18.97), luteal phase (OR 5 4.23, CI 5 1.65–10.87) and postmenopausal (OR 5 2.67, CI 5 1.20–5.93); for progesterone levels in luteal phase (OR 5 3.11, CI 5 1.28–7.56), and for testosterone levels in postmenopausal (OR 5 2.83, CI 5 1.26–6.35). No significant association was found with DHEAS or SHBG.

**CONCLUSION:** Our study suggests that high circulating levels of estradiol and testosterone are positively associated with increased breast cancer risk in Chinese women, which are generally consistent with the observations in Caucasian populations.

**P165-09**  
**ENDOGENOUS STEROID HORMONE LEVELS AND BREAST CANCER RISK: A CASE-CONTROL STUDY IN CHINESE WOMEN**

Mi, Mantian; Wang, Bin; Wang, Jian; Wei, Na; Zhang, Qianying; Zhu, Jundong  
Third Military Medical University, Chongqing, CHN

**RATIONALE & OBJECTIVES:** To determine whether the associations of sex steroid hormone levels with breast cancer risk generally observed in Caucasians are also evident in Chinese women, we conducted a case-control study in Chongqing, China.

**MATERIALS & METHODS:** The study included 367 incident breast cancer patients and 367 healthy controls matched on menstrual status, age and periods of blood collection in the menstrual cycle. Plasmas concentrations of estradiol, progesterone, testosterone, DHEAS and SHBG were determined by electrochemiluminescence immunoassay (ECLIA). Conditional logistic regression analysis was performed to examine their associations with breast cancer risk.

**RESULTS:** From comparisons of upper and lower tertiles, we observed statistically significant positive associations with breast cancer risk for plasma estradiol levels in follicular phase (adjusted odds ratio [OR]=5.48, 95% confidence interval [CI]=1.58-18.97), luteal phase (OR=3.11, CI=1.28-7.56), and postmenopausal (OR=2.83, CI=1.26-6.35). No significant association was found with DHEAS or SHBG.

**CONCLUSION:** Our study suggests that high circulating levels of estradiol and testosterone are positively associated

with increased breast cancer risk in Chinese women, which are generally consistent with the observations in Caucasian populations.

**P165-10**  
**HIGH-FAT DIET INDUCED OBESITY ACCELERATES TUMOR FORMATION IN AZOXYMETHANE AND DEXTRAN SODIUM SULFATE TREATED MICE**

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Recent studies have indicated that body fatness increases the risk of colon cancer. The objective of this study was to determine the effect of high fat diet on the incidence of AOM/DSS-induced colon carcinogenesis and to elucidate possible mechanisms involved. Four-week-old male AJ mice were placed on high-fat diet (HD; 45% of fat kcal) or normal-fat diet (ND; 15% of fat kcal) for 12 weeks. AOM was intraperitoneal injected at a dose of 10mg/kg body weight, followed by 2% DSS (w/v) supply in drinking water for 1week. Plasma insulin, leptin and IGF-1 levels were measured by ELISA. The transcription of epididymal fat tissue leptin and large intestinal leptin receptor (Ob-Ra) were determined by RT-PCR. Results indicated that high-fat fed animals have higher epididymal fat and total tumor numbers. The level of plasma insulin and leptin were significantly higher in the HD group than in the ND group. The level of leptin mRNA in epididymal fat and Ob-Ra mRNA in large intestine significantly higher in the HD group than in the ND group. These results indicate that high fat diet increases colon cancer risk and possible mechanisms include leptin-signaling pathway. The Korea Science and Engineering Foundation (KOSEF) grant funded by the Korea government (2009-0063409 and R01-2008-000-20708-0).

**P166: Micronutrient Deficiencies and their Prevention IV**

**P166-01**  
**A NEW STRATEGY TO OPTIMIZE IODINE INTAKE IN BELGIUM**

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**RATIONALE AND OBJECTIVES:** Surveys have repeatedly indicated that Belgium is affected by mild iodine deficiency. Consequently, optimizing iodine intake was chosen as a priority by the Ministry of Health in its "National Nutrition and Health Plan" (NNHP).

**MATERIALS AND METHODS:** Within the framework of the NNHP, a task force was created to propose a strategy to tackle iodine deficiency.

**RESULTS:** Bread will be fortified with iodized salt. Its iodine content is easy to implement, adapt and control. To avoid an increase of iodine beyond the optimal intake, a step-by-step increase was proposed. Considering the estimated daily iodine intake of 80 µg in Belgium, the strategy aims at an initial increase of daily iodine intake of 30 µg. In a second phase, taking into account the results of the monitoring program, a second increase of 40 µg of daily iodine intake is aimed at, to finally attain 150 µg of daily iodine intake. Monitoring will be based on representative surveys, every 5 years, determining the urinary iodine concentrations in children and pregnant women, as well as on thyroid stimulating hormone concentrations in all newborns.

**CONCLUSION:** Iodine deficiency in Belgium will be tackled using a selective, progressive and monitored approach.

### P166-02

#### IRON DEFICIENCY IS A PREVALENT DIAGNOSIS OF ANAEMIA AT ONE YEAR BUT NOT AT FOUR YEARS OF AGE IN A COHORT OF BRAZILIAN CHILDREN

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**OBJECTIVE:** The aim of the present study is to evaluate the prevalence of anemia, iron deficiency (ID), and iron deficiency anemia (IDA) in children at one and four years of age.

**METHODS:** Of the children initially recruited at birth, 397 were assessed at one year and 354 at four years of age. Anemia was defined as hemoglobin (Hb) concentration < 11.0 g/dL, ID as serum ferritin (SF) < 15.0 µg/L, and IDA as Hb concentration below 11.0 g/dL with ID.

**RESULTS:** At one year, overall prevalence of anemia, ID, and IDA was 63.7%, 90.3%, and 58.8%, respectively. Of children with anemia, 95.0% had ID. At four years, overall prevalence of anemia, ID, and IDA was 38.1%, 16.1%, and 7.4%, respectively. Of children with anemia, 19.3% had ID.

**CONCLUSION:** ID is the main diagnosis of anemia at one year, but not at four years. Further studies should be carried out to determine the causes of anemia in older children.

### P166-03

#### RISK FACTORS OF ANEMIA FOR 6-24 MO INFANTS AND YOUNG CHILDREN IN RURAL CHINA

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**RATIONALE & OBJECTIVES:** Anemia is highly prevalent globally for 6-24 mo children. Besides iron deficiency, other nutrient deficiency and inflammation could also contribute to the high prevalence of anemia. The purposes of this study are to identify the potential etiology of anemia for 6-24 mo children in rural.

**METHODS:** A cross-sectional study was conducted in Linyi, China. 2 ml venous blood was drawn from each child to measure hemoglobin (Hb), plasma ferritin, hsCRP, retinol, zinc, copper and selenium concentration. Total 272 children (157 males and 115 females) aged 6-24 mo were recruited into this study.

**RESULTS:** Among them, the prevalence of anemia (Hb<110 g/L), iron deficiency (ferritin < 12 µg/L), vitamin A deficiency (retinol < 200 µg/L) and elevated CRP (CRP>5 mg/L) was 36.0%, 45.1%, 38.7% and 4.2% respectively. Of those subjects with anemia, 68.0% had iron deficiency (ID), 53.5% had vitamin A deficiency (VAD) and 83.2% had either ID or VAD after excluding those subjects with elevated CRP. After controlling for age and gender, the key risk factors of anemia were ID (AOR 2.7 [1.5, 4.7]), VAD (AOR 2.0 [1.2, 3.6]) and copper concentration (AOR 2.9 [1.1, 7.6] per 1 mg/L increasing).

**CONCLUSION:** Anemia, ID and VAD were highly prevalent for 6-24 mo rural Chinese children. ID and VAD were still the key risk factors for anemia in this population.

### P166-04

#### VITAMIN A DEFICIENCY AMONG RURAL PREGNANT WOMEN IN BANGLADESH

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**OBJECTIVE:** To investigate the prevalence of vitamin A deficiency (VAD) among pregnant women in rural Bangladesh and examine the relationship of various socio-demographic, dietary and nutritional factors with vitamin A status.

Subjects and methods: Pregnant women (n=200), aged 18-39 years, were participated in this study. Socio-demographic, pregnancy related information, dietary intake of vitamin A and mid upper arm circumference (MUAC) data were collected. Serum retinol (vitamin A) concentration was determined.

**RESULTS:** More than half (51%) of the pregnant women had low vitamin A status (serum retinol <1.05 µ mol/L) with 18.5% having VAD (serum retinol <0.70 µ mol/L). Fifty three per cent of the women's vitamin A intake was less than recommended dietary allowance. By multiple regression analysis, gestational age, MUAC, per-capita expenditure on food and wealth index were found to have significant independent relationship with serum retinol concentration; while gestational age of the pregnant women bore a stronger but negative relationship with serum retinol concentration.

**CONCLUSION:** VAD is highly prevalent among rural pregnant women in Bangladesh. Appropriate intervention is warranted in order to improve the vitamin A status.

### P166-05

#### A LONGITUDINAL ASSESSMENT OF VITAMIN B12 AND HOMOCYSTEINE STATUS IN PREGNANCY

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**RATIONALE & OBJECTIVES:** Low vitamin B12 status is a determinant of IUGR in Indian pregnant women. Potential mechanisms may involve homocysteine along with other nutrients in these adverse birth outcomes.

To determine the relationship of vitamin B12 intake, B12 status and plasma homocysteine during pregnancy

**MATERIALS & METHODS:** Vitamin B12 intakes of 419 pregnant Indian women were assessed through a validated food frequency questionnaire at each trimester. In a sub-sample, serum vitamin B12 and homocysteine concentrations were measured during pregnancy and in cord blood at delivery.

**RESULTS & FINDINGS:** Median vitamin B12 intakes were low at the 1st trimester, ~1.8 µg/day with 46% women below RDAs. Vitamin B12 intake and status significantly correlated at the first and second trimesters (r=0.36, p<0.001 and r=0.25, p=0.004). Egg, meat and milk were the main contributors of vitamin B12 intake. Cord blood homocysteine concentration was significantly higher than maternal blood in the first two trimesters (13.82 vs. 7.97 and 6.38 µM/L). A weak inverse relationship between vitamin B12 status and plasma homocysteine was noted at the 1st trimester (r= - 0.20, p=0.029).

**CONCLUSIONS:** A high percentage of South Indian women have poor vitamin B12 intakes related to their low B12 rich food intakes. The significant rise in homocysteine during pregnancy was partially explained by low B12 status.

### P166-06

#### PREVALENCE OF ANEMIA AND THYROID-STIMULATING HORMONE CONCENTRATIONS IN EARLY THAI PREGNANCY

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**RATIONALE:** Maternal anemia and thyroid function during early pregnancy have been reported to be important determinants of pregnancy outcomes and infant development.

**OBJECTIVES:** To evaluate anemia status and thyroid function

of Thai pregnant women during early pregnancy.

**METHODS:** Pregnant women who had a booking at Ramathibodi hospital, Bangkok were asked to participate and informed consents obtained. They were asked to complete a general information questionnaire. Blood was collected for measuring complete blood count (CBC) and thyroid-stimulating hormone (TSH) concentrations. Thyroid gland volume was measured by using a portable echocamera.

**RESULTS:** One hundred and fifty-three pregnant women aged 17-41 years old (mean age,  $29 \pm 5$  years old) were recruited in the study. Median hemoglobin (Hb) concentrations were 12 g/dL and 25 percent was anemic based on the WHO cut-off for anemia during pregnancy ( $Hb < 11.5$  g/dL). Most of the women (87%) had normal TSH concentrations (0.27-4.20  $\mu$ IU/ml) and only 2 percent showed high TSH concentrations ( $>4.20$   $\mu$ IU/ml). Mean thyroid gland volume of this population was 10.6  $\pm$  1.4 ml.

**CONCLUSIONS:** Substantial proportions of Thai pregnant women in urban area had anemia and mild-to-moderate iodine deficiency (ID). WHO recommended giving iron and iodine supplementation for pregnant women, especially, where the severity is high. More research is warranted whether iodine supplementation is necessary when the deficiency is mild-to-moderate to prevent impaired pregnancy outcomes and infant development.

#### P166-07

##### PREVALENCE OF IRON DEFICIENCY AND RELATED FACTORS AMONG THAI INFANTS AGED 9-12 MONTHS

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The aim of this study was to determine iron status, prevalence of iron deficiency (ID) and iron deficiency anemia (IDA), and related factors among Thai infants. The cross-sectional study of 207 healthy infants aged between 9-12 months and their parents were conducted at well baby clinics of Ramathibodi Hospital and Vajira Hospital during February - October 2008. Their general characteristics, socio-economic status, nutritional status, feeding modes, and dietary intake were determined. Blood samples were analyzed for hemoglobin (Hb), hemotocrit (Hct), mean cell volume (MCV), and serum ferritin (SF) as indicators of iron status.

The mean values of Hb, Hct, MCV, and SF of infants were 11.7 $\pm$ 0.9 g/dl, 35.0 $\pm$ 2.6%, 73.7 $\pm$ 5.8 fl, and 33.9 $\pm$ 26.1ng/dl, respectively. The prevalence of anemia, ID, and IDA were 22.2%, 4.4%, and 3.9%, respectively. Related factors of iron status were maternal education, maternal occupation, financial status, low birth weight, prolonged breastfeeding, and low meat intake. Multiple logistic regression analysis indicated that low birth weight, prolonged breastfeeding and low meat intake significantly related to iron depletion, ID, and IDA. Infants with these risk factors should be screened for anemia and iron status.

#### P166-08

##### PREVALENCE OF IRON DEFICIENCY ANEMIA OF VEGETARIAN ADOLESCENTS LIVING IN VEGETARIAN COMMUNITY (RATCHATANI ASOKE), THAILAND

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**RATIONALE and OBJECTIVE:** Iron deficiency anemia is an important public health problem. This cross-sectional study was aimed to determine the prevalence of iron deficiency anemia among vegetarian adolescents living in vegetarian community (Ratchatani Asoke), Thailand.

**METHODS:** Ninety-Four of vegetarian adolescents (51 males, 43 females) aged 10 to 20 years were included in this study. All adolescents were screened out for thalassemia. Blood samples were collected for measurement of hemoglobin (Hb) and serum ferritin (SF) level. Anemia was defined when  $Hb < 11.5$  g/dl in children 10-11 years,  $Hb < 12$  g/dl in children 12-14 years and women 15-20 years,  $Hb < 13$  g/dl in men 15-20 years. Iron depletion (ID) was defined when SF was lower than 15 g/l with non-anemia and iron deficiency anemia (IDA) when SF was lower than 15 g/l with anemia.

**RESULTS:** The vegetarian males and females were anemic, 43.1% and 41.9%, respectively. The prevalence of IDA were 19.6% and 30.2%, whereas the prevalence of ID were 13.7% and 23.3%, respectively. There was no significant different in the prevalence of anemia, ID and IDA between males and females.

**CONCLUSION:** Almost half of the vegetarian adolescents were anemic. Iron deficiency appeared to be the dominant cause in vegetarian females.

#### P166-09

##### PREVALENCE OF ANEMIA, IRON DEFICIENCY ANEMIA AND IRON DEFICIENCY IN GIRL'S HIGH-SCHOOL STUDENTS IN CENTER OF IRAN-YAZD

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**INTRODUCTION:** It is generally assumed that 50% of the cases of anemia are due to iron deficiency. The most severe consequence of iron depletion is iron deficiency anemia (IDA), and it is still considered the most common nutrition deficiency worldwide. The aim of present study was to determine prevalence of iron deficiency, iron deficiency anemia and anemia among girl's high-school students in center of Iran.

**MATERIALS & METHODS:** This work as a cross-sectional study was started 2007 and ended 2008 in Yazd. Two hundred girls participated in study from eight girl high schools that selected by random sampling. Five ml venous blood collected for determination of serum ferritin and cell blood count (CBC). Serum ferritin was determined by using ECLIA method and CBC by cell counter SYSMEX KX21N. Iron deficiency was defined as having serum ferritin values below 12  $\mu$ l. Anemia was defined as having Hb levels below 12 g/dl. Iron-deficiency anemia was taken to be the combination of both.

**RESULTS:** In general, mean of weight (kg), height (cm) and body mass index (kg/m<sup>2</sup>) were 54.5  $\pm$  11.3, 159.1  $\pm$  6.4 and 21.5  $\pm$  4.2, respectively. Mean of age was 15.19  $\pm$  0.7 years. Age frequency according to 14, 15 and 16 and more were 13, 58.5 and 28.5 percents, respectively. Mean of Hb (g/dl), Hct (%), MCV (fl), MCH (pg), MCHC (g/dl) and ferritin ( $\mu$ l) were 12.8  $\pm$  0.9, 38.9  $\pm$  3.0, 80.7  $\pm$  4.3, 26.6  $\pm$  1.8, 33.2  $\pm$  3.6 and 23  $\pm$  18.2, respectively. The prevalence of iron deficiency, anemia and IDA were 34.7%, 13.5% and 9.3%, respectively.

**CONCLUSION:** according to world health organization criteria, anemia is a mild public health problem in this area, but iron deficiency is a remarkable problem and must be do the suitable measures for control and prevention of it.

#### P166-10

##### **DOES ZINC SUPPLEMENT REQUIRED IN PEDIATRIC CELIAC DISEASE?**

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**RATIONALE & OBJECTIVES:** Celiac disease (CD) is a common cause of malabsorption in Northwest Indian Children. The comparative data about effect of gluten free diet (GFD) with or without zinc supplementation on serum zinc levels is scarce. The aims of this study were to assess serum zinc levels in children with CD, to correlate serum zinc levels among the CD patients with short stature and diarrhea and to compare serum zinc levels in deficient patients on GFD with or without four weeks of zinc supplementation.

**MATERIALS & METHODS:** A prospective randomized open label controlled study was conducted on 134 children diagnosed with CD from July 2006 to December 2007. All the patients underwent hemogram, liver function tests, IgA anti-tissue transglutaminase (anti-tTG) antibodies, UGI endoscopy and serum zinc levels at baseline and after 4 weeks. Zinc deficient patients (n=96) were randomized in 2 groups. Group G (n=48) received GFD without and Group G+Z (n=48) received GFD with zinc supplementation for 4 weeks.

**RESULTS & FINDINGS:** Mean age was 6.2 + 3.2 years, mean weight was 14.6 + 5.5 kgs and mean height was 102.6 + 17.2 cms. Male to female ratio was 1.5:1. Major symptoms at presentation were diarrhea (54.5%), failure to thrive (52.2%), abdominal distension (41%), anemia (40%), and pain abdomen (19.4%). Mean serum anti-tTG level was 164.2 U/ml (range 1-749 U/ml) and levels correlated with the severity of duodenal mucosal damage. Mean serum zinc levels at baseline and after 4 weeks were 52.3 µg/dl and 71.9 µg/dl in group G and 51.2 µg/dl and 74.9 µg/dl in group G+Z, respectively (p=ns). Rise in serum zinc level was significant in individual group with or without zinc supplementation (19.5 µg/dl in group G and 23.7 µg/dl in group G+Z) after 4 weeks and difference was not significant when both groups compared. Mean serum zinc levels at baseline and rise were statistically similar at 4 weeks in patients with diarrhea and short stature.

**CONCLUSION:** There is zinc deficiency in patients with celiac disease. Gluten free diet is the mainstay of treatment. Serum zinc levels rise with GFD irrespective of zinc supplementation.

#### P166-11

##### **ZINK, INSULIN GROWTH LIKE FACTOR-1 (IGF-1) AND CHILDREN BODY HEIGHT AT 6 YEARS OLD FROM MALNOURISHED PREGNANT WOMEN IN INDONESIA**

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Prevalence of child stunting in Indonesia is 47.5% for boys and 46.3 for girls (2002). Body height used as an indicator for child growth. The study was aimed to investigate the effect of zinc and food supplementation on child body height.

Cohort retrospectives study was done in Takalar district. Sample is a group of 6 year old children divided into three categories based on intervention in their mothers (malnourished pregnant women) 6 years ago. Group A (58) have zinc and food supplement, group B (25) have food supplement and group C as a control (60) without zinc and food supplement. Child Growth

is calculated by Marshall & Swan formula and data analysis using t-test and Mann-Whitney U test.

Study showed height gain during six years period for group A, B and C (Control) are 60.35±4.73, 53.01±5.71 and 49.39±5.74 cm respectively and significantly different between group A and C and group B and C (p <0,000 and <0,013). Children in group A and B had higher IGF-1 compared to control group.

**CONCLUSION:** Zinc and food supplementation should be given to malnourished pregnant women to prevent growth retardation.

#### P166-12

##### **PREDICTORS OF ANEMIA AND IRON DEFICIENCY IN HIV-INFECTED PREGNANT WOMEN**

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**RATIONALE AND OBJECTIVES:** Persistence of anemia in pregnancy despite iron supplementation – particularly in HIV-infected women – indicates that its etiology may be more complex. We examined predictors of hematological outcomes among HIV-infected pregnant women in Tanzania.

**MATERIALS AND METHODS:** Participants were 906 HIV-infected pregnant women enrolled in a randomized trial of multivitamin supplementation, with hemoglobin measurements at baseline and at least once during follow-up [median: 57.3mo]. Cox regression models were used to examine predictors of hematological outcomes: anemia (Hb<11.0), severe anemia (Hb<8.5g/dL), and iron deficiency (hypochromic microcytosis).

**RESULTS AND FINDINGS:** 26% of women had severe anemia and 83% had anemia at baseline. After adjusting for multivitamin regimen, women with malaria or pathogenic protozoan infections, higher ESR and CD8 levels, and lower CD4 cell counts and hemoglobin levels at baseline had an increased risk of anemia and iron deficiency during follow-up. Low vitamin D (<32ng/mL) concentrations were associated with an increased risk of severe anemia and hypochromic microcytosis.

**CONCLUSION:** Parasitic infections, immunological parameters, and vitamin D deficiency were the main predictors of incident anemia and iron deficiency in this population. A comprehensive approach to anemia, including micronutrient supplementation and infectious disease control, is warranted, particularly in HIV-infected individuals in resource-limited settings.

#### P166-13

##### **REGIONAL DISPARITIES AND SOCIOECONOMIC STATUS HAVE SHOWN IMPACT ON IODINE DEFICIENCY DISORDERS AMONG CHILDREN: EVIDENCE FROM EGYPT**

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Iodine deficiency is the leading cause of preventable intellectual deficit worldwide. Iodine deficiency at critical stages during pregnancy and early childhood results in impaired development of the brain and consequently in impaired mental function. With one third of the world's population at risk, iodine deficiency disorders (IDD) remain a major threat to health and development. Salt iodization has been identified as the main intervention to deliver iodine on a continuous and self-sustaining basis to population around the world.

IDD have been a public health problem for many years in

Egypt. IDD was first documented in 1959 when endemic goiter was reported. Salt iodization program began in 1996 and a ministerial decree prohibiting the production of non-iodized salt for human use and for bread making was passed in 2003. In 2005, the DHS revealed that 78 % of households consumed iodized salt.

The National Iodine Nutrition Survey (NINS) 2008 on children's IDD status showed that only 68.3% of household salts were adequately iodized. There was significant variation between the urban and rural areas and among the different regions. The values were also significantly higher in private schools compared with public schools. Both urinary and salt iodine were negatively correlated to crowding index and positively correlated to property score, thus indicating increasing levels with better scores of socio-economic indicators. Similarly, both urinary and salt iodine were positively correlated to father and mother education, which supports the finding of increasing levels of iodine with better indicators of socio-economic level. Thus, the NINS 2008 showed, as a schoolchild's household salt contains more iodine, and as his/her age and socio-economic level increase, his/her urinary iodine level will also be higher. At the governorate level, the lowest levels of iodine in salt were found in seven Governorates: Dakhalia, Menoufia, Behera, Beni Suef, Minia, Wadi Gedid and South Sinai. The situation indicates the necessity of a systematic approach for supervision and monitoring of the salt produced and sold in these governorates. Thus, focusing efforts on these seven governorates is an effective step towards achieving the goal that 90% or more households use iodized salt.

It should be also guaranteed that adequately iodized salt is available at the markets in all the regions, including rural, frontiers and remote areas. Educational and awareness campaigns are required in rural areas to change the rural population's habit of buying non-iodized salt.

#### **P166-14**

**ANEMIA IN PREGNANT WOMEN IN BUMEHEN CITY**  
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**RATIONALE & OBJECTIVES:** Anemia due to iron deficiency is the most common nutritional disorder in the pregnant women in the world. Regular preventive and intervention programs can be implemented to control this public health. In order to determine anemia prevalence in pregnant women in 1, 2, 3 trimesters of pregnancy, this survey was carried out in Bumehen city in 2002.

**MATERIALS & METHODS:** A Total of 248 pregnant women aged 15 - 42 years with mean age 24±3.2 years were studied. Individual questionnaire was filled out. Height and weight were measured and body mass index (BMI) was calculated. Blood sample was taken for serum iron, hemoglobin (Hb) and hematocrit (Hct) measurement.

**RESULTS & FINDINGS:** Mean iron, Hb and Hct were 69 mg/dl, 12.3 g/dl and 36% respectively. The results shows that 20.3% of the subjects had Hb less than 12 g/dl and 32% were iron deficient (serum iron <50mg/dl). Subjects above 34 years old having lower mean Hb than 25 - 34 years old group and higher compared to those less than 25 years old. Mean Hb in normal weight (BMI between 20 to 25) was lower than obese women (BMI ≥25) and higher compared to low weight (BMI < 20). Also Hb deficiency increased in second trimester compared to first trimester and decreased in the third trimester.

**CONCLUSION:** The high prevalence of iron deficiency in this study calls for immediate attention of health care policy-makers.

#### **P166-15**

**EARLY VITAMIN A SUPPLEMENTATION IMPROVES VITAMIN A STATUS OF INFANT AND LACTATING MOTHER**

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**OBJECTIVES:** To determine the effects of early vitamin A (VA) supplementation according to the new IVACG recommendation on VA status of infants & mothers.

**METHODS:** In a randomized, controlled trial, 200 mother/infant pairs were assigned to 2 groups: VA supplemented (VA+,n=100): infant received 3 doses 50.000IU/dose at 6, 10 and 14 weeks postnatal; mothers received 2 doses 200.000IU/dose after birth; and Control (CTR,n=100): received supplemental VA following current program guidelines (one dose 200.000 IU /mother, one dose 100.000 IU/infant at 6 months postnatal). Serum retinol (sRet) of infants, retinol in breast milk were analyzed at 5 and 11 months postnatal.

**RESULTS:** At 5mo, VA+ infants sRet levels were higher than CTR (1.32 vs. 0.80 μmol/L, p<0.01), low sRet rate was 26% in VA+, while 51% in CTR. Breast milk retinol levels in VA+ were greater (1.70 vs. 1.41, p<0.05); low breast-milk retinol rate was 24% in VA+, and 43% in CTR. At 11mo, vitamin A status was similar in the 2 groups.

**CONCLUSION:** The new IVACG recommendations for vitamin A supplementation improved vitamin A status of infants and mothers during first months after birth.

#### **P166-16**

**FACTORS ASSOCIATED TO IODINE STATUS OF PREGNANT WOMEN AT NAGRAK DISTRICT, WEST JAVA, INDONESIA 2007**

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Iodine Deficiency Disorder (IDD) is one of the nutrition problems in Indonesia. The most damaging effects are increased neonatal mortality, retarded brain development, goiter and socioeconomic deprivation. The government of Indonesia has been conducting nutrition intervention program to reduce the prevalence of IDD through iodized salt, nutrition education, and iodized capsule. The objective of this study is to explain the factors associated to iodine status of pregnant women in Nagrak District, Sukabumi, West Java. The study design is cross-sectional and involved 300 pregnant women as a study subjects. Data collection was taken by nutritionists, general practitioners and nurses. The Nutritionists were responsible for salt profile consumed by families, pregnant women knowledge and habitual practices related to salt, whereas General Practitioners were responsible for identification of goiter grade using palpation method, and Nurses were collecting 24-hour-urine from subjects. Identification iodine on salt is indicated by color change qualitatively. Data analysis was done using statistical program to describe the findings and association (Chi Square). Urine Iodine Excretion (UIE) level was analyzed using ELISA method at reputable laboratory (BPGAKI) in Magelang, Central Java. The result of UIE analysis showed that about 33.7% have normal level of UIE; 40% have deficient and 26.3% have the risk of hyperthyroidism (≥ 200 μg/L). In relation to the use of salt in households indicated that 31.0% used non iodized salt; 30.7% has iodized salt <30 ppm and 38.3% indicated have more than 30 ppm. Iodine status of pregnant women was significantly associated with the habitual practices and knowledge in regard to iodized salt of pregnant women (p<0.05).

#### P166-17

##### **IODINE STATUS OF CHILDREN FROM RED SEA AND NILE VALLEY REGIONS OF THE SUDAN. IMPLICATION ON HEALTH AND DEVELOPMENT**

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IBCHN - Human Nutrition UK

Iodine deficiency disorders (IDD) continue to be the world's leading causes of preventable mental retardation. In Sudan, the situation remains the same even after the implementation of the national salt USI program.

Following a multistage random sampling design we assessed the iodine nutrition status in Sudan, Red Sea zone, and Nile valley. Male and female children (n=282), were assessed for urinary iodine, visible goiter and iodine content of salt.

The median urinary iodine in Red Sea was 555.15 µg/L, mean (589.6µg/L), and showing excessive intake of iodine nutrition. The salt content of iodine was high, the fish intake was low. The Median in the Nile Valley was 159.66, and the mean (176.89 µg/L), showing adequate intake of iodine. The iodine content of salt samples in the Nile valley was zero. The intake of fish was 77%.

Nile valley intake of iodine is adequate; this may indicate the impact of fish consumption. Conversely in the Red Sea State the intake was excessive, due to excessively iodized salt.

It is recommended that the health impact of the excessive consumption of the nutrient and the IDD programme in the country to be critically evaluated.

#### **P167: Growth & Development IV**

#### P167-01

##### **DIETARY PROTEIN INTAKE AND BONE MASS ACCRETION IN PUBERTAL GIRLS WITH LOW CALCIUM INTAKES**

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**OBJECTIVES:** To assess the association between protein intakes and bone mass accrual in pubertal girls with low calcium intake.

**METHODS:** Totally, 757 pre-pubertal girls (mean age 10.1 yr) in urban Beijing, China were recruited for a five-year study including two years of milk supplementation and three years follow-up study. At 0, 12, 24, 48 and 60 months from the baseline, bone mineral content (BMC) of the proximal or distal forearm (PF or DF) and total body (TB) was measured with dual energy X-ray absorptiometry; dietary intakes were assessed by a three-day food record. Linear mixed models were used and continuous variables were logarithm-transformed.

**RESULTS:** The longitudinal calcium intake (432 – 675 mg/d on average) positively influenced BMC at TB, PF and DF after controlling for confounders. However, negative associations were observed between protein intake (55.9 – 61.0 g/d on average) and BMC accrual at TB, PF or DF after adjustment. Moreover, protein from animal foods had significantly negative effects on BMC accrual at DF or PF after similar adjustment plus calcium intake.

**CONCLUSION:** Higher protein intake appeared to have negative effect on bone mass accrual in Chinese pubertal girls with low calcium intake.

#### P167-02

##### **ZINC SUPPLEMENTATION FOR FOUR MONTHS DOES NOT HAVE A SUBSTANTIAL EFFECT ON GROWTH IN YOUNG NORTH INDIAN CHILDREN**

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**OBJECTIVES:** To assess the impact of daily zinc supplementation on growth in young children.

**MATERIALS AND METHODS:** Double blind randomized, placebo-controlled trial conducted in New Delhi, India. 2482 children aged 6 to 30 month supplemented daily with placebo or zinc (10 mg elemental zinc to infants and 20 mg to older children) for 4 months. Weight and length were measured at enrolment and 4 months later. Weekly visits were conducted by field workers to ascertain morbidity in previous 7 days. Changes in length, weight, height for age and weight for height z-scores were assessed in zinc and placebo groups.

**RESULTS:** After four months of supplementation, the weight and length gains in the two groups were not different and no impact was seen in the length-for-age, weight-for-age and weight-for-length Z-scores in the two groups. No substantial effect was seen in any of the subgroups defined for age, income, gender, zinc levels in the crude analysis or after adjusting for age, gender, income, breastfeeding status and baseline anthropometric status.

**CONCLUSIONS:** Despite successful zinc supplementation, reflected by increased plasma zinc concentrations and reduced incidence of diarrhea and pneumonia, there was no beneficial effect of the intervention on growth.

#### P167-03

##### **MALNUTRITION STATUS AND CHANGING TREND OF CHINESE CHILDREN UNDER FIVE**

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**OBJECTIVE:** By comparison of three national survey data of children under 5 years in 2002, 2005 and 2006 respectively, the changing trend of children nutrition situation was studied.

**METHODS:** The multi-stage cluster probability sampling was used to select the children less than 5 years, whose weight and height were measured in standard anthropometry method. And Z-score recommended by WHO (1978) was used to evaluate the nutrition status of children and the software SAS 8.2 was used to analysis the data.

**FINDINGS:** The malnutrition prevalence decreased by year. However, the prevalence of stunting and underweight of rural children is 5.3 times and 4.6 times significant higher than that of urban children respectively (p<0.05) in 2006. Meanwhile, the prevalence of malnutrition in middle and west areas is significantly higher than that in east area (p<0.05). Compared with data of 2002, the prevalence of children stunting and underweight decreased by 30.8% and 24.4% respectively, especially of children within one year which is 61.2% and 47.8%.

**CONCLUSIONS:** The nutrition status of Chinese children see a better changing trend, however some problems of malnutrition among the children in Chinese western area is still quite serious, and their nutrition status requires more concerns and improvement.

#### P167-04

##### UNDERNUTRITION IN EARLY LIFE AND NUTRITIONAL STATUS OF ADOLESCENT FEMALES FROM TANJUNGSARI, INDONESIA

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**RATIONALE AND OBJECTIVE:** Childhood growth is associated with adult nutritional status, but the relative importance of growth in different periods of childhood is still inconclusive, especially in developing countries. The objective of this study was to determine the association of early childhood growth and nutritional status of adolescent Indonesian females. **MATERIALS AND METHODS:** We studied 851 young women measured from birth till 60 months of age and at age 15-17 years from Tanjungsari. We determined the associations of size at birth, infant, early and later childhood growth, with adolescent BMI.

**RESULTS AND FINDINGS:** Prevalence of adolescent underweight was 12.5% and overweight was 9.9%, with no differences in birth weight and length among adolescent groups. Level of WHZ at 6 months and WAZ at 3 months until 60 months onwards differed significantly between underweight, normal weight and overweight adolescents ( $p < 0.05$ ) but groups did not differ in HAZ.

**CONCLUSIONS:** Our results suggest that undernutrition is not a risk factor for overweight in our population.

#### P167-05

##### PREGNANCY WEIGHT GAIN AND BIRTH OUTCOME BY NUTRITIONAL EDUCATION

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**RATIONALE & OBJECTIVES:** About 35% of low birth weight (LBW) babies are born in Bangladesh. The objective is to see the effect of nutrition counseling on reduction in LBW and increase in weight gain during pregnancy.

**MATERIALS & METHODS:** 300 pregnant women at 3rd trimester were randomly allocated to either intervention to receive nutrition education on food security, disease control and caring practices and appropriate breastfeeding of newborn.

**RESULTS & FINDINGS:** The mean weight gain of pregnant women was higher in intervention group compared to controls (8.58kg Vs. 6.08kg  $p < 0.001$ ). The prevalence of LBW was significantly low in intervention group compared to control group (0% Vs. 53.3%). Early initiation of breastfeeding was also higher in intervention group (71% Vs. 7.3%,  $p < 0.001$ ).

**CONCLUSION:** This study demonstrated that nutrition education can effectively reduce prevalence of low birth weight.

#### P167-06

##### EFFECT OF MATERNAL MULTIPLE MICRONUTRIENT SUPPLEMENTATIONS ON INFANT DEATH AND COGNITION IN INDONESIA: A DOUBLE-BLIND CLUSTER-RANDOMISED TRIAL.

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**BACKGROUND:** Pregnant mother supplementation is generally restricted to provision of iron and folic acid (IFA). We assessed the effect of multiple micronutrients (MMN), compared with IFA, on infant death and cognitive performance in the setting of routine prenatal care services.

**METHODS:** In a double-blind cluster-randomised trial in Lombok, Indonesia, from July 2001 to April 2004, we randomly assigned 262 midwives to distribute IFA ( $n=15,486$ ) or MMN ( $n=15,804$ ) supplements to 31 290 pregnant women. April to July 2004, 639 SUMMIT participants (289 IFA, 347 MMN) were tested on a battery of cognitive sensory tests. The primary outcome was early infant mortality (deaths until 90 days of

birth). Secondary outcome was cognitive development/scores. **FINDINGS:** Infants of women consuming MMN supplements had an 18% reduction in early infant mortality compared with those of women given IFA (35.5 deaths per 1000 live births vs. 43 per 1000; relative risk [RR] 0.82, 95% CI 0.70-0.95,  $p=0.010$ ). The mean cognitive score in the MMN group (.025) was .110 units higher than the mean score in the IFA group ( $-0.085$ ) ( $t(634) = 2.09$ ,  $p = .037$ ).

**CONCLUSION:** Maternal MMN supplementation, as compared with IFA, can reduce early infant mortality, also resulted in superior overall cognitive performance.

#### P167-07

##### LOW BONE MASS ASSOCIATED WITH POOR DIETARY COMPLIANCE IN ADOLESCENTS WITH PHENYLKETONURIA

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**RATIONALE & OBJECTIVES:** Phenylketonuria (PKU) is regarded a risk factor for reduced bone mineral density (BMD) due to elimination diet, malabsorption or disturbed growth. The aim of this study was to evaluate associations between PKU course and management, and bone status.

**MATERIALS AND METHODS:** In 195 Caucasian subjects with PKU (mean age:  $13.7 \pm 0.6$  y), total and lumbar spine BMD was assessed using dual energy X-ray absorptiometry (DXA), and serum calcium, phosphate, parathormone, alkaline phosphatase, and 24h calciuria were determined. Retrospective records of serum phenylalanine levels were evaluated in 57 patients over 14y.

**RESULTS:** No disturbances in biochemical markers were found. Mean Z-score for total BMD was  $-0.59 \pm 0.82$  and spine  $-0.89 \pm 0.98$ . Low BMD (Z-score below  $-2.0$ ) was found in 23 subjects (11%). Phenylalanine concentrations correlated negatively with BMD in adolescents.

**CONCLUSIONS:** Although PKU does not affect calcium/phosphate metabolism the deficits in BMD among PKU adolescents are associated with hyperphenylalaninemia. This suggests that prolonged poor dietary control may be, at least partly, associated with reduced bone mass accretion during rapid growth. Whether the life-long risk of osteoporosis attributable to PKU will be sustained in these patients is not clear.

#### P167-08

##### ENERGY-RICH DIET PROMOTED RUMEN EPITHELIUM GROWTH THROUGH ACCELERATION OF CELL CYCLE PROGRESSION AND INCREMENT OF CYCLIN D1 EXPRESSION IN GOATS

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**RATIONALE & OBJECTIVES:** Development and renewal of rumen epithelial cells depend on adequate nutrient intake. Rumen papillae size and epithelial surface area increased in goats consuming an energy-rich diet. This was accompanied by activated IGF-1 system (Shen et al., 2004). However, the cellular and molecular mechanisms underlying is not clear. The aim of this paper was to study the effects of energy-rich diet on rumen epithelium proliferation and the underlying mechanisms



associated with cell cycle and cyclin D1, a regulation protein required for cell cycle progression and target of proliferative signals in G1 phase.

**MATERIALS & METHODS:** Goats were fed peanut straw only (n=9, LL group, ME intake 0.57 MJ/kg0.75/d, nitrogen intake 0.86 g/kg0.75/d) or PS supplemented with 400 g/d of concentrate (n=9, HL group, ME intake 1.00 MJ/kg0.75/d, nitrogen intake 2.33 g/kg0.75/d) for 42 d. At slaughter the fresh rumen epithelium was taken for analysis of cell cycle by flow cytometry and for determination of Cyclin D1 mRNA expression by reverse transcription-polymerase chain reaction (RT-PCR).

**RESULTS & FINDINGS:** In HL group the G0/G1 -phase cell number was lower ( $P<0.01$ ). While the S-phase (the phase of DNA and protein synthesis,  $P<0.01$ ) and G2/M - phase (the phases of cells enter mitosis,  $P<0.01$ ) cell number was higher than those in LL group, indicating that energy-rich diet stimulating the rumen epithelial cells proliferation by accelerated its cell cycle progression. The Cyclin D1 encoding gene was detected in rumen epithelial cells. The abundance of Cyclin D1 mRNA in HL was greater by 50% ( $p<0.05$ ) than that in LL. Furthermore, a positive coefficient correlation between mRNA abundance of Cyclin D1 and G2/M-phase cell number were observed ( $r=0.68$ ,  $P<0.01$ ).

**CONCLUSION:** The energy-rich diet promotes rumen epithelial cell proliferation through acceleration of cell cycle progression and increment of cyclin D1 mRNA expression in goats.

## **P168: Nutrition and Neural/Brain Function II**

### **P168-01**

#### **IMPACT OF FOOD SUPPLEMENTATION ON COGNITIVE FUNCTIONS OF PRESCHOOL CHILDREN**

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**RATIONALE & OBJECTIVES:** Studies have shown mixed results on improving cognitive functions among children.

**METHODS:** We used Leiter International Performance Scale-Revised to assess brief intelligent quotient (IQ) & fluid reasoning in children aged 4-5 yrs fed a food supplement (17 from fortified and 19 from control group) at baseline and after 9 months of intervention.

**RESULTS:** Mean±SD of brief IQ of at baseline was 91.5±10.9 in fortified and 93.5± 13.4 in control group children ( $p=0.62$ ). After the intervention, it was 104.3±10.7 in fortified ( $p=0.001$ ) and 91.5±9.9 in control group. Measures of Visual scanning skill were 13.1±3.9 in fortified and 11.3±2.2 in control ( $p=0.02$ ) and ability to generate rules and develop hypotheses was 8.8±3.8 in fortified and 6.6±2.0 in control group respectively ( $p=0.02$ ) after the intervention.

**CONCLUSIONS:** With the improvement of visual scanning and ability to generate rules and develop hypotheses in fortified group, their brief IQ has increased.

### **P168-02**

#### **EFFECT OF DIETARY DOCOSAHEXAENOIC ACID ON GROWTH AND DEVELOPMENT OF BRAIN IN GASTROSTOMY TUBE-FED NEONATAL RAT**

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Docosahexaenoic acid (DHA) has been added in infant formulas at various levels to meet the WHO's recommendation of 20 mg DHA/kg body weight/day for full-term baby. The objectives of this study were to examine the amount of dietary DHA actually getting into brain tissues and to evaluate the effects of different

level of DHA on the cortex and hippocampus development by determination the expression of N-methyl-D-aspartate receptor (NMDARs) and Choline acetyltransferase (ChAT) in neonatal rat brain. Three-day-old neonatal rat pups were tubed by gastrostomy with artificial rat's milk in various levels of DHA, i.e. 0 (control, C), 5 (adequate, A) and 300 mg (high, H) DHA/dL respectively, for a period of 6, 8, 10 12 and 14 days. Results indicated that DHA levels in various brain tissues were significantly higher in H group than other two groups ( $p<0.05$ ). The protein expression of NMDAR subunit in hippocampus of rat pups in A and H groups after 14 days feeding was significantly increased, while similar phenomenon occurred in the protein expression of NMDR 1A, 2A/B subunit and ChAT in cortex. In addition to a significantly higher NMDAR 2A/B subunits expression in hippocampus of H group pups compared with the C group, there was a dose dependent response on NMDR 2 A/B subunits expression in cortex of neonates. In conclusion, the average DHA in neonatal pups' brains was not significantly increased by the level of DHA added as adequate level (5 mg/dL), however, the protein expression of the neuron markers related to cognition, behavior, learning and/or memory were enhanced in neonates.

### **P168-03**

#### **INFLUENCE OF NUTRITIONAL STATUS OF SCHOOL CHILDREN ON COGNITIVE PERFORMANCE**

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**RATIONALE AND OBJECTIVE:** The influence of nutritional status on cognitive performance of urban and rural school going children was studied.

**METHODOLOGY:** A total of 1056 children (556 male and 500 female) were assessed for nutritional status using anthropometry by standard techniques. The cognitive performance was measured using Raven's progressive color matrices (RPCM), digit span (direct (D) and reverse (R) and verbal fluency tests.

**RESULTS:** Findings indicate that 69 and 80% of children had normal nutritional status using weight-for-age and height-for-age as criteria, whereas 28 and 16% were moderately undernourished. There were statistically significant differences in cognitive performance of children belonging to normal and undernourished category. Normal children scored 3.87 and 2.75 for digit (D & R) tests as against 3.63 and 2.03 scored by severely malnourished children. The scores for RPCM decreased from 12.91 to 10.06 from normal to undernourished subjects. Similar findings were obtained for verbal fluency with severely malnourished children scoring lesser. When height-for-age was used as criteria, much wider differences between scores were observed in all cognitive performance tests.

**CONCLUSION:** The cognitive performance of children was significantly associated with their nutritional status.

### **P168-04**

#### **VITAMIN B12, BUT NOT FOLATE STATUS PREDICTS MENTAL DEVELOPMENT SCORES IN NORTH INDIAN TODDLERS.**

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**RATIONALE:** Micronutrient deficiencies can affect cognitive ability. Children in New Delhi have poor vitamin B12 and folate status.

**OBJECTIVE:** To measure the association between plasma levels of folate, vitamin B12, total homocysteine and

methylmalonic acid with cognitive performance in 569 North Indian children, aged 12 to 18 months.

**METHODS:** Bayley scales of Infant Development II were used for assessment. In multiple regression models, adjusting for several potential confounders, we measured the association between these biomarkers and mental and psychomotor development scores at the time of blood sampling and after 4 months.

**RESULTS:** Folate status was not associated with cognitive performance. However, B12 status was; each two-fold increment in the B12 concentration was associated with an increment in the mental development score of 1.3 (95% CI: 0.2, 2.4,  $P=0.02$ ). Furthermore, each two-fold increase in homocysteine or methylmalonic acid concentration was associated with a decrement in mental development score of 1.9 (CI: 0.5, 3.4,  $P=0.009$ ) and 1.0 (CI: 0.3, 1.7,  $P=0.009$ ) points, respectively.

**CONCLUSION:** Vitamin B12 status showed a significant but modest association with cognitive performance. Considering the high prevalence of B12 deficiency in India, clinical trials examining the effect of B12 on cognitive performance in children should be undertaken.

#### P168-05

##### **COMPARISON OF THE EFFECT OF TWO IRANIAN BREAKFASTS (HIGH CARBOHYDRATE, HIGH PROTEIN) ON COGNITIVE PERFORMANCE, MOOD AND HUNGER-SATIETY STATUS OF 9-11 YEARS OLD PRIMARY SCHOOL-CHILDREN**

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**OBJECTIVES:** Studies generally show that breakfast consumption is beneficial and helps maintain cognition during the morning, but less is known about the effects of different breakfast composition. We compared two common Iranian breakfasts and no breakfast in elementary schoolchildren.

**MATERIALS AND METHODS:** Fifty-one well-nourished schoolchildren (53% female, 9-11 years) received high carbohydrate (60%) and high protein (25%) breakfasts matched for energy, and no breakfast, on 3 separate days one week apart, in a randomized cross-over design. Cognition was assessed pre, 30 and 120-minutes post breakfast, using the Cognitive drug research computerized assessment system; mood and hunger-satiety were assessed 105-minutes post breakfast.

**RESULTS:** The general pattern was a decline in simple reaction time ( $P<0.23$ ), choice reaction time ( $P<0.018$ ) and Power of Attention ( $P<0.013$ ) among girls if they received high carbohydrate breakfast. Choice reaction time was impaired among boys in fasted states more than other condition ( $P<0.003$ ). There were significant differences in alertness between breakfast and no breakfast among girls ( $P<0.021$ ), and significant differences in satiety ratings between breakfast and no breakfast in both sexes ( $P<0.001$ ).

**CONCLUSION:** High carbohydrate breakfast had a negative effect on attention in girls, although breakfast consumption had a positive effect on mood and hunger-satiety. The composition of breakfast is as important as its consumption.

#### P168-06

##### **MULBERRY FRUIT IMPROVES MEMORY DEFICIT AND NEURODEGENERATION IN HIPPOCAMPUS OF ANIMAL MODEL OF ALZHEIMER'S DISEASE**

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**RATIONALE & OBJECTIVE:** Recently, the benefit of fruits possessing antioxidant activity to improve brain damage and functions in age-related disease such as Alzheimer's disease have been considered. Based on the important role of free radicals on the pathophysiology of the mentioned disease, we hypothesized that mulberry fruit which possessed antioxidant activity might be the potential fruit against memory deficit and neurodegeneration in animal model of Alzheimer's disease. Therefore, this study aimed to elucidate this issue.

**MATERIALS & METHODS:** Male Wistar rats were orally given mulberry fruits at various doses ranging from 2, 10 and 50 mg/kg BW at a period of 1 week before 1 week after the intraventricular administration of AF64A, a selective cholinotoxin, bilaterally. Then, the animals were determined the spatial memory using escape latency and retention time in Morris water maze test and determined the neuroprotective effect of mulberry fruit using density of neurons in hippocampus as indices.

**RESULTS & FINDINGS:** The results showed that mulberry fruit could enhance memory and the density of cholinergic neurons in hippocampus. Moreover, it also decreased the malondialdehyde level in this area.

**CONCLUSION:** Therefore, we suggested that the memory enhancing effect of mulberry fruit was partly associated with the neuroprotective effect of this fruit via its antioxidant effect in hippocampus.

#### P168-07

##### **BOMBYX MORI EXERTS NEUROPROTECTIVE EFFECTS IN STROKE MODEL**

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**RATIONALE & OBJECTIVE:** At present, the stroke still remains a significant clinical unmet condition, and numerous patients die or suffer from the disability condition induced by stroke. Therefore, the preventive strategy especially food supplement against this condition is focused. In this study, we hypothesized that Bombyx mori, a mulberry silkworm reputed for brain improvement, could protect against stroke condition. Thus, we aimed to elucidate this issue in animals model of ischemic stroke induced by middle cerebral artery occlusion (MCAO).

**MATERIALS & METHODS:** Male Wistar rats were orally given Bombyx mori at various doses ranging from 60, 90 and 135 mg/kg BW once daily for 2 weeks before and 3 weeks after the occlusion of right middle cerebral artery. Then, they assessed the neurological score, brain infarct volume and level of malondialdehyde (MDA) including in cerebral cortex and hippocampus.

**RESULTS & FINDINGS:** The results showed that Bombyx mori significantly improved neurological score and decreased the infarct volume both in cortex and hippocampus. Moreover, the levels of MDA in both areas were also decreased.

**CONCLUSION:** Therefore, we suggest that the Bombyx mori appears to be the potential neuroprotectant candidate against stroke.

#### P168-08

##### **DIETARY PROTEIN-CARBOHYDRATE RATIO AND AGING IN RELATION TO BRAIN REGIONAL GLUTAMATERGIC ACTIVITY (BRGA) AND IMMUNE RESPONSE**

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**RATIONALE & OBJECTIVES:** Dietary variable manipulation is one of the possible ways to maintain healthy brain and immune function with age. The objective of this

investigation is to study the effects of variable dietary protein-carbohydrate ratio on BRGA in relation to immune response.

**MATERIALS & METHODS:** In the present study both young and aged rats were exposed to normal / low protein-high carbohydrate (LP-HC) / high protein-low carbohydrate (HP-LC) diet under short- and long-term periods in studying hypothalamic and hippocampal glutamate metabolism, receptor activity and cell-mediated immune response.

**RESULTS & FINDINGS:** Normal diet increased BRGA and caused immunosuppression with age. LP-HC diet in aged and HP-LC diet in young rats reduced BRGA with an immunopotentialization; whereas, HP-LC diet in aged and LP-HC diet in young activated BRGA and caused immunosuppression. The degree of these diet-induced effects was dependent on the duration of exposure.

**CONCLUSION:** These results therefore suggest that dietary protein-carbohydrate ratio may act as exogenous modulator of BRGA and immune response depending on amount of dietary protein-carbohydrate ratio, duration of intake and age.

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#### P168-09

##### **EFFECTS OF METHYL DONOR DEFICIENT DIET ON THE BRAIN MATURATION IN RAT: FROM GENE EXPRESSION TO RELATED BEHAVIORS**

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This study relates cerebral expression of selective genes sensitive to methylation and various behaviors involved during the development of rat pups born to dams fed either a normal diet or a diet lacking methyl donors (B12, B2, folate, choline) from one month before mating until the weaning of the offspring (21 days). Afterwards, all rats received normal diet. A brain proteomic investigation at weaning stage showed that several candidate genes involved in neuroplasticity such as synapsin-II could be affected in their expression. Histopathologic analysis confirmed that specific brain areas, including the hippocampus and the cerebellum, were particularly sensitive to homocysteine with a dysregulation of enzymes involved in homocysteine metabolism. Pups exposed to the deficient diet showed a delayed acquisition of motor coordination and maternal stimuli recognition during the suckling period. Moreover, despite that the switch to normal diet after weaning restored the metabolic status, rats kept long-term functional deficits, especially for learning and memory. Finally, a transient MDD diet leads to irreversible genes expression disruption during post-natal brain maturation.

#### P168-10

##### **EFFECTS OF ERGOTHIONEINE ON NEURONAL INJURY INDUCED BY CISPLATIN IN VITRO AND IN VIVO**

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We evaluated the protective effects of ergothioneine (EGT) on neuronal injury induced by cisplatin in CBA mice. The oral pretreatment with 2 or 8 mg EGT/kg b.w. for 58 consecutive days prior 7 days to the administration of 5 mg/kg b.w. of cisplatin (IP 3 times for every other day) significantly increase the number of active avoidance times by the electric shock in mice. EGT (0~200 mM) were applied to primary neuron cells 24 h prior to the treatment with 2 mM cisplatin for 24h, the damage of axon and dendrite induced by cisplatin were

obviously repaired by EGT. Furthermore, 200 mM of EGT can also decrease the 31% of apoptosis cells and decrease the caspase-3 and -9 activities in cisplatin-induced primary neuronal cells. The results suggested EGT could protect the neural cells from damage to ameliorate the impairment of memory and learning ability in cisplatin-induced mice.

#### P168-11

##### **GABA STIMULATES BRAIN PROTEIN SYNTHESIS AND ANTISTRESSFUL ACTION**

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**OBJECTIVES:** GABA ( $\gamma$ -aminobutylic acid) is one of the suppressing neurotransmitters, and also contained many foods including fruits, vegetables and fermented foods. We observed that, when rats were fed GABA-containing diet, the concentrations of growth hormone in serum significantly increased. It is known that growth hormone can be incorporated into brain. Therefore, the protein synthesis in brain after administration of GABA was examined. Changes of neurotransmitters in the brain were determined under stressful condition with or without GABA. In human volunteer study, we determined the effect of GABA on some mood state after the stress exposure.

**MATERIALS & METHODS:** Hypophysectomized rats were fed various amounts of GABA, and brain protein synthesis rate were determined by using 3H-phenylalanine. Also, the brain neurotransmitters were determined by HPLC-ECD. For human study, we propose the simple statistical calculation for mental stressor, then the salivary chromogranin A or some stress markers, and mood state by using the POMS, STAI or others were determined.

**RESULTS:** In animal study, GABA stimulates the protein synthesis via the enhancement in serum growth hormone. In volunteer study, GABA suppresses the increase of stress marker by stress exposure.

**CONCLUSION:** GABA may influence anti-stressful action via brain metabolism.

#### P169: Global Strategy on Diet Physical Activity and Health

##### P169-01

##### **DRINKING WATER RESULTS IN GREATER FAT OXIDATION THAN CARBOHYDRATE BEVERAGES DURING EXERCISE**

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**RATIONALE & OBJECTIVES:** Effective weight loss strategies are needed to address the obesity epidemic. Recommendations stress the need to exercise, but ways to magnify effects of exercise on body fat oxidation remain under-appreciated.

**MATERIALS & METHODS:** We analysed 26 crossover trials on effects of drinking water on fat oxidation during low-to-moderate intensity exercise. Mean rate differences were calculated from reported effects of water and carbohydrate beverages (CHO-B) and stratified by variables known to modify rates of fat oxidation.

**RESULTS & FINDINGS:** Drinking water consistently resulted in greater plasma free fatty acids and fat oxidation (+40%) than CHO-B, consistent with insulin-mediated inhibition of lipolysis and beta-oxidation. Differences in reported rates of fat oxidation after water vs. CHO-B consumption ranged from 0.03g/min (non-fasting, child) to 0.56g/min (fasting, adult).

**CONCLUSIONS:** A fasting adult exercising (<70%VO2Max) 1h each day could burn up to 12kg more body fat per year if water is consumed before/during exercise instead of CHO-B.

Recommendations should stress the need to drink water to magnify the effects of exercise on fat oxidation and weight loss.

**P169-02**  
**TARGETING POPULATIONS AT HEALTH-RISK:  
RELEVANCE OF A FOOD PRICE POLICY**

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INRA-ALISS, Ivry Sur Seine, FRA

**RATIONALE AND OBJECTIVES:** We question the relevance of food price policies for achieving a healthier diet and for targeting populations at nutritional risk. For this, we study the heterogeneity of demand based on 25 food categories. We use a segmentation approach to cluster individuals based on the within-cluster homogeneity of food consumption patterns, to reveal different preferences over distinct classes.

**MATERIAL AND METHODS:** We use a finite mixture of AI demand system models with membership probabilities modeled as a function of socio-demographic variables to describe food demand. The estimation uses a variant of the Expectation-Maximization algorithm applied to French panel data.

**RESULTS AND FINDINGS:** We obtain seven clusters with different price elasticities. One segment is dominated by households with a panelist at health-risk (overweighed/obese). Two segments are characterized by poverty but with distinct demand behavior.

**CONCLUSIONS:** Subsidies on vegetables target the poorer households and those with an overweighed/obese panelist. Would a tax on food be justified, it could be imposed on meat products. However the evidence of substitutions between fat and sugar-rich foods may invalidate such a policy.

**P169-03**  
**MAINSTREAMING NUTRITION INTO FOOD  
REGULATORY SYSTEM POLICY AND PRACTICE**

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**RATIONALE & OBJECTIVES:** The 'mainstreaming' of nutrition into decision-making processes for the food regulatory system's policies and food standards practices is essential to fulfill the system's healthy public policy potential. The research objective was to conceptualize 'the protection of public health and safety' for food regulatory system policy and practice.

**MATERIALS & METHODS:** A review of the historical context and current international practice towards the role of nutrition science and public health policy in food regulatory systems was conducted.

**RESULTS & FINDINGS:** The conceptualization positions the public health – food regulation relationship in two orientations. Firstly, protecting public health in setting food regulation policy - in this orientation nutrition needs to be a core component of risk analysis protocols. Second, applying food regulation as a policy instrument to help promote public health outcomes - in this orientation the costs and benefits of all nutrition outcomes (chronic disease, social, economic and environmental considerations) need to be included in calculating regulatory impact statements.

**CONCLUSION:** This conceptualization will help contribute to the reform of the decision-making of existing food regulatory systems so that their policies and practices will have greater capacity to contend with the public health challenges of modern food systems.

**P170: Marketing of Foods and Drinks to Children**

**P170-01**  
**CULTURAL RESISTANCE TO FAST FOOD  
CONSUMPTION: A STUDY OF YOUTH IN NORTH  
EASTERN THAILAND**

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**RATIONALE & OBJECTIVES:** Marketing of western fast foods, especially targeted at adolescents increased intake of saturated fat and refined sugars underlies nutrition problems with emerging obesity worldwide. This study explores the influences on fast food intake for non-metropolitan (rural and urban) adolescents in North East Thailand (Isan).

**MATERIALS & METHODS:** In and out of formal schooling 634 youths aged 15-19 years randomly representing upper, central and lower Isan were interviewed. All were asked about their knowledge of fast food health risks and their attitude and consumption of fast food and traditional food. Focus groups to obtain qualitative data were employed as well.

**RESULTS & FINDINGS:** Some three quarters of sampled youth were aware that fast food causes obesity and half knew of the link to heart disease. About half consumed fast food regularly induced by lifestyles, social events and marketing as well as convenience, speed, and taste. Nearly two thirds thought that local foods should be more popular and these beliefs were more likely for children from educated and urban families. Local foods already constitute a cultural resistance to fast food uptake.

**CONCLUSIONS:** Several methods could be employed to inform the youth especially rural dwellers that fast food many adverse health consequences. Promoting indigenous food could protect Thai youths against fast food consumption.

**P170-02**  
**NUTRITION ENVIRONMENT IN THE  
NEIGHBORHOOD OF SCHOOLS IN THE CITY OF  
SANTOS, BRAZIL**

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Recent studies have shown the impact of the nutrition environment in individual food choices and their nutritional status. The present study aimed to evaluate food availability and quality in the neighborhood of public schools. All food stores and restaurants in the 500m radius perimeter from two public schools, in areas with different socioeconomic status were assessed between 2008 and 2009. Direct measurements were performed by trained observers. Validated questionnaires from NEMS were used to rate the stores that sell food including meals. Geographical coordinates of all food points were assessed with a GPS receiver, and characteristics of places were observed through direct methods using validated questionnaires. Characteristics of the food options found in 72 establishments (47 restaurants and 25 stores) were observed. Higher concentration of liquor stores and fewer options to find fruits, vegetables, whole-grain bread and other healthier options were observed in the poorest area ( $p < 0.05$ ). The availability of healthy food in the neighborhood of schools can have impact in the development of obesity and chronic diseases in the school years and needs to be improved by interdisciplinary public health policies.

#### **P170-03**

##### **CONSUMER AND PROFESSIONAL QUALITY OF HEALTH RESORT SERVICES IN POLAND – INCLUDING NUTRITIONAL OFFER**

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<sup>2</sup>Jagiellonian University Medical College, Krakow, POL

**INTRODUCTION:** After the period of the political system transformation initiated in 1989, Poland introduced free market of health care services as the result of health care system reform in 1990.

**MATERIAL AND METHODS:** The study has been conducted since 2002 on the grounds of the Ciechocinek S.A. Health Resort. The research analyzed the resort data and conducted the questionnaire interviews among the patients, physicians and nurses, with 500 questionnaires yearly.

**RESULTS:** The patients' satisfaction depends mostly on fulfilling their expectations; which happened for 93.1% of the respondents. Patients value comfort, particularly the high standard of the living quarters and nutrition. The physicians' and nurses' priorities were the range of health procedures and work organization. Disquieting are 11.6% of the patients negatively assessing the nutritional standards; 19.2% of the respondents did not favour the change of their nutritional habits or dietary recommendations.

**CONCLUSIONS:** 1) The patients' expectations (consumer quality) regarding, among others, nutrition are more important on a competitive health resort market than professional quality. 2) Health resorts should specialize in treatment of specific health problems, with adequate nutritional offer.

#### **P170-04**

##### **AVAILABILITY OF PROCESSED FOOD IN THE NEIGHBOURHOOD OF SCHOOLS IN THE CITY OF SANTOS, BRAZIL**

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Recent studies have shown the impact of the nutrition environment in individual food choices and in their nutritional status. The present study aimed to evaluate availability of processed food in the neighborhood of public schools in Santos, Brazil. Grocery and convenience stores were evaluated using questionnaires adapted from the 2007 NEMS Study, providing measures to characterize the stores according to food availability and quality. A "Health Promotion Scale" was generated taking into account the level of manufacturing of those products. Out of 72 establishments, 47 were restaurants and 25 were stores. In these establishments, most of the available products were classified as manufactured (M), resulting in a high availability of products with high amounts of trans and saturated fat, sugar, sodium and glycemic index. The availability of manufactured products in the neighborhood of schools can have great impact for the development of obesity and chronic diseases in children in school years.

#### **P170-05**

##### **CHARACTERIZATION OF THE FOOD MARKET AROUND SCHOOLS IN THE CITY OF SANTOS, BRAZIL**

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The increase in the number establishments that sell high-calorie and low-fiber food is associated with low quality of the diet that can contribute to the increased prevalence of overweight and obesity. This study aimed to characterize the food market around schools considering the energy density and fiber content of foods. All food stores and restaurants around two public schools in different regions in the city were assessed between 2008 and 2009. Geographical coordinates of all food points in the 500m perimeter of schools were assessed with GPS, and characteristics of places were observed through direct methods using validated questionnaires. The availability and quality of food were evaluated according to a scale of Promotion of Healthy Food (PHF). Greater concentration places classified as Low PHF and lowest concentration of supermarkets and markets of fruit and vegetables (Higher PHF Scores) were observed around the school of the poorest area. School children from less-favored area may be at nutritional disadvantage and interventions that aim availability of healthier food options should be considered by public health policies.

#### **P170-06**

##### **DIFFERENCES IN FOOD PRICES AND THE ACCESSIBILITY OF HEALTHY FOOD IN THE CITY OF SANTOS, BRAZIL**

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Several studies have linked the effect of the food environment to nutritional status. This study examined the availability and the accessibility of food in a range of food stores in the city of, Brazil. All food stores and restaurants around two public schools in different regions in the city were assessed between 2008 and 2009. Direct measurements were performed by trained observers. Validated questionnaires from NEMS-S were used to rate the stores that sell food including meals. Geographical coordinates of all food points in two areas with a 500m radius perimeter were assessed with GPS, and characteristics of places were observed through direct methods using validated questionnaires. The lowest price of each food item was assessed. Differences in the distribution of food prices and quality between stores from distinct socioeconomic areas were observed. The area with the higher children population had less options of fruits and vegetables at lower quality and higher prices ( $p < 0.05$ ). Interventions that aim accessibility of healthier food options should be considered by public health policies.

#### **P171: Nutrition and Physical Activity IV**

#### **P171-01**

##### **IMPROVING HYDRATION STATUS ENHANCES ENDURANCE EXERCISE IN CHILDREN**

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**RATIONALE-OBJECTIVES:** The purpose of the study was to evaluate the importance of increasing fluid intake on

hydration status and exercise performance in young children in the heat.

**MATERIALS-METHODS:** 92 young-trained-athletes participated in the study during a 5-day summer sports camp. 31 children served as the control group (CON) and 61 children served as the intervention group (INT). All volunteers had free access to fluids while temperature ranged from 25°C to 35°C. Hydration was assessed based on the first morning urine. A 600 m running test was used to evaluate performance. INT attended a lecture on hydration and urine color charts were mounted in all bathrooms and water accessibility was facilitated in training, dining, and resting areas.

**RESULTS-FINDINGS:** INT improved significantly hydration status (USG pre=1.031±0.010, post=1.023±0.012 p<0.05), while no statistically significant changes were found in the CON. Performance was improved only in INT (time for 600m: pre=189±5sec, post=167±4sec, p<0.05; HR: pre=191±1bpm, post= 190 ±1bpm, p>0.05).

**CONCLUSION:** Improving hydration status by ad-libitum consumption of water can enhance performance, in young children exercising in the heat.

#### P171-02

##### **DIETARY IMPACT OF SEEKING AMPLE PROTEIN: PRELIMINARY FINDINGS ON RESISTANCE TRAINERS**

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**RATIONALE & OBJECTIVES:** Resistance trainers often seek higher protein diets. It is thought that this could adversely affect diet quality. However, population specificity may be an issue.

**MATERIALS & METHODS:** Protein seeking resistance trainers (180±9.6 cm, 88.8 kg fat-free mass [FFM]) were compared to non-protein seekers (176±5.9 cm, 70.1 kg FFM). The diets of male resistance trainers (n=18) who met the criteria (healthy, 18-50 y, ≥3 y of weight training) were analyzed after instruction and completion of a seven-day food diary.

**RESULTS & FINDINGS:** Compared to the non-protein-seekers, the protein-seeking group consumed a larger absolute and relative amount of protein (109.8±21 g/day [17% of kcal] vs. 250.2±87 g/day [34% of kcal], p=0.0004). The protein-seeking group tended to consume less saturated fat than the non-protein-seeking group (21.1±9 g/day [0.23 g/kg FFM] vs. 28.7±8 g/day [0.41g/kg FFM], p=0.076). There was not a reliable difference between the groups in cholesterol intake (427.9±212 mg/day [4.8 mg/kg FFM] vs. 294.9±83 mg/day [4.2mg/kg FFM], p=0.116), or fiber intake (32.2±19 g/day [0.36 g/kg FFM] vs. 28.2±10 g/day [0.40 g/kg FFM], p=0.553).

**CONCLUSION:** Within the limitations of this research design, the diets of resistance trainers, who intentionally seek protein, are not adversely affected.

#### P171-03

##### **DIETARY PROTEIN AND RESISTANCE TRAINING: PRELIMINARY DATA ON BONE HEALTH**

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**RATIONALE & OBJECTIVES:** Educational materials often state that added protein within a diet could cause bone mineral density (BMD) to decrease. Recent data refute this stance. This study's hypothesis was that protein-seeking Caucasian male resistance trainers would not differ from non-protein-seeking peers in BMD.

**MATERIALS & METHODS:** Eighteen resistance athletes (training > 3y) were studied using dual x-ray absorptiometry (DEXA) scans and self-reported 7-day diet logs.

**RESULTS & FINDINGS:** Both absolute and relative protein

intakes differed significantly (protein seekers 250±87g/d [34% of kcal] vs. non-seekers 110±21g/d [17% of kcal]; p<0.002; mean intake period 10.1 y). Protein seeking resistance trainers (BMD = 1.24±0.08g/cm<sup>2</sup>) did not exhibit lower BMD than did the non-protein seekers (BMD = 1.15±0.08g/cm<sup>2</sup>); indeed we presently conclude that they had statistically higher BMD (p=.032). Further, a significant correlation was found between gross protein intake and BMD (r<sup>2</sup>=0.45). Further analyses are ongoing.

**CONCLUSION:** Within the limitations of our design, ample protein intake did not harm, and may have increased, bone density in this population. Future research on related serum and dietary analyses are being considered.

#### P171-04

##### **PROPOSAL OF INTERVENTION FOR PREVENTION OF CHRONIC NONCOMMUNICABLE DISEASES AMONG EMPLOYEES OF UNIVERSITY OF TAUBATE**

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**RATIONALE & OBJECTIVES:** Processes of demographic transition, epidemiologic and nutritional have been occurring since the decade 60, in some countries, including Brazil. The healthful feeding and physical activity represent cares for the health and the welfare physicist of the man. It is proposed, based on this picture, orientation for the alimentary consumption, physical activity and psychological aspects, through practical actions.

**METHODS:** Formation of employees groups from the University of Taubate-SP-Brasil, since 2006, a multidiscipline team, questions are presented on alimentary consumption and of welfare emotional and physicist. Practical activities for meals preparation and physical exercises are regularly offered to the employees participants, favoring the adhesion to the personal cares.

**RESULTS & FINDINGS:** The average age of 41 years. BMI found was 29,21kg/m<sup>2</sup> where the adipose tissue ratio average was 37,13%. The daily energetic need found was 2197,62kcal. Aiming at ponderal adequacy, the average of the considered alimentary days had 11,63% reduction and all the activities are associated to the practical of exercises resisted, hydro gym and walk.

**CONCLUSION:** New strategies and pointers will have to be considered for the improvement of the knowledge regarding determinative of the feeding and the physical activity in the quality of life of the participants.

#### P171-05

##### **VALIDITY AND RELIABILITY OF SELF-ADMINISTERED PAST-1-YEAR PHYSICAL ACTIVITY QUESTIONNAIRE OF CHINESE ADOLESCENTS IN KELANTAN, MALAYSIA**

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**OBJECTIVES:** Assessment of habitual physical activity (PA) in growing adolescents is particularly challenging with very limited validated instruments are used to assess adolescents' physical activity (PA). Hence, the aim of the study was to assess the reliability and validity of a new self-reported past-1-year physical activity questionnaire (PAQ) in Chinese adolescents in Kelantan, Malaysia.

**METHODS:** 220 male and female participants aged 11 to 16 years-old were completed the study, in which all participants were administered with the PAQ, whereas 91 participants and 20 participants, respectively, completed the validity studies using 7-day PA-log and Polar heart rate monitor for 3 days.

**RESULTS:** The mean estimated of total PA levels measured

by PAQ and PA-log were  $20.3 \pm 18.1$  hours/wk and  $15.3 \pm 12.0$  hours/wk, respectively with the Spearman correlation coefficient of 0.74 ( $P < 0.01$ ). When PAQ was compared with the HRM also found that a significant moderate correlation between these two methods was 0.67 ( $P < 0.01$ ). In addition, the test-retest reliability of PAQ administered twice for 2-week apart showed that intraclass correlations (ICC) for total PA measures were relatively high with the ICC ranges from 0.69 to 0.90, except the light PA intensity in males.

**CONCLUSIONS:** This study suggests that new designed PAQ tool seems to provide reasonably good and reliable estimate of habitual PA for past one year in Chinese adolescents in Kelantan, Malaysia.

#### P171-06

##### PHYSICAL ACTIVITY DECLINES WITH AGE DURING ADOLESCENTS IN THAI SCHOOLCHILDREN

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**RATIONALE & OBJECTIVES:** Low physical activity level plays role in obesity problem which is recognized even in early life. The aim of this study was to assess physical activity levels (PAL) in different age groups in Thai adolescents.

**MATERIALS & METHODS:** Schoolchildren ( $n = 640$ ) in grade 5th to 12th from ten schools were enrolled as part of Nutrition Tools development research project. They wore Actigraph (CSA model 7164) for 7 consecutive days. The peak count, time spent for light, moderate to vigorous (MVPA) and vigorous (VPA) activities were recorded. Chi-square tests and Mann-Whitney U test were used for the purpose of statistical analysis.

**RESULTS & FINDINGS:** Four hundred and eighty five schoolchildren (230 boys and 255 girls) with the completed data of activity count ( $>12$  hours during weekday and 8 hours during weekend) were analyzed. Time spent for MVPA and VPA in boys were significantly more than girls in both weekday and weekend ( $p < 0.01$ ). The percentage of active boys and girls (MVPA and VPA more than one hour/day) were significantly inverse relationship with the grade level.

**CONCLUSIONS:** PAL declined rapidly during adolescents. Health promotion program should be encouraged especially in girls both at school and home setting.

#### P171-07

##### HEALTHY EATING

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The goal of healthy eating project was to increase awareness, motivation among Somali women and children about the issues surrounding healthy eating. Due to migration and lifestyle changes, there has been a high rate of diet related diseases within this community e.g. Diabetes. Obesity and Blood Pressure. This project also promoted healthy living for Somali women by encouraging them to participate voluntarily in active leisure programs, therefore giving them greater opportunity to participate in their own health care.

Through this work of education and practical demonstration of balanced diet resulted in healthier eating behaviors that would last a lifetime.

#### P171-08

##### EFFECTS OF TREADMILL TRAINING AND SEA TANGLE EXTRACT SUPPLEMENTATION ON THE ANTIOXIDANT SYSTEM FOLLOWING EXHAUSTIVE EXERCISE STRESS

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**RATIONALE & OBJECTIVES:** This study was designed to investigate the effects of regular treadmill exercise and Sea tangle extract supplementation on the antioxidant system following exercise stress.

**MATERIALS & METHODS:** Treadmill exercise program were given to the 6-week-old rat by 10 m/min for 30 minutes/day, and speed was elevated by 5m/min per week for 4 weeks. The experimental group was divided into 3: a control group (C), Sea tangle extract supplement group (ST, Sea tangle extract supplementation: 5g/ kg diet), and a group of treadmill + Sea tangle extract supplemented group (STD). After the treadmill exercise, these groups were further divided into those that had received the exercise stress for 1 hour (25m/min) and those that had not experienced exercise stress. The activities of the superoxide dismutase (SOD), glutathione peroxidase (GSH-Px), catalase and malondialdehyde (MDA) concentrations were measured.

**RESULTS & FINDINGS:** There was a lower body weight increase in the TD groups than in the C and D group ( $p < 0.05$ ). The catalase activity was increased in STD group compared C and D group after exercise stress.

The SOD activity levels without exercise stress showed a trend of increasing order as  $C < ST < STD$ , with a significant difference ( $p < 0.05$ ). And, the SOD activity after exercise stress was significantly increased in the ST and STD group than in the C group, but there was no significant difference between the ST and STD group. There was no difference in serum MDA concentration among the experimental groups in those that had not experienced exercise stress. However, the STD group with exercise stress showed a serum MDA concentration level significantly lower than that of the C and ST group ( $p < 0.05$ ).

**CONCLUSIONS:** As a result, regular treadmill exercise and Sea tangle extract supplementation could be considered important in controlling the oxidative stress after exhaustive exercise stress.

#### P171-09

##### FITNESS ASSESSMENT IN RELATION NUTRITIONAL PROFILE OF YOUNG ADULT FEMALES

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**RATIONALE & OBJECTIVE:** Nutritional profile including body composition and anthropometric indices plays important role in determining fitness of an individual. The study was conducted on a group 63 adult female studying at CSHs MPUAT, Udaipur, India to find out their fitness in relation to nutritional profile.

**MATERIAL & METHODS:** Nutritional profile was assessed by anthropometric measurements (weight, height and Body Mass Index) and body composition (Fat mass, fat free mass and total body water). Fitness was assessed by heart rate monitor using "Step up test".

**RESULTS & FINDINGS:** Mean age of the group was 20.4 years, weight 51.09kg and BMI 20.44 ( $\text{kg}/\text{m}^2$ ). This shows that nutritional status of the group was normal. The body fat percent was 23.54 ranging from 6.9 to 41.6. The water percent was

55.32 ranging from 41.52 to 68.82. Physical fitness test revealed that about 38 percent females had low recovery indicating poor cardio respiratory endurance. Out of 63 females only 3 showed an excellent fitness while 24 were having poor fitness using Anderson & Johnson (1988) classification. Body Mass Index did not show significant difference ( $P < 0.05$ ) with fitness. Correlation analysis also did not show any significant relation between recovery index, percent body fat and BMI.

**CONCLUSION:** The study concluded that along with nutrition, some other factors also responsible to determine physical fitness.

#### P171-10

##### **PROTECTIVE EFFECTS OF COENZYME Q10 AGAINST OXIDATIVE STRESS INDUCED BY AEROBIC EXERCISE**

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**BACKGROUND AND OBJECTIVES:** Although the antioxidant properties of coenzyme Q10 (CoQ 10) are usually ascribed to its reduced form (H<sub>2</sub> CoQ 10), the dynamics of CoQ 10 antioxidation activities in vivo have not yet been fully elucidated, especially regarding the elimination of excessive oxygen radicals produced during intense aerobic exercise. The present study investigated the protective effects of CoQ 10 against oxidative stress induced by aerobic swimming exercise, in a series of research for the nutritional and biochemical evaluations of H<sub>2</sub> CoQ 10.

**MATERIALS AND METHODS:** Four-week-old specific pathogen-free and SD strain male rats were used. Water-soluble CoQ 10 was dissolved into drinking water (5mg/day/kg body weight) and administered orally for 2 to 4 weeks.

**RESULTS:** Significant elongation of swimming duration by 4-weeks oral administration of CoQ 10 was observed in rats forced to swim. Serum lactic acid and LDH levels immediately after termination of swimming load were also significantly decreased in the CoQ 10 -administered group when compared to those of placebo-administered and control groups. Serum level of H<sub>2</sub> CoQ 10 showed a significant negative correlation with d-ROMs level during the swimming load.

**CONCLUSIONS:** The present results suggest that H<sub>2</sub> CoQ 10 was consumed to protect the body from oxidative stress during excessive aerobic exercise load, such as the forced swimming task, and contributed to defend against cellular damage.

#### P171-11

##### **THE EFFECT OF THREE TYPES OF PHYSICAL ACTIVITY ON THE REDUCTION OF METABOLIC PARAMETERS INVOLVED IN CARDIOVASCULAR RISK**

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The aim of this study was to investigate the effects of three different types of physical activity on the reduction of metabolic parameters, which are the main cause of cardiovascular diseases. This prospective-intervention study was performed at the Institute for Thyroid Gland and Metabolism «ČIGOTA» in Zlatibor, Serbia, between August 2004 and June 2006. Sixty-eight overweight/obese patients, aged 40-70 years with hiperlipidemia. The program of physical workout included:

Group I – fast walking; Group II – gymnastic exercises and specially chosen exercises in the swimming pool; Group III – combined type of physical training of higher intensity and greater length. All patients were also on a special reduction diet of 1000 kcal per day, AHA Step-2 diet. We followed body mass index, body composition, glucose, total, LDL- and HDL-cholesterol and triglyceride levels at the beginning, during and at the end of the intervention. After the intervention period of 2 and particularly 12 weeks, the most desirable results were achieved in Group III by combined exercises, with an average energy expenditure of 900 kcal per day. Our research points out that a specially conceived program of physical activity and diet intervention had significant effects on the reduction of cardiovascular risk factors.

#### P172: Nutrition Education/Communication and Behavioral Changes IV

##### P172-01

##### **IDENTIFYING THE PREFERRED NUTRITION EDUCATION METHODS TO BE INCLUDED IN A NUTRITIONAL EDUCATION PACKAGE FOR OUT-OF-SCHOOL ADOLESCENT GIRLS IN SRI LANKA**

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**RATIONALE:** Nutrition education targeted at out-of school adolescent girls is timely as they are more prone to micronutrient deficiencies.

**OBJECTIVE:** To identify preferred nutrition-education methods for out-of school adolescent girls.

**METHODS:** Eight Focus-Group-Discussions (5-8 per group) with out-of school adolescent girls, their mothers, health-volunteers (HV) and public-health-midwives (PHMs) of an urban and rural area of Sri-Lanka.

**RESULTS:** Group education using an activity-based workbook, and leaflets/posters as supportive educational material was preferred. PHMs were preferred as facilitators over HV of the area. Incentives for participation were establishing contact and continued interactions with health-care-personnel. Interactive sessions on food preparation, cookery demonstrations using locally available foods, vegetarian meals and home-gardening were suggested to be included in the education package. Educational messages highlighting: consequences of under and over-nutrition and micronutrient deficiencies, nutrition in relation to appearance, food preparation by preserving micronutrients and the “height for weight” concept were requested. Identified problems for participation were; financial constraints for girls in both areas, transportation problems to participate for rural girls, negative attitude from the community for urban girls and time-constraints to participate by working girls in both areas.

**CONCLUSION:** Need for activity-based-education methods were highlighted. Messages should reinforce current good practices and gradually modify unacceptable practices.



**P172-02****DEVELOPMENT OF A NUTRITION EDUCATIONAL TOOL FOR DIABETIC PATIENTS IN BHUTAN BASED ON THE BASIC LEVEL OF CARBOHYDRATE COUNTING CONCEPT**

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Diabetes is one of the fastest growing diseases in Bhutan but the knowledge of the disease is still limited among the Bhutanese people. Therefore a nutrition educational tool which would provide necessary information for self management and allow a variety in food choices to fit a person's preferences is necessary. The purpose of this study was to develop and evaluate the effectiveness of a nutrition educational tool based on the basic level of carbohydrate counting concept. The nutrition educational tool was developed as 2 colorful booklets about diabetes and carbohydrate counting.

The effectiveness of the tool was evaluated by 32 type 2 Bhutanese diabetic patients where most significantly ( $p < 0.0001$ ) improved their knowledge of the disease and carbohydrate counting concept. They were also found to be highly satisfied with the developed tool.

The developed nutrition educational tool was acceptable as a learning tool for Bhutanese diabetics and it helped to increase in the knowledge of both the disease as well as the carbohydrate counting concept.

**P172-03****EATING DISORDER AMONG YOUNG JAPANESE WOMEN ASSOCIATED WITH NUTRITIONAL AND BEHAVIORAL FACTORS**

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The body weights of women in their teens and twenties have recently been declining in Japan. It may be caused by psychological problem, such as identity issues, or problems in relationships with family or friends. This work discussed whether students who have higher risk of eating disorders differ in their psychological stability or life style and an awareness of their own appropriate weights.

Our study is based on a survey of 194 students who were divided in four groups: the first included those who had higher scores than 15 in both BITE (Bulimic investigatory Test and Edinburgh) and EAT-26 (Eating Attitudes Test), the second and third were the students who scored over 15 in either of the two tests and the fourth is normal students. The results show that eating disorder occurs notably among the high risk groups who misunderstand themselves as overweight, and that many of them reduce eating and increase alcohol drinking. They seldom try to loose weights with exercise.

We conclude that it is important to provide psychological therapy to young women with symptoms of social anxiety in an effort to provide them with an awareness of body weight issue and thus to correct their behavior.

**P172-04****A PRACTICAL NUTRITION COURSE FOR HEALTH PROFESSIONALS**

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**RATIONALE AND OBJECTIVES:** In their future careers health professionals will have many opportunities for health promotion advice, including nutrition. The objective is to describe the development, implementation and evaluation of a nutrition program.

**METHODS:** A literature search was undertaken of common nutritional problems in Australia and appropriate health promotion advice. The syllabus was designed to meet accreditation requirements and to address the nutrition needs of the Australian population. The students were required to undertake reviews of nutrition related disorders as group learning projects. At the conclusion of the course all students were invited to complete an evaluation survey.

**RESULTS:** The topics for the course were based on health needs and included nutritional recommendations in different life stages and nutrition related chronic diseases. Nutritional epidemiology was included to provide skills for critically reading the nutrition literature. Overall more than 80% of students agreed that the inclusion of the nutrition course in their studies was important and 88% supported the teaching methods. Group research projects and menu planning were undertaken as assignments.

**CONCLUSION:** Teaching nutrition information at undergraduate level is important as health professionals have many opportunities to give nutrition and health promotion information during the course of routine consultations.

**P172-05****DEVELOPMENT OF AN ADDITIONAL THAI FOOD EXCHANGE LIST**

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**RATIONALE:** Food exchange list is the most widely used nutritional tool for meal planning, nutritional education and food intake estimation for people with a variety of diseases. The current Thai food exchange list does not contain combination food list that Thai people commonly consumed.

**OBJECTIVE:** To construct the additional Thai food exchange list by including most commonly consumed food items and more reliable nutrients.

**METHOD:** A questionnaire was circulated to 315 dietitian members of Thai Dietetic Association in order to collect opinion and suggestion from the users as a guideline for development of the food exchange list. Suggested food items collected from the questionnaire were identified from available food nutrient database. Foods fitting in the exchange list were followed the rounding-off method of the Wheeler and colleagues. Mean value, standard deviation, and the range were calculated for each nutrient relative to each food list. It was decided to ignore food items that deviation more than 50% of the SD for a specific nutrient.

**RESULTS:** The additional Thai food exchange list was developed to include combination food list that contain one plate dishes, side dishes, fast foods, desserts and snacks. Nutrients, such as saturated fat, cholesterol, fiber, sodium, potassium, calcium, and phosphorus, were also included in the new version of food exchange list.

**CONCLUSION:** The additional Thai food exchange list is now available. It is a reliable resource for dietitians to estimate food intake and plan meals for clients more accurately.

**P172-06****EFFECT OF THE PATIENT'S CENTER COUNSELING ON EATING BEHAVIOR IN ISCHEMIC STROKE PATIENTS**

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Stroke or cerebrovascular disease is the major leading cause of death in both developed and developing countries. The patient who recovers from stroke is at high risk of stroke recurrence; therefore, secondary prevention is necessary. The purpose of this study was to determine the effect of dietary counseling on changes in eating behavior in ischemic stroke patients. Thirty subjects were diagnosed with ischemic stroke at King Chulalongkorn Memorial Hospital. The patient-centered counseling model was used to provide dietary intervention during 16 weeks. The subjects received individual dietary counseling at baseline, 4th, and 10th week after discharge. The content provided during the counseling was based on the guidelines of the American Heart Association/American Stroke Association Council. Subject's food frequency questionnaire and eating behavior score were assessed at baseline and 16th week. Dietary assessment at week 16 indicated that consumption of food items high in fat, cholesterol and sodium were significantly reduced. As a result, eating behavior scores of fat, cholesterol, and sodium at week 16 were significantly lower than those of week 0. An increased intake of vegetables, with no change in fruit intake, was reported. However, intakes of energy, carbohydrate, protein, fat, cholesterol and sodium were significantly lower at the end of study compared to those at baseline. This research suggests that dietary counseling using a patient-centered counseling model helps ischemic stroke subjects eat healthily.

**P172-07****RANDOMIZED CONTROLLED TRIAL OF A NEW DIETARY EDUCATION TO PREVENT HYPERLIPIDEMIA IN A HIGH-RISK GROUP OF JAPANESE MALE WORKERS**

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**RATIONALE & OBJECTIVES:** To assess the effectiveness of a new dietary education (NDE) to emphasize the correct way to improve laboratory test values in high-risk subjects for hyperlipidemia among Japanese male workers through a randomized controlled trial.

**MATERIALS & METHODS:** We randomly assigned 294 hyperlipidemia patients who were urban workers high-risk subjects to either the NDE group or the control group. Each subject in the NDE group received six sessions during a year of individualized interventions aimed at reducing total energy intake by modifying dietary intake. The control group received conventional dietary education. Outcome measures were examined by t-test, mixed models with/without adjusting for baseline level.

**RESULTS & FINDINGS:** Difference after and before intervention within each group were, triglycerides (TG) was decrease, high-density lipoprotein (HDL) was increase in the intervention group. The NDE group had a significantly lower increase in total cholesterol (TC) and HbA1c. The intervention group had a lower total energy intake than the control group.

**CONCLUSION:** The NDE was shown to improve laboratory test values and to reduce total energy intake in high-risk subjects for hyperlipidemia through a randomized controlled trial.

**P172-08****COVERAGE OF NUTRITION RELATED TOPICS BY PRINT MEDIA: A COMPARATIVE ANALYSIS OF LEADING NEWSPAPERS IN INDIA**

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**RATIONALE & OBJECTIVES:** Newspapers is an important source of health and nutrition information for many readers.1-4 News media over or underemphasize certain causes of ill-health for a variety of reasons, including competition for viewers and commercial interests.5Often, this contribute to confusion among the readers in addition to misinformation. A study was conducted with an objective to analyze the coverage of Nutrition Related (NUT-RE) topic in leading newspapers in India.

**MATERIAL AND METHOD:** Leading English dailies-Deccan Chronicle, The Hindu and The Times of India and leading Telugu dailies-Eenadu, Andhra Jyothi and Andhra Bhumi were selected for the study. Each newspaper was screened from 1st Sept 2007 to 29th Feb 2008 for NUT-RE articles. These articles were classified into different categories/groups for quantitative analysis.

**RESULT & FINDINGS:** A total no. of 667 NUT-RE articles appeared in all the six newspapers during the study periods. Most of the NUT-RE articles appeared in Telugu dailies stick to the well-established nutrition facts and strongly recommended its readers to consume conventional foods like cereals, pulses, millets, fruits and vegetables to protect or enhance one nutrition status. In contrast, English dailies published more articles on obesity and processed foods (chocolates, ice-creams, beverages) than other articles among all NUTRE topics. Health benefits of chocolates, beverages including liquor were mentioned in some of the articles appeared in English dailies, but these articles do not quote proper source of such claims.

**CONCLUSION:** Various articles on chocolates and beverages including liquor appeared in English newspapers found to be typical and could be confusing the readers.

**P172-09****ASSESSING THE MONTHLY FOOD ABUNDANCE-SHORTAGE CYCLE IN FOOD INSECURE OVERWEIGHT/OBESE WOMEN IN OHIO**

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This study assesses a hypothesized monthly cycle of food abundance-shortage among food insecure overweight/obese women as a possible explanation to the paradoxical relationship between food insecurity and overweight/obesity. Overweight and obesity were determined by a Body Mass Index  $\geq 25$ . A shelf-food inventory was used to determine household food availability, and dietary intake was measured by 24-hour dietary recalls. Food insecurity was measured by the USDA Household Food Security Supplemental Module. Differences in the number of shelf-food items and energy/nutrient intake between week1 and week4 were determined. Twenty-two women (77% overweight /obese, 91% food insecure) were interviewed at the beginning and the end of the month (week1, week4) to determine their dietary energy intake and household food supply. Among food insecure overweight/obese women (n=16), the number of shelf-food items (week1: 86.8, week4: 62.6, p=0.0004) and caloric intake (week1: 2157.2 kcal, week4: 1665.9 kcal, p=0.04) decreased significantly at week4. These findings suggest the existence of a monthly cycle among food insecure overweight/obese women, who might be experiencing a caloric over-consumption on week1, when food is more abundant, as a response to the food shortage on week4. Nutrition education and policy interventions are needed to better distribute resources throughout the month.

#### P172-10

### STRATEGIES FOR HEALTH PROMOTION AND LIFESTYLE-RELATED DISEASES PREVENTION BY SHOKUIKU: APPLICATION OF OVERSEAS EVIDENCES

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**RATIONALE & OBJECTIVES:** In Japan, a new health monitoring system started in April 2008, as a high-risk approach for prevention of metabolic syndrome. Besides, the importance of population approach for effective implementation of obesity prevention has been well acknowledged. This study therefore aims to review the overseas evidences on population approaches for dietary improvement to prevent obesity and lifestyle-related diseases.

**MATERIALS & METHODS:** The databases of PubMed were searched using the relevant key words. In addition, the information on diet/nutrition-related population strategies, as well as high-risk ones, was obtained by interviews at the concerned organizations in the selected EU countries.

**RESULTS:** Overall, the nationwide campaigns for encouraging healthy diet (e.g. "Five a Day") through mass media, as well as the country-specific/regional food guides, have contributed to increase awareness among the population. For males, worksite interventions were found most effective to improve eating habit and also to increase physical activity.

**CONCLUSION:** In EU countries, the evidence-based dietary interventions have been implemented successfully under the collaboration with various sectors. Our findings suggest that it is crucial to incorporate population strategies into "Shokuiku (a multiple approach to improve one's diet in Japan)", for which further investigation is required on the appropriate evaluation indicators.

#### P172-11

### A DISCUSSION ON HOW TO IMPROVE STUDENT'S ABILITIES AS DIETICIAN USING THE JAPANESE FOOD GUIDE SPINNING TOP

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The Japanese Food Guide Spinning Top (JFGST) is one of the tools aimed for improving people's eating habits. The JFGST's features are that it is based on not nutrients but dishes and foods and that its usage is simple. However, it is thought that it is necessary for dietitians to use the JFGST appropriately. The purpose of this study is to find out what kind of instructions should be given before the students who aim to be dietitians use the JFGST. Two questionnaire researches were conducted to investigate how to use the JFGST efficiently. The first research was carried out without any special explanation. Then, prior to the second research, the subjects received some instructions about how to use the JFGST. According to the results of both researches, the accuracy rate of both the division judgment and the serving (SV) reading for some dishes became higher in the second research. We also tried to extract some categories about knowledge necessary to use the JFGST by focus group interview on another instruction groups. This analysis is in progress but it seems that cooking experience and knowledge of food are related to the proper use of JFGST.

#### P172-12

### FOOD ACTIVITY DIARY IS AN IMPORTANT GOOD TOOL TO USE IN PATIENTS MANAGEMENT TO CREATE ROOM FOR MORE NUTRITION EDUCATION AND SUPPORT

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**PURPOSE:** The purpose of this study was to determine if patients who completed their food and activity diary changed some unhealthy dietary practices and lost more weight compared to patients who did not complete their food and activity diary.

**METHODS:** Retrospective study in a weight Management program in Kenya. Data was collected from patient's files who had been followed up for 6 months and were compared to patients who had come in the same period and had not completed the FAD.

**RESULTS:** Patients, who complete the Food and Activity Diary made better progress in weight loss, received more nutrition education and were more likely to change behavior"

The results indicate a significant reduction in weight loss and some behavior change in regard to dietary practices of patients who completed their FAD.

**CONCLUSION:** Patients, who complete the Food and Activity Diary made better progress in weight loss, received more nutrition education and were more likely to change behavior"

#### P172-13

### EFFECTIVE WEIGHT LOSS IS SIGNIFICANTLY IMPROVED WITH CONTINUOUS FOLLOW UP AND MONITORING

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**OBJECTIVE:** To determine the difference in weight loss among two groups of patients followed up for more than 3 months at weight loss program in Kenya.

**MATERIALS & METHODS:** This was a non-random study following patient at the clinic from the time they came until they stopped coming on their own. There were two groups of patients, those on Xenical and those on diet and exercise alone.

**RESULTS AND FINDINGS:** We had seen up to 2019 patients. Out of these 673 (33%) did not return for follow up, 485 (24%) came at least more than once, 861(42%) came for more than 3 months, 230 were on Xenical and 631 not on Xenical.

The average weight loss on patients on Xenical was 7.1% while the ones on diet and exercise was 5.8%. The highest and the east weight loss was 32.6 Kg and 5.7 kg respectively. Accurate results will be presented at the conference.

**CONCLUSION:** Continuous monitoring improves weight loss. Patients who need to lose weight should be encouraged to visits the dietician at least three months continuously.

#### P172-14

### A RENAL NUTRITION EDUCATION PROGRAM FOR HEALTHCARE PROFESSIONALS IN THAILAND

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**RATIONALE AND OBJECTIVE:** A rise in elderly Thai population and diabetes have resulted in a parallel increment of prevalence of chronic kidney disease (CKD). CKD prevention strategies require a multidisciplinary team approach to improve

quality of health care. The nutrition knowledge and skills are crucial which can prevent and delay the progression of CKD. This study aimed to develop and evaluate a renal nutrition educational program for healthcare professionals.

**METHODS:** The program was developed by Thai Dietetic Association (TDA). In collaboration with private sectors, medical universities and various hospitals in Thailand, TDA organized the training program between the years 2005-2008. The one-day program consisted of 3 hours of lectures: etiology of disease, nutrition assessment and dietary management for CKD. Two hours of workshop with 4 learning stations: 1) renal food exchange 2) foods high in potassium, phosphorus and sodium 3) low protein products and 4) get the right amount of protein for the kidney. Games, questions and menu planning practices were conducted through these learning sessions. Pre-test and post-test questionnaires were used to evaluate the effectiveness of the program.

**RESULTS:** Total of 2420 healthcare professionals were participated the program. The results indicated a significant improvement in renal nutrition knowledge with an average score of 45.56% for pre-test compared to 70.67% for post-test ( $p < 0.0001$ ). Majority (80%) were satisfied the program.

**CONCLUSION:** The developed education program was effective and can be adopted to implement in CKD patients for improving dietary compliance. This is crucial for the success of therapy and may also delay the progression of CKD.

#### P172-15

##### EFFECTS OF WEIGHT CONTROL PROGRAM ON THE ANTHROPOMETRY, BLOOD LIPID LEVELS, FOOD BEHAVIORS AND NUTRIENTS INTAKES AMONG OVERWEIGHT ADULTS

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Prevalence of an obese population has been increasing in Korea. Thus, in this study was performed to investigate the effect of a weight control program among overweight adults. Twenty-three overweight adults participated in the weight control program for 12 weeks. The body composition, blood lipid levels, food behaviors and nutrients intakes were analyzed before and after implementation of the weight control program.

The body weight was significantly changed from  $60.0 \pm 8.56$  kg to  $59.3 \pm 8.23$  kg ( $p < 0.05$ ). The ratio of hip-waist was significantly decreased from  $0.84 \pm 0.09$  to  $0.80 \pm 0.06$  ( $p < 0.01$ ). There was significantly reduced in body fat after the education ( $p < 0.001$ ). But, lipid profiles were not changed. However, the food behaviors were significantly altered ( $p < 0.01$ ).

Energy intakes was decreased significantly along with intakes of fat, carbohydrates, cholesterol and saturated fatty acids. The scores of nutritional knowledge were significantly improved after the education ( $p < 0.001$ ).

Thus the weight control program showed beneficial effects on the body weight, the food behaviors and nutrients intakes of the individuals that participated.

#### P172-16

##### NUTRITION EDUCATION ENHANCES TEACHER'S BEHAVIOR CHANGE

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**RATIONALE & OBJECTIVES:** Considering the role of the kindergarten and the elementary schools teacher's as important model in young child food habits it was developed a food-based strategy intervention to promote their behavior to an optimal nutrition in schools in Brazil.

**MATERIALS & METHODS:** The study had a longitudinal design and convenient sample of the 187 participants. The intervention consisted of the monthly workshops in healthy diet theoretical substantiated by the stage of change model. It was

used associational and descriptive statistics.

**RESULTS & FINDINGS:** Results showed that 173 (92,5%) of the participants were woman, with average age of  $43,9$  years  $\pm 9,4$ . The monthly family income of the 30,5% ( $n=57$ ) of the participants was less the US\$500,00. It was found a statistical difference ( $p=0,002$ ) between behavior previous and after the intervention.

**CONCLUSION:** The participant's behavior change for better acceptance of nutrition healthy diet will have positive impacts in planning and preparing the healthy lunch foods for young child nutrition at school environment.

#### P172-17

##### USING BIBLIOTHERAPY IN PUBLIC SCHOOL SETTINGS

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**INTRODUCTION AND OBJECTIVES:** The preparations of healthy meals can be greatly influenced by the experiences, attitudes, and values of the foodservice employees. The objective of this study is to increase the foodservice employees' consciousness towards the importance of preparing healthy foods for students.

**METHODS:** It was undertaken a qualitative study based on the bibliotherapy approach with 32 foodservices employees, who had participated in a previous food preparation intervention study, from different public schools in Brazil. Interactive didactic texts were developed which fosters an imaginative response from the participants- reader related to food habits.

**RESULTS:** The participants became more consciousness toward the necessity of preparing healthy foods for students and overcame barriers to adequately adopt efficient food preparations. Also, the participants exchanged ideas and experiences becoming more aware of their crucial role in the foodservice setting.

**CONCLUSION:** Results of this research suggests that the bibliotherapy approach can be used to increase consciousness and constructive interactions among foodservice employees.

#### P172-18

##### COMPARISON OF DIETARY HABITS ACCORDING TO FREQUENT DINNING OUT IN KOREAN WOMEN

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**RATIONALE & OBJECTIVES:** The purpose of this study was to investigate dietary habits according to the frequency of dining out.

**MATERIALS & METHODS:** This survey was conducted from January to March 2008, through questionnaires given to 780 Korean women aged ranging 35-49 years, who visited hospital for routine health check-up. The questionnaires were composed of general characteristics and dietary habits, and the results were analyzed using  $\chi^2$ - tests. The subjects were classified into 2 groups: frequent dining out group (FD, more than 3 times a week,  $n=314$ ) and non-frequent dining out group (NFD, less than 3 times a week,  $n=466$ ).

**RESULTS & FINDINGS:** The FD group were higher frequency of drinking, not-married and divorced, higher education and income ( $p < 0.05$ ) except current smoking (NS). The NFD group ate breakfast more regularly, carbohydrate containing foods everyday, and chose low fat milk ( $p < 0.05$ ). The FD group had more experience of overeating ( $p < 0.001$ ). The FD group also ate more often the fatty meat like ribs and bacon ( $p < 0.001$ ), internal organ ( $p < 0.05$ ), chinese- and fried- food ( $p < 0.001$ ), and processed food ( $p < 0.05$ ). Moreover, the frequency of bread and cake ( $p < 0.001$ ) and soda intake ( $p < 0.05$ ) as a snack was higher in the FD group than NFD group. There were no significant differences of salt, diversity of food group intake, and coffee

drinking between 2 groups.

**CONCLUSION:** The FD group had generally undesirable diet pattern, so nutritional education for healthy diet should be provided to encourage them to choose more desirable food and have healthier dietary habits.

#### P172-19

##### **GENDER DIFFERENCES IN HEALTH-RELATED HABITS AMONG A FAITH-BASED POPULATION**

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**RATIONALE & OBJECTIVES:** Gender differences in health according to Denton et al. (2004) are due to differing structural factors such as age, lifestyle factors that include diet, exercise, drinking, smoking, and psychosocial factors. The aim of this study was to investigate gender differences in nutritional habits, exercise habits, sleep habits and body mass index among a faith-based population whose teaching comprise an emphasis on healthy habits.

**MATERIALS & METHOD:** One hundred and forty six participants who attended weekly worship services comprised a convenience sample of a faith-based population in an east coast city of the United States. Data was collected following an 8-series presentation of a 12 to 15 minutes NEWSTART lifestyle program presented to participants once every month. A questionnaire created for this study was used for data collection. A healthy lifestyle index was constructed following the Steptoe & Wardle 2001 method and computed on habits related to food habits, physical activity, sleep habits, alcohol consumption and smoking.

**RESULTS & FINDINGS:** Females had healthier habits (82%) related to nutrition and had more nightly sleep (60%) of 6 hours or more, but were more physically inactive (70%) than the males. There was a higher level of overweight (57%) and obesity (63%) and higher levels of skipping breakfast (62%) among females. Levels of unhealthy nutritional habits related to smoking (7%) and alcohol (1%) use was low in both males and female but the females tended to select rich desserts (72%) more often than the males. There was an equal (50%) level of fried food consumption habits.

#### P172-20

##### **ASSESSMENT OF THE SELF-MANAGEMENT AMONG BANGLADESHI TYPE 2 DIABETES SUBJECTS**

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**RATIONALE & OBJECTIVES:** Bangladesh Diabetic Somiti (BADAS) is providing basic diabetes care to a large number of diabetic population, free of cost. Self-management is one of the major components of diabetes care. Effort, however, has not been taken to assess impact of the self-management in any among of diabetic patients in Bangladesh. The aim of this study was to assess self-management of the patients in terms of their foot care, exercise, dietary habit, and compliance to drug therapy. We also measured the barriers of self-management.

**MATERIALS AND METHODS:** A total number of 130 subjects (M 62%, F 39%) were selected purposively from among the patients attending the BIRDEM OPD (age, 49.47±9.5 yrs; BMI, 25.14±3.21 kg/m<sup>2</sup>, mean ±SD). All these patients were under the education program of BIRDEM for at least 6 years. Data were collected by a predesigned questionnaire and by examining the patient record books.

**RESULTS & FINDINGS:** About 15% of the subjects followed appropriate guidelines regarding foot care, although 22% thought that only washing is the proper step for foot care. Almost half of the subjects (48%) did their exercise approximately 30 minutes which is not adequate and 42% subjects did not maintain their ideal body weight. Most of the subjects (72%) took grain and

wheat group foods in restricted amount. Among them 34% did this habitually and 36% for diabetes control. About 10% subjects avoided to eat potato and sweet potato. From them 31% did this for diabetes control and 15% were advised by the physician. In case of sweet fruits intake, 20% avoided this because they could not afford. About 55% of the subjects did not visit their dietitian regularly. Among them 45% were not informed by physician, 43% lacked knowledge regarding its importance, and 7% had no time to visit the dietitian. Most of the subjects (65%) followed medication rules properly. About 35%, 49% and 29% of the subjects did not achieve their targeted level of glycemic status, triglyceride level and total cholesterol level respectively.

**CONCLUSION:** The levels of self-management in Bangladeshi type 2 diabetic subjects are not optimum and lack of proper knowledge regarding the importance of self-management is the main barriers for improving the situation.

#### P172-21

##### **ASSESSMENT OF DIETARY INTAKES, BEHAVIOR, AND PHYSICAL ACTIVITY AMONG COLLEGE STUDENTS IN JAPAN**

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**RATIONALE & OBJECTIVES:** The global strategy on diet, physical activity urges healthier lifestyle to prevent metabolic syndrome. Obesity or slim among adolescents has increased alarmingly and has become a serious public health problem in Japan. Regular breakfast eating is an important contributor to a healthy lifestyle and health status and health promoting behavior for Japanese adolescents.

**METHODS:** A cross-sectional, descriptive design was used to investigate a sample of 236 (age 18-23 yrs) college students in the metropolitan Tokyo area during the 2008 academic year. The main variables were dietary intakes, health promoting behavior, physical activity level, and BMI. Data were collected by a self-administered Food frequency questionnaire (FFQW82), lifestyle questionnaire, and 7-day physical activity record.

Obesity or slim was classified according to BMI (obesity, BMI ≥ 25; slim, BMI < 18.5). SPSS was used to analyze the data.

**RESULTS & FINDINGS:** Both 10.0% (n=24) were obese (BMI ≥ 25) or slim (BMI < 18.5). The men's energy intake (mean ± SD kcal) was 1782 ± 249.6 compared with the Recommended Dietary Allowance (RDA, 2005) of 2300kcal. Fat intakes (mean ± SD %) constituted 26.0 ± 2.3 of total energy intake, which complies with the recommended guideline of 25-30%.

**CONCLUSION:** Preventive programs should aim to improve the dietary intakes and physical activity for their current and future health status.

#### P172-22

##### **HELEN KELLER INTERNATIONAL'S ESSENTIAL NUTRITION ACTIONS APPROACH IN RURAL**

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**RATIONALE:** The Essential Nutrition Actions (ENA) approach is a set of seven proven nutrition interventions delivered at the facility and community level to improve the health and nutrition of women, infants and children. In the highly food insecure Barisal Division of Bangladesh, one of the most significant challenges is to build effective counseling and facilitation capacities to counter regional-specific feeding taboos. HKI-Bangladesh has integrated the ENA approach into its successful food security projects.

**OBJECTIVE:** The paper examines the challenges of the diverse ENA stakeholders to improving nutrition and health outcomes while identifying the best practices and designing effective strategies for capacity building (via counseling skills)

of front-line workers.

**MATERIALS AND METHODS:** This is a qualitative study based on the experiences over 50 ENA training recipients including Community Health Volunteers, government health assistants, family welfare assistants, partner NGOs and microfinance organizations gathered through extensive interviews and focus group discussions.

**RESULTS AND CONCLUSION:** The ENA approach, once adapted and applied by a range of stakeholders, addresses the concerns of diverse community groups. To be effective as a behavior change tool, adequate resources and attention must be drawn toward building the counseling capacity of front-line workers. Capacity and knowledge must also focus on influential community members, including spouses and mothers-in-law.

#### P172-23

##### **DEVELOPING A NUTRITION EDUCATION TOOL: BOOKLET FOR SODIUM CONTENT GUIDELINE IN THAI FOODS**

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Hypertension is a major contributor to the global burden among the non-communicable diseases. The reduction of dietary sodium intake is widely prescribed for hypertensive persons to control blood pressure. The purposes of this study were to develop and evaluate the effectiveness of an educational tool model for self-help meal planning to restrict sodium consumption using traffic-light concept.

The developed booklet composed of part 1, focusing on the general information about hypertension, dietary sodium, food exchange lists, and principle of traffic-light concept. Part 2 comprised with colorful food photographs of the top ten most commonly consumed food items in ten categories and demonstrated the sodium content per exchange and per serving of foods using 3 color dots (red, yellow, and green). The effectiveness and participant's satisfaction of the developed tool was assessed through 124 adults (25-59 yrs) who lived in Bangkok. The participant's performances were determined before and after using the booklet.

The results revealed that, from the Pre-test, Post-test score, most participants significantly improved their knowledge and understanding of meal planning using traffic-light concept ( $p < 0.05$ ). From the exercise homework score, a majority of participants understood traffic-light concept at high level (80.6%). In addition, they were also satisfied with the developed educational tool.

In conclusion, the booklet for sodium content guideline in Thai foods using traffic-light concept is an acceptable and attractive learning tool.

#### P172-24

##### **NUTRIPLUS PROGRAM FOR WOMEN, INFANTS, AND CHILDREN IN KOREA**

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**RATIONALE & OBJECTIVES:** To ensure the future health of the nation, a special supplemental nutrition program (NutriPlus+) for Women, Infants and Children was developed in 2004 with US WIC as a benchmark. After 3 years' pilot study, NutriPlus+ was implemented as a nationwide program in 2008, and the effect of the program was examined.

**MATERIALS & METHODS:** Periodical nutrition education

and special supplemental foods were provided to participants certified by residency, age or pregnancy/breastfeeding, household income ( $< 200\%$  of minimum monthly living expenses), and nutritional risk such as anemia, stunting, underweight, and/or inadequate nutrient intake. Supplemental food packages were prepared using combinations of 11 food items (milk, eggs, black soybeans, carrots, potatoes, rice, dried sea mustard, dried-laver, canned tuna, tangerine/orange juice, and infant formula) and delivered to participant's residence periodically, and their nutritional status was assessed before and after participation.

**RESULTS & FINDINGS:** After 6 months (or more) participation, the proportion of participants with iron deficiency anemia was halved (from 54.8% to 27.3%) along with corresponding increase in blood hemoglobin (11.1 to 11.8 g/dl,  $< 0.01$ ) and the prevalence of underweight and/or nutrient intake inadequacy was significantly decreased.

**CONCLUSIONS:** NutriPlus+ Program was effective in improving nutritional status of participants at risk.

#### P172-25

##### **A PRACTICAL NUTRITION EDUCATION TOOL FOR RENAL PATIENTS**

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**RATIONALE AND OBJECTIVE:** A self-management education tool for appropriate food choices and meal planning to prevent malnutrition and delay renal progression among people with chronic kidney disease (CKD) is essential. A dietary education tool is carefully selected for each individual to achieve clients' maximum understanding and adherence. The aim of the study was to develop and evaluate the effectiveness of a nutrition education tool for promotion of healthy eating among CKD patients.

**METHODS:** A package of educational tool was designed (a flip chart, poster and small booklet) for being simple and practical to use. Colorful photographs, graphics and pictorial format were also used. The effectiveness of the tool was evaluated by 50 CKD patients. Pre-test and post-test questionnaires and six-point Likert item were used to assess the subject's knowledge and their satisfaction.

**RESULTS:** The developed educational tool was different from other traditional printed materials. They were designed for easily understanding and illustration the amount of foods for easy to estimate the amount of protein consumed. The contents comprised general information on renal disease, renal food exchange, meal patterns with certain amount of protein, foods high in potassium, phosphorus, sodium and self-monitoring records. The tool was delivered via group education and demonstration session. The scores of subjects' knowledge in estimation the amount of protein in their meals were significantly higher after using the developed tool ( $p < 0.05$ ). Most participants (75%) were also found to be moderately satisfied with the tool.

**CONCLUSION:** The illustrated educational tool can stimulate more semantic responses which could be helpful for self-management meal planning and prevention of protein malnutrition among CKD patients.

#### P172-26

##### **WEIGHT CHANGE IN YOUNG ADULTS: IDENTIFYING FACTORS FOR TARGETED INTERVENTION STRATEGIES**

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**RATIONALE & OBJECTIVES:** Weight gain in the first semester of college is associated with metabolic dysfunctions and cardiovascular disease (CVD) risk in adulthood. Identifying

changes in dietary habits of this population may provide effective intervention strategies and reduce the public health burden of chronic disease.

**MATERIALS & METHODS:** Data from anthropometric and CVD risk biomarker measurements, food diaries and food frequency questionnaires were collected from 53 first-year college students 4 times over the first 16-week semester.

**RESULTS & FINDINGS:** Of those completing last measurement (n=32), 59% gained weight (2.7±1.6kg, p<0.001) and showed a mean increase in lean mass (2.1±2.3kg, p<0.001), and 25% lost weight (-1.1±0.5kg, p<0.001) and showed a mean reduction in fat mass (-1.3±0.5kg, p<0.001). Weight change was not significantly associated with meal plan type or number of meals consumed in dining halls. Comparative analysis of changes in dietary patterns will be presented.

**CONCLUSION:** Both positive and negative weight change was observed in this population, and factors were identified that may serve as potential intervention strategies to decrease weight gain and disease risk in this population.

#### P172-26

##### **GENDER DIFFERENCES IN HEALTH-RELATED HABITS AMONG A FAITH-BASED POPULATION**

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**RATIONALE & OBJECTIVES:** Gender differences in health according to Denton et al. (2004) are due to differing structural factors such as age, lifestyle factors that include diet, exercise, drinking, smoking, and psychosocial factors. The aim of this study was to investigate gender differences in nutritional habits, exercise habits, sleep habits and body mass index among a faith-based population whose teaching comprise an emphasis on healthy habits.

**MATERIALS & METHOD:** One hundred and forty six participants who attended weekly worship services comprised a convenience sample of a faith-based population in an east coast city of the United States. Data was collected following an 8-series presentation of a 12 to 15 minutes NEWSTART lifestyle program presented to participants once every month. A questionnaire created for this study was used for data collection. A healthy lifestyle index was constructed following the Steptoe & Wardle 2001 method and computed on habits related to food habits, physical activity, sleep habits, alcohol consumption and smoking.

**RESULTS & FINDINGS:** Females had healthier habits (82%) related to nutrition and had more nightly sleep (60%) of 6 hours or more, but were more physically inactive (70%) than the males. There was a higher level of overweight (57%) and obesity (63%) and higher levels of skipping breakfast (62%) among females. Levels of unhealthy nutritional habits related to smoking (7%) and alcohol (1%) use was low in both males and female but the females tended to select rich desserts (72%) more often than the males. There was an equal (50%) level of fried food consumption habits.

**CONCLUSION:** Health habits are highly variable across a sample receiving the same health-related education. This study provides directions and priorities to improve future intervention programs. Factors related to gender differences in health need to be carefully examined.

#### **P173: Rational Use of Dietary Supplements**

##### **P173-01**

##### **EGYPTIAN ARTICHOKE CYNARA SCOLYMUS VOLATILE COMPOUNDS: PROTECTES AGAINST LEAD-INDUCED HEPATIC AND RENAL**

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The present study was designed to investigate the potential protective effect of Egyptian artichoke against the hepatorenal toxicity of lead in Swiss male albino rats. Twenty-three volatile compounds were identified using Gas Chromatography – Mass Spectrometry (GC / MS). Four groups of rats were used, group 1 to serve as control, group 2 intraperitoneal injected with lead acetate (20 mg/kg B.W), group 3 and 4 are lead injected rats given artichoke head and leaves extract respectively with drinking water (1g /dl). The experiment continued for 30 days. The plasma total protein, cholesterol, urea and creatinine were determined. The activities of Alanineaminotransferase (ALT), aspartate aminotransferase (AST),  $\gamma$ -glutamyltransferase ( $\gamma$ -GT) were followed. The level of plasma oxidation products of malondialdehyde was estimated. The histopathological changes in liver and kidneys were examined. Artichoke (leaves or head) co-treatment to the lead-administered rats attenuated the increase of ALT, AST,  $\gamma$ -GT activities. In addition, the change in cholesterol, urea, creatinine and protein levels were less marked. The values reported were near to normal. In addition, the morphological damage in the liver and kidney was reduced and the tissues appeared like those of controls. The present study suggests that, because the presence of volatile constituents with antioxidative properties, artichoke may be useful in combating damaging effect of lead toxicity.

##### **P173-02**

##### **ANALYSIS OF MINERAL CONTENTS IN FUNCTIONAL FOODS FOR HEALTH USING INAA-METHOD**

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**RATIONALE AND OBJECTIVES:** With increasing tendency, Korean people intake functional foods for health (FFH) because of increased interest on well-being and quality of life. FFH are known to contain not only physiological functional material but also some micronutrients, especially in case of nutritional supplements. Therefore, the amount of micronutrient intakes in Korean through FFH can also be high. However, the assessment of these micronutrients intake through FFH is difficult because of the deficiency of micronutrient composition database of FFH. Most studies on micromineral intake assessment used a limited data of nutrition labeling of FFH. As for nutritional labeling in Korean FFH, only labeling of Na contents is obligatory from minerals, so the intake of micro-minerals through FFH could not be exactly assessed. In this study, we analyzed the micro-mineral contents of FFH in one serving size and daily allowances to contribute for database building of FFH and assessment for micro-mineral nutrition status of Koreans.

**MATERIAL AND METHODS:** The FFH samples were selected as favored and mostly used FFHs by Koreans using Korean FDA reports and using our survey, and homogenized or/and freeze-dried differently according to FFH type. The prepared FFH samples analyzed for micro-mineral contents using Instrumental Neutron Activation Analysis-method (INAA).

**RESULTS AND FINDINGS:** Mg of one serving size can supply 36.3mg by Clorolla-Spirurinas FFH, followed 36.0mg by Aloe FFH. The Fe content of one serving size was the highest

in nutritional supplements showing an average of 16.65mg, followed by Clorolla-Spirurinas FFH, 1.35mg. The Zn content in one serving size of nutritional supplements was the highest among FFHs showing an average of 4.23mg, followed by glucosamine FFH, 3.75mg. The Se contents in one serving size showed a similar tendency as Zn contents, so nutritional supplements of one serving size can supply an average of 10.8ug glucosamine FFH, 3.75ug Cr can be supplied highly by the one serving size of Clorolla-Spirurinas FFH 10.5ug followed by nutritional supplements 7.9mg Mn contents were below 1ug in one serving size of dietary supplements. The I content was the highest in one serving size of Korean health foods extracts followed by nutritional supplements and Korean ginsengs.

**CONCLUSIONS:** Koreans can intake microminerals by use of not only nutritional supplement but also other FFH such as glucosamine, Clorolla-Spirurinas, and Korean Ginseng. Our results can be used for the assessment of mineral nutrition status of Koreans.

#### P173-03

##### FOOD FOR SPECIFIED HEALTH USES AND DIETARY SUPPLEMENT USE AMONG ADULTS IN JAPAN

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**OBJECTIVES:** This study was undertaken to assess food for specified health uses and dietary supplement use and its association with dietary habits among adults in Japan.

**METHODS:** A nutritional survey was conducted in thirty-five areas of twenty-eight prefectures from 2004 to 2008. Vitamin (B1, B2, B6, C and E) and mineral (calcium and iron) supplements use were also reported. Data of three non-consecutive days in spring, summer, autumn and winter were obtained from each subject. Dietary habits were asked using questionnaire.

**RESULTS & CONCLUSION:** The total number of subjects was 1856 (820 males and 1036 females aged over twenty years). Half of the subjects used food for specified health uses more than one day during the nutritional survey. Use of dietary supplement of calcium and vitamin B1 were more frequent than other nutrients. Nutritional survey should include such food for specified health uses and dietary supplements, which for most may not be medically indicated and contribute to energy intake of vitamin and mineral.

#### P173-04

##### PATTERNS OF DIETARY SUPPLEMENT USAGE IN VIENNESE ADULTS

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**RATIONALE & OBJECTIVES:** The offer of dietary supplements is strongly increasing in Austria. However, little is known about the usage and population characteristics of consumers. The aim of this study was to collect data on dietary supplement intake and motivation of Viennese adults.

**MATERIALS & METHODS:** In this survey carried out in Viennese drugstores, 120 participants were investigated about details regarding the use or non-use of dietary supplements from January till June 2008. Questions about current dietary supplement intake as well as type and main components were asked. Additionally, information on lifestyle and demographic characteristics as well as the motivation for supplement usage were analyzed.

**RESULTS:** Dietary supplements were used by 36% of the participants. Particularly women, people aged between 51 and 64 years, followed by 19 – 25 year old persons, participants with a higher educational level and individuals classified as health-conscious had a greater likelihood of using dietary

supplements. To classify the health-consciousness a special score was developed, including factors as BMI, smoking habits, physical activity, eating habits and medical history.

**CONCLUSION:** This survey describes the number of people using dietary supplements in Vienna and demonstrates associations to lifestyle factors.

#### P173-05

##### HEALTH-ECONOMIC ASPECTS OF OMEGA-3 FATTY ACID SUPPLEMENTATION

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**RATIONALE AND OBJECTIVES:** Chronic diseases due to lifestyle changes dominate mortality statistics. Preventive measures and economic aspects are important. This paper discusses the economic aspects of omega-3 fatty acid (FA) supplements for cardiovascular protection.

**MATERIALS AND METHODS:** Risk reduction for acute myocardial infarction (MI) in primary and secondary prevention (PP and SP) in the general German population, costs for supplementation, and costs for a living year gained (LYG) were calculated for both groups.

**RESULTS AND FINDINGS:** PP resulted in a reduction of 1.711 death cases by MI and 1.353 cases for SP with costs of 121947 € and 51952 €, respectively, for each projected scenario. Costs of each LYG were 6374 € for PP and 3541 € for SP, well below the accepted willingness to pay levels of \$50,000 USD per LYG.

**CONCLUSION:** It is shown that supplementation with omega-3 FA in PP and SP for cardiovascular diseases makes sense under current economic conditions in Germany. Further studies on a broader basis are needed.

#### P173-06

##### PREVALENCE OF HERBAL PRODUCTS AMONG CZECH ADULTS

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**RATIONALE AND OBJECTIVES:** Popularity of herbal products (HP) is increasing worldwide (1). Since the modern scientific data on HP use in Czech Republic are lacking, we decided to study their prevalence among adult population.

**MATERIALS AND METHODS:** Data from 1,000 participants were gathered via face-to-face interviews with questionnaires.

**RESULTS AND FINDINGS:** Accordingly with USA (2), Malaysia (3) and Australia (4), mass media (33%) and literature (23%) were identified as sources on HP information. The products based on traditionally used plants e.g. *Mentha piperita* (18.4%), *Plantago lanceolata* (12.4%) and *Melissa officinalis* (12.2%) are preferred.

**CONCLUSION:** HP is commonly used by Czech adult population, which prefers local plants and information on HP gains particularly from mass media and literature.

**Acknowledgement:** Financially supported by ITS CULS Prague.

#### P173-07

##### EFFECT OF PHYTOSTEROL ESTERS AND OMEGA 3 FATTY ACID SUPPLEMENTATION ON HYPERCHOLESTEROLEMIC PATIENTS

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**RATIONALE & OBJECTIVES:** Studies have shown that the type and amount of dietary fat affect the level of serum



total cholesterol and hence the risk of Coronary Heart Disease. The present study was conducted to assess the complementary effect of phytosterol esters and n-3 fatty acid on lipid profiles of hypercholesterolemic subjects.

**MATERIAL & METHOD:** Hypercholesterolemic subjects of 57 was randomly divided into experimental group (n=29) and control group (n=28). Both the groups were given dietary advice for lowering cholesterol whereas, the experimental group was also given daily supplement of phytosterol (1.5g) and omega 3 fatty acid (630mg EPA and 420mg DHA) in 3 doses for 8 weeks.

**RESULTS:** A significant reduction in the total cholesterol (-18.0% vs +3.85%), triglycerides (-30.21% vs +4.2%), LDL-c (-25.0% vs +4.5%), LDL: HDL-c ratio (-30.7% vs +12.5%) and significant increase in the HDL-c (+10.5% vs-6.5%) was registered in the experimental group as compared to the control group.

**CONCLUSION:** Thus, the study demonstrated a cholesterol lowering effect of phytosterol esters and n-3 fatty acids in combination.

#### **P173-08 STUDY ON NUTRITIONAL KNOWLEDGE, USE OF NUTRITIONAL SUPPLEMENTS AND NUTRIENT INTAKE IN KOREAN ELITE BODYBUILDERS**

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The objectives of this study were to investigate the nutritional knowledge, the use of nutrition supplements, and nutrient intakes of male elite bodybuilders (n=20). Participants carried out a comprehensive survey, anthropometric assessment, and 1 day food record. The mean age of the subjects was 23.4 years. The mean duration of exercise was 5.3 years. The average scores of nutritional knowledge were 71.0 %. The subjects were gathered nutrition information from nutrition book (65%), mass communication (50%), friends (50%) and coach (30%) in order. Ninety percentage of the subjects reported that they were taking nutritional supplements. Major reasons for taking nutritional supplements were to improve performance and to build-up muscle. The most frequently taken nutritional supplements were protein powder (85%), multivitamin/mineral (75%), BCAA (60%) and glutamine (55%) in order. The average daily energy intakes of the subjects were 4,248.7 kcal. The mean intake of protein was 370.3 g/day (3.9 g/kg BW). More research needs to be conducted to determine the optimal amounts of carbohydrates, protein, lipid and micronutrients for the bodybuilders.

#### **P173-09 EFFECTS OF BAMBOO (*Sasa borealis*) LEAF EXTRACT ON $\alpha$ -GLUCOSIDASE ACTIVITY AND POSTPRANDIAL GLYCEMIC RESPONSE**

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Bamboo (*Sasa borealis*) leaf has been known to have anti-diabetic properties. In this study, thus, we tried to evaluate the effects of water extract of bamboo leaf (WEB) on the inhibition of  $\alpha$ -glucosidase activity and postprandial glycemic response following ingestion of four foods, which contain a high percentage of carbohydrate. Fourteen healthy adults consumed 50 g of available carbohydrate from cooked rice, instant ramen, cooked noodle, or bread, either with or without 2,000 mg of WEB. The activity of  $\alpha$ -glucosidase was inhibited dose dependently by WEB. With WEB, blood glucose concentration at 15 min and the positive area under the curve (AUC) of postprandial glycemic response at 15 and 30 min after consuming each of the four foods reduced significantly and total positive AUC during 120 min decreased after eating

cooked rice or bread. Glycemic index and glycemic load of the four foods declined from 13% to 23% with WEB. These findings indicate that WEB may be beneficial for postprandial glucose control which might be partially mediated by inhibition of  $\alpha$ -glucosidase.

#### **P173-10 THE KNOWLEDGE, ATTITUDES AND PRACTICES OF AMERICAN OVERSEAS DIETETIC ASSOCIATION (AODA) MEMBERS REGARDING DIETARY SUPPLEMENTS**

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The study is on the knowledge, attitudes and practices of AODA members regarding dietary supplements. The respondents were sent a 24-item survey in which they had to rate the statements using a five-point Likert scale.

The study aimed to describe the knowledge, attitudes and practices of American Overseas Dietetic Association regarding dietary supplements. And if AODA members believed that dietary supplements are safe and effective to recommend to their clients.

The results of the study showed that the knowledge of AODA members obtained show that they are not sure on their knowledge and training regarding dietary supplements, on its interactions and contraindications. AODA members strongly agree that RDs should be knowledgeable and should act as an authority in dietary supplement issues with the public. Moreover, the members are willing to receive formal training regarding the issues.

The results showed that the respondents were doubtful on the safety and effectiveness of dietary supplements available in the market. They believe that they are a source of trustworthy knowledge on dietary supplements and they are comfortable in discussing dietary supplements to the public, including their clients. Generally, results showed that AODA members are divided in recommending dietary supplements to their clients.

#### **P173-11 DEVELOPMENT OF PRODUCTS SUITABLE FOR TYPE-2 DIABETICS USING FLAXSEED POWDER AND ASSESSMENT OF THEIR SENSORY ACCEPTABILITY**

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**RATIONALE & OBJECTIVE:** Studies have proven flaxseed as a low risk, inexpensive, food based intervention for normalizing the metabolic milieu of diabetics. The present study attempted to develop products using flaxseeds which could be included in the daily diets of diabetics and assess their sensory acceptability.

**MATERIALS & METHOD:** The study was conducted in two phases. Phase I involved development and standardization of 8 products i.e. bread, biscuit, vadi, murruku, cutlet, chapatti, soup and idli. Assessment of yield, shelf life and nutritive value was done. Phase II involved sensory evaluation of products using 5 point rating scale and statistical analysis using chi square.

**RESULTS:** At 1% level, no significant difference was found between the control and experimental samples of bread (p=0.052), biscuit (p=0.35), murruku (p=0.125), cutlets (p=0.216), soup (p=0.28) and chapatti (p=0.035). However, a highly significant difference was there in case of vadi and idli (p=0.000) wherein the experimental sample was more acceptable than control.

**CONCLUSION:** Flaxseeds can be successfully used to prepare well acceptable and appropriate products for diabetics.

## **P174: Nutrient Supplementation (single, multiple combinations) IV**

### **P174-01**

#### **LEUCINE REDUCES THE CONCENTRATIONS OF INSULIN-LIKE GROWTH FACTOR-1 IN PREVIOUSLY OBESE AND INSULIN RESISTANT RATS**

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**RATIONALE & OBJECTIVES:** Recent studies show that supplementation with leucine (SL) favors the reduction of body fat. Moreover, few studies evaluated the effect of leucine in pathophysiological conditions such as insulin resistance. Accordingly, the purpose of this study is to evaluate the effect of SL in insulin resistant rats administered with high-fat diet.

**MATERIALS & METHODS:** Initially thirty rats were fed with high-fat diet for 15 weeks. Subsequently, they were distributed into control group (CG, n = 7) and leucine group (LG, n = 8), fed with AIN-93M and supplementation (5%), respectively. After 6 weeks the animals were sacrificed and samples for analysis were collected.

**RESULTS & FINDINGS:** We do not observe significant difference in body weight gain (p = 0.229), deposit of subcutaneous (p = 0.245), epididymal (p = 0.155) and retroperitoneal (p = 0.152) fat between groups. Furthermore, IGF-1 concentrations of the LG group were reduced significantly when compared with CG group (p <0.024).

**CONCLUSION:** The results of this study suggest that supplementation with leucine interferes in factors secreted by adipose tissue such as IGF-1, which contribute directly to the pre-adipocyte differentiation independent of changes in fat or body weight.

Supported by FAPESP, 07/59291-3 & 07/51964-9.

### **P174-02**

#### **INSULIN RESISTANT RATS MAKE HIGHER DEPOSITION OF FAT WITH LEUCINE SUPPLEMENTATION AFTER EXERCISE**

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**RATIONALE & OBJECTIVES:** Studies show that both the exercise (EX) and leucine supplementation (SL) reduce body fat (BF). Furthermore, the literature is scarce on studies that evaluated the combined effect of these two strategies in a situation pathophysiology. Accordingly, this study aims to evaluate the effect of SL associated with the EX on the GC of rats resistant to insulin.

**MATERIALS & METHODS:** Initially rats were fed with high-fat diet for 15 weeks. Subsequently, they were distributed into control group (CG) (AIN-93M, n=7), leucine group (LG) (5% SL, n=8), exercise group (EG) (swimming 60min/d, n = 8) and group exercise + leucine (GEL) (5% SL + swimming 60min/d, n = 7). After 6 weeks the animals were sacrificed and samples were collected for analysis.

**RESULTS & FINDINGS:** We observed reduction in body weight gain between the GEL vs. CG (p <0.019). Dietary factors (p <0.018) and exercise (p <0.048) contributed to these results. In addition, deposit of epididymal fat (p <0.038) and the sum of three deposits of fat (p <0.022) were increased in LG group vs EG group.

**CONCLUSION:** The results of this study suggest that the SL favors more accumulation of fat by stimulating lipogenesis.

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### **P174-03**

#### **EFFECT OF BOVINE COLOSTRUM SUPPLEMENTATION ON THE MODULATION OF INTERFERON GAMMA IN HOCKEY PLAYERS DURING TRAINING PERIOD**

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**RATIONALE & OBJECTIVES:** Bovine colostrum (BC) contains a remarkable amount of bioactive substances and it is known among athletes as a supplement to enhance immune function. However, it remains unknown whether BC is able to modulate cytokine secretion by human leucocytes. The aim of this investigation was to determine the effects of a commercially available BC preparation on the production of interferon gamma (IFN- g) by human peripheral blood leucocytes.

**MATERIAL & METHODS:** Subjects were adolescent hockey players (13 to 16 years old), under-going regular sports training at the Bukit Jalil Sports School, Malaysia, were randomly assigned into two groups i.e. control group (n=18) and experimental (n=18) group. The control group were given daily supplementation of skim milk (20 g/day) while the experimental group received BC (20 g/day). Venous blood was collected into heparinised tubes on Days 0 and 42, for blood cell count analysis and quantification of IFN- g produced by peripheral blood leucocytes cultured in the presence of a mitogen (Concanavalin A) for 24, 48 and 72 hours were determined using a commercial ELISA kit.

**RESULTS & FINDINGS:** The baseline levels of plasma IFN- g concentrations were comparable for both groups. The six-week dietary intervention positively modulated the production of plasma levels of IFN- g. Although the increase in plasma IFN- g levels at the end of the experiment was higher in the BC group, it did not reach the statistical significant level (4.38 pg/mL vs. 3.55 pg/mL; p=0.25). In contrast, the production of IFN- g by the Concanavalin A-stimulated leucocytes, was significantly (P>0.05) reduced in the BC group.

**CONCLUSION:** The present study shows that six-week (20g/day) of BC supplementation in combination with exercise training can modulate production of IFN- g in adolescent hockey players and the findings suggest that bovine colostrum may enhance the immune status in hockey players during normal training period.

### **P174-04**

#### **BIOTIN LOWERS BLOOD PRESSURE AND BLOOD GLUCOSE IN STROKE-PRONE SPONTANEOUSLY HYPERTENSIVE RAT**

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**RATIONALE & OBJECTIVES:** Biotin deficiency has been associated with hyperglycemia and insulin resistance in animals and humans. We investigated the effects of biotin on glucose homeostasis and hypertension in stroke-prone spontaneously hypertensive rat (SHRSP).

**MATERIALS & METHODS:** SHRSP was divided two groups and provided distilled water or distilled water containing 3.3 mg/l biotin for 8 weeks. The systolic blood pressure was measured once every week during the experimental period. Wistar and Wistar-Kyoto (WKY) were used as control strains. For the single-dose administration of biotin, various doses of biotin was administered intraperitoneally to SHRSP and the alteration of systolic blood pressure was measured. To block

the cGMP cascade, SHRSP was treated with guanylate cyclase inhibitor (ODQ) or nitric oxide synthase inhibitor (L-NAME) before the administration of biotin.

**RESULTS & FINDINGS:** Both single dose and long-term administrations of biotin decreased the blood pressure and glucose in SHRSP. Pretreatment with ODQ abolished the hypotensive action of biotin in the SHRSP, while pretreatment with L-NAME had no effect on the action of biotin. Biotin also showed a protective effect against stroke in the SHRSP.

**CONCLUSION:** Biotin has an antihypertensive effect in the SHRSP via the NO-independent direct activation of soluble guanylate cyclase.

#### P174-05

##### **BENEFICIAL EFFECTS OF SPIROGYRA NEGLECTA EXTRACT ON GLYCEMIC AND LIPIDEMIC STATUS IN STREPTOZOTOCIN-INDUCED DIABETIC RATS FED A DIET ENRICHED IN FAT**

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The effect of diabetes mellitus on lipid metabolism is well established. The association of hyperglycemia with an alteration of lipid parameters presents a major risk for cardiovascular complications in diabetes. In the present study, anti-hyperglycemic and anti-hyperlipidemic efficacies of the aqueous extract from *Spirogyra neglecta* were evaluated in streptozotocin (STZ)-induced diabetes rats fed a diet enriched in fat. The diabetic male Wistar rats, induced by injection of STZ (40 mg/kg intraperitoneally), were fed a fat-rich diet (60% calorie from fat). Oral administration of *Spirogyra neglecta* extract at a dose of 500 mg/kg BW/day was performed for a period of 9 weeks. The results showed that diabetic rats exhibited significant increase in the levels of plasma glucose and triglyceride ( $p < 0.05$ ). Interestingly, the significantly decreased plasma glucose ( $303.7 \pm 46.8$  vs.  $206.3 \pm 22.0$  mg/dL,  $p < 0.05$ ) and triglyceride ( $356.9 \pm 12.0$  vs.  $157.6 \pm 44.5$  mg/dL,  $p < 0.05$ ) were observed in diabetic rats fed *Spirogyra neglecta* extract. *Spirogyra neglecta* extract did not affect plasma cholesterol level in diabetic rats. These findings indicate that the aqueous extract of *Spirogyra neglecta* possesses not only a hypolipidemic effect but also displayed a hypoglycemic ability in type 2 diabetic rats induced by streptozotocin and high fat diet.

#### P174-06

##### **COMPARISON ON COGNITIVE EFFECTS OF CENTELLA ASIATICA IN HEALTHY MIDDLE AGE FEMALE AND MALE VOLUNTEERS**

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**RATIONALE AND OBJECTIVES:** *Centella asiatica* has a reputation to restore decline cognitive function in traditional medicine and in animal model. However, little evidence regarding the efficacy of *Centella asiatica* from clinical trials is available. Therefore, the present study investigated the effect of *Centella asiatica* on cognitive function of healthy middle age volunteer.

**MATERIALS AND METHODS:** Forty-one (22 females and 19 males) healthy middle age participants received the *Centella asiatica* capsules at various doses ranging 3 g to 4 g (according to body weight) daily for 2 months. Cognitive performance was assessed using the Woodcock-Johnson Cognitive Abilities Test III (WJ CAT III) prior to the trial (baseline), 40 days, 60 days and 90 days (after treatment).

**RESULTS:** The results showed that the *Centella asiatica* enhanced many of the cognitive test measured at different time between males and females.

**CONCLUSION:** Therefore, the present findings suggest the potential *Centella asiatica* to attenuate the age-related decline in cognitive function in healthy middle age and elderly adults. However, the precise mechanism(s) underlying these effects still require further investigation.

#### P174-07

##### **DEVELOPMENT AND SENSORY EVALUATION OF HIGH PROTEIN SEASONING PRODUCT FOR DIALYSIS PATIENT**

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Protein-energy malnutrition (PEM) is one of the most common nutritional deficiencies, among continuous ambulatory peritoneal dialysis (CAPD). At present, egg white powders have been used as protein supplement for treatment of PEM, however, the taste is unpalatable. The purpose of this study was to formulate various Thai seasoning high protein with low sodium, phosphorus and potassium products. Egg white powder with three seasoning flavors, Tom Yam, Green Curry and Num Prik Ka Pi, were developed. Descriptive and acceptance test of each flavor were evaluated by 50 participants using quantitative descriptive analysis and 9 point hedonic scale. The formulas and nutritional values were reported. The nutritive values of samples were in the range of 7 g of protein, 1-2 g of fat, 3-5 g of carbohydrate, 140-200 mg of sodium, 35-57 mg of phosphorus and 28-70 mg of potassium per serving (15-20 g). Overall acceptability score of three recipes were found to be like slightly to like moderately mean score of 6+1.58 to 7+1.60. Num Prik Ka Pi was the most favorite flavor, followed by Green Curry and Tom Yam. In conclusion, seasoning white egg powder could be used as alternative choices for high protein products in order to prevent malnutrition in CAPD patient.

#### P174-08

##### **IMPACT OF PRE- GAME SPORTS DRINK ON THE PERFORMANCE OF THE SELECTED ATHLETES**

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The objective of the research was to develop an energy and protein rich pre-game sports drink and evaluate its efficacy by administering the drink to selected athletes. The sports drink was developed using spouted ragi powder, roasted Bengal gram powder, green gram powder, corn flour, sago powder, glucose, milk and sugar. Different proportions of these ingredients were mixed and the most acceptable variation out of three developed was selected for supplementation. Fifty female athletes were selected and divided into two groups of 25 each. One group designated as experimental group was administered the pre-game sports drink for a period of two months. Control group did not receive any supplement. The efficacy of the sports drink administered was evaluated by conducting endurance tests, measuring BMI, body fat percentage, skin fold thickness and selected biochemical parameters before and after supplementation. The results proved that the pre-game sports drink significantly increased the performance abilities and endurance capabilities of the selected athletes.

**P174-09****EFFECT OF VITAMIN D, CALCIUM AND MULTIPLE MICRONUTRIENTS SUPPLEMENTATION ON SERUM LIPIDS AND LIPOPROTEINS LEVEL IN LOW INCOME BANGLADESHI WOMEN WITH HYPOVITAMINOSIS-D: A DOUBLE-BLINDED, RANDOMISED, PLACEBO-CONTROLLED 1-YEAR INTERVENTION**

Islam, Md Zahirul<sup>1</sup>; Shamim, Abu Ahmed<sup>1</sup>; Akhtaruzzaman, Mohammad<sup>2</sup>; Lamberg-Allardt, Christel<sup>1</sup>

<sup>1</sup>University of Helsinki, Helsinki, FIN; <sup>2</sup>Dhaka University, Dhaka, FIN

**RATIONALE & OBJECTIVES:** Several studies indicated the inverse association of serum level of 25-hydroxyvitamin D with cardiovascular risk factors. In fact, data are scarce on potential long-term negative effects of adequate vitamin-D consumption. The aim of this study was to investigate the effect of supplementation of vitamin-D with or without calcium on serum lipid and lipoprotein concentrations in habitually low calcium consumers.

**MATERIALS & METHODS:** Healthy, low-income women (n = 200) aged 16-36 years, were randomly assigned in a double-blind manner to 1 of 4 groups. The subjects received daily supplements of 400 IU of vitamin-D (VD-group) or 400 IU of vitamin-D + 600 mg of calcium lactate (VDCa-group) or multiple micronutrients with 400 IU of vitamin-D + 600 mg of calcium lactate (MMNCA-group) or the group consuming placebo (PL-group). Serum concentrations of lipid and lipoprotein, 25OHD and intact PTH were measured at the baseline and after 1-year follow-up.

**RESULTS:** We observed three supplemented groups showed no changes in serum levels of total cholesterol, LDL-cholesterol, HDL-cholesterol, LDL-cholesterol/HDL-cholesterol ratio and triacylglycerol compared with PL-group (p>0.05). A highly significant change (p<0.001) was observed in serum levels of 25-OHD and iPTH in supplemented groups compared with placebo group.

**CONCLUSION:** Consumption of adequate vitamin D intake for 1-year has no influence in Bangladeshi low-income women with regards to serum lipid and lipoprotein profile.

**P174-10****THE EFFECT OF RICE COMPOSITE INTAKE ON THE NUTRITIONAL STATUS OF MALNOURISHED CHILDREN IN LOPEZ ELEMENTARY SCHOOL IN LOS BAÑOS LAGUNA**

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Rice composite, a mixture of rice and corn in 70:30 proportion, was used in a feeding intervention to determine its effect on the nutritional status of malnourished children of Lopez Elementary School in Los Baños, Laguna. The feeding intervention aimed to improve the children's nutritional status and to compare rice composite to rice alone at improving nutritional status.

Participants were selected based on the weight-for-age classification of International Reference Standard. One group was fed with rice composite while the other was fed with plain rice. The children's anthropometric measurements were obtained before and after the feeding program.

Significant improvement in the anthropometric measurements was observed in the group fed with rice composite. There were weight gains in both groups; however these were significantly higher in children fed with rice composite. Feeding intervention effectively improved participants' nutritional status.

**P175: Food & Nutrition Intervention for Health (Others) IV****P175-01****EVALUATION OF THE FOLLOW-UP FOR THE EFFECT OF A NUTRITION EDUCATION PROGRAM TO REDUCE DIETARY SODIUM**

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This study was to evaluate the follow-up effect of a nutrition education program to reduce dietary sodium and to modify their preference for salty foods. A total of 240 schoolchildren in the city of Daegu, Korea, participated in this study for four weeks. The effects of nutrition education were evaluated before education, after 4 weeks of education, and after 3 months of education. In the salty taste assessment, there was no significant difference between before education and after 3 months. In high-salt dietary attitude, the score for salty taste reached the highest level (3.67±0.40), and for unsalty taste reached the lowest (0.50±0.93) after 3 months. There was a significant improvement (8.34±1.82) after 3 months in nutrition knowledge (p<0.001) and in high-salt dietary attitude (p<0.001). Therefore, the education was effective in improving eating attitude and nutrition knowledge but a systemic diverse and intensive educational access is needed to change students preference for salty taste and a high-salt diet.

**P175-02****EMERGING CONSUMER NUTRITION EDUCATION TRENDS IN SOUTH AFRICA**

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Nutrition communications, Cape Town, ZAF

This poster/presentation will provide insight into emerging trends in South Africa regarding nutrition education tools utilized for consumer education. The process followed in developing Food-based Dietary Guidelines (FBDG) specifically for the South African population, throughout the lifecycle and all cultural groups, will be expanded upon. Special emphasis will be placed on the FBDG for healthy persons older than 7 years which have been adopted by the National Department of Health as the national guidelines.

Awareness will be raised regarding the increased usage of nutrition education tools and educational programs in major supermarket groups around South Africa. Improvement of menu offerings in prominent quick service restaurants (QSR) as part of the social responsibility drive, will be highlighted. Current and forthcoming examples of visual displays in food labeling and health claims within the context of the emerging food labeling legislation will be provided. Advances in the use of technology in nutrition education for utilization by registered health care professionals, will be given.

### P175-03

#### THE EFFECT OF MULTI-VITAMIN/MINERAL SUPPLEMENTATION ON MORTALITY DURING TREATMENT OF PULMONARY TUBERCULOSIS: A RANDOMISED TWO-BY-TWO FACTORIAL TRIAL IN MWANZA, TANZANIA

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**RATIONALE:** Malnutrition is common in pulmonary tuberculosis (TB), and may impair survival.

**OBJECTIVE:** The objective of this study was to assess effects of multi-vitamin/mineral (MVM) and zinc (Zn) supplementation during TB treatment on mortality.

**MATERIALS AND METHODS:** Patients diagnosed with sputum-positive pulmonary TB in Mwanza, Tanzania, were randomized, using a two-by-two factorial design, to Zn (45 mg) or placebo, and MVM (vitamins A, B, C, D, E, and selenium and copper) or placebo. Survival status was ascertained at the end of the 8-month TB treatment and supplementation period.

**RESULTS AND FINDINGS:** Of 499 TB patients, 213 (43 %) had HIV. The mean weight gain at 7 months was 6.88 kg (95% CI 6.36, 7.41). Zn and MVM combined, but neither alone (interaction,  $P=0.03$ ), increased weight gain by 2.37 kg (95% CI 0.91, 3.83), irrespective of HIV status. Survival status at 8 months was determined for 422 patients (84.6 %), of which fifty-two (12.3 %) had died. Among fifty-two deaths, there were no effects of MVM (relative risk (RR) 0.73; 95% CI 0.43, 1.23) and Zn (RR 0.76; 95% CI 0.46, 1.28). However, among HIV co-infected patients, marginally significant effects of both MVM (RR 0.60; 95% CI 0.34, 1.05) and Zn (RR 0.63, 95% CI 0.37, 1.08) were seen, and MVM and Zn combined reduced mortality (RR 0.29; 95% CI 0.10, 0.80; interaction ratio 0.52).

**CONCLUSION:** Supplementation with MVM, including Zn, during treatment of pulmonary TB may reduce mortality in those co-infected with HIV. A randomised trial of the effect of the combined intervention used in this study should be conducted in a different setting to confirm the finding.

### P175-04

#### ADHERENCE TO PHYSICAL ACTIVITY IN OLDER ADULTS: AN INDIVIDUAL OR A CONTEXTUAL ISSUE?

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<sup>1</sup>University of Chile, CHL; <sup>2</sup>University of London, GBR

Adherence to physical activity (PA) interventions is critical for ensuring effectiveness; however the relative contribution of individual, intervention-related, and contextual factors to adherence is still unclear. We used multilevel lineal regression models to assess individual (i.e. sex, age, smoking, depression) intervention-related (e.g. satisfaction with intervention, distance) and neighborhood predictors (e.g. poverty, safety, community groups) of PA adherence in 996 Chilean elderly from 10 health centers assigned to a PA intervention. We found that adherence to the intervention was low ( $X=23.3\%$ ; SE: 24.9). Individual factors were strong predictors of PA adherence (Depression  $\beta$ :-8.01, 95%CI:-11.48, -4.54; working status  $\beta$ =4.84, 95%CI:-8.74;-0.93, and exercise history  $\beta$ =6.51, 95%CI: 2.31; 10.71) while intervention-related and neighborhood factors were not significantly associated to PA adherence after controlling the effect of individual-level variables ( $p>0.05$ ) Overall, health center level explained only 2% of total PA adherence. In conclusion, adherence to a PA intervention was mainly predicted

by individual-level variables. Individual characteristics of the target population have to be considered when tailoring and designing exercise programs for older adults in order to increase their effectiveness.

### P175-05

#### EFFECTIVENESS OF A COMMUNITY RESISTANCE TRAINING INTERVENTION ON INSULIN RESISTANCE IN OLDER PEOPLE

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<sup>1</sup>University of Chile, CHL

Resistance training (RT) is recommended in the promotion of physical activity in older adults but their potential effect on insulin resistance (IR) is uncertain. The aim of this study was to assess the effectiveness of a 24-mo RT intervention on IR in a community setting. A total of 491 older adults, aged 65 to 68 y, with glucose tolerance normal and diabetes were studied. Half of the subjects were randomly assigned to a RT intervention two times a week. IR was defined by HOMA-IR higher than 2.41. The prevalence of IR post-intervention was 25% in the intervention group and 39% in the control group ( $p<0.001$ ). Of the 85 participants with diabetes at baseline, 59% were no classified as having IR in the intervention group versus 31% in the control group ( $p<0.001$ ). Negative binomial regression models showed that compared with controls, the incidence rate ratio for insulin resistance, after adjustment for potential confounders was 0.75 [95% CI: 0.58–0.97] for diabetics and 0.87 [95% CI: 0.64–1.12] for non-diabetics. In conclusion, resistance training is a feasible option as treatment strategy on insulin resistance in type 2 diabetes. These findings lend further support to current public recommendations on physical activity for older adults.

### P175-06

#### GLUTEN CONTENT IN FOOD PRODUCTS DESTINED TO CELIAC POPULATION

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Celiac Disease is a chronic inflammatory disease of the gut and the only treatment is a lifelong gluten-free diet. Gluten is a common “hidden” food ingredient and many foods labelled as free of gluten could contain this protein. The objective was to analyse products from naturally gluten-free foods and gluten-free rendered products in order to confirm gluten absence.

More than 4000 products have been analysed during the last five years (2004-2008). ELISA technique based on the R5 antibody was used to determine gluten content (limit of quantification 5 mg/kg).

Gluten was detected in the 6.6% of analysed samples. By groups, into the naturally gluten-free food group, 6.9 % of the fruit and vegetable derivatives analysed contained gluten. Cereal-based foods and snacks and appetizers showed the major presence of this protein (9.2 and 14.6% of positive samples, respectively). Children are big consumers of snacks, chocolates and appetizers and 11% of the measured samples contain more than 20 mg/kg of gluten (accepted limit by Codex and EC41/2009).

In conclusion, a better control of the labels of foods is necessary to allow a real gluten-free diet.

## P176: Frontiers in Nutrition Research (Others)

### P176-01

#### THE DEVELOPMENT OF A RAPID ASSESSMENT METHOD FOR THE PREDICTION OF GLYCEMIC INDEX

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The glycemic index (GI) is a measurement used to classify foods according to their potential for raising blood glucose levels. The GI of a foodstuff is generally measured by determining the increment in blood glucose concentration after the consumption of a test meal over a set period of time and comparing it with an isoglucosidic control meal (normally white bread or glucose) and expressed as a percentage within a group of individuals (in vitro). Rapid analysis methods (in vivo) have been evaluated worldwide, and in many cases these values have correlated with the GI values determined by in vitro methods. The critic against rapid analysis methods are that the methods do not provide a numerical GI values, although proposed labelling legislation in South Africa recommends that suppliers should only indicate if the product has a high, intermediate or low GI. The purpose of this study was to investigate a rapid assessment method for the prediction of GI, and once developed, determine its reliability to produce scientifically sound results in predicting GI of a food within the three categories of high, intermediate or low GI. The results from this study will be presented.

### P176-02

#### EFFECT OF RED BEET EXTRACT ON CECAL BACTERIA IN ETHANOL-INGESTED RATS

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**RATIONALE & OBJECTIVES:** Water-soluble pigment in red beet extract (RBE) may act cecal environment. We investigated whether RBE affected cecal bacterial population in rats.

**MATERIALS & METHODS:** RBE was given to normal or ethanol-ingested male Wistar rats for six weeks. The population of intestinal bacteria was estimated by terminal restriction fragment length polymorphism analysis.

**RESULTS & FINDINGS:** As results of this technique, levels of Clostridium subcluster XIVa in the RBE groups were lower or tended to be lower than those in the normal groups. In the ethanol-ingested rats, level of Clostridium cluster IV in the RBE group was lower than that in the non-RBE group, and level of Bacteroides in the RBE group was higher than that in the non-RBE group, whereas in the normal rats, levels of these bacteria were not different. Levels of Gammaproteobacteria did not differ among groups.

**CONCLUSION:** In conclusion, RBE may suppress cecal Clostridia under an ethanol-ingesting situation.

### P176-03

#### TWO MAJOR CONSTITUENTS OF DANDELION (*Taraxacum officinale*) LEAVES, LUTEOLIN AND CHICORIC ACID, SYNERGISTICALLY INHIBITED INFLAMMATORY RESPONSES IN LPS STIMULATED RAW 264.7 CELLS

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**RATIONALE & OBJECTIVES:** Nitric oxide (NO) and inducible nitric oxide synthase (iNOS) are a potent biological mediator produced by various mammalian cells and tissues.

Thus suppression of NO production may be the effective therapeutic strategies for attenuation of inflammatory reactions. In this study, the synergistic effect of luteolin and chicoric acid, two major constituents of dandelion (*Taraxacum officinale*), was investigated in lipopolysaccharide (LPS)-stimulated RAW 264.7 cells.

**MATERIALS & METHODS:** Anti-inflammatory properties were evaluated by Griess reaction, cell viability, and Western blot analysis.

**RESULTS & FINDINGS:** Co-treatment of luteolin and chicoric acid suppressed the production of nitric oxide in a dose-dependent manner without any cytotoxicity. The inhibitory effect was further examined using mRNA and protein expression levels, which were attributable to the suppression of inducible nitric oxide synthase (iNOS) and cyclooxygenase-2 (COX-2). Proinflammatory cytokines, such as tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ) and interleukin-1 $\beta$  (IL-1 $\beta$ ), were also reduced dose dependently by both phenolics. Moreover, combinational treatment of two phenolics increased sharply cytoprotective enzyme, heme oxygenase-1 (HO-1).

**CONCLUSION:** These results suggest that two phenolic compounds synergistically suppress LPS activated inflammatory responses in RAW 264.7 cell

### P176-04

#### NUTRIENT-DEPENDENT NEURONAL ACTIVATION PATTERNS IN THE NUCLEUS OF THE SOLITARY TRACT: A STUDY USING 3D MODELING AND NEURONAL DENSITY MAPS

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**RATIONALE & OBJECTIVES:** Nutrient specific signals originating from the intestine are transmitted via the vagus nerve to the nucleus of the solitary tract (NTS) to control food intake during the ingestion of a meal. We hypothesized that encoding of this information by the NTS relies on nutrient-specific neuronal activation patterns.

**MATERIAL & METHODS:** Male C57BL/6J mice (n=3 per group) were stimulated by iso-caloric intragastric loads of either peptone or sucrose. After perfusing the animals with formaldehyde, brainstems were dissected and sampled in serial coronal sections (20  $\mu$ m thick) on which the Fos protein was immunodetected. Digitized images were acquired. Using Free-D, a 3D-reconstruction software, Fos-positive neurons were pointed and 3D models computed to yield 3D activation maps.

**RESULTS & FINDINGS:** Activation patterns within each treatment group were consistent across all animals. Patterns for peptone and sucrose stimulation differed both from the control (water) pattern and from each other.

**CONCLUSION:** Single macronutrients cause specific activation patterns in the NTS. This study presents a novel technique to approach the investigation of central satiation processes.

### P176-05

#### IMPACT OF TESTOSTERONE ON ACTIVATION OF CYP1A1 BY ANDROGRAPHOLIDE PLUS 3-METHYLCHOLANTHRENE IN MALE MOUSE LIVER

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We previously observed the strong synergistic effect on polycyclic aromatic hydrocarbon (PAH)-induced CYP1A1

expression of andrographolide, a major constituent of herbal medicine from the plant, *Andrographis paniculata*, in mouse hepatocytes in primary culture. The present work describes the sex-dependent induction of CYP1A1 expression by andrographolide. The enhanced expression induced by andrographolide was observed only in male C57BL/6 mice, but not in intact or ovariectomized females, nor orchietomized male mice. However, treatment with testosterone restored the enhancement in the orchietomized males. These observations indicate that a male hormone-related system is a crucial mediator in the modulation of CYP1 expression by andrographolide. Therefore, preparation of guidelines regarding the use of *Andrographis paniculata* for health promotion strongly recommended, according to its distinctive characterization on CYP1A1 activation expression.

#### P176-06

##### DNA STABILITY IN PROTEIN ENERGY MALNUTRITION

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**BACKGROUND:** Malnutrition is associated with higher levels of DNA damage possibly because cells from malnourished children could be more susceptible to environmental damage.

**OBJECTIVES:** This study was thus designed to evaluate the basal DNA intensity, the DNA intensity after H<sub>2</sub>O<sub>2</sub> induced damage and its repair capability in lymphocytes of protein energy malnutrition (PEM) patients to demonstrate any defect present, its degree in different types of PEM and delineate the effect of proper nutritional rehabilitation on such changes.

**SUBJECTS AND METHODS:** The study included 28 malnourished infants [14 marasmus, 7 marasmic kwashiorkor and 7 kwashiorkor (KWO)], compared to 15 healthy age and sex matched controls. All infants were subjected to full medical history taking, thorough clinical examination and routine laboratory workup including complete blood count, liver and kidney functions and serum albumin. DNA extraction and agarose gel electrophoresis technique were used for detecting basal DNA intensity and DNA intensity after 0, 15 and 60 minutes of H<sub>2</sub>O<sub>2</sub> treatment (noxious stimulus). Infants were re-evaluated following the same steps after 30±7 days of nutritional rehabilitation.

**RESULTS:** PEM patients, irrelevant of the type, showed lower basal DNA intensity and higher DNA damage on exposure to H<sub>2</sub>O<sub>2</sub> in comparison to well-nourished controls. After nutritional rehabilitation program these DNA derangements improved but the patients still showed significantly lower basal DNA values and higher DNA damage than controls. The study also revealed that the DNA repair capacity of PEM patients was higher than the controls both before and after nutritional rehabilitation.

**CONCLUSION:** PEM is clearly associated with lower basal DNA intensity and increased liability to DNA damage. We thus recommend that proper nutritional rehabilitation of PEM patients is mandatory not only to improve growth features but also to preserve the optimal DNA structure of the cells. Also during management of such patients we should try to avoid any DNA damaging factors. Lastly regular long-term follow up of rehabilitated malnourished children should be done to detect whether these residual DNA changes are reversible as well and to prevent the occurrence of delayed hazards as malignant transformation.

#### P176-07

##### DIETARY PREDICTORS OF CYP1A2 AND NAT2 ACTIVITY

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**RATIONALE & OBJECTIVES:** Genes may be critical in affecting the association between dietary constituents and disease risk. In particular, genes such as cytochrome P-450 and N-acetyltransferase are involved in the metabolism of many xenobiotics.

**MATERIALS & METHODS:** We compared cytochrome P4501A2 (CYP1A2) and N-acetyltransferase-2 activities (NAT2) by measuring urinary caffeine metabolites as a probe for enzyme activity in a community-based study of 165 black and 183 white cigarette smokers.

**RESULTS & FINDINGS:** In stepwise regression analysis examining dietary intake, cruciferous vegetable and red meat intake were significant predictors of CYP1A2 activity. When stratified by race, carrot and onion consumption were predictors of CYP1A2 activity while grapefruit consumption was inversely related to CYP1A2 activity. There were no significant dietary predictors in black subjects. There were no significant dietary predictors of NAT2 activity, although marginal associations were observed with cruciferous vegetable intake and carrot consumption. When stratified by race, there was a significant association with grapefruit consumption in whites only.

**CONCLUSION:** Specific dietary items may induce CYP1A2 activity. NAT2 is thought not to be inducible but diet may affect excretion of acetylated metabolites.

#### P176-08

##### ROLE OF AFRICAN RECIPES IN NUTRITION AND HEALTH; THE CASE OF TRADITIONAL LEAFY VEGETABLES

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Traditional African cuisines have a symbolic and religious value and are associated with cultural identity and social wellbeing. Traditional dishes are prepared inform of staples, snacks, roughages, soups, drinks, relishes and tonics.

African food recipes often include boiling, roasting, baking in hot ashes, steaming and fermentation. The recipes involve use of diverse natural food additives to counteract taste, texture thus improving palatability of the dish. The traditional methods of cooking have been replaced by modern frying and use of processed fats and oils which has led to a sharp increase of nutrition related diseases such as obesity, hypertension among others. Knowledge of preparation of these nutritious vegetables is a major impediment to their utilization.

In 2005, the African Leafy Vegetable Program initiated a regional project to document traditional African leafy vegetable recipes in sub-Saharan Africa. The project documented elements such as; food plant species used, food additives, cooking time and accompaniments. The recipes were then tested in a food laboratory. Some key elements in the recipes such as cooking time were adjusted to fit nutritional standards.

This paper showcases different recipes for preparing traditional African leafy vegetables and their key role in good nutrition and health.

#### P177: Nutrient Requirements & Metabolism: Others III

##### P177-1

##### CELL GROWTH AND MORPHOLOGY IN CULTURED BOVINE SPERMATOGONIAL STEM CELLS

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The application of stem cell technology is limited by sub-optimal tissue culture systems. Culture medium is mainly optimized for cell growth. However, maintenance of genome stability is an overlooked important parameter in long term tissue culture systems. Increased genome damage may cause

accelerated ageing, aberrant gene expression and oncogenic transformation. Adverse health outcomes may be increased if genomically aberrant stem cells are transplanted in vivo. The aim of this project is to identify the best supplements for DMEM medium to optimize growth and genome health maintenance of cultured bovine spermatogonial stem cells. The design was based on a three-step matrix system to determine optimal concentrations of 7 growth factors (GFs) and 7 antioxidants (AOs). Growth was determined after 14 days using (a) MTT assay, (b) counts of spermatogonial stem cell colonies (c) the morphology of the colonies and (d) the percentage of lectin *Dolichos biflorus* agglutinin (DBA) positive cells. DBA is used as a specific marker for bovine spermatogonial stem cells. We identified the 4 AOs and 4 GFs that significantly improved cell growth and morphology, tested the combinations and compared the combination of all of the most effective AOs and GFs. Ongoing experiments are now aimed at identifying the best combination treatments based on their effects on genome stability using the cytokinesis – block micronucleus ‘Cytome’ assay and telomere length measurements

#### **P177-2 CYTOKINESIS-BLOCK MICRONUCLEUS ‘CYTOME’ ASSAY IN CULTURED BOVINE SPERMATOGONIAL STEM CELLS**

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(CSIRO, Adelaide, AUS)

The cytokinesis block micronucleus (CBMN) assay has evolved into a comprehensive method for measuring chromosome breakage, chromosome loss, non-disjunction, necrosis and apoptosis. This study has validated the use of the CBMN ‘Cytome’ assay for bovine spermatogonial stem cell (SSC) cultures showing a dose dependent increase in DNA damage biomarkers induced by either folic acid deficiency or exposure to ionizing radiation. Binucleated cells were harvested after 14 days of culture in folate deficient medium. Lectin *Dolichos biflorus* agglutinin (DBA) positive binucleated cells were specifically selected and scored for micronuclei (MNi), nucleoplasmic bridges (NPBs) and nuclear buds (NBuds) to obtain a measure of genome instability in the spermatogonial stem cell lineage cells.

The study showed a significant dose dependent increase in frequency of DBA positive binucleated cells with MNi and/or NPBs with decreasing folic acid concentrations (5, 1, 0.2, 0.04, 0.008 and 0.0016mg/ml) that span the ‘normal’ physiological range. The biomarkers of chromosome instability were also increased in DBA positive binucleated cells in irradiated cultures (1, 2 and 4 Gy gamma-rays) relative to un-irradiated controls. The CBMN ‘cytome’ assay is a robust and reproducible method for measuring genome damage in cultured bovine SSCs.

#### **P177-3 RELATIONSHIP BETWEEN DIETARY PATTERN AND HIRSUTISM IN YOUNG WOMEN IN AHWAZ, IRAN**

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**RATIONALE & OBJECTIVES:** Hirsutism is defined as the excessive growth of terminal hair on the face and body of a woman in a typical male pattern distribution. It is either due to increased androgen production or to increased sensitivity of the hair follicle to androgens. This study was carried out to determine contributory dietary factors of hirsutism in young university students in Ahwaz.

**MATERIALS & METHODS:** In this cross sectional study 180 young female university students in Ahwaz were randomly selected (63 hirsutism and 117 non-hirsutism). Hirsutism was evaluated by the Ferriman & Gallway test. A Food Frequency

Questionnaire (FFQ) was used to assess the dietary pattern. The main dietary components of interest were fat, protein and isoflavonoides. Chi square test was used for statistical analyses by SPSS software (version 13).

**RESULTS:** There was a direct relationship between protein intake and hirsutism ( $P=0.05$ ), but no significant relationship was observed between fat intake and hirsutism ( $p=0.07$ ). A significant inverse relationship was observed between isoflavonoides intake and hirsutism ( $p=0.01$ ).

**CONCLUSION:** According to findings of this study, increasing the intakes of foods rich in isoflavonoides is recommended.

#### **P177-4 RELATIONSHIP BETWEEN GLYCEMIC INDEX AND RESISTANT STARCH CONTENT OF RICE PASTA**

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**RATIONALE & OBJECTIVES:** Postprandial hyperglycemia is associated with risk for type 2 diabetes and metabolic syndrome. Glycemic index (GI) is a classification of carbohydrate foods based on acute plasma glucose response. Low GI foods improved the glycemic response in diabetic patients and healthy subjects. Foods such as pasta and whole grain cereals are supposed to have the low GI response. The aim of this study was to clarify the relationship between GI and resistant starch (RS) content of rice pasta including the unpolished rice.

**MATERIALS & METHODS:** Fifteen subjects (eight men and seven women) participated in this study. Plasma glucose and insulin levels were measured after ingestion of glucose, cooked Indica rice, rice vermicelli and rice pasta to estimate GI and insulinemic index (II). An in vitro enzymatic starch digestion method was applied to estimate RS contents of test foods.

**RESULTS AND CONCLUSION:** It was clarified that the values of GI and II of rice pasta were smaller than those after ingestion of cooked Indica rice, and RS content of rice pasta was greater than that of Indica rice. These results indicated that reduction of GI response of rice pasta is caused by increase of RS content on rice pasta.

#### **P177-5 STUDY ON BONE TURNOVER IN AGING FEMALE RATS WITH DAIDZEIN INTERVENTION - TRACP 5B, ALP, IGF-1 AND BGP EXPRESSION**

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To study bone turnover and the effect of daidzein intervention on bone metabolism in adult female rats, ninety 3-month SD female rats were operated on their back, ovariectomized rats as the osteoporosis model (OVX) while Sham rats as the normal control. Four serum bone markers were observed to study the bone metabolism in these aging female rats with daidzein intervention. The results showed that in natural aging rats, serum IGF-1 and BGP were declined to the valley at 6m, but 9m exceed 3m ( $P<0.05$ ,  $P<0.01$ ). ALP and TRACP 5b released from OB or OC, respective, were decreased gradually from 3m-old to 9m-old ( $P<0.05$ ). ALP, IGF-1 and BGP in 6m OVX rats presented high expression. These meant that 6m OVX, 9m Sham and OVX rats were into postmenopausal period, their bone metabolism went into high turnover type. In this study, it was indicated that both of IGF-1 and BGP for bone formation or remodeling were more sensitive biomarkers. When ovariectomized rats have been treated by daidzein in 6 months, especially in dose of 50mg/kg, their bone metabolism was tended to be lower turnover from high level. Their serum IGF-1 and TRACP 5b were enhanced with the decrease of serum BGP and ALP because of daidzein intervention. This indicated that the bone remodeling or overturn in 9m ovariectomized rats was



could improved by daizdein, especially in 50mg/kg dose.

**P177-6**  
**SUPPRESSIVE EFFECT OF POSTPRANDIAL BLOOD GLUCOSE AND INSULIN BY THE INGESTION OF JELLY-CONTAINING THE EXTRACTIVE FROM MORUS ALBA IN PATIENTS WITH TYPE-2 DIABETES**  
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It is important for the patients and pre-patients of type-2 diabetes to maintain the normal range of blood glucose and insulin. We have already clarified that the extractive from the leaves of *Morus alba* (ELM) competitively inhibits the human intestinal disaccharidases. Then, we designed up the Jelly-containing ELM, of which ratio of the amount of ELM to sucrose was 1:10, and placebo Jelly added no ELM. We investigated the suppressive effect on the postprandial elevation of blood glucose and insulin, collecting blood at the indicated time in 10 type-2 diabetes patients and 10 healthy subjects. The sucrose inhibited by ELM, is transferred into the large intestine, and fermented by the intestinal microbes, so, we also measured the excretion of breath hydrogen in healthy subjects.

When the subjects ingested Jelly-containing ELM, the increments of blood glucose and insulin were significantly suppressed compared with placebo Jelly, in both patients and healthy subjects. The excretion of breath hydrogen was markedly increased after the ingestion of Jelly-containing ELM. These results demonstrate that the desserts such as Jelly and others containing ELM suppress the increment of blood glucose and insulin in patients and pre-patients of type-2 diabetes.

**P177-7**  
**SUPPRESSIVE EFFECT OF TURMERIC (CURCUMA LONGA L) EXTRACTS WITH OR WITHOUT ROASTING AMELIORATE OXIDATIVE STRESS AND INFLAMMATORY RESPONSES**

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Turmeric (*Curcuma long L*) is well-known as oriental traditional medicinal plant. Curcumin is known to have a wide array of bioactivity including antioxidant, anti-inflammatory, anti-cancer, and cardio-protective properties. This study was designed to compare how effectively turmeric extracts (hot water and ethanol) with or without roasting ameliorate oxidative stress and inflammatory responses. Total antioxidant capacity and total phenol content were higher in ethanol extracts than in hot water extracts. Treatment of RAW 264.7 cells with turmeric ethanol extract significantly reduced LPS-stimulated NO, TNF- $\alpha$  production and protein expressions of inducible nitric oxide iNOS and COX-2. Ethanol extracts of turmeric had stronger elevation on anti-oxidative enzyme expressions and suppression on inflammatory enzyme expressions than their hot water extracts. These results suggest that turmeric extracts has mild antioxidant and anti-inflammatory activities to suppress intracellular oxidative stress and inflammatory responses through the up-regulation of antioxidant enzyme expressions and down-regulation of iNOS expression.

**P177-8**  
**THE INFLUENCE OF MATERNAL EARLY TO MID-GESTATION NUTRIENT RESTRICTION ON LONG CHAIN POLYUNSATURATED FATTY ACIDS IN FETAL SHEEP**

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**RATIONALE & OBJECTIVES:** Extensive epidemiological evidence indicates that the nutritional and hormonal environment encountered by the fetus is a strong determinant of not only fetal growth but also disease risk in later life. Long chain polyunsaturated fatty acids (LCPUFA) have diverse roles in tissue function. Docosahexaenoic acid (DHA, 22:6n-3) and arachidonic acid (ARA, 20:4n-6) play critical roles in neurodevelopment during the perinatal period. In addition to the well-studied ARA and eicosapentaenoic acid (EPA, 20:5n-3)-derived eicosanoids, recent studies indicate that DHA and EPA are substrates for potent bioactive compounds involved in the resolution phase of inflammation and in neuroprotection. Studies in rats demonstrate that n-3 LCPUFA, notably EPA and DHA, modulate the expression and repression in brain of a number of genes that are involved in structure, energy metabolism, neurotransmission, signal transduction and regulation. The early to mid-gestational period (days 28–78) in sheep is the period of most rapid placental development. Maternal nutrient restriction (MNR) in this phase has negative consequences on fetal growth and development, predisposing the fetus to disease in adult life. However, the influence of MNR on fetal tissue fatty acids remains largely unclear. We therefore undertook an exploratory study to evaluate the impact of MNR on fetal fatty acids in sheep tissues.

**MATERIALS & METHODS:** Ewes were fed to 50% (MNR, n=6) or 100% (control fed, n=6) of total digestible nutrients from days 28 to 78 of gestation. At 78 days, fetuses were sacrificed and the fatty acids in fetal liver, lung and muscle as well as maternal and fetal plasma were analyzed using gas chromatography.

**RESULTS & FINDINGS:** Most fatty acids were not influenced by MNR. The n-3 long chain PUFA eicosapentaenoic acid (20:5n-3, EPA) concentration ( $\mu\text{g}/\text{mg}$ ) was increased and more than doubled in the MNR sheep. Similarly, docosapentaenoic acid (22:5n-3, DPA) increased by 60, 19, and 38% in liver, lung, and muscle, respectively. Neither docosahexaenoic acid (22:6n-3, DHA) nor any of n-6 PUFA changed. Arachidonic acid (20:4n-6; ARA) decreased in MNR maternal plasma as a percent of total fatty acids only, while in MNR fetal plasma only EPA increased.

**CONCLUSION:** These results provide the first indication that MNR in early to mid-gestation influences the profiles of LCPUFA in fetal tissues, especially fetal n-3 PUFA are most influenced. This suggests that metabolic processes involving LCPUFA should be considered in evaluations of the impact of maternal nutrition on perinatal health.

**P177-9**  
**EFFECT OF ADDING DIFFERENT LEVELS OF LICORICE ON SOME QUALITY AND SENSORY CHARACTERISTICS OF CHICKEN MEAT PATTIES**

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The objective of this study was to investigate the effect of supplementing licorice extract meal in the diet of broilers (0, 0.04 and 0.06)% on some quality and sensory characteristics of patties. The experiment reported here involved 300 chicks,

slaughtered at 56 day and stored for subsequent analysis. The chemical composition, pH, WHC, PV, TBA and FFA were determined according to the method represented in Koniecko (1979), cooking loss and dripping loss according to Owens and Sams (2000) and sensory evaluation according to Baker and Drafler (1957). The data revealed significant increases in the percentage of moisture, protein, water holding capacity (WHC) of patties, and there were significant increases of the degree of flavor, tenderness, juiciness and overall acceptance for all treatment. While there were significant decrease of percentages of fat, thiobarbituric acid (TBA) and peroxide value (PV), which increased by storing the meat at 4.

#### **P177-10**

##### **ENHANCING GRAIN IRON AND ZINC IN SORGHUM**

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Sorghum is cultivated and consumed as a staple food in these areas. Growing high-yielding cultivars with micronutrients fertilization provides an attractive approach to improve grain micronutrient contents (Johnson et al. 2005). A study was carried out at the ICRISAT farm in Patancheru, India to determine the effects of micronutrient fertilization on sorghum grain Fe and Zn.

The analysis of variance indicated significant genetic variability among the genotypes. Soil type did not have significant effect on grain Fe and Zn content as indicated by the non-significant mean squares due to soil type. A non-significant variance due to micronutrient fertilization levels per se suggested poor evidence on the influence of soil micronutrient fertilization on grain Fe and Zn content in any particular soil type. Numerically, while no pattern was observed for grain Fe content, grain Zn content seemed to be marginally higher when growth on the Alfisols.

Micronutrient application with Fe and Zn fertilizers and soil type has limited effect on grain Fe and Zn contents when the soils are not deficient in these minerals. Hence, genetic enhancement for grain Fe and Zn-contents should be given priority.

#### **P 177-11**

##### **A COMPARATIVE STUDY IF ANTHROPOMETRIC PARAMETERS WITH SPECIAL REFERENCE TO MDM**

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The proposed work was carried out on 400 children who were studying on govt. Primary school of Raipur city. Out of 400,271 were girls and 129 were boys. The survey was conducted between July 2003- Jan.2004. In 2008-2009 another set of data was collected from Kabirdham District, Kawaddha town in which same number of subjects i.e 400 children (271 girls and 129 boys) were selected as subject. Data's were collected on anthropometric parametre such as height and weight. This was done to compare the utility of MDM programme since the inception of MDM programme and after six years. The result indicates that anthropometric parameters of the subject selected in July 2008-Jan.2009 have an increase in weight and height as compared to data collected in July 2003-Jan.2004. Results reveal that weight and height of the subjects from Kawardha city showed an increase of 07.00% and 09.00% respectively as compared to study carried out in Raipur. The haemoglobin level of the subjects were 7% more in 2008-09 as compared to recorded values of Hb in July 2003-Jan 2004. It can be concluded that MDM programme is have a significant impact on nutritional status of the subjects, but it can be implemented in more efficient manner to fructify its original objectives.

#### **P 177-12**

##### **MALNUTRITION AND ANAEMIA AMONG PRE-SCHOOL CHILDREN IN KENITRA, MOROCCO**

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**AIMS:** The objective of the present study is to evaluate the level of malnutrition and anaemia and the impact of some socio-economic and demographic factors of households on the nutritional status and anaemia of children less than 5 years of age in Kenitra.

**METHODS:** Height-for-age, weight-for-height and weight-for-age indices for each child were determined. Measures of disparity were also calculated to determine the extent of malnutrition in this study area. Children falling below the cut-off point ( $\pm 2SD$ ) from the median of the reference population were classified as stunted, wasted and under-weight. Blood samples were collected to measure haemoglobin (Hb).

**RESULTS:** The results show that the level of wasting, stunting, and underweight in children under three years of age was 5, 4 % %, 13, 5 %, and 42, 3 % respectively. Malnutrition was significantly higher among boys than among girls. The age and illiteracy of the mother are the main risk factors. A total 111 of preschool children, 85 have haemoglobin below 11g/dl is a prevalence of 76.5%. Sex is not a risk factor. There is a significant relationship between maternal education and anaemia among children ( $p < 0.05$ ).

**CONCLUSIONS:** In this area of study, malnutrition and anaemia remains a major problem among pre-school children. The main causes of malnutrition seem to be the bad weaning practices among Pre-school children and cultural attitudes of food.

#### **P 177-13**

##### **KNOWLEDGE TRANSLATION IN CROSS-CULTURAL NUTRITION RESEARCH**

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**RATIONALE & OBJECTIVES:** All too often research results are inaccessible to communities and research participants. In efforts to improve knowledge translation and dissemination, a DVD describing the key findings of the International Polar Year Inuit Child Health Survey of Nunavut Canada was developed.

**MATERIALS & METHODS:** Key findings were reviewed with steering committee members and other key stakeholders, a draft DVD was developed in English and translated into Inuktitut, Nettiilik, and Innuianaqtun, representing the 3 primary Inuit dialects found in the communities that participated in the child health survey conducted in Nunavut.

**RESULTS & FINDINGS:** A total of 383 preschool children, aged 3-5 years, participated in the survey in 16 Nunavut communities. Key findings relating to household crowding, passive smoking, food security, traditional food use, dietary adequacy and dietary quality, healthy weight, visual acuity, methylmercury exposures, and other health indicators are presented. Recommendations were provided for promoting health of children in the Arctic. Specific information of results is embargoed until dissemination of information on findings to communities is completed in May of 2009.

**CONCLUSIONS:** Presentation of research results in a multilingual DVD format enhances uptake of research results by communities and other stakeholders and improves the capacity of research to empower communities, inform policy, and ultimately make meaningful differences that will improve the health of children living in Indigenous Peoples' communities.

**P 177-14**

**RELATIONSHIP OF PHYSICAL ACTIVITY LEVEL, PERCENT BODY FAT, PERCENT LEAN BODY MASS AND BONE Z-SCORE IN THAI ADOLESCENTS**

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The impact of physical activity level (PAL) is known to be a crucial factor in growth development during childhood and adolescent. As part of the "Nutrition Tool Development Program", a set of data, 302 children aged 10-18 yrs, was analyzed to look at the relationship of PAL measured by CSA and body composition measured by DEXA (percent body fat: %BF, percent lean body mass:%LBM, and bone Z-score). PAL was set to quartile for the comparison, and Mann Whitney was used for statistical purpose. The results demonstrated the lower PAL in girls than boys, and they were both decline with the advance in age. Though there were no different in %BF and %LBM in boys for each quartile. The bone Z-score improved significantly ( $p < 0.01$ ) for boys, whereas girls showed statistical different ( $p < 0.01$ ) for the first and last quartile. Their scores were changed from -0.2 to +0.4 for boys, and from -0.4 to -0.2 for girls. In conclusions, even though at the relatively high level of PA for girls, they were still the vulnerable group. The educational policy maker should put more emphasize to increase physical activity in Thai children, particularly in girls.

**P 177-15**

**ASSOCIATION BETWEEN ANTHROPOMETRIC STATUS OF CHILDREN AND ENERGY, PROTEIN AND MICRONUTRIENTS (IRON, VIT A, B2) INTAKE IN IRANIAN HOUSEHOLDS**

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**OBJECTIVE:** The purpose of this study was to determine association between anthropometric status of under five children and energy, protein, micronutrient intake in Iranian households who participated in the National Food Consumption Pattern and Nutritional Status Survey (2001-2002).

**METHODS:** Data from 7158 households were used. There were 2562 children under five in the study. Under and overweight were defined as lower and higher than 2 standard deviation of weight for age z-scores respectively. Food intake was collected through a combination of food weighing and 24-h recall method for 3 consecutive days. Modified Iranian food composition table was used to calculate energy and nutrient intake.

**RESULTS:** Prevalence of under and overweight were 7.6% and 5.2% respectively and were higher in girls than boys ( $P < 0.05$ ). The intake to requirement ratio of protein and energy were related to anthropometric status among boys ( $P < 0.01$ ). There was no relation between vitA, B2 and iron intake and anthropometric status in both sexes.

**CONCLUSION:** Based on nutritional transition in Iran, both high prevalence of under and overweight among under five year old children must be considered seriously.

**P 177-16**

**THE ASSOCIATION BETWEEN CALCIUM INTAKE FROM GRAINS AND ANTHROPOMETRIC INDICATORS AMONG POSTMENOPAUSAL WOMEN IN CITY OF AHWAZ , IRAN**

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**RATIONALE & OBJECTIVE:** Calcium may be protective factor against osteoporosis, hypertension and metabolic syndrome. Risk of osteoporosis in postmenopausal women is high. Aim of this study was to determine the association between calcium intake from grains and anthropometric indicators among postmenopausal women in city of Ahwaz.

**MATERIALS & METHODS:** Inadescriptive cross-sectional study, 53 post menopausal women (age:  $57.9 \pm 9$  years) were selected. Food frequency questionnaires were used to estimate calcium intake. Anthropometric methods were done according to the WHO's standard protocols. Body fat (BF%) was estimated by bioimpedence analysis method.

**RESULTS & FINDING:** Based on calcium intakes, participants divided in three groups: low, intermediate and high. Weight and BF% were significantly higher in the low, compared to the high intakes group ( $P = 0.012$ ,  $P = 0.01$ , respectively).

**CONCLUSION:** Findings of this study showed an association between calcium intake from grains with overweight and obesity in postmenopausal women.

**P 177-17**

**ANTIOXIDANT ACTIVITY OF ALOE VERA LEAF PULP AQUEOUS EXTRACT**

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The present study demonstrated that the aqueous extract from Aloe vera leaf pulp contained naturally occurring antioxidant components, such as phenols, flavonoids, ascorbic acid,  $\beta$ -carotene, and  $\alpha$ -tocopherol. The extract exhibited inhibitory capacity against  $FeCl_3$ /ascorbic acid induced phosphatidylcholine liposome oxidation, scavenged  $ABTS \cdot +$ , stable DPPH  $\cdot$ , and superoxide anion radicals, acted as reductant and thus seems to be good source of natural antioxidants.

**P 177-18**

**DIETARY CARBOHYDRATE INTAKE AND ITS ASSOCIATION WITH RISK FACTORS OF NON-COMMUNICABLE DISEASE IN TEHRANIAN ADOLESCENTS**

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**OBJECTIVE:** to study dietary carbohydrate intake and its association with non-communicable diseases risk factors in Tehranian adolescents.

**METHODS:** Among participants of Tehran Lipid and Glucose Study, 213 girls and 299 boys aged 7-18 year were randomly selected for nutritional assessment. They were divided into two age groups: 7-12 and 13-18 years old. Fasting blood samples and anthropometric data were collected. Dietary intake was assessed by a food frequency questionnaire. Carbohydrate, fiber, mono- and disaccharide intakes were calculated using food composition table.

**RESULTS:** Mean  $\pm$  SD of BMI, daily energy, total carbohydrate and fiber intakes were  $18 \pm 3$  kg/m<sup>2</sup>,  $2378 \pm 860$  Kcal,  $374 \pm 135$  and  $39 \pm 23$  gram;  $22 \pm 4$  kg/m<sup>2</sup>,  $2493 \pm 872$  Kcal,  $323 \pm 124$  and  $33 \pm 17$  gram in boys and girls respectively. Glucose, fructose, galactose, sucrose, lactose and maltose contributed to 5, 5, 1, 9, 6 and 0.4 percent of total carbohydrate intake. Median (interquartile range) of fructose and lactose intake per 1000 Kcal was significantly different between 7-12 and 13-18

years old age groups: 7.2(4.5) vs. 6.4(3.6) and 7.9(5.7) vs. 6.2(5.8) for fructose and lactose, respectively. After adjusting for energy intake, there was significant relationship between total carbohydrate and BMI ( $r=0.11$ ,  $p<0.05$ ). Maltose had correlation with BMI, waist circumference and triglyceride;  $r=0.13$ ,  $r=0.18$  ( $p<0.01$ ) and  $r=0.11$ , ( $p<0.05$ ). Lactose had significant adverse correlation with BMI ( $r=-0.11$ ,  $p<0.05$ ) and waist circumference ( $r=-0.13$ ,  $p<0.01$ ).

**CONCLUSION:** More than 25% of carbohydrate intake was from mono- and disaccharide with the largest proportion from sucrose. Carbohydrate intake from dairy was correlated with lower BMI and waist circumference.

#### P 177-19

##### **EFFECT OF FUcoxANTHIN AND ETHANOL EXTRACT SEAWEED CONTAINING FUcoxANTHIN ON GLUCOSE METABOLISM IN C57BL/6N MICE FED HIGH-FAT DIET**

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**RATIONALE:** This study investigated the hypoglycemic effect of 0.02%(w/w) fucoxanthin(Fx) and ethanol extract seaweed containing 0.02%(w/w) fucoxanthin. (EtOH-Sw)

**METHODS:** C57BL/6N mice were divided into three groups and each group was fed high-fat diet (HF control, 20% fat(w/w)) and with Fx or EtOH-Sw for 9 weeks.

**RESULTS:** The Fx supplement was lowered blood glucose level compared to the other groups at 9th weeks. Also, hepatic glycogen contents were significantly higher in the Fx group than the HF control group. In analysis of key enzymes related to hepatic glucose metabolism, glucokinase activity was significantly higher in the Fx group than the HF control group. Furthermore, the hepatic glucose-6-phosphatase and phosphoenolpyruvate carboxykinase activities were significantly lower in the Fx and EtOH-Sw groups than the HF control group.

**CONCLUSION:** These results suggest that Fx and EtOH-Sw supplement exhibit antidiabetic effect by lowering hepatic gluconeogenesis.

#### P 177-20

##### **COMPARISON OF ISOTOPE DILUTION WITH BIOELECTRICAL IMPEDANCE ANALYSIS AMONG HIV-INFECTED AND HIV-UNINFECTED PREGNANT WOMEN IN TANZANIA**

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**RATIONALE & OBJECTIVES:** Bioelectrical impedance analysis (BIA) is a simple tool to assess total body water (TBW), from which estimates of body composition can be derived. However, its use has not been validated during pregnancy or extensively evaluated in HIV infection. We therefore compared BIA against isotope dilution (2H<sub>2</sub>O), which is a reference method for total body water (TBW) and body composition, in a cohort of HIV-infected (HIV+) and HIV-uninfected (HIV-) pregnant women. **MATERIALS & METHODS:** We enrolled 30 HIV+ and 30 HIV- pregnant women and measured TBW with both BIA and 2H<sub>2</sub>O, in addition to anthropometry, during each trimester and at 10-weeks postpartum. We also collected information on pregnancy outcomes.

**RESULTS & FINDINGS:** In trimesters 1, 2 and 3 and at

10-weeks postpartum, TBWBIA was correlated with TBW2H<sub>2</sub>O among HIV+ women ( $r=0.85$ ,  $0.90$ ,  $0.80$ ,  $0.92$ , respectively; all  $P < 0.0001$ ) and among HIV- women ( $r=0.85$ ,  $0.74$ ,  $0.77$ ,  $0.87$ , respectively; all  $P < 0.0001$ ). During pregnancy, mean TBWBIA progressively underestimated mean TBW2H<sub>2</sub>O; trimester-specific differences (mean  $\pm$  SD) were  $-1.02\pm 2.36$  L,  $-1.47\pm 2.43$  L, and  $-2.42\pm 2.63$  L, respectively. The difference at 10-weeks postpartum was small ( $-0.24\pm 2.07$  L). Bland-Altman models indicated that TBWBIA may be subject to a proportional bias, since the degree of underestimation was directly related to the amount of TBW. TBW2H<sub>2</sub>O at trimesters 1, 2, and 3 was not correlated with birth weight among HIV- women. Among HIV+ women, TBW2H<sub>2</sub>O was directly related to birth weight ( $r=0.52$ ,  $P=0.02$ ;  $r=0.66$ ,  $P=0.003$ ;  $r=0.42$ ,  $P=0.10$ , respectively); these correlations were stronger than those between birth weight and measurements of maternal triceps skinfold thickness, mid-upper arm circumference, or baseline body mass index.

**CONCLUSION:** During pregnancy, TBWBIA correlates well with TBW2H<sub>2</sub>O, but the validity of TBWBIA during pregnancy nevertheless remains uncertain. Maternal TBW, and therefore lean body mass, may be a determinant of birth weight among HIV+ women.

#### P 177-21

##### **IODINE DEFICIENCY PROBLEMS IN GEORGIA**

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**BACKGROUND:** Almost all-Georgian territory is under the risk of iodine deficiency disorders development. During the last decade iodine deficiency more and more has dipped due to significant food and nutrition related changes. The consumption of seafood products decreased 3-4 times. The deal of local products in food composition has grown, which is very poor in iodine. And the change of nutrition infrastructure considerable influenced on iodine deficiency disorders prevalence.

**METHODS:** Clinical-epidemiological study, using: cluster sampling epidemiological method; clinical (thyroid size, cretinism) and biochemical (urinary iodine and thyroid-related hormones). using: ultrasonography, urinary iodine and TSH assay methods.

**RESULTS:** The results of the clinical - epidemiological study (2003-2005) showed that, there are some districts in Georgia were identified more than 70% of iodine deficiency disorders prevalence (Kobuleti, Shuakhevi, Ambrolauri, and Tskhinvali). The spread of nodal goiter reached to about 1.8%. This indicates to severity of iodine deficiency. The intellectual and physical damage of children is very notable in some severe iodine deficiency areas of Georgia, and is some cases of cretinism. The distribution of clinical forms of Goiter by age groups showed the severity of deficiency: 1. 1-5 years – 36.5 %. diffused nontoxic goiter (II degree) – 7.9%, diffused nontoxic goiter (III degree) – 0.1%, nodal goiter – 0.1%; 2. 6-11 years – 39.3 %. diffused nontoxic goiter (II degree) – 3.5%, diffused nontoxic goiter (III degree) – 0.2%, nodal goiter – 0.2%; 3. 12-15 years – 45.6%. diffused nontoxic goiter (II degree) – 7.4%, diffused nontoxic goiter (III degree) – 0.6%, nodal goiter – 0.5%; 4. 16-50 years – 51.7 %. diffused nontoxic goiter (II degree) – 16%, diffused nontoxic goiter (III degree) – 3.2%, nodal goiter – 3.1%; 5. >50 years – 31 %. diffused nontoxic goiter (II degree) – 12%, diffused nontoxic goiter (III degree) – 4.9%, nodal goiter – 7.3%; According to the WHO classification, if deficiency in children reached to 30% and more, it's considered as a severe deficiency.

**CONCLUSION:** Iodine deficiency is a countrywide nutritional problem requiring the involvement of the salt and food industry, educational and health sectors, community based activities, and scientific sectors to overcome it. Iodine fortification will succeed when producers are fully involved as key partners in standards formulation, regulations and resolution of marketing and technical issues. It needs intersectoral actions.

**P 177-22**

**COMPARISON OF SERUM VITAMIN E, LACTATE, POTASSIUM AND ZINC LEVELS IN ARABIAN AND ENGLISH THOROUGHBRED RACE HORSES**

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**RATIONALE & OBJECTIVES:** All minerals play crucial roles in the physiological response to exercise, in energy metabolism and in tissue conservation during an exercise period. Racehorses have needs for minerals as well as other nutrients in order to perform their task. Biochemical values are related to diet, sex, environmental agents and age, and these values are used in diagnosis of diseases and assess the nutritional status of horses. The aim of this study was to determine serum vitamin E, lactate, potassium and zinc levels in Arabian and English thoroughbred race horses fed the same diets.

**MATERIALS & METHODS:** The diet was formulated to provide 2.31 Mcal DE/kg and 10.96% crude protein. Vitamin E, lactate, potassium and zinc were determined in serum obtained from 40 Arabian and 40 English healthy racing thoroughbred horses aged 2-3. Serum zinc concentration was determined by atomic absorption spectrophotometer, vitamin E by HPLC and the other biochemical parameters by a UV-spectrophotometer.

**RESULTS & FINDINGS:** Mean values were 2.65 and 2.81 µg/ml for vitamin E, 1.88 and 2.16 mg/dl for lactate, 2.64 and 3.14 mmol/l for potassium, and 160 and 58 µg/dl for zinc in Arabian and English horses, respectively. This study did not demonstrate a significant effect of breed on serum vitamin E and lactate levels. However, breed may have an effect on serum potassium and zinc concentrations in Arabian and English thoroughbred race horses (p<0.05).

**CONCLUSION:** In our work, we observed difference in absorbing zinc, and therefore English horses had lower serum zinc concentration when both breeds are fed diets of identical zinc concentrations.

**P 177-23**

**SUPPRESSIVE EFFECT OF LICORICE(GLYCYRRHIZA URALENSIS) EXTRACTS WITH OR WITHOUT ROASTING AMELIORATE OXIDATIVE STRESS AND INFLAMMATORY RESPONSES**

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Licorice containing glycyrrhizin is known for a variety of biological activities, such as anti-oxidants and anti-inflammatory properties. This study was designed to compare how effectively licorice extracts (hot water and ethanol) with or without roasting ameliorate oxidative stress and inflammatory responses. Roasting treatment increased total antioxidant capacity and total phenol content both of licorice hot water and ethanol extracts. Treatment of RAW 264.7 cells with licorice ethanol extract significantly decrease NO production. Protein expressions of anti-oxidative enzymes, such as catalase, superoxide dismutase (SOD), and glutathione reductase, were significantly elevated in licorice extracts-treated cells. Roasting Ethanol extracts of licorice had stronger elevation on anti-oxidative enzyme expressions and suppression on inflammatory enzyme expressions than their hot water extracts. These results suggest that licorice extracts has mild antioxidant and anti-inflammatory activities to suppress intracellular oxidative stress and inflammatory responses through the up-regulation of antioxidant enzyme expressions and down-regulation of iNOS expression.

**P 177-24**

**PROGRAMME TO REDUCE CHILDHOOD OBESITY: INITIATIVE OF THE CHILEAN MINISTRY OF HEALTH AND THE NATIONAL HEALTH FOUND (FONASA)**

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Reduce the prevalence of childhood obesity is a main sanitary objective for the decade.

**OBJECTIVE:** evaluate anthropometric and metabolic response to a short time model of intervention in obesity.

**METHODS:**Prospective evaluation of childhood and adolescent obesity, 6 - 19 years of age, that entered a pilot program of the Ministry of Health and FONASA; multidisciplinary, non-pharmacologic intervention of 4 months length. BMI, lipid profile and HOMA index were evaluated initially. In a subset of participants the blood profile was repeated at the 4th month.

**RESULTS:** 400 patients entered the program (56,3% female), age average of 12,2years (6,3 - 18,2 years of age), a baseline z score BMI 2,93 (1,84 a 7,7), HOMA: 2,47 (0,37 a 14,25), 35% with insulin resistance, 14,7% with glucose intolerance, 39% total cholesterol (TC) > 170 mg/dL and triglycerides 37% > 110 mg/dl. The program was completed by a 67,8% patients, of whom a 68,4% reduce de z score BMI from the baseline versus the 4th month control; 3,13 vs. 2,61 respectively, p < 0,05 without correlation with age, gender, or baseline z score BMI. The group that completed the program had a z score BMI baseline significantly higher (3,1 vs. 2,74, p < 0,05). A subset of 118 participants repeated laboratory exams, finding that 50% reduced the HOMA.

**CONCLUSION:** A high percentage of children succeed in completing the program, having more adherence those who have more overweight at the entrance of the program. The program shows an improvement in nutritional state and in metabolic factors.

**P178: Nutritional Assessment Others IV**

**P178-01**

**THE PREVALENCE OF OBESITY AND ITS RELATIONSHIP WITH NUTRITIONAL STATUS OF 18- TO 25-YEAR-OLD TEHRANINAN GIRLS**

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**INTRODUCTION:** Obesity is a risk factor for many diseases. This study explored the prevalence of obesity and overweight in young girls of Tehran.

**METHOD:** Cross-sectional study from 22jul-22Aug 2008, 1022 girls (18- 25-year) who approach pre marriage consultation centers of Tehran (96 persons were excluded due to having an especial diet and professional exercise), anthropometric data were used, and the BMI (Kg/m<sup>2</sup>) was counted. The level of physical activity was measured by qualitative questionnaire with 3 criteria of mild, moderate and severe. With simple randomization for 104 persons the standard questionnaire of food frequency (FFQ) was completed.

**RESULTS:** mean age and BMI ±SD of samples were respectively: 22.4 ± 2.2(y) and 21.9 ± 3.5(kg/m<sup>2</sup>). The prevalence of overweight and obesity were respectively: 11.9% and 3.1% and prevalence of central obesity (WC>=80cm) was 13.3%. There was a significant negative relationship between BMI≤25 and education level (p=0.01) and a significant positive relationship with diabetes among close relatives (p=0.01). Low physical activity had an independent role in predicting overweight and obesity (OR=1.7 with 95% CI:1.1, 2.5) (p=0.03). 21.4% of persons received less than recommended level of fiber (14gr /1000Kcal), 66.7% had a high-sugar (>10%

of kcal/day) and 9.5% had high-fat diet (>34% of Kcal/day). Fruit, vegetables, dairy, cereals and meat consumed in the recommended level or above in respectively 91.3%, 75%, 76%, 6.2% and 96% of samples.

**CONCLUSION:** An intervention in high-sugar diet pattern seems to be an urgent major.

**P178-02**  
**IMPROVING PRECISION OF AN ORAL IRON TOLERANCE METHODOLOGY USED FOR ELEMENTAL IRON FORTIFICANT ABSORPTION ASSESSMENT**

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**RATIONALE & OBJECTIVES:** Human bioavailability data on elemental iron fortificants (Feelem) are limited due to lack of methods for measuring absorption from Feelem. An oral iron tolerance test (OITT) has been validated with radioisotopes and whole-body counting. However, although valid as a measure of iron absorption ( $r^2=0.94$ ), it has been difficult to compare repeated measurements. We hypothesized that the precision could be improved by normalizing to standardized radioiron dose absorption.

**MATERIALS & METHODS:** On three consecutive mornings, subjects were served FeSO<sub>4</sub>. Day one and two 3 mg <sup>59</sup>Fe labeled iron was served. On day three 100 mg iron was served. Iron absorption from the 3 mg dose and the 100 mg dose was studied using whole-body counting, and the S-Fe response during six hours (S-Fe AUC0-6h), respectively.

**RESULTS & FINDINGS:** Non-normalized, the median (95% CI) for S-Fe AUC0-6h following administration of 100 mg iron was 263 (149-325) area units. After normalizing the S-Fe AUC0-6h to 60% absorption from the 3-mg radioiron dose, the median was 261 (227-299) area units.

**CONCLUSION:** By radioiron reference dose normalization data gets more symmetrically distributed, and the range in variation narrows down considerably. Consequently, this could allow comparison of repeated absorption measurements.

**P178-03**  
**FOOD INTAKE AND NUTRITIONAL STATUS IN ADULTS FROM ROMANIA**

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A cross-sectional study was performed on 614 adults (aged 20-65 and >65) aiming to evaluate the relationship between their diet intake and nutritional status. In the "European Nutrition and Health Report 2009" Project, previous data were critically reviewed and additional data were collected. A 24-hour recall food intake questionnaire proved that the average protein and fat (including SFA) shares of total energy intake were slightly higher, while the carbohydrates intake was lower than the recommended levels in all ages. Cholesterol intake was high, while the calcium and magnesium intake was insufficient. The plasma total cholesterol level was close to the upper normal limit of 200 mg/dL and the mean HDL-cholesterol and triglycerides were within the normal range. Overweight and obesity were moderately prevalent in elderly (44% and 13%) and highly prevalent in younger adults (87% and 53%). The results underline some significant nutritional health hazards in our country.

**P178-04**  
**NUTRITIONAL STATUS OF STUDENTS FROM CENTRAL-EASTERN EUROPE WHAT SHOULD BE DONE TO IMPROVE IT?**

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Political, economic and social transformations in the countries of central-eastern Europe caused essential changes in nutritional attitudes.

The aim of this work was to evaluate the nourishment condition of the academical youths from four countries: Belarus, Lithuania, Russia and Poland.

The total of 1517 students were included into the study: 303-Belarus (BY); 316 - Lithuania (LT); 284-Russia (RUS); 614 - Poland (PL). For every studied person BMI, the thickness of 4 skin- fatty folds and percentage of the fatty tissue in the body was measured.

**RESULTS:** Average values of BMI were on the level recognized for correct (BY-21,7 + 2,8; LT-22,5 + 3.1; RUS-22,3 + 4,0; PL-22,1 + 3,0 kg/m<sup>2</sup>). The percentage of the fatty tissue was as follows: (BY-19.0 + 6.8%, LT-16,9 + 8,7%, RUS-21.1 + 6,3%, PL-20,9 + 7.1%); among male students, the lowest values were observed in Lithuania (average 11%), while the highest in Russia (average 19%). Similar dependences were observed in case of the thickness of skin- fatty folds

1. The nutritional educational program was prepared, to be implemented in all universities that were participating in the study.

2. The rationalization of the way of nourishment and motivation for physical activity is initiated among the academicals youth.

**P178-05**  
**INFLUENCE OF INTERACTION "SUCROSE-GREEN TEA DECOCTION (GTD)" ON ANTIOXIDANT STATUS (TAS), GLUTATHION PEROXIDASE ACTIVITY (GPX) AND PLASMATIC CONJUGATED DIENES (CDS) IN RATS**

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**RATIONALE & OBJECTIVE:** The influence of the interaction sucrose-tea on (TAS), (GPX) and (CDs) is not completely highlighted. Our objective was to study the influence of (GTD) + graded amounts of sucrose on the TAS, GPX and CDs in rat.

**MATERIALS & METHODS:** The study was conducted on 4 groups of adult rats during 9 weeks. The control group received a standard diet (SD) + water, the group 2: SD + GTD, group 3: SD + GTD + 20 g of sucrose and group 4: SD + GTD + 40 g of sucrose. After sacrifice, blood was drawn for the determination of TAS, GPX and CDs.

**RESULTS & FINDINGS:** Results showed that GTD alone increases SAT by 216 %, as compared to the CG, whereas the addition of sucrose strongly reduces the antioxidant power of tea. However, the influence of the interaction "sucrose-tea" on GPX and DCs was not significant.

**CONCLUSION:** The addition of sucrose interacts with tea polyphenols and reduces its antioxidants properties.

#### P178-06

##### **MATERNAL NUTRITIONAL STATUS AND BIRTH WEIGHT OF BABY AT A SELECTED MATERNITY CENTRE IN DHAKA CITY**

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This cross-sectional type of comparative study was conducted among the women and their babies who had delivered at Azimpur maternity center, Azimpur, Dhaka city with the objective to find out the relationship between the birth weight pattern and maternal nutritional status. The mean age of the respondents was 23.4± 4.2 years and mean age at marriage was 18.9±3.3 years. Of the total 201, 97% of the respondents were housewives and most of them lived in urban areas (66.2%). Almost half of the respondents (50.2%) were educated up to secondary level. About 2/3rd of the total respondents (66.7%) received antenatal checkup (ANC) more than 3 times. Babies of 1st birth order were 55% and 27.4% were of 2nd birth order. Over 90% of the babies were at term (completed 37 weeks). Majority (87%) of the respondents maintained a gap 3 or more years between two successive pregnancies. Nutritional status of the mothers in terms of BMI showed that more than half (51.7%) of the mothers were normal (BMI 19.8-26 kg/m<sup>2</sup>), 46.3% over weight (BMI >26 kg/m<sup>2</sup>) and only 2% under weight (BMI <19.8-26 kg/m<sup>2</sup>). Majority (95%) of the mothers had a MAC of >22cm. Low birth weight baby was found 4.5%. Mid Arm circumference and height of the mothers were found to exhibit relationship with birth weight of the babies ( $r = 0.232$ ,  $p = 0.001$  and  $r = 0.324$ ,  $p < 0.001$  respectively).

#### P178-07

##### **MAGNITUDE OF PREDOMINANT MALNUTRITION PROBLEMS AMONG FILIPINO PRESCHOOL CHILDREN**

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**RATIONALE:** The series of Philippine national nutrition surveys showing persistently increasing rates of vitamin A deficiency (VAD) and iron deficiency anemia (IDA) among 6-<72 month old Filipinos is alarming. The proportion of underweight (UW), underheight (UHt) and thin (UWHt), reported among 0-5 yr-old children have remained significant public health problems. The magnitude of these problems, and their long term consequences, places these children at risk. Although single deficiencies have been reported, co-occurrences have rarely been explored.

**OBJECTIVES:** This paper aims to identify, describe and measure the magnitude of predominating malnutrition problems either existing singly or in combination with other malnutrition problems and identify most at-risk groups among Filipino preschool children.

**METHODS:** Data was extracted from the 2003 NNS of FNRI. VAD was defined as plasma retinol (PR) <20ug/dL and hemoglobin (Hb) < 11.0 g/dL. Weight-for-age (WA), height-for-age (HA) and weight-for-height (WH), less than -2SD from reference median were considered UHt, UW and UWHt, respectively. Estimates of the mean, prevalence rates and % distribution were generated using STATA and SPSS packages. Mean one-day nutrient intakes and % adequacy were also included. Results: 25.7% of the children were free from any deficiency and 31.5% had single malnutrition problems. The remaining 42.7% posed a combination of 2 or more. The most prevalent malnutrition problems are VAD (40.2%), IDA (32.7%), UHt (32.0%), UW (28.9%) and UWHt (5.3%). Among the 2-way combination, prevalence of UHt combined with UW (20.8%) and VAD with IDA (15.4%) were among the highest. Three-combination included: VAD + UHt + UW (9.3%) and

IDA + UHt + UW (7.9%). VAD + IDA + UHt + UW showed a 4.2% prevalence, while only 0.7% of the children had 5 forms of malnutrition (VAD + IDA + UHt + UW = UWHt). Infants, 6 - 12 months had highest VAD (48.2%), IDA 67.1%) and VAD + IDA (35.6%) prevalence rates. UHt and UW were highest among 36-<48 months-old (38.8%) and 24-<36 months-old (31.9%) children. Highest prevalence of 2 or more combination problems were observed among infants 12-<24 months.

**CONCLUSION:** VAD, IDA, UHt, UW and UWHt remain the most predominant and significant public health problems among 6-<72 mo-old Filipino children, existing singly or in combination with other malnutrition problems. Infants and younger children were at increased risk to VAD, IDA and UWHt, while older children to UHt and UW. Malnutrition problems of 2 or more combinations were highest among children 12-24 months.

#### P179: Obesity V

##### P179-01

##### **POLYUNSATURATED FATTY ACIDS AND INSULIN RESISTANCE IN MORBID OBESE WOMEN WITH GENOTYPE PRO12PRO IN PPAR-GAMMA2 GENE**

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**RATIONALE & OBJECTIVES:** Insulin resistance (IR) is associated with obesity. The polyunsaturated fatty acids (PUFAs) are agonists of the peroxisome proliferator-activated receptor (PPAR-gamma2), transcription factor associated with insulin sensitivity. The objective was to evaluate the influence of PUFA high diet on IR in morbid obese without polymorphism in PPAR-gamma2 (Pro12Pro).

**MATERIALS & METHODS:** 18 adult women were evaluated. The genotype was detected by PCR-RFLP and enzymatic digestion. The women used diet test (G1: 10-15% of total energy value (VET) of PUFAs and <10% of monounsaturated fatty acids (MUFA), n=08) or control (G2: <10% PUFAs and 10-15% of MUFA, n=10), for 45 days. Biochemical analysis was performed before and after diet. HOMA-IR (Homeostasis Model Assessment) was used to evaluate IR.

**FINDINGS & RESULTS:** The anthropometric and biochemical parameters did not differ between groups before intervention. G2 reduced blood glucose, fasting insulin and HOMA-IR.

**CONCLUSION:** The PUFAs did not affect glucose metabolism in obese women with genotype Pro12Pro in PPAR-gamma. Diet adequate in MUFA improved the IR on them.

##### P179-02

##### **TREND OF OBESITY AND ABDOMINAL OBESITY IN TEHRANIAN POPULATION**

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**INTRODUCTION:** An increasing trend of obesity has been reported in different studies. This study was conducted to examine trends of obesity and abdominal obesity among Tehranian adults during 9 years.

**METHODS:** Height and weight of 4402 adults, aged ≥20years old, participants of the Tehran Lipid and Glucose Study, were measured in 1999–2001(phase1) and the same persons in two other times: 2002–04 (phase2) and 2005–07 (phase3). Criteria used for obesity and abdominal obesity defined body mass index (BMI) ≥30 and waist circumference ≥ 94/80 cm for men/women respectively. Subjects were divided into 10-year groups and the prevalence of obesity was compared across sex and age group.

**RESULTS:** The prevalence of obesity was 15.8, 18.6 and 21% in men and 31.5, 37.7 and 38.6% in women in phase 1, phase 2 and phase 3 ( $p < 0.001$ ). The prevalence of abdominal obesity in men was 36.5, 57.2 and 63.3% and in women was 76.7, 83.8 and 83.6% in the three mentioned periods ( $p < 0.001$ ). Men aged between 20-39 years had highest rate of increased obesity (23.8%) and abdominal obesity (88.3%). In both sexes an increased trend was observed between phase 1 to 2. Between phase 2 to 3 this trend was observed in men but not women.

**CONCLUSION:** This study demonstrates significant rises in the prevalence of both obesity and abdominal obesity in both sexes especially in young men, calling for urgent action to educate people in lifestyle modifications

#### P179-03

##### **ASSOCIATIONS OF OBESITY WITH DIABETES, HYPERTENSION AND CARDIOVASCULAR DISEASE, AND ROLE OF SOCIOECONOMIC AND LIFESTYLE FACTORS: A POPULATION BASED STUDY**

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**OBJECTIVES:** To assess the relationships of obesity to diabetes, hypertension and cardiovascular disease, and the roles as mediators of socioeconomic and lifestyle factors in the general population in North-eastern France.

**METHODS:** 6,216 subjects aged 15 or over from north-eastern France, completed a postal questionnaire gathering socioeconomic and lifestyle factors and diseases diagnosed by a physician. Alcohol abuse was defined by the DETA questionnaire. The data was analyzed using the adjusted odds ratios (ORa) computed with logistic models.

**RESULTS:** Obesity affected 18.7%, diabetes 3.3%, hypertension 13.0%, and cardiovascular disease 19.8%. Diabetes related to obesity: OR adjusted for age and sex 1.73 (95% CI 1.28-2.33). This OR slightly decreased to 1.58 when controlling for all factors studied among which the significant factors were primary education (ORa 1.54), insufficient income (1.64), being a manual worker (1.91). Hypertension related to obesity: OR adjusted for age and sex 1.74 (95% CI 1.46-2.08). This OR markedly decreased to 1.23 when controlling for all factors among which the significant factors were alcohol abuse (ORa 1.39); living alone was close to significance (1.23). Cardiovascular disease related to obesity: OR adjusted for age and sex 1.23 (95% CI 1.05-1.44). This OR did not decrease (1.21) when controlling for all factors among which the significant factors were alcohol abuse (ORa 1.37) and insufficient income (1.47).

**CONCLUSIONS:** Obesity was associated with diabetes, hypertension and cardiovascular disease. The socioeconomic and lifestyle factors investigated played mediated roles for diabetes and hypertension, but not for cardiovascular disease.

#### P179-04

##### **DIETARY SESAMIN SUPPLEMENT DECREASES FAT ACCUMULATION AND IMPROVES INSULIN RESISTANCE IN OBESE RATS**

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**RATIONALE & OBJECTIVES:** Sesamin, a major lignan in sesame seeds and oil, is known to increase  $\beta$ -oxidation and reduce lipogenesis.

**MATERIALS & METHODS:** Thirty Spague-Dawley rats were fed a pure AIN-93G diet (standard diet), and 30 rats were fed a high-fat diet (modified from AIN-93G containing 45% of

calories from soybean oil) to induce obesity. After 4 weeks, rats were assigned to 6 groups: N0 (standard diet without sesamin), N1 (standard diet with 0.1% sesamin), N5 (standard diet with 0.5% sesamin), F0 (high-fat diet without sesamin), F1 (high-fat diet with 0.1% sesamin), and F5 (high-fat diet with 0.5% sesamin). The rats were weighed weekly and sacrificed after 5 weeks of the experiment.

**RESULTS:** There were significant reductions in body weight, epididymal adipose tissue, and adipocyte size in the F5 group. Supplementation with sesamin led to significantly increased serum high-density lipoprotein cholesterol (HDL-C) and decreased plasma triglyceride, low-density lipoprotein cholesterol (LDL-C), and non-esterified fatty acids. Insulin sensitivity also improved in the F5 group. In addition, there were significant reductions in liver triglyceride and total cholesterol concentrations.

**CONCLUSION:** Sesamin can improve lipid metabolism and prevent the accumulation of white adipose tissue.

#### P179-05

##### **CORRELATES OF OBESITY AMONG PEOPLE OF DIFFERENT AGES: A POPULATION BASED STUDY IN FRANCE**

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**OBJECTIVES:** To assess the relationships of obesity to potential socio-economic and lifestyle factors and health status among people of various ages in northeastern.

**METHODS:** In total 5,986 adults subjects aged 18 or over, randomly selected in north-eastern France, completed a postal questionnaire gathering socioeconomic factors, education, living alone, smoking, alcohol abuse (DETA questionnaire), health status, diseases, fatigue, sleep disorders, pain, depression/sadness (Duke questionnaire), physical, sensorial and cognitive disabilities (according to the WHO classification), and family support. The data was analyzed using the adjusted odds ratios (ORa) computed with multivariate logistic models.

**RESULTS:** Obesity ( $\geq 30$  kg/m<sup>2</sup>) affected 18.7% of subjects. It was more frequent among women (ORa 1.18, 95%CI 1.00-1.37) and related to not-good health status (1.65, 1.41-1.93), pain (1.24, 1.00-1.54), physical disability (1.29, 1.08-1.53), insufficient income (1.62, 1.21-2.17), and being a farmer (2.51, 1.60-3.93) or a craftsman/tradesman (1.60, 1.00-2.55). Among young adults (under 30 years) the significant factors were: being a manual worker or an intermediate professional (ORa about 5), being a craftsman/tradesman (18.13), and not-good health status (2.37). Among the subjects aged 30-49 the significant factors were: not-good health status (2.37) and insufficient income (1.96). Among the subjects aged 50-69, they were: being a farmer (3.88), alcohol abuse (1.70) and insufficient income (2.10). Among the elderly people aged 70 years or over, only insufficient income was significant (2.37) while being a farmer (2.72) and alcohol abuse (1.98) were close to significance.

**CONCLUSIONS:** Obesity is related to gender, socio-occupational category, health status, pain, physical disability, income and alcohol abuse. The correlation of obesity differed between age groups. Prevention to reduce obesity and related diseases should address those factors and to help people to be aware of the benefits of improving their living conditions and lifestyle.



**P179-06**

**THE RELATIONSHIP BETWEEN SERUM 25-HYDROXY VITAMIN D CONCENTRATION AND OBESITY IN IRANIAN ADULTS**

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**RATIONALE & OBJECTIVES:** Studies have conflicting results about association between serum vitamin D and anthropometric measurements. The aim of this study was to investigate the association between serum vitamin D and body mass index (BMI) or waist to hip ratio (WHR).

**MATERIALS & METHODS:** This is a cross-sectional study on Iranian Multi-Center Osteoporosis Project. Serum vitamin D, BMI and WHR 2872 healthy people, aged from 20 to 69 were measured. Parathyroid hormone, calcium, phosphorus, age and gender were considered as covariates. Analyses of covariance (ANCOVA) and regression models were employed to do statistical analysis.

**RESULTS & FINDINGS:** There is no statistically significant difference between serum vitamin D and BMI (coefficient: -0.020, CI 95%= -0.263 to 0.223) and WHR (coefficient: -0.043, CI 95%= -11.056 to 10.970) among obese and non-obese subjects before and after covariates adjustment in all population.

**CONCLUSION:** We found there is no association between BMI or WHR and serum vitamin D.

**P180: Nutrition Throughout the life course: Others**

**P180-01**

**COEXISTENCE OF ANAEMIA AND OBESITY AMONG WOMEN IN NORTH WEST MOROCCO**

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**RATIONALE & OBJECTIVES:** Morocco is undergoing nutrition transition marked by the coexistence of nutritional deficiencies and chronic diseases. The aim of this study is to determine the prevalence of anaemia and overweight among women of reproductive age in Kenitra.

**MATERIALS & METHODS:** 128 women were recruited when attending vaccination campaign for their preschool children. Anthropometric parameters and haemoglobin rate were evaluated. Women responded also to a questionnaire on socio-demographic characteristics.

**RESULTS & FINDINGS:** Average age was 28.37 ± 6.91. BMI mean was 25.83 ± 6.15 kg/m<sup>2</sup>. Mean haemoglobin rate was 11.43 ± 1.5 g/dl. General overweight was reported in 56% and overt obesity (BMI > 30 Kg/m<sup>2</sup>) in 15.6%. Anaemia prevalence reaches 60%. Almost 52 % of anaemic women are from rural area while 48 % are from urban. Only 10.93% of women use iron fortified flour.

**CONCLUSION:** Nutrition transition expressed by the double burden of anaemia and obesity is pronounced in this area of Morocco. More nutritional education and communication are needed.

**P180-02**

**BONE HEALTH OF SPORTS WOMEN: RELATION TO DIET AND LIFESTYLE**

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**RATIONALE & OBJECTIVES:** To evaluate the relationship of diet and lifestyle with bone health of sportswomen.

**MATERIALS & METHODS:** Sample comprised of 91 sportswomen, 18–21 years old. Tools used included a questionnaire on socio-demographic, health profile, sun exposure, sports and dietary practices, one day 24-hour dietary recall to assess nutrient intakes, anthropometric evaluation of BMI and WHR and estimation of serum 25(OH) Vitamin D, calcium, phosphorus, alkaline phosphatase and parathyroid hormone.

**RESULTS AND FINDINGS:** 48% had trained for more than 3 years. 71% practiced sports at least 2 hours daily. 72.5% had daily sun exposure of 1-3 hours., BSA exposure between 15–45%. 90% did not use sunscreen. Mean BMI and WHR were 21.6 kg/m<sup>2</sup> and 0.75 respectively. 97.8% had normal serum 25-OHvitaminD levels (Kit classification). According to Lip's classification, 51.6% had normal levels, 45.1% had mild and 3.3% had moderate hypovitaminosis D. 42.9% were vegetarian. Consumption of tea, coffee, aerated drinks and fried foods was high. Intake of vitamin D rich foods was low. Mean intakes of energy, iron, thiamine, riboflavin and niacin were significantly lower and calcium, folic acid and vitamin C were significantly higher than RDA. Dietary fiber, phytates and oxalate intakes were high.

**CONCLUSION:** Good serum 25 (OH) vitamin D levels in sportswomen, inspire of poor vitamin D content of diets, was indicative that daily sun exposure coupled with regular physical activity are the major contributors to bone accrual and good bone health.

**P180-03**

**EATING ALONE, BREAKFAST SKIPPING, AND WRONG WEIGHT REDUCTION TRIALS WERE RELATED WITH INADEQUATE NUTRIENT INTAKES OF URBAN LACTATING WOMEN IN KOREA**

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Since Nutritional care of lactating women has not been studied enough, nutrients intake status of 73 urban lactating women (45 breast feeding, 13 formula feeding, 15 mixed feeding) and its related factors were investigated. Self-recorded dietary data for 2 weekdays and eating behaviors were surveyed in 2008. The subjects aged 29.2±3.4 years and their infants aged 8.2±3.2 months. Mean nutrient adequacy ratios (MAR) was 0.77±0.14 and 57.5% of the subjects took meals 3 times daily, 43.8% used to skip breakfast, 46.6% ate alone 3-6 times per week. Subjects having lower MAR (<0.73, n=24), compared with subjects having higher MAR (≥0.83, n=24), showed higher ratios of that tried to reduce weight in wrong ways, skipped breakfast, and ate alone. As the result, nutrition care program for lactating women should be focused to good eating behavior and desirable weight reduction as well as to adequate nutrients intakes.

**P180-04**

**DOUBLE BURDEN OF MALNUTRIITION**

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Insulin Growth like factor-1 (IGF-1) is an important factor in the regulation of various physiologic effects. Nutritional intake is a main regulator of circulating IGF-1. The relationship of Zinc status and IGF-1 in malnourished pregnant women has not been studied adequately, even though suboptimal intake of zinc intake has been reported widely in the elderly. This study was cross sectional study and aim to identify the concentration of IGF-1 serum and nutrient intake from 123 malnourished pregnant women. The dietary intake was assessed using 24 hours food recall and analyzed using WFood2. Concentration of zinc and IGF-1 were measured by radioimmunoassay. Zinc and IGF-1 concentration was significantly different compared to normal pregnant women (8.8 ± 1.4 ng/l) and IGF-1 (92.9 ± 50.1) while intake zinc from food (4,34 ± 2.26), iron (4,48

± 2,26), energy (1208 ± 402 kcal), protein (46,8 gram). Mean weight and mid-arm circumference were (45.4 ± 3.9 kg & 22.09 ± 0.9 mm). Conclusion; low food intake, high fiber impact on zinc, iron and IGF-1 level

**P180-05**  
**BEHAVIOR DETERMINANT ANALYSIS OF MALNOURISHED PREGNANCY IN INDONESIA**

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**RATIONALE/OBJECTIVE:** Behavior determinant including life style, consumption pattern, and physical activities are highly related to nutritional status of mothers. Behavior determinant have been analyzed to understand the risk of malnourished pregnancy in Indonesia based on the data Indonesian Basic Health Survey in 2007.

**METHOD:** Case control approach is used to analyze the risk factor, which were 1435 malnourished pregnancy as a case, and control were 2947 pregnant with nutritional identified normally, with matching on age and cluster census. The risk factors identified include: smoking habit, alcohol consumption, fruit or vegetable consumption, protein and energy intake, and physical activities. Risk factors have been analyzed with OR (CI 95%)

**RESULT:** Pregnant with protein and consumption intake < 80% RDA have risk factor for malnourish pregnancy, which were the risk for energy consumption with OR 1.144 (CI: 1.001-1.3080) and protein consumption with OR 1.199 (CI: 1.055-1.364). Smoking habit or alcohol consumption, fruits or vegetables, and physical activities as well are not risk factors for this study.

**CONCLUSION:** Food consumption during pregnancy is a risk factor especially for protein and energy consumption, even other behavior relatively homogeneous and not become risk factor for malnourish in pregnancy.

**P180-06**  
**NUTRITIONAL STATUS AND PERCEPTION OF NUTRITION AMONG ADOLESCENT GIRLS IN TANZANIA**

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This study sought to determine the nutritional status of adolescent girls as well as their knowledge and perception of nutrition and examine the implications for safe motherhood. Nine hundred rural and urban, in school and out of school, adolescent girls aged between 10 and 19 years participated. anthropometric measurements of weight and height were used to assess the nutritional status of adolescent girls. A structured questionnaire was administered to gather information about nutrition knowledge, attitude, perception and practice. Data were analyzed using the spss program for windows version 12 and descriptive statistics were compiled. Thirty percent of the adolescent girls were underweight especially those belonging to the age groups 14, 15 and 16 years. The prevalence of stunting was 55%. Adolescent girls had poor knowledge, negative attitude towards nutrition and poor practice of nutrition. Meal skipping and snacking habits are widely practiced. The most frequently skipped meal is breakfast (48%). Poor nutrition among adolescent girls is a risk factor for safe motherhood.

**P180-07**  
**MATERNAL FACTORS AND SEASONAL INFLUENCES ON THE INFANTS' BIRTH WEIGHT, GROWTH AND DEVELOPMENT – A STUDY AMONG RURAL/URBAN POOR IN DELHI**

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**RATIONALE AND OBJECTIVES:** To study whether maternal factors and seasonality have an impact on the pregnancy outcome as well as on growth / development of the child.

**MATERIALS AND METHODS:** 398 pregnant women have been enrolled from urban slums and rural areas of Delhi; after collecting baseline data at 18 + 2 weeks of gestation, the subjects are being followed at 24+2weeks, 30+2weeks and 36+2 weeks (term) of pregnancy, whereas after child birth at 15 days, 1 month, 3rd month and 6th month post partum. In addition, 180 NPWL women were enrolled from the same cohort and had been followed for a period of 12 months, once in every season.

**RESULTS AND FINDINGS:** The follow-up data gathered during pregnancy and lactation highlights the changes brought about in their maternal diet and nutrient intake and its impact on fetal growth / development. The dietary data gathered from pregnant and NPWL women throw light on seasonal variations in the dietary/ nutrient intakes by these women.

**CONCLUSION:** The study shall be of great help in planning interventional activities for women particularly the pregnant women which will have a long lasting impact on the child's growth and development and thus bridging the intergenerational gap.

**P180-08**  
**DIET AND NUTRITIONAL PROFILE OF DELHI BASED SPORTSWOMEN PARTICIPATING IN TEAM GAMES AT STATE / NATIONAL LEVEL**

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**RATIONALE & OBJECTIVE:** To evaluate diet and nutritional profile of 100 Delhi based sportswomen, aged 18 – 25 years, participating in one of four team games – volleyball, hockey, football and kabaddi at state / national level and determine its impact, if any, on physical performance.

**MATERIALS & METHODOLOGY:** A structured questionnaire was used to gather information on lifestyle patterns, health status and dietary habits. Anthropometric parameters assessed included body mass index (BMI), waist hip ratio, body fat percentages. Dietary assessment was done using 24-hour dietary recall and food frequency questionnaire. Physical performance assessment was based on modified AAHPER Youth Physical Fitness Test battery.

**RESULTS & FINDINGS:** Data revealed that 77% subjects spent 2 – 3 hours in sports practice on weekdays, 73% had a training age >7 years and 43% reported changes in menstrual cycle. 80% subjects had BMI within normal range and 95% had normal body fat percentages. Poor food choices were observed in majority. The mean macronutrients and micronutrient intakes of volleyball players were significantly higher than the rest. Physical performance of the volleyball players was the best.

**CONCLUSION:** It is imperative to develop guidelines and generate awareness regarding proper nutrition practices amongst sports personnel for optimizing their physical performance.

## **P181: Evidence-based Policies & Programs to Address the Global Health and Nutrition Goals**

### **P181-01**

#### **THE ATTITUDE OF CONSUMERS AND SMEs TOWARDS OBESITY ISSUES AND HEALTHY FOOD**

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**RATIONALE AND OBJECTIVES:** Obesity became a significant global socio-pathogenic phenomenon that shorten our lives, damage our health and limit our mobility and fitness. One of the projects directly supported by European Union therefore targeted one of the determinants of the obesity – the diet. The overall objective of the FOOD PRO FIT project is to promote healthier food by improving its nutritional quality, the specific one is to add the nutrition criteria to develop, test and implement the well known HACCP tool in its new innovative form.

**MATERIALS AND METHODS:** In order to evaluate the attitude and awareness of both consumers and food producers and food processing enterprises, the project team in 7 countries conducted a survey that analyzed the awareness, attitude and behavior of consumers, SMEs involved in food production, sale, processing and serving. Besides that a pilot testing of altered recipes has been done in almost 45 companies, canteens and restaurants in 3 countries to evaluate the feasibility of the new tool and 12 focus group meetings held in non pilot countries that further discussed the obesity and healthy food agenda.

**RESULTS AND FINDINGS:** The dietary habits of Europeans slowly changes. Most of the respondents are aware of dietary recommendations concerning fat, salt and sugar although some interesting conclusions can be done from some topics of the survey. The SMEs are generally interested in the production and sale of healthier food, however they appoints to some significant legislative and marketing barriers.

**CONCLUSION:** If successfully implemented in various sectors the new HANCP tool can contribute to the uneasy fight against obesity and provide the consumers a healthier choice of food that contains a balanced portion of nutrients.

### **P181-02**

#### **IDENTIFICATION OF MOST SERIOUSLY DISTRICT BY NUTRITIONAL STATUS OF CHILDREN UNDER-FIVE WITH SPATIAL ANALYSIS IN WEST JAVA**

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Base line health research have been done in Indonesia (RISKESDAS 2007 th). Collecting data cover health data belonging to nutritional status of children under-five (anthropometri data) covering all region of indonesia. The fact not yet been analysed by using GIS method, therefore this article will be studied by spatial. That matter be able to yield faktual information, where can supported regional policy.

**OBJECTIVE:** Identifying of most seriously district by nutritional status of children under-five, also to know how about related factor.

**METHOD:** GIS Analyse with spatial (subdividing of data and overlay with union method).

**RESULT:** Undernourist (weight for age) in west java it's have been under average national goal, but it is can be potency remain to become problem of public health, because a lot of there are in poor district. While case nutritional status with combination of indicator (weigh for age, weight for heighth, height for age) at risk it's spread all district. And so were are related factor, there are family where economic condition are poor, infection diseases, and visiting intregated service post (posyandu).

Identification of most seriously district by nutritional status of children under-five (BALITA) both of high catagory and moderate catagory is a lot of found at adjacent regency district. This picture instruct the fact that problem of nutritional status tend to to represent epidemiology problem. There are four district of most seriously by nutritional status of children which high catagory. Related factual factors are infection diseases (diarrhea/ARI), and visiting intregated service post (posyandu).

### **P181-03**

#### **MAPPING MALNUTRITION RISK; A GEOSPATIAL APPROACH TO COMBAT CHILD MALNUTRITION IN SRI LANKA**

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Despite the improvement in many health indices, malnutrition continues to be a burden and is a public health problem in Sri Lanka. One of the reasons for Sri Lanka's inability to address child malnutrition and related issues effectively is believed to be related to poor targeting and coverage of most vulnerable populations/areas. For the first time we mapped the prevalence under nutrition among children under 5 in the country using secondary data available for the years 2002, 2003 and 2004 and overlaid to identify most vulnerable Divisional Secretariat Divisions (DS Divisions) where the prevalence of underweight was very high (> 30%) for the given years. Thirty-one out of 323 DS divisions have been identified as most vulnerable areas. We further mapped those DS divisions by the lowest administrative demarcation i.e. Grama Niladari areas (GN areas) and observed that the burden of malnutrition for most of the DS divisions was due to few (3 to 4) clusters (a group of GN areas) where there was a very high prevalence of malnutrition. These exercises demonstrate the clustering effect of malnutrition in Sri Lanka. Risk maps generated can be utilized to implement spatially targeted interventions and monitor their progress. Geospatial modeling has also done to simulate the effectiveness of targeted interventions.

### **P181-04**

#### **INSIGHTS FROM THE GUATEMALAN FOOD SYSTEM: USING EXPLORATORY SPATIAL DATA ANALYSIS FOR FOOD AND NUTRITION SECURITY ANALYSIS**

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**RATIONALE AND OBJECTIVES:** Food and nutrition security (FNS) for all remains a major development objective worldwide. Guatemala faces a high rate of child undernourishment despite efforts engaged on its reduction. Socioeconomic models used for identifying determinants of FNS or for targeting vulnerable groups are usually developed in a non-spatial way, which neglects the phenomenon's geographic dimension. We seek to contribute to the analysis of FNS outcomes by employing spatial analysis.

**MATERIAL AND METHODS:** Using nationally representative data, elements embedded in the food system are integrated and examined with exploratory spatial data analysis and overlay techniques, with the aim of identifying areas where the system might be compromised.

**RESULTS AND FINDINGS:** The elements explored are spatially related and display spatial trends and dependency. The consideration of these patterns in research and modelling applications can improve the understanding and use of the related information for the development of support strategies.

**CONCLUSION:** We conclude with recommendations so as to include spatial analysis in the study of FNS.

**P181-05**  
**COMPREHENSIVE CARE SERVICES FOR PLHIV, IS IT LIMITED TO HEALTH FACILITIES?**

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**RATIONALE & OBJECTIVES:** WFP through partners is replicating food support to over 6,000 ART clients to Kilifi and Mariakani district hospitals at the coastal Province of Kenya, which has high prevalence of HIV and food insecurity.

**MATERIALS & METHODS:** Monthly monitoring and operational research will advice programming. APHIA II Coast, MOH through NASCOP and WFP has jointly developed an integrated database that enhances case management of clients on treatment and M&E.

**RESULTS & FINDINGS:** Identification of implementing Partners (IP's) through consultative meetings and planning meetings is mandatory. Success depends on an IP's with strong Livelihood and Sustainability capabilities. Capacity building for IP's and beneficiaries is critical.

**CONCLUSIONS:** Comprehensive Care Services are not limited to health facilities if integrated and linked to food support, community and Health facility services for PLHIV they provide a very strong system of sustainable services.

**P181-06**  
**RESOURCE CAPABILITY OF SELECTED LOCAL GOVERNMENT UNITS IN IMPLEMENTING PRE-NATAL IRON SUPPLEMENTATION**

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<sup>1</sup>Food and Nutrition Research of Institute, Metro Manila, PHL; <sup>2</sup>Univerity of the Philippines Los Banos PHL

**RATIONALE & OBJECTIVES:** In spite of a national program on pre-natal iron supplementation, gestational anemia in the country remains a persistent public health problem (FNRI, 2005). In the present set-up where delivery of public health programs becomes the mandate of the local government units (LGUs), this study aimed to determine the effectiveness of LGUs' implementation given their resource capability.

**MATERIALS & METHODS:** The study, a prospective case series, interviewed and tested for anemia 150 women attending government pre-natal care. Reports and records were examined to assess LGUs' capability to implement the program.

**RESULTS & FINDINGS:** Fiscally, LGUs are incapable to meet the prescribed number of supplements and health personnel vis-à-vis population requirement. Consequently, supply was affected and inevitably, prescription was resorted to. With prescription, the multiple vitamins and minerals supplements were more preferred over the conventional IFA. However, with their higher cost and mothers' poor condition, compliance was reduced resulting to the increase in anemia prevalence from 29.0 to 40.1%, 3-4 months after.

**CONCLUSION:** Increased budgetary allocation is a requisite to reduce gestational anemia.

**P181-07**  
**PARADOX PHENOMENON OF NUTRITION CONDITION SINCE REFORMATION ERA IN INDONESIA**

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**RATIONALE:** In 1998, after 32 years of Soeharto time, a reform was happened in Indonesia. In many areas including democracy, journalism, authority, and economic situation, it showed significantly improved. Otherwise, this study purpose is to analysis the sequence of economic growth with nutritional status in year 2000 - 2005

**METHOD:** Analysis sequence data from Indonesia Health Profile and National Statistical Bureau

**RESULT:** Situation in Indonesia in reformation era. GNI improved from 2000 (USD570), 2002 (USD830), 2003 (USD940), and 2005 (USD1280), at the same time underweight increased to 24.66%; 27.3%; 27.5% and 28.0%, respectively. In addition, budget for nutrition improvement program increased from IRD71.4 in 2000 to IRD175 in 2005. This situation is a paradox phenomenon.

Several reasons for this paradox phenomenon were 1) euphoria reformation whereas all were neglected including the positive programs such as nutritional position in national development plan and community based nutrition, 2) wrong perception on decentralization resulting lack of nutrition program intention, lack of nutrition role on government organization, and inadequate nutrition staffs.

**CONCLUSION:** 1) Repositioning nutrition in the mainstream of development whereas nutritional status as a development indicator, 2) revitalizing as a community based nutrition program, and 3) establishing nutrition development board in national level.

**P182: Food & Nutrition Intervention for Health (Others) V**

**P182-01**  
**USE OF COMPLEMENTARY AND ALTERNATIVE MEDICINE AMONG CANCER PATIENTS**

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Worldwide, there is growing evidence of the use of complementary and alternative medicine (CAM) among cancer patients. This study describes the patterns of CAM use and its related factors among cancer patients in Malaysia. A cross sectional and descriptive survey using interviewer-administered questionnaire was conducted among 250 cancer patients in four regions in Peninsular Malaysia. The height and weight of cancer patients were measured and dietary intake was assessed based on 24-hour diet recall and food frequency questionnaire. About 53% of cancer patients were using CAM together with conventional treatment. Vitamin is the most prevalent types of CAM (63%) that have been used among cancer patients and most of them used CAM because it can keep them healthy and energetic. Most of cancer patients noticed that they do not experience any side effects from CAM use. Further analysis will be done to determine factors contributing to the use of CAM among cancer patients. The CAM use among cancer patients should be monitored to ensure the effectiveness and safety of this treatment.

**P182-02**  
**THE EFFECT OF FRUIT AND VEGETABLE CONSUMPTION ON BIRTH WEIGHT AMONG TRIBES PEOPLE IN SOUTH OF IRAN.**

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**INTRODUCTION:** The study has been conducted to determination of fruit and vegetable consumption in pregnancy and its association with birth weight among tribes population.

**MATERIALS AND METHODS:** Cross sectional study based on face to face interviews, a food frequency questionnaire (FFQ), and extractions of birth weight of their children from growth monitoring card. The sample population was 627 tribes' women living in south of who have completed the FFQ in mid-pregnancy, focused on frequency of green leafy vegetable intake and quantified intake of fruit. The outcomes were birth weight and z-score for expected birth weight adjusted for sex and gestation week. Information on maternal height, weight, and other potential variables was obtained through face-to-face

interviews.

**RESULTS:** Significant associations were found for all exposures to fruit and vegetable intake with birth weight, ( $p < 0.05$ ). The strongest association was found for fruit intake in which cases mean birth weight increased by 107 g (95% CI 73-142). All associations were stronger among lean women (BMI < 20,  $n = 308$ ), whose children's mean birth weight increased by 246 g (95% CI 216-279) in fruit intake. For vegetables the results were inconclusive. When adjusted with other variables, the association between vegetables and birth weight was significant. **CONCLUSION:** Fruit and vegetables consumption in pregnancy is positively associated with birth weight in well-nourished tribes women, especially among the women with BMI < 20.

#### P182-03

##### **EFFECT OF EDUCATION ON NUTRITIONAL KNOWLEDGE OF HIGH SCHOOL FEMALE STUDENTS OF CITY AHVAZ, IRAN**

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**OBJECTIVES:** The purpose of this research is to examine the effect of education on nutritional knowledge of high school female students of Ahvaz city.

**MATERIAL AND METHOD:** This research was a semi-experimental intervention and subjects were high school female students of science course. At first, information regarding the food guide pyramid, nutritional sources and nutritional deficiency were evaluated by means of a questionnaire consisting of 52 questions. Then in stage second there was an educational package taught by the method of face to face and nutrition education booklets were distributed among the students. After 45 days, the nutritional knowledge of the students was evaluated by the same questionnaire.

**RESULTS AND FINDINGS:** The analysis of the data indicated that the level of the nutritional knowledge of the students before and after the education had noticeably increased ( $p < 0.05$ ).

**CONCLUSION:** Findings suggest that nutritional education package in a short period of time can make noticeable changes in nutritional knowledge of high school female students and this effect on their food habits and practice.

#### P182-04

##### **ANTHROPOMETRIC FEATURES OF PUPILS PROVIDED WITH MEALS UNDER THE NEPAD SCHOOL FEEDING PROGRAMME**

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**INTRODUCTION:** The School feeding program was introduced to improve both nutrient and energy intakes among pupils in Ghana.

**STUDY DESIGN AND METHODOLOGY:** A cross sectional design was employed. A total of 400 pupils were sampled randomly from three public schools in the greater Accra Region. A semi-structured questionnaire was used to solicit socio-economic information. Standard procedures were used in obtaining anthropometric data while 24-hour recall dietary data was collected for a sub-sample. Statistical significance was tested using Chi-square and Analysis of Variance.

**RESULTS:** Height ( $p = 0.02$ ), body weight ( $p = 0.04$ ) and triceps skinfold measurements were statistically significant among pupils from the various schools ( $p < 0.001$ ). Body mass index also showed statistical significance association with sex of pupils ( $p < 0.001$ ). Only children aged 7 – 10 years met their EAR for protein, carbohydrate and energy. About 28.0% of pupils were suffering from various degrees of malnutrition.

Selected vitamin and mineral intakes were above 50.0% for all age groups and sexes.

**CONCLUSIONS:** Females were heavier, taller and have relatively more subcutaneous fat than males of comparable age. Only 7 – 10 year-olds met energy and macromolecule intakes.