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The Journal

- Serves as a forum for the sharing of research findings and information across broad areas in nutrition
- Publishes original research reports, topical article reviews, book reviews, case reports, short communications, invited editorials and letters to the editor.
- Welcomes articles in nutrition and related fields such as dietetics, food science, biotechnology, public health and anthropology

Contents

1st Southeast Asia Public Health Nutrition (SEA-PHN) Conference 14 – 17 May 2017

Abstracts for	
Keynote Address	2
Plenary Lectures	2
Symposia	5
Abstracts for Lunch Symposia	25
Abstracts for Young Researchers' Awards	
Oral	31
Poster	34
Abstracts for Free Paper Presentations	38
Abstracts for Poster Presentations	52

Nutrition Society of Malaysia 32nd Annual Scientific Conference

Abstracts for Poster Presentations (Undergraduates)	128
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*1st Southeast Asia Public Health Nutrition (SEA-PHN) Conference
14 – 17 May 2017*

Abstracts for

- 1. Keynote Address**
- 2. Plenary Lectures**
- 3. Symposia**

Keynote Address**Regional partnership and collaboration:
Together in advancing public health****Teruo Miyazawa**

*Federation of Asian Nutrition Societies (FANS);
International Union of Nutritional Sciences (IUNS);
New Industry Creation Hatchery Center, Tohoku
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Congratulation, and I would like to celebrate the opening of the 1st Southeast Asia Public Health Nutrition Conference on behalf of the Federation of Asian Nutrition Societies (FANS) and the International Union of Nutritional Sciences (IUNS). One half of the world population is in the Asian regions. For developing the welfare and public health, a regional partnership is very important among key stakeholders, such as nutrition societies and corporate partners. FANS and IUNS should welcome for establishing the SEA-PHN Network in promoting public health nutrition and alleviating nutrition problems in combating the dual burden nutrition in the region. Nutrition and food for longevity for the well-being of all regions may be much focused on the expansion of collaborative ties among SEA countries and with our international colleagues. The role of food and nutrition has changed drastically in recent times as it has evolved into a truly multidisciplinary science, encompassing work from consumer research to materials technology for food processing. We must take note of health trends together with environmental concerns and the changing economic climate. I hope that the SEA-PHN Network outcome will fortify the members who engage in future actions and collaborations.

Plenary Lectures**PL-01 Scaling up nutrition and health
movement in Indonesia – Past to present****Florentinus G. Winarno**

*Task Force Coordinator of Indonesian Academy of
Sciences*

The great success of the 20th century was identifying the essential nutrients and their deficiencies. This allowed for differential diagnosis of deficiency and universal recommendation. However,

viewing the benefits of diets as solely preventing nutrient deficiency is much too limiting; *diet plays a wider role in either promoting health and or preventing disease*. Even though Indonesia is the second of the world biodiversity Center, having a great food potential development, Indonesia still facing food and nutrition problem. Malnutrition among vulnerable group are still relatively very significantly high and still facing problems of stunted 0-23 month children, and underweight children, high proportion of pregnant women who are anemic, lower birth weight infants, high infant mortality rate. despite micronutrients deficiencies /prevalence of anemia and vitamin A, as well as obesity among preschool children. Those progress and constraints will be covered in this presentation. The Second International Conference on Nutrition (ICN 2), 2014, *The Rome Declaration of Nutrition, The Frame work for Action*. To establish national policies aimed at eradicating malnutrition and transform food system to make nutritious diets available to all. The time when the fetus grows in the womb is the most important phase in human life, because this can impact health, not only in the early life but also throughout life. Good nutrition before birth is critical for a healthy life. Due to those problem have emerged, particularly in the developing countries, SUN global movement, be developed , working together in the fight against malnutrition in all its form to end malnutrition. Indonesia joint SUN Global movement. A Presidential decree was signed in June 2013 No43/2013, serves as its legal platform, Policy for the First 1000 days Of life movement including the guidelines for program planning. The total cost of Indonesian Nutrition Plans over 7 years is approximately \$16 billion/ NMTD Plan 2015-2019. There are significant progress have been made since 2013, in the food and nutrition development, particularly food security and vulnerability, and food safety. The Future Priorities 2016 – 2017: The implementation of the monitoring and evaluation (M7E(frame work. To support the design of research effective prevention of stunting increases. The future is a new era for improving Human Health. The future is here We must all learn from the past, so we can look toward a brighter future as there are much more to be discovered in the field of Food science and nutrition intervention, such as nutrigenomic and microbiome, the gut microflora greatly effect human health, hold promise for further application in the health and nutrition intervention. The child wellness begins in the womb, so the significant intervention point is

with pregnant women. Geographically, Indonesia is very large marine continent, 3/4 is ocean, the government recognizes that nutrition status and problems are not spread equally nationwide, Western regents of the country are generally better off. The nutrition status of eastern region is more severe, so needs better attention.

PL-02 Nutrition scene in Malaysia – The past, present and future challenges

Lokman Hakim S, Zalma AR and Khairul Zarina MY

Public Health Programme, Ministry of Health, Malaysia

Malaysia is an upper middle-income country experiencing a nutrition transition. The accelerated phase of industrialization and urbanisation has inevitably leads to changes in the Malaysian lifestyle and dietary patterns. These changes contribute to a shift on nutritional related health problems, from undernutrition and communicable diseases, to the emerging issues of obesity and diet-related non-communicable diseases (NCDs). The objective of this presentation is to highlight the nutrition scenario in Malaysia, the challenges and way forward in combating double-burden of malnutrition. The Malaysian Cabinet has endorsed the National Nutrition Policy in 2003 in order to eradicate and control diet-related diseases. In translating the policy into action, the National Plan of Action for Nutrition Malaysia (NPANM) has been formulated. The NPANM series are Malaysia's commitment towards the World Declaration on Nutrition during the International Conference on Nutrition (ICN). The Plan has identified various nutrition-related indicators and strategies that are in accordance with nutrition commitments at international, regional and national level. Through the NPANM III, 2016-2015, a multidisciplinary approach is strengthened to ensure concerted effort from various sectors in the implementation of nutrition-related programmes and activities in the country. Policy coherent within various ministries is also crucial in ensuring food and nutrition security especially on availability, accessibility and affordability of healthy foods and food products. In addition to strengthening healthy eating promotion to all age groups, building supporting environment, implementing hard policies approach and the empowerment of communities are the way forward to combat obesity and NCDs in the country.

PL-03 The growth of nutrition activities in the Philippines: Lessons learned and challenges for the future

Rodolfo Florentino

Nutrition Foundation of the Philippines

Following the success of the Bataan Rice Enrichment Experiment which led to the enactment of the landmark Rice Enrichment Law, nutrition consciousness started to build-up in the Philippines, with the establishment of several institutions and organizations which took the initiative of spreading the word about the problem of malnutrition in the country and implementing early nutrition activities. With the enactment of the Nutrition Act of the Philippines (PD491) and the creation of the National Nutrition Council (NNC) and its Secretariat in 1974, national nutrition activities started in earnest. The Philippine Plan of Action for Nutrition (PPAN) formulated by NNC every 4 years, has since been guiding the policies, strategies, programs and targets of all food and nutrition-related government departments and NGOs towards the goal of improving the nutrition of the population. The PPAN has gradually evolved from one targeting severe undernutrition particularly in children, to one encompassing the increasing over-nutrition in adults and children, and now to a multi-sectoral strategy with the goal of improving the nutrition of the whole population. The classical nutrition interventions such as food assistance to the malnourished, micronutrient supplementation, breastfeeding campaign and complementary feeding, NIE, and food fortification, have been gradually expanding in their strategies and scope in response to the changing nutrition landscape. At the same time, nutrition surveys, as well as a monitoring and evaluation system at the local level and basic and applied research in food and nutrition, have provided the needed support to the nutrition effort. With the programs' improving manpower and financial resources, the nutrition situation of the country has gradually improved. Challenges remain, including obtaining the political will of chief executives at all levels of government, operationalizing an over-arching approach to nutrition improvement, and balancing between managing the malnourished and targeting the over-all improvement of nutrition of the country.

PL-04 Nutritional policies and strategic plan development in Thailand: challenges and experience

Tontisirin Kraisd

Professor and Senior Advisor, Institute of Nutrition, Mahidol University, Thailand

Thailand has successfully reduced maternal and child malnutrition since the 1980s and most strikingly was the decline of underweight in under-five from 51% to less than 10% presently. Prevalence of anaemia during pregnancy, low birth weight and stunting have also remarkably reduced. The Poverty Alleviation Plan (PAP) under the National Rural Development Committee acted as an umbrella for multi-stakeholders and multi-strategic approaches implemented at rural communities with strong commitment and support from national level. Provision of basic services have been made available in all areas along with mass mobilization based on community volunteer system of one volunteer per 10 households in order to reach those previously unreached. Community leaders and volunteers collaborate with service providers to take remedial actions based on the basic minimum need indicators that incorporated nutrition indicators. Pregnant mothers received local snacks as supplementary foods, multivitamin and iron tablets as well as nutrition education through antenatal care. Infant and young children received basic services including growth monitoring and promotion, breast feeding and appropriate complementary feeding from food at household and a triple mix of rice, legume and sesame prepared at community. In 1992, Thailand initiated school lunch and school milk programs (SLP and SMP) starting from kindergarten and gradually expanding to cover Grade 6. Significant improvement of maternal and child nutrition was observed after a few years of implementation and continued improvement was seen later. The average height of young adults both male and female presently is approximately 5-7 centimeters taller than previous generation. Thailand currently is facing some remnants of under-nutrition an increasing prevalence of overweight, obesity and non-communicable diseases (NCDs). The Strategic Framework for Food Management under the National Food Committee currently acts as umbrella for implementation at community level using nutrition and NCD indicators to guide collaborative and remedial actions between service providers, volunteers and other

stakeholders with the aims for good nutrition, good health and well-being for all.

PL-05 Tackling the changing nutrition scene in Vietnam: Success and challenges

Le Thi Hop

President of VINUTAS; The Former Director of NIN - Vietnam

Nutrition policy and intervention programs during the last decades During the 1980s, after a long devastating war and the pressure of high population rate, nutritional status of the Vietnamese, especially of children and mothers was very poor. In 1980, the National Institute of Nutrition (NIN) of Vietnam was established and started to conduct several nutrition epidemiological studies, providing scientific evidences on malnutrition rate and its main causes; and to elaborate the National Plan of Action for Nutrition (NPAN). Nutrition network has been set up in the whole country. Control of Protein Energy Malnutrition (PEM) and vitamin A deficiency has become a national project. In 1995, the Prime Minister ratified the NPAN 1995-2000, where the Government asked authorities at all levels to integrate nutrition goals, including the reduction of malnutrition, into their local socio-economic development plans. The National Nutrition Strategy (NNS) 2001-2010 and the second NNS for the period 2011-2020 was officially ratified by the Government. The PEM control program, PAM project, High dose Vitamin A supplementation for children, Iron/folic supplementation for pregnant women were implemented. Besides the malnutrition control programs, food fortification and school nutrition project were also developed and carried out during the period 2011-2020. The main intervention strategies were nutrition throughout the lifecycle with preventive orientation, prioritizing high risk groups and disadvantaged areas. It used community-based and multi-sectoral approach in implementation of nutrition activities. The Vietnamese food-based dietary guidelines were developed for every 5 - 10 years (FBDG for period 1995-2000, 2001-2005, 2006-2010 and 2011-2020, as nutrition education tools.

Building up capacity for nutrition have been given high attention. Since 1994, the MSc. training of community nutrition and in 2005 the Ph.D training in nutrition have been conducted. Thanks to the NNS 2001-2010 and the NNS 2011-

2020, international cooperation with the UN agencies (WHO, UNICEF and FAO), Regional ILSI, SEAMEO TROPMED, Thailand, Malaysia, and the Philippines... were more effective and strengthened. The SEA-PHN network was established and it is the new opportunity of collaboration with other countries in the SEA region.

Changing of nutrition problems in Vietnam during the past 4 decades Child malnutrition (underweight) prevalence has been remarkably reduced, from 51.5% in 1985 to 25.2% in 2005, 17.5% in 2010 and 14.1% in 2015. The prevalence of stunting of children under 5 was 59.7% in 1985, 43.3% in 2000, 29.3% in 2010 and 24.6% in 2015. The prevalence of overweight and obesity among under 5 and school children is increasing remarkably in big cities such as Ho Chi Minh City and Hanoi. The prevalence of women of reproductive age with CED (BMI <18.5) was reduced. Meanwhile, the rate of overweight and obesity is on the rise.

The successes and challenges – Main successes: The achievements of NNS and nutrition programs have been well acknowledged within the country and by the international community. Child malnutrition (underweight, stunting) prevalence as well as micronutrient deficiencies have been remarkably reduced. Capacity building and nutrition network from central to grass root levels have been developed and strengthened. International cooperation with UN agencies, other organizations and countries has been also strengthened.

Remaining challenges: Vietnam has started to face with double burden of malnutrition, as stunting is still high and overweight/obesity is increasing very fast. Disparities among regions and ethnic minorities are getting bigger. Becoming the low middle-income country, the investment from Government and donors for nutrition program/interventions is decreasing, thus it is very difficult to sustain nutrition programs/projects in Vietnam.

Symposia

S1-01 Jom Mama Project: Pre-pregnancy intervention to reduce the risk of diabetes and pre-diabetes

Mohammad Faid AR¹, Zainudin MA², Ainul Nadziha MH³, Julius C⁴, Mimi Rodzaimah AK¹, Zaahirah M¹

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Diabetes mellitus (DM) is an important public health concern in Malaysia. Over the past two decades, the population of Malaysia has grown rapidly and the prevalence of diabetes in Malaysia has dramatically increased, along with the frequency of obesity, hyperlipidemia and hypertension. Hence the Jom Mama Project was introduced aiming to improve the overall health of young women prior to their first pregnancy. The objective of this study was to evaluate the efficacy of a lifestyle intervention combining behaviour change counselling approach by community health promoters (CHPs) and utilization of an E-Health platform to enhance women health prior to pregnancy. This project constitutes an original complex intervention delivered in collaboration with the Ministry of Health Malaysia, The University of Witwatersrand South Africa, The University of Southampton UK, Steno Diabetes Center Denmark and Novo Nordisk. This is a randomized controlled trial study among newly registered married couples (nulliparous women age 20-39 years old) and own a smartphone. The intervention group (n=132) receiving 8 month package of lifestyle behavior change counseling by Community Health Promoter (CHPs) and utilization of an E-Health Platform, whilst the control group (n=132) will only receive one phone call to attend the endpoint measurement visit. The baseline measurement assessed include weight, height, waist circumference, hip circumference, blood pressure, HbA1c and fasting serum lipid that will be repeated at the end of intervention or exit assessment. Other measurement taken include changes in the level of health literacy measured by European Health Literacy Survey, dietary intake measured by Food Frequency Questionnaire (FFQ), physical activity and sedentary behavior measured by International Physical Activity questionnaire (IPAQ) and stress level measured by Depression Anxiety and Stress 21 items (DASS-21) from baseline to

after 8 months. This study is still ongoing since November 2015, involving 5 clinics in Seremban District. The recruitment phase for Baseline Assessment (BA) has been completed with total of 552 couples has been selected out of which 119 couples (60 in intervention arm and 59 in control arm) had reached the endpoint at 8 months period while the others still undergoing the study phase.

S1-02 The challenges of obesity in pregnancy

Jodie Dodd

Discipline of Obstetrics & Gynaecology, and the Robinson Research Institute, The University of Adelaide, South Australia; Women's and Children's Hospital, North Adelaide, South Australia

Overweight and obesity during pregnancy is common. There is an extensive observational literature highlighting the effects of excessive gestational weight gain among overweight and obese pregnant women and an increased risk of adverse pregnancy and birth outcomes. However, evidence from large-scale randomised trials which have utilised robust methodology indicate that provision of an antenatal dietary and lifestyle intervention during pregnancy is ineffective in limiting gestational weight gain to the extent required to potentially impact clinical pregnancy and birth outcomes. This presentation will focus on the evidence available to date for antenatal interventions for pregnant women who are overweight or obese, in addition to challenging the current focus on gestational weight gain as a relevant clinical outcome, and considering alternative approaches which may be required if outcomes for women and their infants are to be improved.

S1-03 Maternal anemia in relation to low birth weight

Charintip Somprasit

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Anaemia during pregnancy can be caused by several etiologies. We are focusing on the iron deficiency anaemia (IDA) which is associated to adverse obstetric outcomes e.g. Low birth weight (LBW), growth restriction, preterm birth, also perinatal mortality. The prevalence of IDA is still very high in developing countries especially the South East Asia countries. This important nutritional deficiency affected third-fourth of

pregnant women in particular area with high degree of severe anaemia. Data from National nutritional survey (NNS) in Thailand indicated that among Thai pregnant women in remote area at least one-fourth had an adverse impact from the iron and iodine deficiency. Despite several studies had been reported the maternal anaemia is a significant risk factor for adverse perinatal outcomes such as preterm, low birth weight also perinatal death. On the other hand, recent data showed a limited association between severity of anaemia and low birth weight. Not only LBW is associated with maternal anaemia, but also related to other causes such as teenage mother, low maternal BMI, poor antenatal care. Development of medical strategy and public health policy for preventing maternal anaemia through food-based approaches and iron supplement schedule in deficiency region are the important issues to be considered. Also, controversial issues for diagnosis and management of IDA and LBW have to be reviewed and addressed.

S2-01 Eradication of undernutrition in Southeast Asia

Corazon Barba

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The last two decades have seen significant gains in the reduction of undernutrition in developing regions. However, the co-occurrence of different forms of undernutrition, namely, stunting, wasting and/or underweight, and micronutrient deficiencies poses challenges. This paper will discuss trends in undernutrition in Southeast Asia (SEA) and policies aimed towards the eradication of undernutrition. According to the State of Women and Children (SOWC) report in 2016, stunting ($\geq 30\%$) and underweight ($\geq 20\%$) among under-five children remain highly prevalent in Cambodia, Indonesia, Lao PDR, Myanmar, Philippines, and Timor Leste. Similarly, anemia among 6-59 month old children and pregnant women persists as a moderate to severe public health problem. To combat these, the 10 packages of nutrition-specific interventions outlined by Bhutta (2013) may be implemented. However, the approach to eradicating undernutrition need not be limited to them. Nutrition-sensitive interventions that bring forward and underline the role of other sectors in addressing nutrition problems have yet to be fully explored. While

SEA countries have national nutrition strategies and action plans, these have to be re-evaluated so that enabling environments are established and sustained. Likewise, gaps in the implementation of interventions should be identified. Also, since nutrition is a developmental and multi-sectoral issue, the role and engagement of stakeholders must be carefully examined to maximise partnerships. Conscious effort to embed nutrition in policies, programs, and strategies is necessary to maximize financial inputs by the government. Finally, best practices from countries like Thailand and Brazil that have successfully implemented nutrition programs and met their targets, may be studied for piloting and scaling up. But contextualization to the local setting must not be overlooked. In conclusion, the eradication of undernutrition should remain a priority for many SEA countries. Doing so will alleviate potential increases in both obesity and NCDs but it requires strengthened government policies.

S2-02 Public health nutrition policies and strategies for the prevention and control of NCD in Brunei Darussalam: Implementation, challenges and opportunities

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Brunei Darussalam is an oil-and-gas-producing sultanate, with a population of less than half a million. Over the past few decades, the country has experienced an epidemiological transition from infectious to non-communicable diseases (NCDs), with rapidly emerging epidemic of lifestyle-related diseases such as hypertension, diabetes and obesity. In respond to the epidemic, Brunei Darussalam has adopted a commitment to the prevention and control of NCDs as outlines in the Brunei Darussalam National Multisectoral Action Plan for the Prevention and Control of Non-communicable Diseases (BruMAP-NCD) (2013-2018). The BruMAP-NCD provided strategic direction and coordinated action on the public health policies and implementations. Five key strategic objectives were identified, including 'Promotion of Balanced and Healthy Diet'. Under this strategic objective, a number

of nutrition policies and actions are currently being implemented; Revision of a Food-Based National Dietary Guidelines; Healthier Choice Initiative, with the development of a Healthier Choice logo and a set of nutrient criteria, as part of a multifaceted strategy to reduce salt, sugar and fat, and eliminate trans-fat in processed foods; Healthy Supermarket and Restaurant Programme, to generate and drive demand of the healthier food choices; Restriction of sales and marketing of unhealthy foods and beverages in schools; and fiscal policies to promote healthy diet, implementation of tax on sugar-sweetened beverages, tax exemption of beverages meeting the nutrient criteria and an advocacy to earmark the revenue for evidence-based public health initiatives. The acceleration of the policies and actions are faced with a number of challenges; multisectoral commitment coupled with limited capacity, especially in the wake of the current global oil economic climate. The predicaments, however, should instigate opportunities to innovate, review current management through consolidation of services, inculcate community-owned health promotion programmes that are effective and sustainable, leverage on high level political support by strengthening multisectoral collaboration and policy environments, as well enhancing evidence generation through research.

S2-03 Burden of undernutrition and overweight/obesity – Policy and programme in Bangladesh

Tahmeed Ahmed

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With a relatively small land mass, huge population density and frequent natural calamities, Bangladesh faces a number of challenges regarding nutritional status of the population. With a population of about 160 million and a population density of more than 1100 persons per square kilometer, the country is challenged with a huge burden of undernutrition. Over a period of 10 years, childhood stunting has decreased from 51% to 36%, underweight from 43% to 33%. Prevalence of childhood wasting, however, has changed little and is currently 14%. Close to half a million children suffer from severe acute malnutrition. The average stature of

women of child bearing age has slightly improved but still 13% of women are less than 145 cm tall. Undernutrition of women, as defined by a body mass index of <18.5, has decreased substantially from 34% in 2004 to 19% in 2014. At the national level, overweight among under-five children is still not a major issue, with 0.4% and 1.4% children being above 2 SD of weight-for-age and weight-for height respectively. The situation among women is alarming – the proportion of women overweight (BMI \geq 25) has increased from 9% to 24% over the last 10 years. The quality of diet, particularly for young children, is a major issue. Only 28% of 6-23 months old children take a diet that has diversity of food. Only one-fifth of young children receive minimum acceptable diet – a composite of presence of milk in diet, minimum dietary diversity and minimum meal frequency. Micronutrient deficiencies are still widely prevalent. More than one-third and one-fifth of school age children suffer from anemia and sub-clinical vitamin A deficiency, respectively. Deficiency of zinc affects 45% of children, more common among those living in slums. Despite having a good universal salt iodization program, 40% of the population suffers from iodine deficiency. The Government of Bangladesh has implemented a new national nutrition policy. The policy recognizes the burden of undernutrition as well as the threat of overweight and obesity. It rests on three key pillars. The first is to scale up nutrition specific or direct interventions, which include infant and young child feeding, behavior-change communication to improve nutritional status, micronutrient supplementation, and treatment of severe acute malnutrition. The second goal is to foster nutrition-sensitive or indirect interventions. These include alleviation of food insecurity, promotion of nutrition-friendly agriculture, aquaculture, introducing nutrition into social safety net programs, water-sanitation-hygiene, and promoting preventive actions against overweight and obesity. The third goal is to foster multisectoral efforts through high level coordination of all national level actions.

S3-01 Optimized complementary feeding recommendations in South East Asia

Umī Fahmida

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Linear programming (LP) approach provides robust method for developing optimized complementary feeding recommendations (CFRs) by using locally available food groups, sub-groups and items that can best meet nutrient requirement of children under two years of age. We presented findings from cross-sectional as well as intervention studies where optimized CFRs developed using LP were used in several countries in South East Asia (SEA). From the cross-sectional studies, similarities as well as differences in problem nutrients were found across countries. Typical problem nutrients for minerals were iron, zinc and calcium whereas for vitamins were niacin, folate and thiamin. Problem nutrients were more found in younger children and different problem nutrients were found between children from households with lower vs middle socio-economic situation (SES) which reflect different dietary patterns. Amongst children in Indonesia from lower SES more problem nutrients were identified when fortified foods were taken out from the food pattern. Findings from intervention in Lombok Indonesia showed that children whose mothers received nutrition education with optimized CFRs had higher nutrient intakes and nutrient densities in their CF diet although densities were still below desired densities for iron, zinc, calcium. An intervention study on stunted children in Dompu Indonesia showed that higher nutrient density CF diet which included fortified food was not beneficial for stunted as compared to optimized CFR without fortified food. In an intervention trial in Myanmar, optimized CFR can minimize the negative effect of iron supplementation on zinc status and gut microbiota. The findings suggest the benefit of promoting optimized CFR and further study is needed to provide more evidence of its effectiveness at the public health level. This effort is currently being done by SEAMEO RECFON and academic partners as well as program implementers in Indonesia, Lao PDR and Myanmar and will expand to other countries in SEA region.

S3-02 Community feeding program in Orang Asli settlement, RPS Kemar Malaysia experience

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Childhood malnutrition is common and severe among Orang Asli aboriginal community. Community Feeding Program is a community-based management addressing malnourished children aged 6 months to 6 years in RPS Kemar aiming to achieve 25% recovery after 6 months and to maintain normal body weight. Nutritional status of 643 children from 17 centers in RPS Kemar was assessed monthly from year 2013 to 2015 using WHO 2006/2007 standard growth chart. The children were supplied with high calorie food, full cream milk and multivitamin with average 500-500 kCal/day in 5 days per week, while underweight children (Weight-for-Age < -2 SD and BMI-for-Age < -2 SD) were given extra High Calorie and Protein supplement called Ready-to-Use Therapeutic Food (RUTF) (average 300-400 kCal), 3 times per week. In addition, the underweight children also received monthly food basket consisted of special formulation milk and multivitamin. The result showed an improvement of the children's nutritional status after 6 months in the program. The recovery rate from underweight in 2013, 2014 and 2015 were 59.9%, 25.0%, and 61.4% respectively. In 2010, only 38.7 % of the children in the community had normal body weight status, but after the intervention, in 2013, 2014 and 2015, the percentage increased to 54.9%, 60.3% and 59% respectively. The results obtained in this program suggested that community-based-management with high calorie food supply is beneficial for underweight children. Therefore the continuity of the program is essential to sustain normal nutritional status among children in interior remote Orang Asli community.

S3-03 Strategies to reduce stunting among young children

Doddy Izwardy

Directorate of Nutrition, Ministry of Health Republic Indonesia

Chronic undernutrition among children as indicated by stunting remains public health problem within some countries in South East Asia Region, including Indonesia. Associated with reduced quality of life and increased risk of non-communicable diseases, such nutritional problem is potentially hampered the future economic growth within a country. In Indonesia, the prevalence of stunting among under-five children falls beyond the high public health cut off point and draws special attention of the government to

address it by adopting SUN Movement approach. Invented in 2014, a comprehensive Nutritional Status Survey (NSS) has been managed by the Directorate of Nutrition - MOH for better profiling the national nutritional problems that will be utilized for the basis of designing effective stunting reduction strategy. Such extensive routine national profiles by itself lend valuable information on the pattern of stunting prevalence across time and regions. Studying the pattern, both specific and sensitive interventions, especially focusing on the first 1,000 days of life have been proven effective to reduce stunting within the last few years. In the near future, an Electronic Recording and Reporting Community-based of Nutrition Program (e-RRCNP) will be launched in parallel with a community nutrition center as an integrated program package. This package will ensure rapid real-time data gathering on every malnourished children (by name and by address) and delivery of any needed intervention on timely manner.

S4-01 Implementation of National Plan of Action for Nutrition in Indonesia

Doddy Izwardy

Directorate of Nutrition, Ministry of Health Republic Indonesia

To encounter nutritional problems in Indonesia, priority and targets have been set up following the design of SUN Movement. Full package of both specific and sensitive interventions are delivered to optimize the wellbeing of children in their first 1,000 days of life. To integrate various programs within the package, a National Plan of Action for Nutrition (NPoAN) has been prepared. Several specific interventions are managed under the Directorate of Community Nutrition - MoH and monitored with numbers of key performance indicators within each program. Specific Activities are Iron-folic supplementation, balanced diet campaign, complementary feeding for school aged children, growth monitoring, micronutrient supplementation, promoting healthy diet and clean behavior with exclusive breast feeding. Integrated information system is established including Nutrition Status Surveillance (NSS) and Electronic Recording and Reporting Community-based of Nutrition Program (e-RRCNP). Within the NPoAN, the collaboration and coordination with other sectors, which are in charge in delivering mostly sensitive interventions, have

been emphasized. To monitor these program integrations, key performance indicators from other sectors are shared and reviewed.

S4-02 Implementation of the national plan of action for nutrition in Malaysia – Success and challenges

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The National Plan of Action for Nutrition of Malaysia (NPANM) was first developed in 1996, following the declaration of the first International Conference on Nutrition (ICN), jointly organized by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) in 1992. The NPANMI, 1996-2000 described in details strategies and activities to combat both spectrum of malnutrition – under- and over-nutrition. In 2003, the National Nutrition Policy was developed with the aim to achieve and maintain nutritional well-being of Malaysians to enable them to contribute to nation building in line with Vision 2020. The objectives of the policy are 1) to enhance and maintain nutritional well-being for all, 2) to ensure household food security for all, and 3) to strengthen inter- and intra-sectoral linkages in the development and implementation of all nutrition-related activities in the country. The NPANM II, 2006-2015 was developed as a mechanism to implement the policy. Various strategies and activities which involve multi-sectoral collaboration were outlined in the plan. The collaboration was strengthened in the NPANM III, 2016-2025. The success and challenges in implementing the NPANM will be shared in the presentation.

S4-03 Implementation of National plan of action for nutrition in Myanmar – Success and challenges

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The National Nutrition program in Myanmar was initiated in 1954. Since 1994, Myanmar has formulated a multisectoral National Plan of Action on Food and Nutrition (NPAFN) with the goal of ensuring adequate access to, and utilization of food that is safe, and well-balanced on a long term basis of the people of

Myanmar. Strategic directions and objectives are outline to address the immediate, underlying and basic causal factors along the different life stages with special focus on the First 1000 days. The implementation roadmap is based on the prioritization and sequencing principles. Central Board of Food and Nutrition (CBFN) was formed in 1994 as the multisectoral coordination body. It was reformed in 2013 and also approved to form Technical working groups and Food and Nutrition Advisory Group. After joining Scaling Up Nutrition (SUN) on 15 May 2013, SUN action plan of Myanmar has been developed based on existing NPAFN. It increases awareness and coordination by establishment of SUN networks namely Government, UN, Civil society, Donor and Business networks. Government expenditure on Health including Nutrition is increased. The “Integrated program for Nutrition Improvement (IPNI)” comprising *quality coverage of both Nutrition specific and Nutrition Sensitive interventions and Governance* was initiated in 2014 and expanded among nutritionally vulnerable areas. Other progresses include “National Coordination Meeting on Nutrition” chaired by the State Counselor in January 2017, twenty Core Nutrition actions identified by the platform, first exercise on National Nutrition Stocktaking , planning to conduct National Nutrition Seminar which will be followed by development of National Nutrition Agenda and “National Micronutrient and Food consumption survey” during 2017. Challenges are costing of NPAFN, upgrading institutional and human capacity, strengthening multi-sectoral platform, information, and more investments.

S4-04 Implementing the National plan of action for nutrition in Philippines – Success and challenges

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The Philippine Plan of Action for Nutrition (PPAN) is the country’s blueprint for nutrition improvement. It is a systematic integration of efforts of government and private agencies to address malnutrition through direct nutrition interventions and development measures. PPAN is part of the Philippine Development Plan under the Human Development Chapter. To date, the National Nutrition Council (NNC) has formulated nine national plans since 1974 yet the nutritional situation of the country remains a challenge for

some indicators. Hunger incidence in the country remains a serious concern. Official government statistics and data from hunger surveys show an increasing trend in hunger incidence among Filipino households. Nutritional problems like undernutrition and micronutrient deficiencies continue to exist in some sector of population while others are bulging and have developed lifestyle-related diseases. As the country's lead agency in food and nutrition research and development, the FNRI-DOST plays an important role in ensuring a well-nourished Filipino through the provision of accurate data, correct information and innovative technologies. To strengthen this thrust, the Institute supports the implementation of the plan specifically in the conduct of the National Nutrition Surveys and food and nutrition technology and model interventions. This presentation is a snapshot of the success and challenges experienced over the years while implementing PPAN in the Philippines. It hopes to present the history of the plan, why the plan was created, and the role of each agency to achieve the set targets. The core of the presentation zeroes-in on the draft plan of action for 2017-2022, and how this equates as well as contrasts to the old plan. The presentation closes with a statement that while various interventions addressing malnutrition problems among Filipinos resulted to an improvement in some of the conditions, much are still to be done to achieve zero malnutrition for the Philippines.

S4-05 Implementation of National plan of action for nutrition in Thailand – Success and challenges

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Thailand is currently facing double-burden of malnutrition characterized by persistent undernutrition (stunting, wasting, micronutrient deficiencies) and coexisting overweight and obesity across the life course. As the 20 years National Strategic Plan (2017-2036) in Health with concept for Thailand 4.0 towards the 2030 Sustainable Development Goals (SDGs) including nutrition through SDG2 “End hunger, achieve food security and improved nutrition and promote

sustainable agriculture”, the Department of Health has developed the strategic plan of health promotion and environmental health according to the National Health Development Plan under the 12th National Economic and Social Development Plan (2017-2021). The plan emphasizes health promotion in all age groups with Life Course Approach to strengthen effective cooperative and collaborative environment to prevent and solve all forms of malnutrition as committed in the Rome Declaration on Nutrition in the Second International Conference on Nutrition (ICN2) 2014. Health education and behavioural modifications will be used to improve healthy eating, decrease unhealthy diets consumption such as sweet, salty and fatty diets and also encourage vegetable and fruits intake to ensure adequate and balanced nutritional intake by all ages. Water, sanitation, hygiene and food safety are also included. The action plan is consistent with the global strategy to achieve the 2025 Global Nutrition Targets and also nutrition related Global NCD Targets. This plan is also in line with the Strategic Framework for Food Management in Thailand which has been drafting for the 2nd 5-yrs plan (2017-2021) that include food and nutrition security development, food quality, food safety, food education and food management. Cooperation amongst involved organizations both in public and private sectors and civil societies to develop effective sustainable integrated and unified cooperative intervention and action for solving and prevention of malnutrition in Thailand is the key of success and challenge.

S4-06 Implementation of National plan of action for nutrition in Vietnam– Success and challenges

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With the adoption of World Declaration and Plan of Action for Nutrition in the first ICN in 1992, Vietnam developed its first NPAN 1995 – 2000, followed up by NNS 2001 – 2010 and the current NNS 2011 – 2020. Objectives of NNS 2011-2020 are to improve diet of Vietnamese people, nutrition and micro-nutrient status of mothers and children; to control overweight, obesity and nutrition risk factors for NCD; and to improve nutrition knowledge and practices in general population. A NPAN is developed for every 5 year phase to enable the achievement of the NNS. Vietnam has just conducted midterm review of NPAN

2011-2016 and is developing the next NPAN towards 2020. The review showed that NPAN objectives on reduction of child malnutrition have been achieved while the objectives on micro-nutrient deficiency reduction, obesity control and exclusive breastfeeding have not been met. Major achievements included the integration of nutrition indicator in socio-economic development plan at national and sub-national level with the establishment of sub-national steering committees and plan of action with multi-sectoral approach. A number of nutrition supporting policies have been developed showing the strong commitment of the government. Nutrition specific and nutrition sensitive interventions have been implemented in large scale with priorities given to disadvantaged areas but the disparities among regions are still persistent, showing that there should be more investment for nutrition, and more effective implementation and cross-sector coordination. Considering the existing and emerging nutrition issues of the country, the main principles of the upcoming NPAN are:

- Implementation of interventions following life cycle with the focus on 1000 days.
- Implementation at national scale with priority for poor, disadvantaged areas with high child malnutrition rate.
- Implementation in collaboration with other health programs and poverty reduction, WASH, food security, disaster management and other socio-economic development programs.
- Advocacy efforts on the participation of authorities at all levels, line ministries and other stakeholders in nutrition.
- Implementation together with research to assess the achievements and orient the next period.
- Diversification of financial resources for nutrition.

S5-01 School-based intervention programs in South East Asia in improving nutritional status: Successes and challenges

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School health and nutrition interventions (SHN) are among the most cost-effective health interventions and are important investment in achieving Education for All. The countries in SEAR are implementing country - problem - based

SHN interventions guided by the framework “Focusing Resources on Effective School Health (FRESH)”. This is an interagency efforts to promote and support effective school health and nutrition policy and programming with four core components to consider when designing school health and nutrition programs: health-related school polices; provision of safe water and sanitation; skills-based health education; and school-based health and nutrition services. In a study conducted by SEAMEO INNOTECH, it showed that the common SHN interventions across the SEAR backed by national policies are: Healthy and safe school environment, Health education, Physical education, Nutrition services, Health services, Counselling, Psychological and social services, Health promotion for staff, Family and community Involvement. Issues and challenges however are besetting the implementation of these interventions despite the presence of national policies. The major constraints for effective nutrition education could be: inadequate funding; lack and poor school facilities to support a healthy school environment; lack of manpower, and professional development trainings. There is a need therefore to consolidate and strengthen ongoing school based nutrition programs, aiming at improved nutritional status, improved school performance and creating an appropriate learning environment through nutrition education, school gardening, school meals, nutritional assessment, clean water and sanitation, as well a physical activity education.

S5-02 Interventions to support teenage pregnancies: Ministry of Health’s initiatives

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The objective of this presentation is to highlight the Ministry of Health (MOH) initiatives and interventions to support teenage pregnancies in Malaysia. These include brief overview of policy and programme development for adolescents, situational analysis of teenage pregnancy and nutritional problem in particular anaemia in pregnancy, as well as MOH interventions to support teenage pregnancy, associated issues, challenges and way forward in tackling not only health problems but the social determinants that affect health of adolescent in general

through holistic interventions and intersectoral collaboration. There is limited study on nutritional problems in particular anaemia in teenage pregnancy. However, recent National Health and Morbidity Survey (NHMS) 2015 among Malaysian adults above 15 yrs showed the overall prevalence of anemia (HB<11gm%) in the population was 34.7% and among 15-19 yrs was 34.1%. Subsequently, the NHMS 2016 among pregnant women aged 15-49 years revealed 29.3% had anemia. According to WHO, this is classified as moderate public health problem. A recent clinical audit of 484 antenatal cards of teenage mothers collected from all states over a one month period in October 2016 showed that 36.7% were anaemic (HB< 11gm%) at booking compared to 29.2% anaemic at 36 weeks. Further analysis of those found as anemic at booking (mean Hb of 9.84 gm%) noted significant improvement at 36 weeks (mean Hb of 10.93 gm%), which can be contributed by the successful intervention at primary care levels.

S5-03 An overview on body image and disordered behaviours among school-age children and adolescents in Taiwan and other Asian countries

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Disordered eating attitudes and behaviours pertaining to the fear of fatness increased dramatically across Asian's high-income populations of young females, with clinical eating disorders proliferating beyond Japan to Singapore, Hong Kong, Korea, and Taiwan. The order by which eating disorders have spread among Asian countries seems closely related to Asian economic transformation. Consequently, a second wave comprised of the Association of Southeast Asian Nations countries - Philippines, Malaysia, Indonesia, and Thailand; and lastly, China and Vietnam. Many studies have indicated that adolescents are considered at a high risk of developing an eating disorder. And various biological and psychological factors appear to be associated with eating disorders. For example, distorted body image, criticism, teasing, and bullying focused on food, weight, and shape issues increase the risk of developing eating disorders. This session presents an overview on eating disorders related to thoughts and behaviours

among school-age children and adolescent in Taiwan and other Asian countries to indicate the seriousness and urgency of this issue and the need for education in acquiring healthy mental attitudes and eating behaviours. Furthermore, a critical view of the emergence and spread of eating disorders in Asia has revealed concurrently with rapidly rising rates of overweight and obesity. Although eating disorders and obesity have traditionally been conceptualized as separate conditions, they share many common etiological factors and it has found successful strategies for combating one will almost certainly impact the other. Success in this strive will be conditional on researchers and policymakers in both fields working together to develop effective and innovative strategies around prevention and intervention of eating disorders and obesity.

S6-01 Update on food composition programmes in South-East Asia: ASEANFOODS

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The Association of Southeast Asian Network of Food Data systems (ASEANFOODS) was established in 1986 consisting of 10 member countries comprising Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand, and Vietnam. To coordinate the ASEANFOODS activities, the Institute of Nutrition, Mahidol University (INMU) was chosen as the Regional Centre in 1986 and INFOODS Regional Database Centre in 1991. The goal and objectives are to strengthening the development of national and regional food composition data (FCD) with high quality, adequate quantity and accessibility to the users. The first ASEAN FCTs was published in 2000 and then subsequently available online in ASEANFOODS website. A number of proficiency testing schemes for laboratories were organised and few reference materials for food analysis were developed. During 2015-2016, ASEAN-FOODS collaborated with and supported by International Life Sciences Institute South East Asia Region (ILSI-SEA) in organising two workshops in Thailand: 1) Roundtable discussion on Food Composition Database, 17-18 December 2015; and 2) ASEANFOODS - ILSI SEA Region Workshop on Food Composition Data, 30-31 March 2016. The specific objectives of the first workshop were to develop a quality evaluation system (draft

guideline) for assessing the quality of published national FCTs in ASEAN countries and to develop action plan for succeeding workshop and future activities. The specific objectives of the second workshop were 1) to review the proposed plan/strategies for updating of ASEAN FCTs/FCDBs and organising FoodComp-ASEAN course, 2) to discuss the feasibility of incorporating nutrient data of pre-packaged foods (branded food products) into national FCDBs. At the national level, most of ASEAN countries have been actively working on generating new data. The achievement of representative countries is summarised as follows: *Malaysia* has been centralising the coordination, compilation and documentation of the laboratory analyses of nutrients by the participating institutions through a web-based system for data generators, data compilers and data users. This online FCDB publishes partial releases of the Malaysian FCD websites since 2015. The analytical methods of various vitamins have also been updated. *Philippines*: Current activities are on updating FCTs and web-based PhilFCT. New food data, focusing on indigenous fruits and vegetables, are being generated, compiled, checked and evaluated until the end of the 3rd quarter of 2017. *Thailand*: The hard copy of the new version Thai FCT was published in September 2015. The on-line Thai FCDB is available since April 2016 at the INMU website. Food composition data for new food items and missing data are being developed. Collection of FCD of branded food products from various food companies are in process. *Vietnam*: Activity on updating the Vietnam FCDB is at the final preparation step. The hard copy will be published by April 2017. A strategic plan for updating the ASEAN FCDB is available; the activity could be conducted in 2018 when the FCDB of the main member countries are sufficiently available. The main activity of the ASEANFOODS Regional Centre in 2017 will be to strengthening the competence of the young staffs at the ASEANFOODS member countries by collaborating with the area experts organising the FoodComp-ASEAN 2017 in Thailand.

S6-02 Analytical aspects of functional food components in Japanese official claims and food composition table

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Due to the increasing concerns on healthy diet aimed to prevent chronic diseases, functional foods (FF) originated in Japan in the 1980's now attract worldwide attention. Food for Specified Health Uses (FOSHU), the first officially approved FF in the world, is now gaining wide recognition in the Japanese community, growing to the market size of around 6000 million US\$. In 2015, the Consumer Affairs Agency of Japan (CAA) released a new category for health-claim-foods; Food with Function Claims (FFC). According to the rule for FFC, industries are allowed to indicate health claims under their own responsibility not only for the processed foods but also for the fresh produces. The industries however are required to verify their scientific evidence for both safety and effectiveness, and open all the information at the CAA website. By the end of March 2017, about 800 products were accepted by CAA, raising the expectation for the market to become more than triple size in 2016 from about 400 million US\$ in 2015. The analytical data is regarded as the critical part of the scientific evidence, where quantitative and qualitative methods for analyses should be validated. However functional substances consisting of large and complex molecules such as functional-glycans may sometimes pose a difficulty in the analyses. Currently JFRL contributes to the analytical parts with about 80 % share of the entire FFC applications. I will focus on the difficulty-in the analyses of FF-components in FFC with suggestions for solution. The second topic deals with the validity of the analytical data including the FF components listed in the Food Composition Table in Japan (FCT). To improve the credibility of the FF-components such as vitamins, minerals, and dietary fibers, the official verification studies are being continued under advises of the official expert panel.

S6-03 What do technological developments mean for dietary surveys?

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New technology is revolutionising how dietary surveys are being conducted resulting in better information that is available more quickly, to more people and for a lower resource cost. The widespread availability of powerful computers and hand held devices means that digital

collection of dietary intake data is common. An obvious advantage of this is the capacity for the data to be checked and securely stored without further transcription. Less obvious advantages include the capacity for immediate data transformation (for example from food intake to nutrients), connectivity with other people and databases (for example to provide visual images of specific food), and the collection of different types of information such as time, location, visual images, bar codes etc. A carefully designed system allows survey burden to be both reduced and partially transferred to survey participants reducing overall survey costs. Convenience for participants can be increased in many ways - for example by reducing the time required for survey participation, or allowing survey participation at times or time interval convenient to the participant. In a relatively short period of time, the use of mobile phones has become widespread. These hand held devices have already become more than a telephone. Other current uses for this common tool is for structured data capture and storage; audio recording, playback and transmission; image capture, transformation and transmission (moving or still), a light source, a clock, an alarm, a geographic location device. Mobile phones can link with other devices which perform various measurements and functions. The very high penetration of mobile phones into populations of widely varying characteristics highlights the potential for new technology to be easily incorporated into innovative dietary survey design. It is beyond question that other functions and sensors will be incorporated into personal hand held devices such as mobile phones, and that multifunctional wearable or implanted technology will become widely available. There are many challenges in the collection of food consumption data using current methods including the capability of individuals to provide accurate self-reported data, the variation in foods consumed within and between individuals, and the difficulty in food identification and characterisation, and the balancing of meeting sampling needs with containment of costs and subject burden. The incorporation of new technologies aims to address one or more of these challenges, and also provides the potential for collecting a much wider range of information than has traditionally been collected.

S7-01 Community obesity prevention programme: Learning from the My Body is Fit and Fabulous (MyBFF) programme

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My Body is Fit and Fabulous (MyBFF) was initiated in 2012 by the government to combat obesity epidemic in Malaysia. This program was a collaborative research effort with the Sackler Institute for Nutrition Science, New York together with Ministry of Health, public universities, Ministry of Education, GSIAC, MIGHT other agencies. This obesity intervention programs targeted housewives (MyBFF@home), schoolchildren (MyBFF@school) and working adults (MyBFF@work) in Malaysia. MyBFF@home was a 12-month community-based intervention study for overweight and obese housewives aged 18-59 years (BMI 25.0-39.9kgm⁻²) living in low-cost community flats around Klang Valley. The package comprised of 6 individual counselling and activity sessions (dietary, physical activity and self-monitoring behaviour). Totally 328 housewives were recruited (intervention=169; control=159). MyBFF@school was a 16-week program for overweight and obese children in primary and secondary students. It combined physical activity, nutrition and psychology strategy. A total of 237 primary students (aged 7-11 years old) and 188 secondary school students were recruited in Phase I (2014) and 1494 primary students (aged 7-11 years old) and 1139 secondary school students were recruited in Phase 2 (2015-2017). MyBFF@work was a 6-month intervention which is low cost, feasible and a goal-directed weight loss program for overweight and obese Malaysian civil servants from various Federal Ministries and State Department Offices in Kota Bharu Kelantan (BMI ≥30kgm⁻²). The intervention programme recruited 178 participants involving behaviour and nutritional approach, meal replacement and physical activity. The findings of this intervention indicated collaborative effort among all sectors to enhance the community empowerment have showed some impact to the community to combat and reduce the obesity situation in Malaysia.

S7-02 NCD prevention strategies and action plans in China

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Chronic disease became a major cause of death among Chinese residents and their prevalence was on rise in the past twenty years. According to the report on Chinese residents' chronic disease and nutrition report, the mortality of chronic diseases was 533/100000 in 2012, accounting for 86.6% of total deaths. Cardiovascular disease, cancer and chronic respiratory diseases are the leading causes of death and accounted for 79.4% of total deaths. With the economic, medical and health progress in China, the mortality rates of most chronic diseases, such as cancer and stroke, were on a decline. While, the prevalence rates of most chronic disease, such as diabetes, hypertension and cardio-cerebrovascular disease were on the rise. It is worth attention that the burden of chronic diseases will continue increase; especially with the population aging accelerates in China. In order to effectively cope with this challenge, the government made public policies to improve the policy environment for NCD prevention. The new long-term chronic disease prevention and control planning 2017-2025 was released in this year. This plan emphasized that built NCD prevention and control system based on inter-departmental cooperation, carry out joint actions with regard to environment and nutrition improvement, tobacco control, physical fitness and social assistance so as to carry forward the integrated development of prevention, control and management of NCD in China. Over the past decade, lots of prevention actions carried out in China and obtained some effects. For example "China Healthy lifestyle for all" was initiated in 2007. This action is initiated by the state and oriented to the whole population nationwide and the aim of this action is make a breakthrough in diet and physical exercises so as to promote the establishment of healthy lifestyle. Main activities included development of health supporting environment, training of healthy lifestyle instructors, generalization of health supporting tools and materials and media publicity. The acknowledge of healthy lifestyle, the use of healthy supporting tools and the adoption of some healthy actions have been obviously improved According to the evaluation investigation for the Project during its 5th anniversary in 2012. From 2016 to 2025, this action has advanced with the times and the periodical target is "reduction on salt, oil and sugar; healthy oral cavity, weight and bones".

S7-03 Stunting in early childhood and risk of overweight/obesity in adolescence: evidence from 7 and 14 years cohort in Indonesia

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Stunting, a form of chronic malnutrition, has been closely related to being overweight/obese in children around the world, including in Indonesia - constituting the double burden of malnutrition. My previous cross-sectional research has shown that stunted children were significantly more likely to be overweight than the healthy height children (Odds Ratio>1) in four different years (1993, 1997, 2000 and 2007). This study aims to determine whether stunted young children (aged 2-4-9 years) are at greater risk of overweight/obesity in adolescence. This is a secondary data analysis using the Indonesian Family Life Survey waves 1 (1993) to 4 (2007). We generated a 14-year follow-up cohort (1993-2007) and two 7-year cohorts (1993-2000 and 2000-2007) of children. Stunting (HAZ<-2) and overweight/obesity (BMIZ>+1) were determined based upon the WHO Child Growth Standards. We analysed the data using STATA Data Analysis and Statistical Software version 13. We computed and presented the prevalence of stunted children in 1993 who fell in the overweight category fourteen years later in 2007 as well as the prevalence of stunted children in 1993 and 2000 who become overweight/obese seven years later (in 2000 and 2007, respectively). 765, 1083, and 1589 children were included in the 14-year-, and the two 7-year-cohort analyses, respectively. In the 7-year-cohorts, early life stunting was inversely associated with overweight/obesity (Prevalence Ratio 0.32 and 0.38, respectively; P<0.05), but no significant association was found with the 14-year cohort. We found no association between early-life stunting and overweight/obesity in adolescence in Indonesian children.

S8-01 Micronutrient deficiencies among underfive children and reproductive-age women in Southeast Asia with focus on iron, zinc and vitamin D

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Micronutrient deficiencies among children and women are public health problems worldwide, including Southeast Asia (SEA). Iron, zinc and vitamin D deficiencies are of important concerns due to the health and functional consequences. This paper reviews the situation in SEA, with focus on iron, zinc and vitamin D deficiencies. SEA countries are diverse in developmental stages and so are the forms and extents of malnutrition. Anaemia is still prevalent but several recent reports of low prevalence of iron deficiency in women and children raised questions on the extent of iron deficiency and etiology of anaemia. Ferritin is the most common indicator that could be inflated by low-grade inflammation and common infection, hence masking iron deficiency. Varying degrees of nutritional deficiencies (vitamin A, B12 and folic) and non-nutritional factors, e.g., parasitic infection, Thalassemia (10-50% of population in some SEA countries), and obesity may contribute to anaemia. The etiology of iron deficiency and anaemia needs to be elucidated to devise proper policy and programs. Less clear is the extent of zinc deficiency but is consistently reported in small-scale studies. Habitual diets of SEA may not provide adequate iron and zinc intakes. Phytate present in cereal grains and legumes, and polyphenols in dark green leafy vegetables are major absorption inhibitors of iron and zinc. Increasing animal source foods and vitamin C, or food processing which reduce/remove the absorption inhibitors could be the food-based strategy to increase bioavailable iron and zinc. Lastly, recent national representative surveys found high prevalence of vitamin D insufficiency in children and women in Cambodia, Indonesia, Malaysia, Thailand and Vietnam, possibly due to changing lifestyles and less exposure to sunlight. Therefore, nutrition situation of children and women in SEA demonstrates dynamicity associated with changing environment, lifestyles, food habits, physical activities that may differentially affect the population in this diverse region.

S8-02 Intervention programmes in alleviating micronutrient deficiencies in communities with low resources

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In poor countries, undernutrition is an underlying cause of child deaths under the age of 5 years for about 3.5 million where many of which are preventable through effective nutrition interventions operating at scale. Thirty of more than 80 countries in the world have stunting rates of 40 percent or more which is considered to be very high. The 2008 lancet series reported that effective interventions to reduce underweight, stunting, micronutrient deficiencies, and child deaths include breastfeeding counselling, appropriate complementary feeding, and vitamin A and zinc supplementation. Interventions to reduce iron and iodine deficiency are important for maternal survival and for children cognitive development, educability, and future economic productivity. Save the Children also highlighted that the six low-cost nutrition interventions with universal coverage or lifesaving six save more than 2 million mother and child deaths each year. The lifesavings six are iron folate, breastfeeding, complementary feeding, vitamin A, zinc and hygiene. Paper by Gibson reports that food based approaches namely fortification, dietary diversification and modification, and bio fortification is starting to be recognized as the important strategies to improve micronutrient deficiency in the diet. Micronutrient powders (sprinkles) is one of new approaches for complementary foods supplement to reduce risk of micronutrient deficiency in addition to food lets and lipid-based nutrient supplements. Therefore the prevention of maternal and child under nutrition is the best option and a long-term investment that will benefit the current generation and their children. This paper shows the intervention programmes in reducing micronutrient deficiencies in communities with low resources in Cambodia, Laos and Myanmar highlighted the nutrition and micronutrient status and interventions, challenges, and lesson learnt for future improvement.

S8-03 Rice fortification for an alternative micronutrient problem solution: do the evidence support?

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Micronutrient deficiency (MD) is widespread in the developing countries, which has profound

implications for social and economic development. From a public health viewpoint, MD is a concern not just because such large numbers of people are affected, but also because it being a risk factor for many diseases, can contribute to high rates of morbidity and even mortality. It has been estimated that micronutrient deficiencies account for about 7.3% of the global burden of disease. The most common forms of MD is iron deficiency anemia, which is estimated that over 2 billion people in the world are anemic, and about one-third of it is in the Asia region. According to WHO, food fortification is one of the cost effective micronutrient solutions beside dietary diversification, nutrition education, and supplementation. Rice, a major staple food in the diet of South East Asian (SEA) population, is a potential vehicle for micronutrient fortification. A micronutrient fortified rice studies in the Philippines showed that iron-fortified rice significantly decreased the prevalence of anemia among the school children but not among the mothers. Fortified rice given to Cambodian school children showed improvements in their Hb and iron status. Current micronutrient fortified rice studies showed no effect among preschool children and mothers, but effect on improvement on Hb, serum ferritin and folic acid concentrations. A plausible explanations of the non-significant results are the study design, the micronutrient compound, the dosage, the food leaking, the food pattern, and the duration of the study. In conclusion, with a good program design, micronutrient fortified rice could be used for a targeted micronutrient program, such as school meal programs and dormitory meal program.

S9-01 FBDG: Update on development and implementation in Indonesia

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The Indonesian Food-Based Dietary Guidelines (IFBDG) or “Pedoman Gizi Seimbang” was issued on July 24, 2014 by the Health Minister Regulation No 41 year 2014. It is providing guidelines for healthy eating and behaviour for the whole society. The principle of Nutrition Guide for balanced Diet is believed to be able to cope with the double burden of nutrition problems, both deficiency and excess. Nutrition education and counselling which began in 1952 using “Healthy 4 Perfect 5 / 4 Sehat 5 Sempurna

Slogan has managed to instil an understanding of the importance of nutrition and then change the behaviour of public consumption.. The slogan “Healthy 4 Perfect 5” is no longer compatible with the development of sciences and nutrition issues today so that it needs to be updated with slogans and visuals relevant with the current conditions. In 1955 the “Healthy 4 Perfect 5” was changed to “The General Guidance for Balance Diet” / Pedoman Umum Gizi, and in 2014 it was updated to “The Balanced Diet Guidelines” / Pedoman Gizi Seimbang. By considering the long term vision development to realize the healthy, intelligent, and superior or competitive generation or nation, and input from various stakeholders through the competition and trials from the results of Nutrition slogan, it is decided that the new slogan is “Balanced Diet, Outstanding Healthy Nation” / Gizi Seimbang Bangsa Sehat Berprestasi. There are two (2) Visuals in the new IFBDG are “Balanced Diet Tumpeng”/Tumpeng Gizi Seimbang which perform 4 pilars, and “My Eating Plate”/Piring Makanku that inform *One Meal Dish*. The basic principle of IFBD consists of four (4) Pillars which are basically a series of efforts to balance between the nutrients intake and expenditure. The four (4) Pilars are: 1). Consume different kinds of food, 2) Get used to hygienic behaviour, 3) Do physical activities, 4) Monitoring body weight regularly. There are four (4) sequence layers in Balanced Diet Tumpeng from bottom to top, and closer to the top, it get smaller. The four layers means balanced diet based on the principle of four pillars of balanced diet. There are two kinds of messages in the new IFBDG, such as: 1. General messages for adult and healthy people which contains 10 messages. 2. Special messages for different age group. The success of delivering the messages of balanced diet to the community is strongly influenced by how the Communications, Information, and Education (CIE) is applied. To obtain optimal results from the delivery of balanced diet messages i.e., to change behaviour of society towards “balanced diet habit”, it needs strategy and appropriate, community based implementation of CIE. In implementing the balanced diet education, the officers in charge are required to be creative, full of initiative to develop the messages contained in the guidebook by adapting them to the problems, situations and local conditions.

S9-02 FBDG – Update on development and implementation in Malaysia

Mohd Ismail Noor

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Malaysia is currently experiencing an epidemiological transition from a situation with the predominance of infectious diseases to one distinguished by the growing threat of chronic and degenerative diseases. It is now widely accepted that the major causes of morbidity and mortality in Malaysia are related to unhealthy eating habits and a sedentary lifestyle. Besides an alarming increase in prevalence of overweight and obesity, diet-related diseases such as Type 2 diabetes, cardiovascular disease, hypertension and certain forms of cancer have recorded an increase during the last few decades in Malaysia. One of the prime strategies identified under the National Nutrition Policy was to ensure that all Malaysians are provided with adequate access to reliable and accurate nutrition information in order to assist them in making informed decisions on their habitual dietary intake. The Malaysian Dietary Guidelines (2010) differ in scope as compared to the first version published in 1999. The updated guidelines contain 14 key messages instead of 8 key messages (1999) and also provide detailed background paper on each of the key messages. The dietary guidelines have 51 key recommendations with some additional recommendations for special population groups. Although the dietary guidelines were primarily intended for use by healthcare providers, they have been widely disseminated in numerous simplified form (to be highlighted in today's session) to help educate the general public on healthy eating. The TWG have since published MDG for children and Adolescents (2013) and this presentation will also highlight guidelines for the elderly, pregnant and lactating women and vegetarians that will be published shortly. We are hopeful that the development of these guidelines will help empower the community to make informed choices on their habitual dietary intake, which will have a positive influence on their health and well-being.

S9-03 FBDG – Update on development and implementation in Myanmar

May Khin Than

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Myanmar Food-based Dietary Guidelines (FBDG) has developed and published in 2003. The language used is Myanmar and it came into third edition in 2007. Myanmar is food secured at national level but still facing with triple burden of malnutrition. Although over nutrition is increasing, stunting (29.2 %, DHS 2016) and anaemia (57% among under five children, DHS 2016) were two main public health nutrition problems. The prevalence of hypertension, hyperlipidemia and diabetes among 25-64 years were 26.4%, 36.7% and 10.5% respectively (Diabetes and risk factors survey, 2014). The findings highlighted the gaps between nutrition knowledge and practice. Review workshops to update FBDG by a technical working group were conducted in 2015 - 2016. General objective of the updated FBDG is to raise Nutrition and Health of the community by adequate and healthy consumption of food. Specific objectives are (1) to improve knowledge and practice on "healthy diet" by specific age, sex and physiological condition (2) to prevent undernutrition and diet related chronic diseases (3) to prepare the food safe and hygienically (4) to select proper foods for special condition (5) to support healthy lifestyle. It is still under finalization to cover (1) *General guidelines to consume all food groups appropriately and safely, to Control body weight* (2) *Special guidelines for specific age groups and for Non-communicable diseases*. No specific dissemination workshop has been done however the guideline is integrated to manuals for Basic Health Staff and Volunteers and cooking demonstration. Key messages of the guidelines are dispersed in relevant workshops, advocacy activities and trainings in institutions etc. Promotion is also done through various mass media, social media and interpersonal communication to the community by Basic Health Staff and volunteers. Regular and intense monitoring is crucial to ensure effective implementation of the FBDG.

S9-04 Nutritional guidelines for Filipinos: Towards building the gap between the scientific evidence and the public's behaviour

Celeste Tanchoco

ILSI Philippine Country Committee; Philippines association for the Study of Overweight and Obesity (PASOO)

The Nutritional Guidelines for Filipinos (NGF) were first formally introduced to the public in 1990, in an attempt to give consumer the science-based nutrition recommendation that aims at the improvement of nutritional status through adoption of desirable dietary practices and healthy lifestyle. These are 10 messages each with nutrition and health rational, covering the whole range of food and nutrition issues from importance of consuming a variety of foods to recommendation on the intake of specific food groups. The guidelines also includes specific messages: exclusively breastfeed infant from birth to 6 months, consuming safe foods and water, attain normal body weight through diet and physical activity, manage stress, avoid alcoholic beverages and not to smoke. Since the launching, activities have been initiated at various levels to ensure that the key messages of the guidelines reach the target groups. Among others, the celebration of the Nutrition Month provides initially the venue to create awareness on the NGF. IEC materials such as posters, handbooks, press releases, billboards, radio and TV plugs, and exhibits were developed, printed and distributed. Though many efforts have been done and are still being done to disseminate the NGF, more is to desired to ensure wider dissemination of the key messages. IN the following decades since its introduction, dietary lifestyles have not noticeably improved in the Philippines. Lifestyle diseases become more prevalent and overweight & obesity rates have risen significantly. Although the NGF has become increasingly evidence based, there seems to be an ever-widening gap between science and the public's behaviour. The need for the integration and translation of the evidence has truly never been greater nor has the need for appropriate communication to the public been more important. The need for a more coordinated synchronized and sustainable effort from all institutions engaged in nutrition work is important. A comprehensive plan that includes implementation, assessment, monitoring and evaluation must be developed. Impact of the guidelines will have to be developed.

S9-05 FBDG – Update on development and implementation in Singapore

Chelsea Chang

Health Promotion Board Singapore

Food-based dietary guidelines are nutrition recommendations unique to each country's

population dietary needs, with the objective of promoting good health and preventing the development of chronic diseases. Dietary guidelines provide easy-to-understand guidance to the general public on healthier eating to help improve dietary habits. Often, such guidelines are also presented in a pictorial form to better depict recommended food groups and proportions for a well-balanced diet. The dietary guideline also establishes the strong basis for national food and nutrition programmes and policies, and helps to guide the food industry in product development and innovation. In this presentation, a brief overview on Singapore's food-based dietary guidelines across various life stages will be covered. The presentation will focus on the dissemination and implementation of the dietary guidelines, which have been carried out via various communication and marketing channels, national programmes and policies in Singapore.

S9-06 FBDG – Update on development and implementation in Thailand

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In Thailand, dietary guideline based on 5 food groups has been used as nutrition education tool in the past. However, recognizing that Food-based Dietary Guidelines (FBDG) could be an effective tool to promote healthy food consumption among population, Thailand has developed FBDG as "rules of dietary intake" which consists of 9 rules. The "Nutrition Flag" was also designed to promote greater understanding of the dietary guidelines that are based on Thai FBDG. Various campaigns and projects have been carried out as part of the implementation and dissemination to promote usage and understanding of Thai FBDG through different kinds of media as well as to many public and private sectors. The core curriculum subjects have also been updated to add on the information and knowledge of Thai FBDG in schools and universities. Moreover, nutritionists and other health professionals were trained to use FBDG to communicate to target population. Along with FBDG, the Nutrition Flag aims to inform public an appropriate daily diet

which is categorized into three groups based on energy intake. Many sectors were, then, able to set an appropriate diet guided by FBDG and the Nutrition Flag. The evaluation after dissemination and implementation found that FBDG is an effective tool which can be easily understood. The Nutrition Flag, however, is more difficult to follow as Thai eating behaviours are still based on feeling rather than appropriate energy intake. The next step for Thai FBDG and the Nutrition Flag is to update these tools based on new DRI, which is under revision. Improvement on ways of implementation and communication is essential to ensure that Thai population are equipped with health literacy, which is an ability to choose appropriate diet for own individuals and people around.

S9-07 FBDG - Update on development and implementation in Vietnam

Mai LB¹, Hop LT² and Tuyen LD¹

¹Vietnam National Institute of Nutrition; ²Vietnam Nutrition Association

Progress of food based dietary guidelines in Vietnam: The food based dietary guidelines is one crucial tool for nutritional education and communication in Vietnam. The FBDGs provides a framework for advices to improve the food consumption patterns, nutritional well-being, and encourage healthy lifestyles of individuals and population. Together with the changes of socio-economic situation in transition period, Vietnam needs to deal with different nutritional problems including malnutrition, overweight, and undiversified diets at the same time. There is a demand to keep Vietnamese people in the safe corridor between two dangerous edges of which one is a high prevalence of undernourishment and another is emerging of overweight and obesity. From 1995 to present, four versions of FBDGs have been developed and revised every 5 -10 years. After the Prime Minister ratified the National Plan of Action for Nutrition in 1995, the first FBDGs of Vietnam was developed and approved by the Ministry of Health (MOH). Every set of FBDGs consists of 10 tips on proper nutrition, which communicate within socio-cultural context and focus on locally available foods. The first version for the period from 1995 to 2000 had a special advice for better organizing family's meal and development of VAC system to self-guarantee family food security. In the year 2001, the Prime Minister approved the National

Strategies of Nutrition for the ten-year period from 2001 to 2010. The FBDGs, therefore, was revised for the period from 2001 to 2005 to use as basis in the planning, implementation and evaluation of Vietnam government's nutritional strategies. The second version of FBDGs also shows political will to tackle nutrition-related health problems. In 2006, through scientific data from national surveys carried out by National Institute of Nutrition, it could be seen that food habits and eating patterns of Vietnamese had been changed. The third version of FBDGs was developed with the involvement of multiple stakeholders such as MOH, Ministry of Agriculture and Development (MOAD), Women Unions. The FBDGs were implemented at nation-wide level in a comprehensive process. Printing materials i.e. leaflets, posters, and manual books that carried FBDGs were distributed in commune-level in Vietnam. In 2010, the new version of National Strategies of Nutrition had been developed and was approved by the Government in February 2012. The evaluation of FBDGs was carried out and the fourth FBDGs was developed and approved by MOH of Vietnam. In 2016, four food pyramids were developed by National Institute of Nutrition. Food pyramids were often displayed with the food images absent, creating the optimal number of servings to be eaten each day for each of the basic food groups. They are crucial tool for nutritional education and communication to improve the nutrition knowledge and proper practices of the community and are essential for the success of guiding consumers to take advices into action.

Abstracts for Symposium 10 (Young Researchers' Awards) are in pages S31 - S34.

S11-01 +10 min of physical activity per day

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Prospective cohort studies have shown that people with a larger amount of physical activity (PA) and exercise have lower risks of non-communicable diseases (NCDs). In Japan, the Ministry of Health, Labour and Welfare published in March 2013 the "ActiveGuide", i.e. the Japanese official PA guidelines for health promotion. In this document, the most important message is "+10", standing for "add 10 minutes of

MVPA per day". The establishment of the "+10" recommendation is supported by strong scientific evidences. Firstly, a meta-analysis including 26 cohort studies indicated that an increment of 10 minutes of MVPA per day can result in a 3.2% reduction of the average relative risk of NCDs, dementia joint-musculoskeletal impairment, and mortality. Secondly, the National Health and Nutrition Survey (Japan, 2010) reported that 60.8% of the Japanese population is inclined to add the equivalent of 10 minutes of PA in their daily life. In the line of these results, the "+10" recommendation is viewed as feasible and efficient for Japanese population. To our knowledge, the implementation of an additional low-dose PA recommendation in a governmental health promotion policy is a world first. We hope that the Japanese PA policy will inspire other national and international public health agencies.

S11-02 Interventions to promote physical activity

Andrew Hills

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Physical activity has been described as public health's 'best bet' or 'best buy.' This is based on increasing evidence of the many health benefits associated with regular participation in physical activity, irrespective of stage in the lifespan. Unfortunately, despite the strong evidence base to support the numerous physical, social and mental health benefits associated with regular participation in physical activity and exercise, the lifestyle practices of many individuals in the region are suboptimal. The common features of an unhealthy lifestyle include low levels of habitual physical activity, inactive or sedentary behaviours, combined with a poor diet. Lifestyle interventions with a focus on increased engagement in physical activity are recognised as a potentially potent approach for the prevention and management of a range of common lifestyle diseases, including obesity and type 2 diabetes. A major challenge is to optimise engagement in physical activity at the population level and provide guidance on the best combination of physical activity and diet to provide the greatest benefit. This presentation explores the current knowledge and understanding regarding interventions to promote physical activity.

S11-03 Promoting physical activity among the elderly

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Philippine Association for the Study of Overweight and Obesity

Regular physical activity (PA) plays a significant role in delaying premature mortality and reduces the risk for many chronic diseases and health conditions (ACSM, 2006). It also attenuates symptoms and poor outcomes of some age-related chronic conditions. However, the ability to respond to physiological stress diminishes with advancing age (Skinner, 1993) making increasing physical activity a real challenge among the elderly. Programs that promote increased physical activity among the elderly come in the form of educational, cognitive, behavioral, and combination strategies. Educational programs provide vital information but did not automatically cause any positive change in physical activity behavior. While behavioral-based strategies, such as goal setting, self-monitoring and group exercise participation showed some success in increasing physical activity, the most effective interventions were cognitive-based and cognitive-behavioral based strategies. The least effective intervention was the use of supervised exercise sessions, a behavioral intervention (Chase, 2013). Presently, the Philippines uses educational strategies in combination with supervised exercise participation. This is undertaken through the leadership of the local government units (LGUs), as well as some private and non-governmental organizations. The Department of Health also uses exercise advocacies - "Unat Kunat" (Stretch what is stiff) and celebrations, such as the Filipino Elderly Week on October 1 - 7, to emphasize the need for increased physical activity among the elderly. Also, while the Philippines has Physical Activity Guidelines that include three elderly age groups (60 - 70 yr, 70 - 80 yr, and 80+ yr.) its wider dissemination is desired. Furthermore, given the widely different situations among the localities of the Philippines, there is a need for barriers to physical activity to be identified and breached.

S12-01 Role of prebiotics in promoting digestive health

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Prebiotics currently refer to non-digestible food components or substances that are selectively metabolized in the intestinal tract resulting in specific changes that provide a beneficial effect to the host. According to the International Scientific Association for Probiotics and Prebiotics (ISAPP) there are 3 criteria for determining a prebiotic effect namely resistance to degradation by stomach acid and hydrolysis by digestive enzymes; fermentation by intestinal microorganisms; and selective stimulation of growth and/or activity of beneficial microorganisms in the gut. The most widely accepted prebiotics are inulin, fructo-oligosaccharides and galacto-oligosaccharides. Other potential compounds include polydextrose, isomalto-oligosaccharides, gluco-oligosaccharides, xylo-oligosaccharides, palatinose, gentio-oligosaccharides, and sugar alcohols. The key target microorganisms are *Lactobacilli* and *Bifidobacteria*. Recent research has suggested several metabolic effects of prebiotics such as enhanced SCFA production, improvement in gut barrier function and host immunity, and protection against potentially pathogenic bacteria. A classical effect of prebiotics was demonstrated in the reduction of the prevalence of infectious infantile diarrhoea and traveller's diarrhoea. They provide similar health benefits as dietary fiber in maintaining gut health and decreasing the incidence of constipation. Many studies have shown enhancement of calcium absorption with prebiotic intake, mainly short- and long-chain fructo-oligosaccharides and inulin. Moreover, prebiotics may also play a role in weight management, cardiovascular disease and cancer.

S12-02 Probiotics and upper respiratory tract illness in healthy active individuals

Nicholas West

Menzies Health Institute QLD and School of Medical Science, Griffith University, Australia

Healthy physically active individuals represent a key target group for health claims and sales of probiotics. In recent meta-analyses, a positive effect of probiotics against upper respiratory tract illnesses has been noted. The aim of this study was to determine the clinical effects of two probiotic supplements on upper respiratory tract illness (the common cold) in healthy active adults. A randomised double-blind placebo-controlled trial was conducted. Four hundred and sixty five participants (241 males; age 35 ± 12 y (mean \pm SD) and 224 females; age 36 ± 12

y) were assigned to one of three groups: Group 1 - *Bifidobacterium animalis* subsp. *lactis* BI-04 (BI-04) 2.0×10^9 colony forming units per day, CFU per day, Group 2 - *Lactobacillus acidophilus* NCFM and *Bifidobacterium animalis* subsp. *lactis* Bi-07 (NCFM & Bi-07) 5×10^9 CFU each per day) or Group 3 - placebo mixed in a drink. The risk of an upper respiratory illness episode was significantly lower in the BI-04 group (hazard ratio 0.73; 95% confidence interval 0.55 to 0.95; $P=0.022$) compared to placebo. There was no significant difference in illness risk between the NCFM & Bi-07 group (hazard ratio 0.81; 0.62 to 1.08; $P=0.15$) and the placebo group. There was a 0.7 and 0.9 month delay in the median time to an illness episode in the BI-04 and NCFM & Bi-07 groups respectively compared to placebo (placebo 2.5 months; BI-04 3.2 months; NCFM & Bi-07 3.4 months). The probiotic BI-04 appears to be a useful nutritional supplement in reducing the risk of URTI in healthy physically-active adults. These results are consistent with recent trends that some probiotics may be beneficial for use by healthy active individuals for upper respiratory tract illness.

S12-03 Regulatory status and scientific substantiation of health claims in SEA

Pauline Chan, Tee ES and Jocelyn W

ILSI Southeast Asia Region, Singapore

Over the past 20 years, there have been greater consumer interest and awareness on the roles of foods and food components play in providing health benefits beyond basic nutrition. These are known as functional foods and their benefits are usually communicated through health claims which include nutrient function, other function, and reduction of disease risk claims accordingly to Codex Guidelines for Use of Nutrition and Health Claims (CAC/GL 23-1997). The rapid development of functional foods in the Southeast Asia region has led to major developments in the national regulations on nutrition and health claims in this region. However, such regulations vary significantly among different countries and the regulatory framework to deal with these involves various stages of development. Differences in the types of health claims permitted, the criteria for claims, availability of positive list of claims as well as the regulatory approval systems related to these claims can be observed in the SEA region. These differences may sometimes cause confusion among

consumers and are potential barriers to trade for food manufacturers. International Life Sciences Institute (ILSI) SEA Region has been working on the areas of functional foods since 1995 when it organized the First International Conference on East-Perspectives on Functional Foods: Science, Innovations and Claims. Subsequently, ILSI SEA Region has organized more than 10 other conferences, seminars and workshops to address issues related to functional foods including regulatory status and scientific substantiation of health claims. The first Monograph on Functional Foods in Asia (Tee, 2004) was also published by ILSI SEA Region in 2004, and an updated second edition of Monograph on Functional Foods will

be published in mid 2017. An important chapter of the Monograph will cover the regulatory status of the various types of health claims permitted in the key SEA countries, list of permitted claims included in the available positive lists, the regulatory framework for application and review of claim applications, as well as the scientific substantiation requirement will be shared. With the set-up of ASEAN Economic Community (AEC) as a single market and production base, a better understanding of the similarities and differences in the regulatory status of claims in the region may result in harmonization of the scientific framework as well as substantiation of these health claims.

1st Southeast Asia Public Health Nutrition (SEA-PHN) Conference
14 - 17 May 2017

Abstracts for
Lunch Symposia

Lunch Symposia

LS-1 Improving metabolism and health: What role can prebiotic fibres and slow-release carbohydrates play?

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There has been considerable debate about how carbohydrates affect metabolic health, particularly since the consumption of carbohydrates directly influences blood glucose and insulin levels. Carbohydrates are one of the major sources of nutrients in the human diet and come in many forms. What role can different carbohydrates play in metabolic health and which ones to look for? Given the dramatic increase of chronic diseases which stem mostly from impaired metabolic health, it becomes more and more evident that the type and quality of carbohydrates consumed do matter. This is equally true for dietary fibres as for nutritive carbohydrates. Of great interest are prebiotic chicory root fibres in this respect. Inulin and oligofructose (FOS) are natural dietary fibres extracted from the chicory root. These fibres are selectively fermented by the gut microflora supporting the growth of beneficial bifidobacteria. Notably it is this prebiotic fermentation of chicory root fibres and the resulting short-chain fatty acids (SCFAs) which play a role in human health, by positively influencing the environment of the gut and acting as signals. Associated benefits are manifold and reach out to improvements in bowel regularity and digestive health, enhanced calcium absorption and bone health, blood glucose lowering effects, and influences on appetite regulation through gut hormones or directly in the brain via the gut brain axis. On the side of nutritive carbohydrates, the rate of energy supply to the body can make a difference with relevance to metabolic health. Palatinose™ (isomaltulose) is a slow-release carbohydrate and provides energy in the form of glucose in a balanced and sustained way over a longer period of time. Its slower intestinal release beneficially influences the body's incretin response, leads to an overall lower blood glucose and insulin response and thereby improves the metabolic profile. The contribution of fat oxidation in energy metabolism is increased with potential long-term

benefits for body weight and body composition. This symposium will provide an overview and update on the latest science on how prebiotic chicory root fibres (inulin and oligofructose) and the slow-release carbohydrate Palatinose™ can improve metabolic health with relevance to major public health issues in Southeast Asia.

LS-2 The impact of soy on gut microbiome and its benefits across the lifespan

Wang Hongwei

Applied Nutrition Manager, DuPont Nutrition & Health

Soy protein is one of the most available plant proteins that is low in fat, saturated fat and is lactose and cholesterol-free. With a Protein Digestibility-Corrected Amino Acid Score (PDCAAS) of 1, soy protein can be considered to be as nutritious as dairy and egg protein. Recent studies have evaluated the impact of protein source on the composition of the gut microbiota. We look at the insights on how including soy protein in the diet can further support cardio metabolic health. High quality soy protein has shown to exhibit health benefits with a distinct impact on the gut microbiome, specifically in creating a more diverse intestinal microbial composition and better consistent shifts in some specific microbial families. There are new emerging evidences relative to soy's ability to support health across the human lifespan, such as growth and development for babies, weight management in adults and reduction of risk for cardiovascular diseases for the elderly adults. The combination of soy with other high quality proteins from dairy has also shown to enhance muscle growth during post exercise recovery.

LS-3 The microbiome, prebiotics and health implications

Cindy H. Nakatsu

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The growing knowledge of health benefits related to prebiotics has peaked interest in studying the role of the gut microbiome. By definition, the host microbiome must be involved in fermentation of prebiotics. These are typically polysaccharides that are not digested by host enzymes. Our knowledge of the microbiota associated with prebiotic fermentation has advanced because of

the availability and decreased costs of methods that do not rely on cultivation of gut microbiota. Often fermentation of prebiotics results in the production of beneficial metabolites. The most studied are short chain fatty acids (SCFA) that have been linked to several health benefits, including decreases in inflammatory diseases, metabolic syndrome and heart disease. These concepts will be covered in this presentation along with examples from clinical studies that we have been conducting using soluble corn fiber (SCF) prebiotics to investigate the role of the gut microbiome and its association with changes in calcium (Ca) absorption. These studies have shown that SCF can modulate the intestinal microbiota that correlate with increases in calcium absorption.

LS-4 Amino Acids and Healthy Muscle

Yoshio Kawahara

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Amino acid intake through meals and supplements has a great influence on the maintenance and promotion of our body muscles. In particular, the Branched Chain Amino Acids (BCAAs) which cannot be produced in our living body are called “essential amino acids”. Human beings should take BCAAs (valine, leucine and isoleucine) through meal (and / or supplement if needed) in considering the balance of amino acids composition in protein foods. BCAA absorbed from food, along with free amino acids of skeletal muscle are called protein and amino acid reservoir, is an energy source during exercise. Leucine has the function of regulating secretion of insulin and regulating protein metabolism. The effects of BCAA on muscle injury and its recovery from exercise depend on intake volume and its ingestion timing. Based on scientific evidences on BCAAs, we would like to share the expectation as the supplements while considering the metabolic pathway and the contribution for protein/ glucose metabolism. In addition to the instantaneous power, muscular strength and endurance at top athletes, other functions of the amino acids in the body, including for child’s growth and elderly’s ability to exercise will be shared. Moreover, amino acids contribute to achieve the Sustainable Development Goals (SDGs) by the United Nations, such as lysine fortification in developmental stage and environmental sustainability on the earth.

Amino acids are significant for healthy muscle and are essential for our healthy life.

LS-5 Fit vs Fat: The role of balanced nutrition in combating obesity in Southeast Asia

Chin-Kun Wang

President, International Society for Nutraceuticals and Functional Foods; Council member of the Federation Association of Asian Nutrition Societies Distinguished Professor, Chung Shan Medical University; Fellow, International Academy of Food Science and Technology; Honorary President, Nutrition Society of Taiwan; Member of Herbalife Nutrition Advisory Board

For some years, the overweight and obesity epidemic have developed into serious health issues in several Southeast Asian countries, largely due to the changed dietary behavior and meal patterns. It is very critical to prevent the advancing health challenges and to combat obesity as it is closely associated with many metabolic diseases (e.g. diabetes, cardiovascular diseases, cancer). There are many known ways to fight against obesity, of which balanced nutrition is considered to be safer and perhaps, more suitable for most population groups. Reducing calorie intake and strengthening of the body muscle could be better solutions to obesity among affected population. Calorie intake calculation and high quality protein support are important during weight management. Soybean proteins (SPs) are respected for their positive and functional impacts on human health. Consumption of SPs has resulted in hypercholesterolemia, prevention of cardiovascular diseases and osteoporosis and reducing the risk of some cancers. Due to good accessibility, SPs are popular in Asia for maintaining people’s muscle and protein requirement. Many studies have clearly demonstrated that the intervention of reduced calorie intake, containing balanced nutrition with SPs, has significantly decreased certain metabolic syndromes. To sum up, a good combination of balanced nutrients and reduced calorie intake could be effective in body weight management in the fight against obesity.

LS-6 Oats & health: from farm to fork

YiFang Chu

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Considerable research has been published on the health effects of oats, particularly on oats' effects on cardiovascular risk factors and indices of carbohydrate metabolism (e.g., glucose, insulin levels). Additionally, work in nascent areas such as post-prandial glycemic responses as well as the antioxidant and anti-inflammatory properties of oats have been noteworthy. Furthermore, the relationship between the physical characteristics of oats (e.g., viscosity, molecular weight) and their health effects has been explored in greater detail. Key research findings regarding the purported mechanisms for the health effects of oats and oat components are summarized in this abstract. For cardiovascular risks, consumption of 3-6 g/day oat β -glucan significantly lowers the atherogenic lipid profile, including low-density lipoprotein cholesterol (LDL-C), non-high-density lipoprotein cholesterol (non-HDL-C), small dense LDL, LDL particle number, and apolipoprotein B. Oat consumption has also been associated with increases in HDL-C in studies of hypertriglyceridemic individuals. Data on the effects of oats and oat components on blood pressure are inconsistent, but some studies have found a modest hypotensive effect in obese subjects and in individuals with treated hypertension. Data on the impact of oat and β -glucan consumption on glucose homeostasis are conclusive. Several well-controlled clinical trials have suggested a beneficial, dose-related effect on postprandial glucose levels (in contrast to fasting values), especially when oat products (versus β -glucan) are consumed. Data are also clear that oat consumption improves subject satiety (i.e., hunger and fullness). However, it is unclear what the potential long-term effects of oat consumption (or its constituents) are on modulating weight gain in adults. Several *in vitro* studies have shown that oats can affect gut microbial metabolism in ways that may benefit gut and whole-body health; however, studies on laxation have not yielded positive results. It is possible that the physicochemical characteristics of oats affect fermentability. There is a small, but increasing, number of well-designed clinical studies investigating the potential for oats to serve as dietary antioxidative and/or anti-inflammatory substances. Emerging *in vitro* data suggest plausible and potential physiologically relevant effects. There is a growing appreciation for the relationship between the physicochemical properties of oats/oat fractions and health-related

variables, particularly in emerging areas such as satiety, glycemic response management, and antioxidant potential. A recent study indicated that processors may be able to improve the physicochemical and nutritional properties of oat end products through processing of specific oat genotypes from select growing locations. Positive physiological outcomes may eventually be dependent on processing, variety selection, and preparation before consumption. To conclude, from farm to fork, the impact of each step should carefully be studied to help food companies design and deliver products that can provide the most health benefits to consumers.

LS-7 Randomized trial of dietary fiber and *Lactobacillus casei* administration for prevention of colorectal tumors

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The epidemiologic evidence that dietary fiber protects against colorectal cancer is equivocal. No large-scale clinical study of the administration of *Lactobacillus casei* has been reported. We examined whether dietary fiber and *L. casei* prevented the occurrence of colorectal tumors. Subjects were 398 men and women presently free from tumor who had had at least 2 colorectal tumors removed. Subjects were randomly assigned to 4 groups administered wheat bran, *L. casei*, both or neither. The primary end point was the presence or absence of new colorectal tumor(s) diagnosed by colonoscopy after 2 and 4 years. Among 380 subjects who completed the study, 95, 96, 96 and 93 were assigned to the wheat bran, *L. casei*, both and no treatment groups, respectively.

Multivariate adjusted ORs for occurrence of tumors were 1.31 (95% CI 0.87–1.98) in the wheat bran group and 0.76 (0.50–1.15) in the *L. casei* group compared to the control group. There was a significantly higher number of large tumors after 4 years in the wheat bran group. The occurrence rate of tumors with a grade of moderate atypia or higher was significantly lower in the group administered *L. casei*. No significant difference in the development of new colorectal tumors was observed with administration of either wheat bran or *L. casei*. However, our results suggest that *L. casei* prevented atypia of colorectal tumors.

LS8-01 Breakfast pattern of adults in Asia and its association with chronic disease development

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Breakfast is the most important meal of the day. It sets the mental, emotional and physical condition for important activities throughout the day. Among adults, breakfast intake has been shown to be associated with the prevention of obesity and chronic disease development. Hence, regardless of age, skipping breakfast should be avoided. However, eating any food for breakfast may not be right too. One should also ensure having a nutritious and balanced meal as breakfast as each nutrient provides benefits to the body differently. There is numerous research publications related to children's breakfast. However, little attention was focused at investigating problems related to adult's breakfast especially in Asia. Nevertheless, based on available resources, this presentation will highlight several issues related to breakfast skipping among adults, breakfast intake between urban and rural area, adult breakfast quality and its association with chronic disease development such as obesity and type 2 diabetes.

LS8-02 Slowly digestible starch from cereal-based foods, metabolic interest at breakfast

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Based on WHO recommendations, starch should represent the largest component of our daily energy intake (40% to 50%). During food manufacturing, heat, moisture and pressure modify dramatically the digestibility of starch in processed foods. Above the usual method to measure starch content, the rate and extent of starch digestion can be measured *in vitro* using a method developed by Englyst that classifies starch into three major fractions: rapidly digestible starch (RDS), slowly digestible starch (SDS) and resistant starch (RS) (Englyst *et al.*, 1996). Some studies compared the physiological effects of starch-based products and show that a high SDS content, in addition to high fiber and fat content, is the main contributor for a low postprandial glycemic response (Englyst *et al.*, 2003; Meynier *et al.* 2015). We have investigated the impact of high SDS cereal products eaten at breakfast on postprandial metabolism. Based on three human trials, we investigated deeply the link between SDS, appearance rate of glucose using dual stable isotope method, and metabolic response (Nazare *et al.* 2010; Vinoy *et al.* 2013; Péronnet *et al.* 2015). High SDS cereal products induced a slower appearance rate of CHO which led to a lower postprandial glycemic and insulin responses. In long term trials, postprandial hyperglycemia has been involved in Type 2 diabetes genesis as well as in cardiovascular events (Blaak *et al.* 2012). To conclude, the reduction of postprandial hyperglycemia may be relevant for health and metabolic disease prevention and a meaningful target for intervention through e.g. dietary factors such as diets including high SDS cereal products eaten at breakfast.

*1st Southeast Asia Public Health Nutrition (SEA-PHN) Conference
14-17 May 2017*

Abstracts for

Young Researchers' Awards

- 1. Oral**
- 2. Poster**

Young Researchers' Awards (Oral)**YRA-O-01 Production and physicochemical characterisation of capsaicin-loaded solid-lipid nanoparticles (SLNs) by microwave-assisted microemulsion technique***Li LY¹, Shah RM², Eldridge DS², Harding IH², Palombo EA² and Ginjom IR¹**¹Faculty of Engineering, Computing and Science, Swinburne University of Technology Sarawak Campus, Malaysia; ²Department of Chemistry and Biotechnology, Swinburne University of Technology, Melbourne Australia*

Capsaicin has shown the capability to help in the prevention of obesity. However, the direct incorporation of an ample amount of capsaicin will produce a product that is too hot for normal people. Thus, a novel microwave-assisted technique was employed to encapsulate capsaicin into solid-lipid nanoparticles (SLNs). SLNs were prepared by microwave-heating the mixture of stearic acid, Tween-20, water and different amounts of capsaicin, i.e. SLN0, SLN5, SLN10 and SLN15, with 0mg, 5mg, 10mg and 15mg of capsaicin incorporated, respectively. The physicochemical properties of the SLNs, including particle size (PS), polydispersity index (PI), encapsulation efficiency (EE), capsaicin loading capacity (LC) and release profiles of capsaicin loaded SLN in different ionic strength mediums were characterised. The short-term stability of SLN dispersions was also investigated. Capsaicin incorporated SLNs suggested a relatively lower PS (160-180nm) and PI (<0.2) values as compared to control sample (SLN0). However, there was no significant difference ($P > 0.5$) of PI among SLN5, SLN10 and SLN15, which might be due to the stabilization effect of the capsaicin. The average EE and LC for SLN5, SLN10 and SLN15 are 60.6%, 69.7%, 76.4%, and 3.3%, 7.7%, 11.7%, respectively. NaCl was used as the ionic strength (IS) regulator to examine the capsaicin release profile. Fifty percent of the encapsulated capsaicin had been released in the first 2 hours and the release rates reached 80%-90% at 4 hours. In comparison with the release medium of distilled water, it was noticed that a minor increase in IS (0.11M and 0.14M) could speed up the release rate. In contrast, further increase of IS (0.51M and 1.0M) restricted the release of capsaicin. The incorporation of capsaicin in SLN demonstrates a promising capability to stabilise the system and the novel micro-emulsion product could be

a system applicable for the controlled delivery of capsaicin.

YRA-O-02 Sedentary behaviour and cardio-metabolic health markers among breast cancer survivors*Mohd Razif Shahril¹, Nor Syamimi Zakarai¹, Nurnazahiah Ali¹, Kow Ving Lok¹, Lua Pei Lin¹, Aryati Ahmad¹, Zumura'in Zahali², Hamid Jan Jan Mohamed² and Suhaina Sulaiman³**¹School of Nutrition and Dietetics, Faculty of Health Sciences, Universiti Sultan Zainal Abidin; ²Nutrition and Dietetics Programme, School of Health Sciences, Universiti Sains Malaysia; ³Dietetics Programme, School of Healthcare Sciences, Faculty of Health Sciences, Universiti Kebangsaan Malaysia*

Cardio-metabolic health markers are linked to poorer outcomes including increased risk of recurrence and overall mortality among breast cancer survivors, a growing population group. Sedentary behaviour is emerging as an important factor that may compromise the cardio-metabolic health markers. However, the relationship has not been well established due to lack of objectivity of measurement. The present study aimed to determine the differences in cardio-metabolic health markers including high molecular weight (HMW) adiponectin and leptin between low and high sedentary time, sedentary breaks and step counts among breast cancer survivors. A cross-sectional study was carried out using convenience sampling involving 84 breast cancer survivors from two government referral hospitals in the East Coast of Peninsular Malaysia. Sedentary time and behaviour were measured using activPAL3™ physical activity monitor which was worn by the study participant for seven consecutive days. Cardio-metabolic health markers included in this study were systolic and diastolic blood pressure, total cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), low-density lipoprotein cholesterol (LDL-C), triglycerides (TG), glucose, high molecular weight (HMW) adiponectin and leptin. Besides that, a routine anthropometry including waist circumference measurement and total body fat were conducted using calibrated instruments. The results showed that mean age were 52.9 ± 7.5 years, body mass index 28.2 ± 4.9 kg/m², waist circumference 89.0 ± 10.9 cm and total body fat 39.8 ± 6.3 %. The study participants spent 10.9 ± 1.8 h per day sitting/lying, 1.8 ± 0.6 h per day standing, 1.7 ± 0.5 h per day stepping, accumulating 7527 ± 2612 steps per day in $74 \pm$

20 sit-to-stand transitions per day. Mean TC were 6.17 ± 1.46 mmol/L, LDL-C 3.94 ± 1.37 mmol/L, HDL-C 1.46 ± 0.42 mmol/L, TG 1.66 ± 0.94 mmol/L, glucose 6.84 ± 3.23 mmol/L, HMW adiponectin 3.53 ± 2.56 μ g/mL, leptin 44.8 ± 20.4 ng/mL. Fasting serum HDL-C concentration were significantly higher among those who spent less than 11 hours per day being sedentary ($p = 0.009$) and among those who had more than 73 sedentary breaks per day ($p = 0.017$) during waking hours. At the same time, TC concentration were significantly higher among those who had higher sedentary breaks per day ($p = 0.041$). There was no significant differences on other cardio-metabolic health markers including HMW adiponectin and leptin between different cut-offs of sedentary behaviour including step counts. It was also noteworthy that half (51.2%) of the breast cancer survivors in current study were identified to have metabolic syndrome when assessed using harmonised definition diagnosis criteria. In conclusion, HDL-C was significantly lower among those who spent longer sedentary time and lower number of sedentary breaks during waking hours while TC was interestingly higher with higher number of sedentary breaks. No differences were observed on cardio-metabolic markers and step count per day. Larger longitudinal study is needed to confirm whether there is direct relationship between sedentary behaviour and cardio-metabolic health markers.

YRA-O-03 Risk factors for stunting among 0-23 month old children in Bali, West Java and East Nusa Tenggara Provinces in Indonesia

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The study was carried out with the purpose to explore the risk factors of stunting among 0-23 month old children in Bali, West Java and East Nusa Tenggara (NTT). The data was gathered from Riset Kesehatan Dasar (Basic Health Research) 2010, Ministry of Health Republic of Indonesia. Bali, West Java and NTT were selected because they are categorised as having mild, moderate and severe levels of stunting among children aged less than five years respectively. Backward regression logistic was applied to analyse risk factors for stunting. A total of 1554 children

aged 0-23 months were selected in the analysis. Prevalence of stunting in Bali, West Java and NTT was 35.9%, 31.4% and 45.0%, respectively. The risk factors for stunted children were low birth weight (OR= 2.21, 95%CI= 1.006-4.860), mother's height less than 150 cm (OR= 1.77, 95%CI= 1.205-2.594), poor sanitation (OR= 1.46, 95%CI= 1.010-2.126) and pre-lacteal feeding (OR= 1.47, 95%CI= 1.000-2.154). The qualitative evaluation of macro factors demonstrated that low coverage of four pillars of Safe Motherhood (50%) and high hard physical labour among women in NTT may affect the highest LBW prevalence (19.2%) and may lead to the highest stunting prevalence (45.0%). Lower coverage of handled obstetric complications in Bali (38.54%) than in West Java (64.86%) and higher hard physical labour among women in Bali than women in West Java may affect the higher LBW prevalence in Bali (12.1%) than in West Java (10.9%). Higher LBW problem may lead to higher stunting in Bali, compared to West Java. In conclusion, low birth weight (LBW) is a dominant risk factor for stunting among 0-23 month old children in Bali, West Java and NTT Provinces.

YRA-O-04 A randomised trial to test the effectiveness of breastfeeding relaxation therapy on maternal stress, breast milk composition and infant outcomes

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Lactation involves complex physiological and psychological signalling between mother and infant and is energetically costly. Postpartum distress may affect the energy allocated in breast milk since it increases energy expenditure. If the mother is more relaxed, she may be able to allocate more energy to breastfeeding. Previous studies among mothers of preterm infants reported a significant increase in milk volume in those who listened to relaxation therapy during breastfeeding. No studies have investigated the effects of relaxation therapy on milk composition and the consequent effects on infant growth and behaviour. Thus, we would like to test the hypothesis that the breastfeeding relaxation intervention has favourable effects on both mother and infant outcomes. Pregnant women (n=88) were recruited from antenatal clinics in Klang-Valley, Malaysia. Following delivery,

mothers that were breastfeeding exclusively were randomised into control (n=31) and intervention groups (n=33). The intervention group mothers were asked to listen daily to an audio recording with relaxation therapy. Home visits (HV) were performed when the baby was 2-3, 6-8 and 12-14-weeks old to assess their weight, length and head circumference. Maternal stress and infant behaviour were assessed using validated questionnaires, and milk samples were collected during visits. The intervention group has significant lower maternal stress scores (p=0.029), longer infant sleep duration (p=0.017), and higher infant weight (p=0.001) and BMI (p=0.0001) at later HV. Relaxation group mothers also showed higher foremilk carbohydrate (p<0.05); greater total average milk carbohydrate (p=0.02) and hindmilk fat (p=0.03); and pooled increase in milk energy within a feed (p=0.04). Overall, the relaxation therapy had positive effects, reducing maternal stress during lactation period. Mothers who were more relaxed as a result of listening to the therapy may have had more efficient milk ejection, and favourably altered breast milk composition, showing by higher milk energy, which this affect infant growth and behaviour.

YRA-O-05 Dietary phytate, zinc to iron molar ratio, fat, iron, and calcium significantly predict the bioavailability of iron in the diets of pregnant women in rural Bangladesh: a cross-sectional study

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Pregnant women are at high risk of iron deficiency due to their low intake and low bioavailability of iron in the diets. Monotonous plant-based diets often contain high levels of phytate which may inhibit the bioavailability of iron. This study assessed the dietary components that significantly predict the bioavailability of iron in the diets of pregnant women in rural Bangladesh. A multiple pass recall (MPR) approach was used for this study to assess the nutrients intake in the diets, with in-depth probing interview covering 24-hour dietary recall conducted among 717 pregnant women who were in either their second

or third trimester. The phytate to iron molar ratio, an indicator for iron bioavailability, was spanned a wide range from 5.66 to 21.58. The ratio was positively associated with dietary fiber ($r = 0.18$, $P = 0.019$), phytate ($r = 0.76$, $P < 0.001$), zinc to iron molar ratio ($r = 0.72$, $P < 0.001$), and calcium ($r = 0.36$, $P < 0.007$). Phytate to calcium molar ratio was inversely correlated with dietary fat ($r = 0.43$) and iron ($r = 0.64$) ($P < 0.001$ for both). In stepwise regression analysis, dietary phytate, zinc to iron molar ratio, dietary fat, iron, and calcium emerged as independent significant ($P < 0.001$) predictors of phytate to iron molar ratio, explain 96.42% of the observed variation. High phytate consumption, high zinc to iron molar ratio, low dietary fat, iron, and calcium intakes have a significant role in determining differences in iron bioavailability in the diets of pregnant women in rural Bangladesh.

YRA-O-06 Psychological consequences of obesity associated with cognitive function in children aged 10-11 years in Kuala Lumpur, Malaysia

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Past studies examined the impact of psychological consequences of obesity on academic performance but very few associated these factors with cognitive function in children. Hence, this study aimed to examine the associations between psychological consequences of obesity such as self-esteem, body image, disordered eating and depression with cognitive function in normal weight and overweight/obese school children aged 10-11 years in Kuala Lumpur, Malaysia. This cross-sectional comparison study was conducted in eleven primary schools selected using multistage stratified sampling. A total of 1976 children were screened for BMI through measurement of height and weight. A total of 225 overweight/obese children were selected and matched for age, sex and ethnicity with 225 normal weight children. Anthropometric measurements included weight,

height, waist circumference (WC), and body fat percentage (BF %). Rosenberg Self-Esteem Scale (RSES), Collin's Child Figure Drawings, Children's Eating Attitude Test (ChEAT) and Children Depression Inventory (CDI) was used to assess the psychological related factors. Cognitive function (FIQ) was measured by using main subtests Wechsler's Intelligence Scale for Children (WISC-IV). A significant mean difference was observed with overweight/obese children having higher body image discrepancy scores ($t=5.390$; $p<0.001$) and disordered eating scores ($t=-3.512$; $p<0.001$) compared to normal weight children. Ordinary least square (OLS) regression analysis was conducted to determine the psychological factors mediating the relationship between overweight/obesity with cognitive function in children. It was found that disordered eating ($\beta=-0.282$, $p<0.001$) and depression ($\beta=-0.454$; $p<0.05$) mediated the relationship between weight status and Full IQ (FIQ) score, contributing 11.6% of the variances in cognitive functioning of the children. These data suggest that being overweight or obese poses a greater risk of developing psychological related consequences compared to being normal weight and these consequences contributed negatively to cognitive function in children. Further studies are needed in order to better understand the underlying mechanisms behind these relationships.

Young Researchers' Awards (Poster)

YRA-P-01 Planting the seed for the future. The impact of a school garden pilot program in Quezon City, the Philippines

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Malnutrition remains a significant public health concern in the Philippines. Malnourished adolescents are more likely to experience overweight and obesity in adulthood. Several studies have indicated that school gardens have many potential benefits through a hands-on learning approach. However, no such school garden program has been developed in the Philippines. The study aim was to measure the impact of a culturally tailored school garden intervention, developed and piloted by the Nutrition Foundation of the Philippines Inc. (NFP). 'The Nutri-Garden School Program' integrated into the high school curriculum, consisted of education modules on nutrition,

cooking and gardening that were taught twice a week to students over the school year. In conjunction, students established a 35m² vegetable garden on the school grounds. The intervention was piloted in one class of 36 8th grade students enrolled in a high school in Quezon City between June 2015 and July 2016. A self-reported survey on nutrition and agriculture knowledge and a food frequency questionnaire (FFQ) with 33 culturally specific food items were administered pre and post the intervention. A paired t-test was used to compare student responses pre-post intervention, mean pre = 16.6 (SD 11.1), mean post = 23.1 (SD 15.8) and this mean difference was statistically significant (p -value <0.05). Descriptive analysis from the FFQ suggests that vegetable intake increased post the program. All students reported that they enjoyed the program and 88% stated that they became more self-sufficient in providing food for themselves. The Nutri-Garden School Program is the first of its kind in the Philippines and has potential to improve the prevalence of malnutrition and health literacy in Filipino adolescents'. However, further research is required to measure the longer term health benefits of school gardens in the Philippines and the conditions that are required for such programs to succeed in this context.

YRA-P-02 Mung bean sprouts for cardiovascular diseases prevention

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The cause of death in the world has changed from communicable diseases to non-communicable diseases. The prevalence of coronary heart diseases diagnosed by doctors in Indonesia was 1.5% and stroke increased to 12.1% while in 2007 was only 8.3%. The disease is closely associated with lifestyle. The consumption of antioxidant-rich diet can prevent the cardiovascular disease. Mung bean have active compounds that increased after germinations. The aim of this study was to determine the active compounds

of mung bean sprouts as an alternative solution for cardiovascular disease prevention. *Phaseolus radiatus* (L) of mung bean that germinated in 2 days was analysed. Proximate compositions were measured by The Association of Official Analytical Chemist (AOAC) method, the phenolic compound by the Folin-Ciocalteu method, total antioxidant activity and vitamin E by Spectrophotometric method. Mung bean sprouts have 33% crude fat, 55% crude protein, 66.49% moisture, 340.5 mg of vitamin E, 25.84% of the total antioxidant capacity, 0.137% phenolic compound, 97.16 ppm flavonoids, 6:59% crude fiber in dry based. The literature showed that bean consumption, such as mung bean can prevent the high risk of cardiovascular diseases because of its active compounds. Compared to the previous study, mung bean sprouts active compound has higher than the whole of mung bean. Mung bean sprouts have high proximate compositions, antioxidant activity, and can be an alternative solution in food management for cardiovascular diseases.

YRA-P-03 The knowledge of nutrition at elementary school children in Bekasi, Indonesia

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Changes in lifestyle such as consumption of fast foods and junk foods have led to increased nutritional problems, especially obesity. This not only happens among adults but also in children, especially elementary school children. One possible reason is the lack of knowledge on nutrition. This study aims to determine the nutrition knowledge and nutritional status of elementary school children. The test was given to 75 primary school children aged 8-9 years. The school children were made to answer questions related to the consumption of fruits and vegetables, protein and breakfast as well as physical activity to determine their knowledge. Anthropometric measurements (weight and height) were conducted to determine the nutritional status. Based on BMI-for-age, the findings indicated that 38.7% of the children were classed as thinness and 6.7% as obesity. The average score of nutrition knowledge was 63.40. Categorising knowledge based on the median value, 45.3% had less knowledge of nutrition. Chi-square test results showed that there was no relation between knowledge and the incidence

of nutritional problems at elementary school children in the city of Bekasi. This may occur because the provision of meals for the elementary school children is done by parents so that children cannot choose their own food. Further research is needed to determine the correlation between knowledge of parents and child nutritional status.

YRA-P-04 Contribution of UVB exposure and diet to vitamin D needs in Asians in two distinct geographical locations and climates

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The aim of this longitudinal study was to compare the contributions of UVB exposure and diet to total vitamin D among Asians in Kuala Lumpur (3°N) and Aberdeen (57°N). A total of 115 Asians in Kuala Lumpur and 85 Asians in Aberdeen were monitored for one year [Aberdeen: at every season and Kuala Lumpur: during Southwest monsoon (SWM) and Northeast monsoon (NEM)]. UVB exposure was measured using polysulphone film badges; sunlight exposure habits, skin colour and dietary vitamin D intake was assessed by web-based questionnaire. Median summer UVB exposure of Asians in Aberdeen (0.25 SED/d) was higher than UVB exposure for the Kuala Lumpur participants (SWM=0.20 SED/d, p=0.02; NEM=0.14 SED/d, p<0.01). UVB exposure was the major source of vitamin D in Kuala Lumpur year-round (61% in SWM and 59% in NEM; 108 IU/d vitamin D) but only during summer in Aberdeen (59%; 64 IU/d vitamin D). Median dietary vitamin D intake was higher in Aberdeen (122 IU/d), year-round, than intakes in Kuala Lumpur (78 IU/d). Dietary intakes were below the recommendations in both locations (UK RNI=400 IU/d; Malaysian RNI=200 IU/d). Median total vitamin D (UVB plus diet) was only higher in Aberdeen during summer (338 IU/d) than Kuala Lumpur (SWM=241 IU/d; NEM=214 IU/d), providing a comparable intake across the year (Aberdeen: 221 IU/day; Kuala Lumpur: 228 IU/d). The low UVB exposure among Asians in their home country is of concern. For Asians residing at the northerly latitude of Scotland,

acquiring vitamin D needs from UVB exposure alone (except in summer) may be challenging due to ambient UVB in Aberdeen (only available from April to October). Promoting outdoor active lifestyle with sensible sun protection and food-based strategies may be the key approach to make up the shortfall in vitamin D needs among Asians in both locations and climates.

YRA-P-05 The relation between breastfeeding and complementary feeding with nutritional status of children under five years old in Tinelo Village, Gorontalo Regency

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Breastfeeding and complementary feeding patterns by mothers relate to the nutritional status of children under five years old. This cross-sectional study aims to determine the relation of breastfeeding and complementary feeding patterns with nutritional status of children under five years old. The accidental sampling was done to include 56 toddlers as subjects. The pattern of breastfeeding and complementary feeding were obtained through interviews using questionnaires, while the nutritional status of children was obtained by measuring the children. The results showed that the nutritional status of the children based on the indicator weight-for-age was undernutrition 32.1%, normal 66.1% and 1.8% overweight. Nutritional status based on indicators height-for-age was short nutritional status 25.5%, normal 67.8% and tall 7.2%. Based on the indicator body mass index for age, there was 32.1% children with thin nutritional status, normal 55.5% and 12.5% obesity. Toddlers with normal nutritional status 63.4% received colostrum, 71.4% with frequent breastfeeding. There was no relationship between the pattern of breastfeeding and complementary feeding with toddler nutritional status based on the indicator weight-for-age and body mass index for age. There was no relationship between the provision of colostrum, the frequency of breastfeeding, age of first getting breastfeeding and frequency of breastfeeding with nutritional status indicators height-for-age and there was correlation between age first breastfed with nutritional status indicator height-for-age ($p = 0.042$). It was concluded that there was a relationship between age at first breast-

fed with infant nutritional status indicator height-for-age, but there was no correlation between the pattern of breastfeeding and complementary feeding with infant nutritional status indicators weight-for-age and body mass index for age.

YRA-P-06 Are Malaysian children getting enough physical activity? Results from the Malaysia Active Healthy Kids Report Card 2016

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The Active Healthy Kids Global Alliance (<http://www.activehealthykids.org>) is a network of researchers, health professionals and stakeholders who are working together to advance physical activity (PA) in children and youth from around the world. Malaysia participated in its Global Matrix 2.0 as one of 38 countries from 6 continents that prepared Report Cards on PA of children and youth. The Malaysia Active Healthy Kids Report Card 2016 collected, assessed and graded current and comprehensive data on PA and associated factors in Malaysian children and adolescents aged 5-17 years. This report card was developed following the Active Healthy Kids Canada Report Card protocol. The Research Working Group identified core matrices, assessed key data sources and evaluated evidence gathered for grade assignments. A grade was assigned to each of the indicators by comparing the best available evidence against a relevant benchmark using standardized grading scheme. Overall PA, Active Transportation and Sedentary Behavior were assigned the grade of D. The lowest grade of F was assigned to Diet, while School and Government Strategies and Investment were graded higher with a B. Five indicators were assigned INC due to the lack of nationally representative data. The report card demonstrates that Malaysian children and adolescents have low levels of PA and low participation in active commuting. On the other hand, they spend long duration on screen time, and have very low compliance with dietary recommendations. More efforts are needed to address root causes of physical inactivity

while increasing opportunities for children and adolescents to be more physically active.

YRA-P-07 Metabolic syndrome risk factors and effectiveness of a nutritional and lifestyle educational programme for Punjabi women in Central Malaysia

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Metabolic syndrome (Mets) has been established as key features to cardiovascular risks among South Asians. Practicing healthier lifestyle by improving diet and physical activity helps in preventing Mets and reducing obesity prevalence. This study aimed to determine Mets risk factors among Malaysian Punjabis and measure the effectiveness of a nutritional and lifestyle educational programme for overweight and obese Punjabi women in Central Malaysia. A cross sectional study was carried out to determine the prevalence and risk factors of Mets of Malaysian Punjabis. Following that quasi-experimental study design was deployed for 12 weeks to

deliver the educational modules. Both control (n=15) and intervention (n=25) groups were given different modules and completed baseline and post intervention assessments. Follow up assessment was performed 3 months post intervention. Prevalence of Mets was 43% among the subjects (females: 61%, males: 39%). Logistics regression analysis revealed low education level (Odds ratio (OR) 7.02, p=0.009), insulin resistance (OR 1.21, p<0.001), inflammation (OR 1.13, p=0.003) and visceral fat (OR 1.11, p=0.001) were found to be significant factors associated with Mets. Meanwhile, for intervention study, subjects had no significant differences at baseline in their anthropometric measurements, dietary intake, physical activity levels (PAL) and biochemical profile except for higher high molecular weight (HMW) adiponectin in the control group (p<0.001). Analysis revealed no significant effect of time and group on weight, however, there was a significant interaction effect between time*group (Effect Size (ES) = 0.34, p<0.001). The same was observed for body mass index (ES = 0.31, p=0.001), waist circumference (ES=0.18, p=0.027) and visceral fat (ES= 0.16, p=0.038). For biochemical measures, increased in mean changes of HMW adiponectin (p=0.001) and reduced triglycerides (p=0.018) was significantly found in the intervention group. Only dietary protein (p=0.029) intake was significantly different between groups post intervention with no differences found in PAL. This study revealed that Punjabis who projects high Mets prevalence could benefit through longer nutritional and lifestyle educational programme.

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**Abstracts for
Free Paper Presentations**

FP-01 Validity of household dietary diversity score as a measure of food insecurity among households in Lucena City, Quezon

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Food security is a multifaceted issue experienced by nations, globally. A trend currently being explored in recent studies in measuring food security is the Dietary Diversity Score (DDS). Household Dietary Diversity Score (HDDS), which is a type of DDS, obtains a snapshot of the economic ability of a household, making it an effective indicator of food insecurity. The objective of this study is to assess the validity of the HDDS as a tool for measuring food insecurity using Household Food Insecurity Access Scale (HFIAS) and Household Mean Adequacy Ratio (HHMAR) as reference standards. HFIAS is obtained by using a standardized questionnaire consisting of food security-related conditions experienced in the last thirty days, while the HHMAR is obtained by performing a household 24-hour food recall and calculating it as the average of the energy adequacy ratio and the seven micronutrients. Using HFIAS and HHMAR, at least 70% of the selected households in Lucena City were found to be food insecure. Using Spearman correlation, HDDS showed a positive correlation with HHMAR ($r = 0.43$, $p < 0.001$) and a negative correlation with HFIAS ($r = -0.347$, $p < 0.001$). Receiver Operating Curve (ROC) Analysis was done to determine the appropriate HDDS cut-off for identifying food insecure household. The areas under the curve (AUC) obtained (0.618, 0.70, 0.701, 0.743), classified HDDS as a "fair indicator" of food insecurity. HDDS of 6 was identified as the optimal score when evaluating food insecurity with consideration of sensitivity and specificity. In this study, HDDS was proven to be a valid measure of food insecurity. It shows the great potential of this quick assessment tool in identifying population at-risk, which is crucial in the design of timely and appropriate intervention to alleviate food insecurity and other nutrition and health-related problems which may arise from it.

FP-02 Functional foods: Consumer perception of technology-based food innovation in Iran

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Functional dairy products market has been growing steadily in Iran. Awareness and perception related to these products has an important role in consumers' acceptance and subsequently long-term marketplace success of these products. Given the novelty of functional foods in the market and the lack of information about consumers' perception towards these products in Iran, this study aimed to fill the knowledge gap in this regard. Four hundred consumers aged between 25 to 65 years were selected from ten major chain stores in different geographical areas in Tehran, the capital of Iran, through multistage sampling method. The data were collected by a researcher-made questionnaire that its validity and reliability had been measured. In general, familiarity with different kinds of functional dairy products and the percentage of their consumption was found to be low among Tehranian adults. The majority of the participants (about 87%) believed that functional dairy products is effective in preventing the development of chronic diseases, maintaining the health, and correcting health problems caused by poor nutrition. It was therefore believed that these products should be included in everyone's diet. In addition, about two-thirds of them agreed with the need to increase the production of functional dairy products in the country, and believed that these products are worth the extra costs. However, the majority of people were skeptical about the dose of added active ingredients to functional dairy products (83%) and unpleasant side effects (66%). About one third of adults believed that the information provided in functional dairy products is exaggerated and half of them had doubts about the authenticity of the information on food labels. The findings could provide information for the dairy industry to get people to trust them and expand its market, as well as public health sector to design and implement intervention programs

to improve consumer knowledge and perception on functional dairy products and promote their consumption in the population.

FP-03 Association between lifestyle factors and metabolic syndrome among Chinese vegetarians in selected community centers in Kuala Lumpur and Selangor

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According to the Joint Interim Statement 2009 (JIS), metabolic syndrome (MetS) is defined as an individual who has three out of five risk factors, namely high waist circumference (WC), high blood pressure (BP), high blood glucose, high triglyceride (TG) and low high-density lipoprotein cholesterol (HDL-C). This study aimed to determine the prevalence of MetS and its associated lifestyle factors among Chinese vegetarians in selected community centers in Kuala Lumpur and Selangor. This cross-sectional study comprises 150 Chinese vegetarians (females: 72.0%; males: 28.0%), with an average age of 47.35±13.16 years old. The subjects answered a set of self-administered questionnaire that consisted of socio-demographic characteristics, smoking behaviour, alcohol consumption, meal consumption, physical activity, psychological distress and sleep quality. Body weight, height, body fat percentage, WC and BP were measured, while 10 ml fasting venous blood was withdrawn for haemoglobin, blood glucose, and blood lipid profile analysis. A majority of the subjects were lacto-ovo vegetarians (78.0%), followed by ovo-vegetarians (10.0%), vegans (9.3%), and lacto-vegetarians (2.7%), with an average of 10.58±7.70 years practising vegetarianism. The prevalence of MetS was 18.7%, while high blood pressure was the most common risk factors as half of the subjects (52.0%) were having high BP. While sex was not associated with MetS (females:17.6%; males:21.4%; $\chi^2=0.29$, $p=0.643$), female subjects had lower diastolic BP ($t=3.80$, $p=0.0001$), blood glucose ($t=2.09$, $p=0.030$), HDL-C ($t=-2.98$,

$p=0.003$), and TG ($t=2.77$, $p=0.007$) as compared to male subjects. Employment status ($\chi^2=10.55$, $p=0.002$), BMI classification ($\chi^2=27.79$, $p=0.0001$), body fat percentage ($\chi^2=18.91$, $p=0.0001$) and anxiety levels ($\chi^2=11.66$, $p=0.020$) were associated with MetS. However, age, monthly household income, smoking behaviour, alcohol consumption, meal consumption, physical activity, depression, stress, and sleep quality were not associated with MetS. In conclusion, about one-fifth of Chinese vegetarians were facing MetS problem. Future lifestyle intervention that consider body composition and psychological well-being are needed for Chinese vegetarians.

FP-04 Complementary breastfeeding as risk factor for the prevalence of stunting in children of 6-24 months at Yogyakarta municipality

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Stunting is a growth disorder commonly found in children of under 24 months. The prevalence of stunting children under five at the Province Yogyakarta Special Territory is 22.5% and at Yogyakarta Municipality is 15.11%. The prevalence of stunting in children under 24 months is associated with many factors, such as breastfeeding cessation leading to early complementary breastfeeding supplementation, inadequate nutrient intake (energy and protein) and social economic condition of the family. The objective of the study is to analyse the risk of complementary breastfeeding to the prevalence of stunting in children of 6-24 months at Yogyakarta Municipality. The study was observational with case control study design. Locations of the study were three subdistricts (Tegalrejo, Umbulharjo and Kota Gede) at the area of Yogyakarta Municipality. Subjects of the study were children of 6-24 months at Yogyakarta Municipality. Samples consisted of 121 stunted and 121 non stunted children selected through non probability sampling with consecutive sampling method. Status of stunting in children was assessed through height/age and analysis of risk of complementary breastfeeding to the prevalence of stunting. The study also observed education of parents, members of the family, low family income, birth weight, parents' height as external variables related to complementary breastfeeding. Results of the study indicated that

the prevalence of stunting was higher in children of 13-24 months (80.2%) male (52.1%). The results of bivariate analysis showed the time of complementary breastfeeding supplementation was significantly associated with the prevalence of stunting (OR = 1.71; 95% CI = 1.02-2.85). Variable of age of children was significantly associated with the prevalence of stunting (OR = 2.47; 95% CI = 1.34-4.63). External variables which were significantly associated with the prevalence of stunting were mothers' height (OR = 2.14; 95% CI = 1.08-4.33) and birth weight (OR = 5.60; 95% CI = 2.27-15.70). The results of multivariate analysis showed variables that had higher risk for the prevalence of stunting were age of children, mothers' height and birth weight. Thus there was no significant association between the time of complementary breastfeeding initiation, energy and protein intake and the prevalence of stunting. It can be concluded that time of complementary breastfeeding initiation < 6 months, low energy and protein intake are not risk factors for the prevalence of stunting in children of 6-24 months at Yogyakarta Municipality. Age of children 13-24 months, low mothers' height and children with low birth weight are more dominant variables to the prevalence of stunting.

FP-05 Profiles of food shopping behaviour at street vendors: online survey in five countries

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The role of street foods has been acknowledged to contribute to daily food consumption in most societies. However, little is known about the food shopping behaviour at street food vendors when compared across societies. The objective is to describe profile of food shopping at street food vendors in five countries. The study was designed as online survey administered by Global Market Insite using their consumer panels in Australia (n=770), China (n=807), Indonesia (n=793), Singapore (n=771), and Vietnam (n=810) during December 2013 and January 2014. Subjects were those involved as food provider in their home. Descriptive and logistic regression analyses were used. Subjects were older in Australia as compared to other countries, and youngest in Vietnam. Singaporeans and Vietnamese were

highly represented by participants who were unmarried/single. Subjects across countries belonged to higher educated category. Food shopping at street vendors was highest among Indonesians (51.5%), Vietnamese (53.3%), and lowest among Australians (10.4%). Frequency of street food shopping was the least (i.e. occasionally) among Australians; most frequent (i.e. 2-3 times weekly) among Vietnamese. Foods commonly bought by Chinese, Indonesians, Singaporeans, and Vietnamese were snack, whilst whole meal and snack were equally common among Australians. Australians and Singaporeans considered good taste when purchasing street foods, Indonesians and Vietnamese regarded practicality; and Chinese considered 'cheap' cost as the main reasons. In Australia, China, and Vietnam no factors on demographics and weight concerns were related to street food shopping. Among Singaporeans, when the person who prepares main meal was the subject him/herself, it increased the likelihood of buying street foods (OR 4.3; 95% CI 1.5-12.1), and it was the opposite among Indonesians (0.3; 0.1-0.8). Food shopping behaviors varied in five countries. Food environments in relation to street food vendors in each country need investigation for planning a promotion of healthier eating behavior.

FP-06 Conversion of infection status in patients pulmonary tuberculosis with multi-drugs resistant after receiving snack head fish and virgin coconut oil: a randomized, double-blind, controlled study

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Patients with pulmonary tuberculosis with multi-drugs resistance (TB-MDR) are increasing in Indonesia. This study was carried out to assess effects of natural supplements from snack head fish (SHF) and virgin coconut oil (VCO) on infection status in patient with TB-MDR. The study was randomised, double-blind, and controlled design. Subjects were randomly divided into two groups; group that received natural supplement (ALBVCO, n=15) and group

receiving placebo (NOSUPL, n=15). SHF was given in a capsule of 500mg and provided three times two capsules a day while VCO was in liquid and provided three times two table-spoons (20ml) a day to the ALBVCO. NOSUPL received similar capsules and liquid but not containing the active compounds. The supplements were directly provided to the patients for eight weeks. Both groups received standard drugs for TB-MDR patients. Measurements were done monthly for sputum but radiological examination (x-ray) before and three and six months after intervention. Data was analysed using chi-square test, paired and independent t-test. At baseline, characteristic of subjects in both group were comparable except for body mass index (18.27±4.90 vs. 12.24±2.82 respectively for ALBVCO and NOSUPL, p=0.001). After intervention, sputum conversion at ALBVCO were totally converted to negative (100%) at three months while only 66.7% at NOSUPL group (p=0.001). In addition, the results from x-ray showed that at baseline and then three and six months after intervention, signs of active tuberculosis reduced significantly in ALBVCO (100%, 47%, and 20%) compared to NOSUPL (100%, 80%, and 60%). The difference between groups was significant (p=0.001). We conclude that supplement with snack head fish and virgin coconut oils may help infection status conversion in patients with MDR.

FP-07 The CSIRO Healthy Diet Score: an online survey to estimate compliance with dietary guidelines

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There are few dietary assessment tools that are scientifically developed and freely available online. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) Healthy Diet Score survey asks questions about the quantity of core foods (fruit, vegetables, grains, meat and dairy) and discretionary foods (such as cakes, biscuits, confectionary, takeaways, and alcohol), as well as the quality and variety of foods consumed. Food group intake is calculated and compared to nutrition recommendations. On completion, individuals receive a personalised Diet Score—reflecting their overall compliance with the Australian Dietary Guidelines. Over 167,000 Australians have completed the survey

since it was launched in May 2015. The average Diet Score was 58.6 out of a possible 100 (SD = 12.9). Women scored higher than men (59 vs 56); older adults higher than younger adults; and normal weight adults higher than obese adults (60 vs 55). It was most common to receive feedback about discretionary foods (73.8% of the sample), followed by dairy foods (55.5%) and healthy fats (47.0%), meaning that individual's intakes were least in line with guidelines for these food groups. Results suggest that Australians' diets are largely not consistent with the recommendations in the guidelines. The combination of using technology and providing the tool free of charge has attracted a lot of traffic to the website, providing valuable insights into what Australians' report to be eating. The use of technology has also enhanced the user experience, with individuals receiving immediate and personalised feedback. This survey tool will be a cost effective and useful way to monitor population diet quality and understand the degree to diets comply with dietary guidelines.

FP-08 An evaluation of the effectiveness of home-based RUTF versus Supplementary Food in the treatment of severe acute malnutrition in the Philippines

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Children suffering from severe acute malnutrition (SAM) have greater risk of death than their well-nourished peers, and are more likely to have impairments in motor development and alterations in metabolism that could lead to serious chronic diseases in adulthood. Treating them in hospitals may not always be desirable or practical due to geographical isolation, thus home-based treatment has been recommended. Plumpy'Nut®, approved by World Health Organization (WHO) in treating SAM, is a solid ready-to-use therapeutic food (RUTF) requiring neither refrigeration nor preparation. However, current evidence on its effectiveness in home-based treatment is inconclusive. This study compares preliminary data on RUTF with a rice-based micronutrient fortified, soy blended supplementary food, called 'Nutripack', to examine the difference in outcomes in SAM children between 6-59 months old. The following outcomes were investigated 1) recovery (moving from a below -3 weight-to-

height z-score (WHZ) to above -2), 2) death and 3) loss to follow-up (LTF). Data were obtained from a home-based feeding program implemented by International Care Ministries (ICM). RUTF and Nutripacks were distributed to SAM children at each of ICM's 10 bases where children's weight and height were monitored for 15 weeks. In batch 1 (June-September 2016), 3 bases used RUTF; 3 bases utilized Nutripacks, and the rest used RUTF for some of their SAM cases and Nutripacks for the others. In batch 2 (October 2016-January 2017), all bases used RUTF. A total of 200 SAM children (146 received RUTF and 54 received Nutripacks) treated between 2016 and 2017 were studied. Although recovery rates for RUTF and Nutripacks were similar, higher percentages of children moving from SAM (WHZ <-3) to MAM (-3 ≤ WHZ ≤ -2) and lower percentages of LTF were consistently observed in the RUTF group. Differences in recovery were also seen across bases. Causes of the variation will be discussed.

FP-09 Effect of high-and low-glycemic index and glycemic load test meals on blood glucose, insulin, incretin hormones, and satiety in prediabetic subjects

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This study was aimed to evaluate the effect of different glycemic index (GI) and glycemic load (GL) values of test meal on blood glucose, insulin, glucagon-like peptide-1 (GLP-1), glucose-dependent insulintropic polypeptide (GIP), and satiety in prediabetic subjects. Twelve prediabetic subjects (mean age 44.0±10.3 years and BMI 28.0±4.0 kg/m²) were recruited for the study. They were fed with two test meals as stirred fry rice which consisted of 2 different varieties of rice, contained 180 g low GI rice for low GI-high GL (LGI-HGL) test meal and high GI rice for high GI-high GL (HGI-HGL) test meal, respectively. The food ingredients of all test meals were similar, except for the difference in types of rice and fruits. This 2 test meals provided relatively the same amount of energy, protein, fat and total carbohydrate though LGI-HGL showed the higher amount of dietary fiber. The results in test meals showed that LGI-HGL (GI=48%, GL=40) compared to HGI-HGL (GI=80%, GL=63)

test meal was provided lowered the incremental area under the curve (IAUC) of blood glucose and serum insulin, but this result did not reach statistical significance (P>0.05). While GIP was higher in HGI-HGL tested meal, that reached the statistically *significant* difference than LGI-HGL test meals (P<0.05). Conversely, the postprandial GLP-1 response was increased by LGI-HGL tested meal when compared to HGI-HGL test meal. The *subjective* feeling of *appetite* was significantly lower after consuming the LGI-HGL test meal as compared to the HGI-HGL test meal. This result suggest that consumption of LGI-HGL test meal could lower blood glucose, insulin and GIP responses as well as increase the GLP-1 hormone and satiety as compared to HGI-HGL test meal.

FP-10 Creating a healthier nutrition environment in secondary schools in Kuala Lumpur: the NuTeen project protocol and preliminary findings

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Schools offer a captive environment to promote healthy nutrition. This study describes the protocol of a school based nutrition intervention and preliminary findings. The NuTeen intervention is a single blind, cluster randomized controlled trial which aims to showcase a model healthy school canteen in selected secondary schools in Kuala Lumpur. Prior to the intervention a needs assessment survey based on PRECEDE-PROCEED Planning Model was conducted in 10 randomly selected secondary schools in Kuala Lumpur. School stakeholders including students, teachers and principals, parents and canteen operators were assessed for predisposing, reinforcing, and enabling factors. Four of these schools were randomized into intervention and control groups in a 1:1 ratio. Focus groups were conducted with stakeholders to identify possible barriers and enablers for healthy canteen implementation. The intervention, conducted over 8 weeks, was grounded in the Social Cognitive Theory and comprised a multi-component nutrition education and behavior modification approach. Intervention activities included training and supporting canteen

staff, educational sessions, poster and video competition for students, reactivation of existing canteen committee by appointing students as "canteen scout", promotion of nutritious choices through nutrition labelling of canteen foods and healthy meal and snack demonstrations. The Healthy Canteen Week was launched on the 8th week. Evaluation includes process, impact and outcome measures. Control schools were given leaflets containing nutrition information. At baseline 924 students and respective parents, 254 teachers and 40 canteen operators answered the questionnaires. Obesity was found in 32% of students. Vegetable and fruit consumption among students was below 30% while 60% of them think that canteens lack healthy food choices. Nutrition knowledge was low in students and moderate in teachers, parents and canteen staff. Over 40% of canteen food were energy-dense food. Well planned and sustainable interventions should be comprehensive and encompass theoretical models with active student and community involvement

FP-11 S.M.A.R.T program improves nutrition knowledge, attitude and practices of primary school students

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Concerted efforts have been made by Ministry of Health and Ministry of Education in order to improve the nutritional status among school children, in view of the alarming rise of childhood obesity in last two decades. SMART educational programme, based on the key messages of Malaysian Dietary Guidelines, has been newly introduced. The study aimed to evaluate changes of knowledge, attitudes and practices of the primary school children after they followed the SMART programme. A total of 430 students from four primary schools were randomly selected with 213 students in intervention group and others (n=217) served as controlled group. Only intervention group received the SMART programme. Self-administered questionnaire was done by students before (pre-intervention) and after (post intervention) and follow up tests after 6 months of the SMART programme had been completed. It was observed that knowledge score had increased significantly from 54.37±14.27** at pre-test to 64.30±16.65** in post-test and 57.63±16.40** follow-up test among

the intervention group. Besides, the attitude for intervention group was reported as 51.83±17.51 and 54.32±19.93 for pre-test and post test. The nutrition practice for intervention group also increased significantly from 48.64±15.98** for pre-test, to 52.02±18.67** for post-test. However, there was no significant improvement for follow-up group in attitude and practice scores respectively. These results also indicated no significant changes for pre, post and follow up test for controlled group. The findings support the importance nutrition education of providing students with interactive nutrition knowledge to promote healthy dietary behavior. Therefore, the major MDG messages through continuous nutrition school based educative program are vital for children who will be the leaders of the nation tomorrow.

Note: ** (p<0.05)

FP-12 Is plasma vitamin D status linked to sleep quality and eating pattern at night during pregnancy?

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Body's circadian clock has been reported to be regulated by vitamin D and it is possible that plasma 25-hydroxyvitamin D (25OHD) may influence human behavioural circadian rhythms, such as sleep and eating behaviour. This study aimed to examine the associations of maternal plasma 25OHD status with sleep quality and eating pattern at night during pregnancy. This was a cross-sectional study within a prospective cohort in Singapore. Maternal plasma 25OHD concentration was measured using the isotope-dilution liquid chromatography-tandem mass spectrometry, sleep quality was assessed using the Pittsburgh sleep quality index (PSQI) and eating pattern was determined from the 24-hour dietary recall at 26-28 weeks' gestation for 890 women. Plasma 25OHD status was defined as sufficient (>75nmol/L), insufficient (50-75nmol/L) and deficient (<50nmol/L). Poor sleep quality was defined by a total global PSQI score >5. Night-time eating pattern was defined according to consumption of >50% of total energy intake from 1900-0659h. Over half of the maternal plasma 25OHD status were classified as sufficient (n=527, 59.2%), followed by insufficient (n=244, 27.4%) and deficient (n=119, 13.4%). Using multiple logistic regression with adjustment for confounders, women with plasma 25OHD deficiency had higher odds of having poor sleep quality [odds ratio (OR) 3.49; 95% confidence interval (CI) 1.84-6.63] and night-time eating pattern (OR:1.85; 95% CI 1.00-3.41) than those with 25OHD sufficient. No associations of 25OHD insufficiency with poor sleep quality and night-time eating pattern were obtained. Our findings showed that maternal plasma 25OHD deficiency was associated with poor sleep quality and night-time eating pattern during the late-second trimester of pregnancy, suggesting plasma 25OHD concentration may be a biomarker of the circadian behavioural status among pregnant women. Further studies should evaluate whether increasing plasma 25OHD concentration in deficient individual can induce improvement in human circadian behaviour, or

improving circadian behaviour can itself increase plasma 25OHD concentration.

FP-13 NCD risk factors among school children in selected schools in Manila and Quezon City, Philippines

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The Philippines' FNRI reported that 90% of Filipinos have one or two of the six prevalent NCD risk factors. The prevalence of NCD risk factors has increased from 1998 to 2008 with 25% of obese adolescents showing early signs of diabetes by the time they reach the age of 15 and 70% having at least one risk factor for CVD upon reaching the age of 20. This descriptive study interviewed randomly selected school children aged 10-17 years old from selected primary and secondary schools in Manila and Quezon City to explore their level of awareness of NCD risk factors and its prevention, their "risky" practices i.e. food preference and physical inactivity. Results showed that 24-69% were aware of NCD and its risk factors, i.e. smoking, drinking alcohol, consumption of fatty, salty or sugary foods and physical inactivity. They however, have favorable attitude towards adopting practices to prevent NCD in the future. Majority have one or two NCD risk factors with 83% preferring to eat fatty food which include fried rice (17.7%), hotdog (17%), quail eggs (15.6%), and use of margarine/ mayonnaise/butter and peanut butter (15.1%) and 45% having low physical activity. The moderate to high level of awareness of NCD and its associated ill effects can be attributed to their exposure to NCD information from television and social media. Majority (89%) watched television. This could explain their food preferences which prominently are marketed products on TV. Overall, the respondents are supportive of any regulation that would promote healthy lifestyle in the school or community. School and community-based education strategies should focus on increasing knowledge about NCD prevention targeting also the parents, canteen managers and street food vendors to ensure that foods served at home, in the school canteen and on the street are healthy and can prevent NCD.

FP-14 Obesity and polymorphism in FTO gene in multi-ethnic Malaysian adults**Mitra S R¹, Tan P Y¹ and Farahnaz Amini²**¹School of Biosciences, Faculty of Science, University of Nottingham Malaysia Campus; ²School of Anti-Aging, Aesthetic & Regenerative Medicine, UCSI University, Kula Lumpur Campus, Malaysia

This study aimed to evaluate interaction between anthropometric indices, biochemical parameters, and polymorphisms in the FTO gene in Malaysians of three ethnic groups. Malaysian adults (Malays, Chinese and Indians) with BMI>23 from communities living in Selangor were recruited. Our results reveal, mean age (\pm SD) for Malays (n=60), Chinese (n=22) and Indians (n=47) were 41.8 \pm 10.3y, 42.5 \pm 10.8y and 45.7 \pm 10.9y respectively. Mean body fat percent for Indian females was 43.8% (\pm 5.7) and for the Indian males was 32.5% (\pm 9.3), for Chinese females was 40.2% (\pm 4.7) and for the Chinese male was 42% (n=1), for Malay females was 42.1% (\pm 4.8) and for Malay male was 34.8% (\pm 3.8). (Females, normal range is 18~28%; males, normal range is 10~20%). In the combined data, Malaysian Indians had significantly lower HDL cholesterol (1.3 \pm 0.3 mmol/L) (p=0.001) compared to Malaysian Chinese (1.7 \pm 0.5 mmol/L), but not so with Malaysian Malays (1.6 \pm 0.3 mmol/L). Insulin resistance as evaluated using the homeostasis model assessment of insulin resistance (HOMA-IR); was significantly higher in Malaysian Indians compared to both Chinese and Malays (1.8 \pm 1.5 against 0.9 \pm 0.6 and 1.1 \pm 0.7, respectively). Similar inference can be drawn with respect to total cholesterol/HDL ratio (4.1 \pm 10.0 against 3.5 \pm 1.2 and 1.1 \pm 0.7, respectively). There was ethnicity difference on the effect of FTO gene variants on insulin resistance (HOMA-IR) in Malaysian Indian women only. HOMA-IR was higher in the mutant allele GG of rs9930501 (2.6 \pm 1.8) when compared to AG (1.0 \pm 0.4) and AA (1.7 \pm 1.6), statistical significance was achieved in case of difference between GG and AG (p=0.02). We see a similar picture for rs9930506 (p=0.03). In case of rs9932754, mutant allele CC (2.6 \pm 1.8) was higher than TC (1.0 \pm 0.1) and TT (1.5 \pm 0.5), significance was achieved in case of TC only (p=0.02). We suggest personalised intervention based on genetic make up for successful outcome in weight management.

FP-15 A sago worm as a good protein-rich food for rural children's complementary feeding in Southeast Sulawesi, Indonesia**Nirmala IR¹, Trees¹, Suwarni¹ and Pramono MS²**¹Nutrition Department, Health Polytechnic, Ministry of Health, Kendari, Southeast Sulawesi, Indonesia; ²National Institute of Health, Research and Development (NIHRD), Center of Research and Development of Humanity and Health Management, Ministry of Health, Republic of Indonesia

Sago worm (*Rhinchophorus ferrugineus*) is protein-rich, found in the rest of sago palm trunk, which is after the sago starch itself had been taken by farmer in the sago palm field. The aim of the present intervention was to assess the effect of sago worm consumption as one component of complementary feeding among children under five. Children aged 1-5 years old (n=23), were purposively allocated to intervention group and control group, served with different treatment: complementary feeding with added sago worm (intervention group); and complementary feeding without added sago worm (control group). The intervention snacks were served 1 time/day (100.0 g) for 45 days. The intervention and control snacks were designed to contain similar amounts of vegetables (carrots and long beans) and also another ingredient including rice; or sticky rice; or cassava; or sweet potato; or banana; or tofu per portion. But the difference between 2 treatment groups is sago worm content only available in the intervention group's snacks. Anthropometric assessment was measured at screening and endpoint. In the intervention group receiving complementary feeding with sago worm content, there was an increasing trend for children's height compared to the control group (0.3 cm vs. 0.2 cm), while there were no differences between groups in weight or height. In conclusion, consumption of sago worm instead of another source of protein-rich food has potentially an effect on nutritional status of children, reducing the incidence of underweight children through 45 days' intervention.

FP-16 Sunlight exposure, northeast monsoon and vitamin D: cross-sectional and intervention study findings**Norliyana A^{1,2}, Wan Abdul Manan WM¹, Wan Mohd Izani WM³ and Hamid Jan JM¹**¹Nutrition and Dietetics Programme, School of Health Sciences, Universiti Sains Malaysia; ²Faculty of Food

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In spite of abundant sunshine and vitamin D producing UV-B rays for cutaneous vitamin D synthesis, low levels of vitamin D have been documented among Malaysian population. The aim of this study was to determine the role of occupation and monsoon season on vitamin D status. This study also aimed at investigating the effectiveness of sunlight exposure or vitamin D supplement on vitamin D level. A comparative cross sectional study was carried out to determine the level of serum vitamin D among outdoor (n=119) and indoor workers (n=118) during monsoon and non-monsoon season. Following that a quasi-experimental study design was conducted for 12 weeks among indoor workers with vitamin D insufficiency, to evaluate the mean changes of serum vitamin D level by different interventions [15 minutes sunlight exposure biweekly (n=19), 50 000 IU cholecalciferol weekly (n=15) or placebo (n=14)]. In cross-sectional study, outdoor workers had significantly higher mean serum vitamin D than indoor workers in both monsoon and non-monsoon seasons. Sunlight exposure was significantly higher among outdoor workers regardless of sex. However, it was lower among females than males, resulting in about two-thirds of indoor female workers having insufficient vitamin D. The differences in vitamin D levels during monsoon season were only observed among outdoor workers. The mean serum vitamin D level was higher during non-monsoon season and lower during monsoon season (mean difference (MD) = 9.81nmol/l, $p < 0.001$). Meanwhile, in intervention study, baseline data did not differ significantly among the groups. However, mean age was significantly lower in sunlight exposure than in vitamin D supplement group (MD = -10.33 years, $p = 0.004$). Analysis revealed there was a significant difference of mean serum vitamin D within each intervention group based on time ($F = 5.300$, $p = 0.026$). Significant increased were observed from baseline to endpoint for both sunlight exposure (MD= 14.27 nmol/l, $p < 0.001$) and vitamin D supplement (MD=14.30 nmol/l, $p < 0.001$) group but not for placebo group (MD=1.75 nmol/l, $p = 0.074$). The results of this study showed that indoor worker especially female has higher risk of vitamin D insufficiency and both sunlight exposure and vitamin D supplementation are similarly effective in improving vitamin D level.

FP-17 Factors associated with cognitive development of infants at 6 and 12 months: preliminary findings from an infant cohort in Seremban

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These are preliminary findings on factors associated with cognitive development of an on-going cohort study of infants from birth to 2 years in Seremban, Negeri Sembilan. The present analysis includes 267 and 94 infants who had been followed-up until 6 and 12 months respectively. Infant's gestational age and birth weight were obtained from clinic health card. Socio-demographic background, infant feeding practices, home environment and infant temperament were assessed using questionnaires. Iron status was assessed at 6 months. Anthropometric measurements were conducted at 6 and 12 months, and z-scores of weight-for-age, length-for-age and weight-for-length were determined. Cognitive development was assessed using Bayley Scales of Infant and Toddler Development at 6 and 12 months. Mean birth weight was 3.09 kg and prevalence of low birth weight was 6.7%. Stunting at 6 and 12 months was 23.9% and 26.5% respectively. About 41.5% of the infants were anaemic at 6 months. Mean duration of exclusive breast-feeding was 4.25 months ($SD = 1.88$), with 43.1% being exclusively breast-fed until 6 months. The mean age of introduction to complementary food was 4.65 months ($SD = 0.94$). The mean cognitive scores was 98.39 ($SD = 13.33$) and 98.67 ($SD = 11.60$) at 6 and 12 months respectively. Monthly household income, birth weight, learning materials, home environment and perceptual sensitivity were significantly correlated with cognitive development at 6 months ($p < 0.05$). At 12 months, cognitive development was positively associated with high intensity pleasure and negatively associated with low intensity pleasure and orienting/regulatory capacity ($p < 0.05$). Cognitive development at 6 and 12 months were associated ($r = 0.50$, $p < 0.001$). Home environment ($\beta = 0.74$, $p = 0.008$) and orienting/regulatory capacity ($\beta = -4.79$, $p = 0.020$) were significant predictors of cognitive development at 6 months. Orienting/

regulatory capacity was the only predictor of cognitive development at 12 months ($\beta=-4.06$, $p=0.028$). Infant temperament, specifically orienting/regulatory capacity, is an important factor contributing to cognitive development at 6 and 12 months.

FP-18 Video game is one of a promising media to modify knowledge and attitude on the importance of breakfast among elementary school children

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Having breakfast is associated with good studying concentrations, nutritional status and infrequent eating out. The objective of this study was to determine the effect of nutrition education through video games on the elementary student's knowledge and attitudes about breakfast. This was a quasi-experiment with pre-post test control group design. Sample was 114 students for both intervention and control group. Sample was drawn by proportional stratified random sampling technique from two schools. Both groups were administered standard leaflet which contained lesson about breakfast for 10-15 minutes. Video game was delivered only for intervention group for two following days and 30 minutes each day. Pre-test was performed a day before the leaflet administration while post-test was performed twice, after leaflet administration and a week after last video game delivery. Paired and independent samples t-test was employed to answer the research questions. Student's age ranged from 9 to 11 years old and more than half of those were girls (53.1%). The average scores of knowledge (post test 1 - pretest and post test 2 - pretest) in intervention group (4.82 ± 2.53 and 3.25 ± 2.47) were significantly differed if compared to control group (1.75 ± 2.66 and 1.25 ± 2.69). The average scores of attitude in intervention group (7.16 ± 7.17 and 7.34 ± 7.11) were significantly differed if compares to control group (2.83 ± 6.58 and 2.64 ± 6.90). There was a significant improvement of knowledge and attitude among intervention group ($p < 0.05$). Video games might be one of promising media to improve the school children's behavior on the importance of having breakfast.

FP-19 Effect of nutrition education intervention on predictors and prevalence of anaemia among children aged 6 to 59 months in Shebelle zone, Somali Region, Eastern Ethiopia

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Globally, anaemia is one of the major public health problems that affect over 1.6 billion individuals of all age groups (mainly children and pregnant mothers) of both industrialized and developing nations, the overall prevalence rate was reported 24.8%. In 2011 anemia affected 273.2 million under five children, out of which almost two third (62.3%) occurs to Sub-Saharan Africa. Ethiopia is one of the seriously affected countries in Africa region. Hence, the aim of the study is to assess the impact of nutrition education intervention (NEI) of children below five years of age on the anaemia prevalence, and its predictors of preschool children in Shebelle Zone of Somali Region. A grouped randomized controlled trial was conducted on 404 children 6 - 59 months and their mothers/caregivers in Gode and Adadle districts at baseline and post intervention. A face-to-face interview for mothers/caregivers was done using a structured questionnaire, blood haemoglobin (Hb) level of the children were measured using HemoCue 301. After 8 months of NEI. Chi-square test for categorical and t-test (independent and paired), and repeated measure ANOVA for continuous variables were used. The overall anaemia prevalence was reduced from baseline (72%) to post intervention (51%). The majority of this change had occurred in intervention group that makes a big improvement from 79.3% of anaemia in baseline to 44.8% in post intervention. Unlike, the control group had only showed a minimal decrease of anaemia prevalence from 64.9% in baseline to 57.2% at the post intervention. The mean score Hb level of paired t-test were significantly improved ($P < 0.001$) after NEI in both intervention and control group, within group. While, independent t-test between intervention and control groups in pre and post intervention, the intervention group has significantly had higher increment ($P < 0.01$). It can be concluded that the NEI has been seen effective and significantly

improved the mean haemoglobin level in intervention group. The anaemia prevalence was also significantly declined in intervention group, compared to control group. Therefore, behaviour change communication, using locally available, accessible and affordable nutritious foods and other resources with proper infant and young child feeding and basic health services such as; de-worming, Vitamin A supplementation and drinking clean, and boiled water, proper using of insecticide treated nets, environmental managements and other services are highly very effective to tackle the children's anaemia status.

FP-20 Revitalizing the function of nutrition status survey (NSS) within the national surveillance system of child malnutrition in Indonesia

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Developing an effective surveillance system for routine updates of child nutrition profiles in an archipelagic country like Indonesia remains challenging. Yet, this profile update is continuously needed for iterative monitoring of nutrition related program performance and ensuring relevant policy responsiveness toward the prevailing problems. Since 2003, Ministry of Health (MoH) – Republic of Indonesia has established annual NSS as part of the nutrition surveillance system. Since then, several modifications were proposed and trialed to optimize its design for obtaining valid nutritional status profile on regular basis. Irrespective to these efforts, severe doubt on NSS data quality prevailed. The surveys went on and off through years with high dependencies on central financial and managerial backups with almost no significant utilization for policy making at any administrative level. Recently, the Community Nutrition Directorate at MoH has committed to revitalize the function of NSS within the national surveillance system. The sampling areas covered up 134 to 496 and then 514 districts in the year 2014, 2015, and 2016, respectively. Designed as repeated cross-sectional surveys, the nutritional status profiles of children U-5 at all districts in 34 provinces could then be generated in 2016. One of the key variables in the survey is the nutritional status of children U-5 as indicated by WAZ and MUAC. With these data, not only the national profile, but also the distribution patterns

of child malnutrition over the country could be presented up to the district/city level. However, this achievement does not immediately wipe the chronic doubt on the data quality due to some critical limitations in the survey implementation as elaborated in the report. Yet, thinking positively, one must see this as a feasible challenge to further improve the NSS design to be more efficient and effective in the implementation nationwide.

FP-21 Association between dietary patterns and risk of nasopharyngeal carcinoma: a multi-centric hospital based case-control study in Malaysia

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Nasopharyngeal carcinoma (NPC) is the fourth most common cancer especially among Chinese men in Malaysia. Analyses of dietary patterns can provide insight into the complex interactions of foods, nutrients, and biologically active components within a diet, which vary among populations. We aimed to investigate the associations between dietary patterns and NPC risk in Malaysian. In a study of 300 cases and 300 matched controls, principal component analysis was used to identify dietary patterns using a 170-item semi-quantitative food frequency questionnaire. The associations between dietary patterns and NPC risk were assessed using conditional logistic regression models to estimate odds ratios (ORs) and 95% confidence intervals (CIs). Three dietary patterns (high vegetable and fruit, high protein and high-salted and processed food) were derived accounting 10.24%, 5.07% and 4.74% of the variance respectively. A significant reduction in NPC risk was observed in high vegetable and fruits dietary pattern for third quartiles versus lowest quartile (OR = 0.58, 95% CI = 0.36, 0.95). Interestingly, a significant increase in NPC risk more than three-folds was observed in high-salted and processed food dietary pattern for second quartile versus lowest quartile (OR = 3.28, 95% CI = 1.80, 5.98). The risk was significantly more than four-folds for third quartile compared

to lowest quartile (OR = 4.33, 95% CI = 2.27, 8.26). Independent risk contribution increased almost 15 times at highest consumption of salted and processed food (OR = 14.86, 95% CI = 7.32, 30.18). Our results indicate that individuals who prefer the high-salted and processed food dietary pattern should be made aware of their increased NPC risk. The high vegetable and fruit dietary pattern is recommended for the Malaysian population to prevent NPC. In conclusion, the dietary recommendations described in this study can be used to support guidelines for NPC prevention and to develop public health policies.

FP-22 Evidence-based recommendations for balanced nutrition in managing obesity and related metabolic disorders

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Obesity poses a serious health issues throughout the world. Many metabolic disorders that are obesity related have put a number of health authorities, especially in Asia, on high alert at the national levels. Therefore, the management of obesity may be one of the solutions to control the rise of metabolic disorders, such as diabetes. Managing obesity may have many ways, such as dietary control, surgery, medication, acupuncture, nutraceuticals, etc. Except long-term dietary control, many of the means may cause side effects and adiposity rebound still occurs frequently as well. It is widely agreed that decrease in calorie intake and increase in physical activity are principles for managing obesity. However, based on reference, reckless calorie-controlled diet usually leads to some nutrient deficiency problems which may cause further health issues. Hence, it is critical that a balanced diet should be required at the onset of any obesity treatments. Many studies have demonstrated that a responsible calorie-restricted rule, which includes the use of natural food and proper meal replacement, has significantly shrunk the obesity of the subjects studied (Flechner-Mors, et al., 2010). It has been shown that the overall body fat was significantly reduced, with no reduction in muscle mass. In addition, the metabolic disorders, such as hypertension, hypercholesterolemia, hyperglycemia, were also resolved and the rate

of adiposity rebound was significantly low. The other intervention study using green tea and oolong tea also demonstrated significant effects in obesity control as well as hypolipidemia in the human clinical trials.

FP-23 A continuum of care analysis on adherence towards maternal and child nutrition programs and its association to child stunting in Indonesia

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Stunting in Indonesia remains highly prevalent despite the government's effort through various maternal and child nutrition (MCN) programmes to reduce it. The study aims to assess mothers' adherence towards the MCN programs and its association with risk of stunting among children aged 6-23 months. The study included 6,341 mothers of children aged 6-23 months old in Indonesian Basic Health Survey 2010 dataset. The MCN programmes covered maternal iron-folic acid supplementation (IFAS), continued breastfeeding (CBF) promotion, complementary feeding (CF) promotion, and vitamin A supplementation (VAS). It was hypothesised that better adherence to the four programmes was associated with lower risk of stunting. Multivariate logistic regression was used to examine the association, controlling for maternal height, low birth weight/LBW history, child's sex and age, health seeking behaviour and socio-economic factors. The study showed that prevalence of stunting was 37.9%, proportion of mothers with good adherence was 70.2% (VAS), 68.4% (CBF), 27.7% (IFAS), and 12.1% (CF). Adherence towards number of programmes was 5% (none), 29.1% (one), 46% (two), 17.6% (three) and 2.4% (four). The hypothesis was not proven

as there was no significant difference on risk of stunting between adherence towards 3-4 and 1-2 MCN programmes. Instead, pre-pregnancy and prenatal factors revealed as significant risk factors of stunting. Good adherence towards IFAS was associated with lower risk of severe stunting (aOR=1.28, 95%CI 1.02-1.55), as was higher maternal height (aOR=1.25, 95%CI 1.02-1.54), and no-LBW history (aOR=1.87, 95%CI 1.53-2.30). Currently-breastfed children from poor families had borderline significant higher risk of stunting (aOR=1.35, 95%CI 1.00, 1.83, $p=0.052$) than the no-longer-breastfed children, which was associated with the poorer dietary diversity of the currently-breastfed children (low flesh foods, dairy product, and egg consumption). The finding reinforces the importance of good nutrition of women before and during pregnancy. In addition, promotion of CBF should be done along with promotion of good CF practices.

FP-24 Estimating portion sizes from digital food images: Accuracy of estimation by nutrition professionals

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Accurate portion size estimation is important in determining validity of digital imaging methods in dietary assessment. This study aims to determine the accuracy of nutrition professionals in estimating food portion sizes based on digital

images. A total of 38 subjects (16 dietitians, 8 nutritionists and 14 nutrition researchers, mean age 26.4 ± 2.5 years) participated in this study. Each subject was randomly given two food images labelled as Image A (lunch meal on a plate) and Image B (lunch meal in a bowl). Subjects were asked to estimate food amount (to the closest gram) of the presented foods via an online questionnaire. Portion size estimation for Images A and B were completed by 38 and 31 subjects, respectively. Accuracy of portion size estimation was determined by calculating mean percentage error of estimated and weighed portion sizes. Less than one-fourth of subjects (21.0% for Image A, 29.0% for Image B, $p=0.02$) accurately estimated portion sizes within $\pm 10\%$ errors. For Image A, rice (mean error 3.5%) and sliced fruits (mean error -7.4%) were accurately estimated within 10% error; while estimated portion sizes for cooked vegetables ($p=0.25$) and *sambal* ($p=0.11$) were not significantly different from weighed portion sizes. For image B, soup noodles were accurately estimated (mean error -8.3%); while estimation were not significantly different for boiled eggs ($p=0.22$). Overall, mean error was $24.1\% \pm 32.9$ for any food type. Mean error of portion size estimation was higher for foods served on a plate (mean error $27.9\% \pm 32.9$) than those served in a bowl (mean error $17.0\% \pm 30.5$). This could be due to the fixed volume of the bowl which guided subjects in estimating portion sizes. Training should be provided to nutrition professionals to improve their skills in estimating portion sizes based on digital food images.

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**Abstracts for
Poster Presentations**

Group A: Nutritional Status (Various Groups) and Community Interventions

PP-A01 Nutritional status of adults in chosen slum flats in Jakarta, Indonesia

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It is established that overweight and obesity give adverse effects to health. Surprisingly, worldwide obesity has more than doubled since 1980 (WHO, 2016). According to Ministry of Health Indonesia (2013), the number of overweight and obese adults have increased from 10% and 11.7% in 2010 to 11.5% and 14.8% in 2013. However, there are 14% and 20.8% adults living in Jakarta are overweight and obese (Ministry of Health Indonesia, 2013). People living in slum area have poor access to nutrition education which lead to less nutritious diet consumption and less exercise, which make them more susceptible to become obese (Unger and Riley, 2007). Nutritional status of adults in Jakarta slum flats have not been previously determined. This study aimed to examine nutritional status of adults living in slum flats in Jakarta. Cross sectional study was conducted in four chosen slum flats in Jakarta during February to March 2017. Total sampling was used in this study. Data collected including sex, age, weight and height from all adults who had their nutritional status checked. Body mass index (BMI) was calculated using formula: weight/height² and classified using standard from Ministry of Health Indonesia: low (<18.5kg/m²), normal (18.5-24.9kg/m²), overweight (25-27kg/m²), and obesity (>27kg/m²). Total of 105 subjects (87% women) were involved in this study. Average of age was 40.3±8.5 years old. The average BMI was 25.9±4.7 kg/m². Prevalence of overweight and obesity were 21.9% and 31.4% respectively, while 42.9% and 3.8% subjects had normal and low BMI. This study supports previous studies that people living in slum area, including slum flats, are more susceptible to be overweight and obese. Improving coverage of nutrition education may be an alternative solution in addressing this problem.

PP-A02 Associations between overweight and obesity with cardiovascular risk factors in adolescents from three states in Malaysia

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In view of high prevalence of childhood obesity in Malaysia, this cross-sectional study aimed to evaluate the prevalence of childhood obesity and its associations between body mass index (BMI) and cardiovascular risk factors in 507 adolescents aged 13 years from southern regions of Peninsular Malaysia (Negeri Sembilan, Melaka and Johor). Anthropometric measurements including weight and height of respondents were measured, and BMI was calculated and classified into BMI categories using International Obesity Task Force (IOTF) standard. Biochemical data were measured while self-reported physical activity (PAQ-C) levels and socio demographic information were collected from the study adolescents and their parents, respectively. Logistic regression was performed to assess associations between BMI and individual biochemical data [Homeostatic Model Assessment (HOMA-IR), total cholesterol level (mmol/L), triglyceride level (mmol/L), low-density lipoprotein cholesterol (LDL-C) (mmol/L) and high-density lipoprotein cholesterol (HDL-C) (mmol/L)] after adjusting for school location, maternal education and physical activity level. The prevalence of overweight and obesity were 16.6 and 10.5%, respectively. Overweight or obese males and females were 3.4 (95% CI: 1.4-8.5) and 5.3 (95% CI: 3.0-9.5) times more likely to have higher insulin resistance and 3.5 (95% CI: 1.0-11.8) and 3.2 (95% CI: 1.2-9.0) times more likely to have lower HDL-C levels compared to normal or overweight counterparts, correspondingly. Overweight or obese males were 8.1 (95% CI: 1.6-42.6) times more likely to have higher triglycerides values compared to those normal or underweight males. Identification and prevention of cardio metabolic risk factors in early childhood may be beneficial among overweight and obese adolescents.

PP-A03 Pattern of skipping meals and its determinants among adolescent girls: Bangladesh perspective

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Meal skipping is one of the most important dietary concerns among adolescent girls. The study aimed to determine the meal skipping pattern and its determinants among adolescent girls (10-19 years) from both urban slum (Dhaka) and rural (Jamalpur) districts of Bangladesh. A total of 800 girls from 100 randomly selected BRAC Adolescent Development Programme (ADP) clubs participated in this cross sectional study where a mixed method approach was employed. Information on meal skipping was collected using a 7-days prospective food diary, filled up by the girls individually. The determinants were explored through focus group discussions (FGDs) and in-depth interviews (IDIs) conducted among adolescent girls, their parents, school teachers and BRAC ADP staff. Meal skipping was more common among girls from urban slum compared to those of rural areas. Fifty one percent (51%) girls in Dhaka and 29% girls in Jamalpur skipped either breakfast, lunch or dinner at least once in a week. Breakfast skipping (at least once in a week) was significantly higher in Dhaka than Jamalpur (27.5% vs 4.2%). It was found that 24% girls missed their lunch at least once a week. This did not vary between districts. Meanwhile, 26.4% girls from urban slum and 11.6% girls from rural areas skipped their dinner. One of the most commonly identified determinants of meal skipping was timing of school which demanded early wake up in the morning when girls did not feel comfortable to eat. Other important reasons include controlling body weight and body shape and fight or turmoil with siblings and mothers. . Insufficient fuel (gas) for cooking and lack of time of mother to prepare foods for girls were cited as cause of skipping meals in Dhaka slum. The study investigated the pattern and factors associated with meal skipping among adolescent girls. These findings are important and can be utilised to plan or develop effective promotional interventions to develop healthy food behaviour among the adolescent girls.

PP-A04 Malnutrition identification according to Mini Nutritional Assessment- Short Form and dietary intake among community living elderly in Kuantan, Pahang

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Malnutrition is under recognised and remains a problem in elderly population. However, studies related to malnutrition among community living elderly population in Malaysia specifically in Kuantan is scarce. Thus, this study aimed to identify prevalence of malnutrition in elderly population in Kuantan while determining the associated factors, and to assess energy and protein intake of the elderly. Seventy-three community living elderly (n= 39 men and n= 34 women) aged 60 years and older were recruited from Kuantan, Pahang. Malnutrition was assessed by using a validated nutritional screening tool for elderly, the Mini Nutritional Assessment- Short Form (MNA-SF). Diet history was used to collect dietary intake data and was analysed with the use of Nutritionist Pro Software. All data were statistically analysed by using SPSS software version 12.0. Statistically significant level was set at $p < 0.05$. 47 participants (64.4%) were identified in malnutrition and at risk of malnutrition categories (score= 0-11), whilst 26 participants (35.6%) were well nourished (score= 12-14). Only two factors showed significant association with malnutrition risk; income per month ($p = 0.045$) and frequency of physical activity ($p = 0.039$). Mean energy (1287.50 ± 404.11 kcal/day) and protein (47.40 ± 14.28 gram) intake of the elderly were lower than recommended intake. In conclusion, timely malnutrition identification and nutrition intervention should be taken to prevent health deterioration and improve quality of life.

PP-A05 Trend of under-nutrition among toddlers in various ethnicity in East Java, Indonesia

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Under-nutrition is one of the major public health problems in Indonesia. The results of the Nutritional Status Monitoring (NSM) by the Health Department of East Java Province showed that the prevalence of toddler under-nutrition in East Java increased from 1.8% in 2015 to 3.4% in 2016. Socio-cultural factors, such as ethnicity, is one of the main factors associated with the nutritional and health status of toddlers. The objective of this study was to analyse the differences in toddler under-nutrition trend among ethnic communities in East Java province. This was an observational study using secondary data analysis of monthly reports for nutritional program and NSM in East Java. Data analysis was performed for all of the data from 38 districts in East Java Province. The results from repeated measures ANOVA showed a significant difference in toddler under-nutrition trend among ethnicity (p-value=0.005). The trend of under-nutrition among toddlers in Mataraman, Arek, Pandalungan and Madura ethnic showed a declining trend. However, the trend in Osing ethnic showed an increasing trend of under-nutrition. When covariate variables were included in the ANOVA tests, the differences of toddler under-nutrition trend among ethnic communities in East Java remained significant. These include: the proportion of early initiation of breastfeeding (p-value=0.004), exclusive breastfeeding (p-value=0.004), proportion of society participation (p-value=0.005) and the proportion of nutrition program successful (p-value=0.006), activeness of cadre (p-value=0.004), activeness of child's growth monitoring report (p-value=0.007), chronic malnutrition among pregnant women (p-value=0.004), proportion of poor families (p-value=0.006), food expenditures (p-value=0.003), Human Development Index (p-value=0.008), and Public Health Development Index (p-value=0.002).

PP-A06 Comparison of the diagnostic performance of body mass index and waist circumference measurements to identify obesity: in a group of Malaysian adults

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Body mass index (BMI) and waist circumference (WC) measurements are the most widely

used methods to assess obesity in clinical and epidemiological studies. The guidelines developed by WHO stated that obesity is defined as BMI >30kg/m². Abdominal obesity is defined as WC >102cm for men and >88 cm for women, respectively. Excess adiposity is characterised as body fat percentage(BFP) >25% in men and >35% in women, respectively. Nevertheless, the diagnostic performance of BMI and WC for identifying obesity for Asians population is still inconclusive. The objective of this study was to determine the validity and diagnostic performance of BMI and WC measurements in diagnosing obesity as compared to the measurement of BFP by bioelectrical impedance analysis (BIA) as a reference. Data of BMI, WC and BFP of 105 overweight participants involved in an annual health check screening which consisted of 29 men and 76 women were analysed. There was a significant positive correlation between BMI and BFP (r=0.627), p<0.0001), but there was weak correlation between WC and BFP (r=0.227, p=0.021). Hence, this study showed that BMI [AUC:0.876 (95% CI: 0.812,0.940); p=0.027] was a better anthropometric indicator compared to WC [AUC: 0.569 (95% CI: 0.394, 0.743); p=0.680] in identifying obesity.

PP-A07 The estimation of maternal weight gain during pregnancy with birth weight

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Maternal weight gain during pregnancy is one of the factors that influence the baby's birth weight. The research objective was to determine the estimated weight gain during pregnancy with birth weight infants. Cross sectional study design was used to collect secondary data in five selected health centers in the city of Padang, namely Lubuk Buaya, Air Dingin, Seberang Padang, Pauh and Ambacang. Data collected were characteristics and nutritional status of the mother and the characteristics of the baby and infant birth weight. A total of 174 respondents were studied. The percentage of infants with low birth weight (LBW) was quite high ie 15.5%. The average maternal weight gain during pregnancy was higher in infants born to normal compared to infants born LBW. The cut off point for maternal weight gain during pregnancy based on the ROC curve was 10.95 kg better in predicting low birth weight infants with a value of sensitivity,

specificity, and area under the curve value above 60%. Maternal weight gain during pregnancy below 10.95 kg was 2.68 times the risk for LBW childbirth compared with women with weight gain during pregnancy above 10.95 kg. Therefore it is recommended to women to improve their weight gain during pregnancy to be above the cut off point through the intake of nutritious and balanced so that the mothers can give birth to babies with normal weight.

PP-A08 The effect of fruit consumption and physical activity intervention on nutritional status (BMI/age) of obese children in elementary schools in Riau Indonesia

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The objectives of this study are to analyse the effect of (1) fruit consumption intervention on nutritional status (BMI/age) of obese students; (2) physical activity intervention on nutritional status (BMI/age) of obese students; and (3) fruit consumption and physical activity intervention on nutritional status (BMI/age) of obese students. This study used Quasi Experimental design and was conducted on April to September 2016 in Elementary School in Riau Indonesia. The number of samples required were 28 students for each of the three groups. The groups were randomly assigned as follows: (1) students of Muhammadiyah 019 Elementary School determined as group A which received fruit consumption interventions; (2) Air Tiris 001 Elementary School students as group B with physical activity interventions, and (3) Ranggini Elementary School students as group C with fruit consumption and physical activity. Interventions were conducted for eight weeks (two months). The data were processed and analysed descriptively and inferentially used Microsoft Excel 2013 and SPSS version 20. There was significant regression ($p < 0.05$) between the three groups (fruit consumption; physical activity; fruit consumption and physical activity) to nutritional status (BMI/age). Nutritional status based on BMI/age z-score showed a decrease after the intervention in all three treatment groups, namely Group A (fruit consumption) by z-score 0.09; Group B (physical activity) by z-score 0.28; and Group C (fruit consumption and physical activity) by z-score of 0.39.

PP-A09 The association of Indonesian healthy eating index with indicators of metabolic syndromes among adult women

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The objective of this study was to analyse the association between Indonesian Healthy Eating Index (IHEI) and indicators of metabolic syndrome among adult women. The data was analysed from a baseline of the experimental study on vitamin D intervention among textile workers at Bogor City. A number of 32 overweight and obese women (29-45 years) participated on this study. The US-HEI was adjusted to IHEI based on the Indonesian RDA and scoring system. The Pearson correlation was applied to test the association between IHEI score and metabolic syndromes (HDL cholesterol, glucose, triglyceride, systole, diastole, body mass index). Based on the IHEI subject was categorised as 25% poor (score <40), 37.5% low (score 40-54), and 37.5% normal (score 55-69). There was no significant association between IHEI with HDL cholesterol, diastole, and body mass index ($p > 0.05$). However the IHEI was positively associated with triglyceride ($r = 0.581$, $p = 0.023$), glucose ($r = 0.298$, $p = 0.049$), and systole ($r = 0.300$, $p = 0.048$). More studies are required, involving subjects with different background to improve IHEI.

PP-A10 Management system of Thai Healthier Logo for combating NCDs

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During the past decades NCDs have become public health problem in Thailand. In order to proactively confront these emerging problems, the Thailand's National Food Committee decided to implement a Front of Pack simplified nutrition labeling namely Healthier Choice Logo as a tool for consumer education and introduction of healthier food choices into the market. The logo as voluntary basis is jointly established by Thailand Food and Drug Administration and Institute of Nutrition,

Mahidol University. A working group consisted of representatives from public, private and academic sectors develop the healthier criteria for different food product groups. The developed criteria must be considered, modified if needed and approved by the stakeholders in the public hearings as well as by the scientific committee. The final approval is performed by a committee of the National Food Committee before being announced. The developed criteria are mainly for industrially produced food products. A neutral agency i.e. the Nutrition Promotion Foundation has been assigned to be responsible as the management authority on issuing the logo and monitoring. The campaign activity is performed by both government and private sectors such as modern trade, convenient store franchise. Budget for the program implementation is supported by the Thailand's Health Promotion Fund.

PP-A11 Validation of exclusive breastfeeding practice by maternal recall with deuterium oxide dose to mother technique among mothers in Klang Valley

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Overestimation of exclusive breastfeeding (EBF) rate has been reported in previous studies, hence an accurate and reliable method to determine the actual EBF practice is imperative. This cross-sectional study was carried out to validate EBF practice among mothers in Klang Valley- by comparison of maternal recall against deuterium oxide dose-to-mother technique. A total of 32 mother-infant pairs were recruited from hospitals and government health clinics in Klang Valley, however only 30 mother-infant pairs completed the study. Socio-demographic questionnaire was self-administered while EBF practices questionnaires were interview administered, while anthropometric measurements (height, weight, waist circumference, and blood pressure for mother; length and weight for infant) were measured for both mothers and infants when infants were aged 3 months±1 week. This was followed by baseline saliva collection of mother-infant pairs after mothers were given 30±0.01g of D₂O. The saliva sample of mother-infant pairs

were collected 6 times at post dose day. The results from EBF questionnaire showed that all mothers claimed they were practising EBF and their infant never received any water sources other than their breast milk during maternal recall method. However, isotopic data from D₂O technique showed only 3% of mothers were actually practising EBF. The D₂O technique also showed that mean intake of human milk was 710.1 ± 232.1 g/day. Meanwhile non-EBF infants received mean non-milk oral intake of 104.6 ± 61.5g/day; indicating non-EBF practice. In contrast EBF infants received only 10 g/day, demonstrating EBF practice. The results revealed that maternal recall method is an unreliable method to determine exclusive breastfeeding practices among mothers. More promotion and education on exclusive breastfeeding is needed to ensure that Malaysian mothers understand exclusivity of breastfeeding.

PP-A12 Food insecurity and nutritional status among Orang Asli (Mah Meri) women in Kuala Langat, Selangor, Malaysia

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This cross-sectional study was designed to determine consequences of food insecurity on nutritional status among 222 Mah Meri women (18 to 59 year old) in Kuala Langat, Selangor, Malaysia. Radimer/Cornell Hunger and Food Insecurity Instrument and Healthy Eating Index (HEI) were used to assess household food insecurity and overall diet quality respectively. Demographic and socioeconomic data, food security status and 24-hour dietary recalls were obtained through face-to-face interview with respondents. Anthropometric measurements including weight, height, waist circumference and body fat percentage were conducted. About 82.9% of households experienced some forms of food insecurity: 29.3% were household food insecure, 23.4% were individual food insecure and 30.2% fell into 'child hunger' category. The overall diet quality of the respondents was poor, with mean HEI score of 46.0%. The prevalence of overweight and obese respondents was 57.2%, 53.6% abdominal obesity and 72.1% at-risk body fat percentage. Food secure group had significantly less children and smaller household size compared to food insecure groups (p<0.05).

There was a significant decrease in the mean household income, income per capital and food expenditure as food insecurity worsened ($p < 0.001$). After controlling for covariates, food secure group had significantly higher HEI scores for components cereals and meat compared to food insecure groups ($p < 0.01$). Conversely, women from child hunger group had significantly higher sodium score than women from household insecure group ($p < 0.01$). However, no significant difference was found in body mass index, waist circumference and body fat percentage according to food security status. In conclusion, majority of Mah Meri households were food insecure, the women had poor diet quality and were overweight and obese. Therefore, more effort is needed to improve knowledge of healthy food preferences and awareness of health status through nutrition education, nutrition intervention and health promotion programs among Orang Asli (Mah Meri).

PP-A13 Factors affecting the nutritional status of congenitally blind Filipino in an institutional setting

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Blind individuals are vulnerable to nutrition-related health problems due to their disability. However, in the Philippines, there seems to be no previous studies conducted on the relationship of nutritional knowledge and food preference to nutritional status and dietary intake. This pilot study aimed to provide a baseline data to determine the factors affecting the nutritional status of congenitally blind Filipino children in an institutional setting. Descriptive design was used. A total of 55 school children residing in the dormitory of an institute for the blind were surveyed and observed. A 2-day food weighing was conducted on non-consecutive weekdays. The survey included demographic questions, a 15-item test on nutritional knowledge, and a 3-part questionnaire on food preference. PLS was used to analyze the results. Results of a multiple regression analyses indicate an effect of the two factors (nutrition knowledge and food preference)

on dietary intake and nutritional status. Our findings show that nutrition knowledge has no significant effect on nutritional status. Also, nutritional knowledge and food preferences of the blind children in the institution were significantly related to their dietary intake, while food preferences were also found to be positively associated with nutritional status. The results of this study suggest that nutrition education on the principles of a balanced diet is crucial in maintaining normal nutrition status. These can also be of significant help for formal school administrators and education policy makers in formulating activities for the improvement of the learning environment of blind school children.

PP-A14 Correlates of malnutrition among depressed Filipino elderly in an institutionalized homecare setting: A Partial Least Square Study

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Depression among the elderly increases the risk for malnutrition. As depression affects the food intake quantity, this may result to nutrient deficiency. However, data on the contributory effect of depression, appetite, B-Vitamins and fiber intake leading to malnutrition among the elderly in the institutions are very limited. This study purports to explore the effect of nutrition-related factors such as appetite level, B-vitamin and Fiber intake in the prevalence of malnutrition among depressed Filipino older residents. A total of 102 purposively selected elderly from private and public homecare institutions within Metro Manila, Philippines participated in the study. Data needed were gathered using the following instruments: Geriatric Depression Scale, Council on Nutrition Appetite Questionnaire and 3 day-24 Hour Food Recall. Data were treated descriptively and inferentially using the Statistical Package for the Social Sciences (SPSS) version 20.0 and Warp PLS version 3.0. Notably, results of the partial least square revealed that of the hypotheses, only fiber intake had marked significant relationship ($p = 0.02$) elderly malnutrition. Depression ($p = 0.12$), Appetite (0.25), and B-vitamin intake (0.18) showed a weak correlation to the prevalence

of malnutrition. In geriatric homecare setting, the role of adequate fiber intake in alleviating the prevalence of malnutrition among the depressed elderly cannot be underestimated. This study invites all health and medical practitioners particularly Nutritionist-Dietitians, government officials and homecare institutions to partake in providing dietary regulation through a multidisciplinary approach.

PP-A15 Prevalence and associated factors of obesity among adolescents with autism spectrum disorders (ASD) in the Philippines

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The prevalence of overweight and obesity in the Philippines have increased from 1989 to 2013, as evidenced by trends in the previous and most recent nutrition surveys. Meanwhile, Autism ranks as 3rd in the Top 10 developmental disorders in the country as of 2009. Studies conducted internationally had ascertained the prevalence and associated factors of obesity in adolescents with Autism Spectrum Disorder (ASD), however there seems to be paucity in a developing country like the Philippines. The purpose of this study was to determine the prevalence of obesity among adolescents with ASD and examine how factors such as food intake, physical activity, social participation and parental care can contribute to the onset of such condition. Fifty (50) participants were assessed in terms of their anthropometric measurements and dietary intake. Parents reported on the family empowerment scale, reflective of the level of parental care, and on the eight measures of social participation among adolescents with ASD. Over half of the total sample (n=26; 52%) were found to be either overweight or obese. Significant findings are as follows: as parental care increases, food intake increases ($\beta=0.25$, $p<.01$); low social participation leads to low levels of physical activity ($\beta=0.26$, $p<.01$); increased food intake and low physical activity leads to obesity ($\beta=0.24$, $p<.01$; $\beta = 0.11$, $p=0.06$, respectively). This study averred the importance of parental care and social participation in regulating food intake and

physical activity among adolescents with ASD, in order to reduce the rates of obesity. Moreover, it may open possibilities of making nutrition an integral part in the management of ASD in the Philippines.

PP-A16 The role of alcohol consumption, food intake, and physical activity on the prevalence of obesity among Filipino call center agents

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In line with the increasing trend of Business Process Outsourcing (BPO), an increase in the prevalence of overweight and obesity among call center agents for the past decade in Asia has been observed. However, little research has been done in the Philippine context involving Alcohol Consumption (AC), Food Intake (FI), and Physical Activity (PA) and the widespread of obesity among call center agents. The study examined the relationship of AC, FI, and PA to obesity and the potential disparities between regular and night shift workers. A descriptive exploratory research design was used in this study. A total of 218 adult call center agents were purposively surveyed based on the inclusion criteria. Demographic profile, FI, AC, and PA were assessed in line with the study objectives. A standard regression analysis was used to determine the relationship of AC, FI, and PA to obesity and independent test for the difference between shift works (SW). A total of 218 participants completed the survey. Partial Least Square exhibited modest but statistically significant association of FI ($p<0.01$) and PA ($p<0.01$) to obesity. Interestingly, AC had insignificant results towards its association with obesity. However, AC, specifically beer ($p<0.01$), displayed a significant difference, in which regular shift workers consume higher alcohol than the late shift workers. Notably, the preponderance of the participants who were overweight, have higher beer consumption, and larger waist circumference were men from regular SW. In the study, obesity appears to be predicted by FI and PA. Nutrition education on proper food choices and application

of occupational moderate physical of SW could help in improving health and well-being among working population.

PP-A17 Examining the relationship of daily money allowance, sugar-sweetened beverages consumption, and level of nutrition knowledge on the nutritional status among a select group of Filipino adolescents

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Over the past 10 years, there has been an increase in the prevalence of overweight and obesity among Filipino adolescents, and studies have shown that it is greatly contributed by sugar-sweetened beverage consumption. However, only a few studies have examined the relationship of sugar-sweetened beverage consumption and other factors on the nutritional status of Filipino adolescents. This study aims to examine the relationship of daily money allowance, sugar-sweetened beverage consumption and level of nutrition knowledge on the nutritional status of a select group of Filipino adolescents. A partial least square approach was used to examine the relationship between the variables. A total of 200 senior high school students participated in the study. In line with the study objectives, their demographic profile was measured by a 13-item questionnaire regarding their robofoto, while their level of nutrition knowledge was assessed using a 12-item researcher-made questionnaire, and their sugar-sweetened beverage consumption were measured by using a semi-quantitative food frequency questionnaire that covered their sugar-sweetened beverage consumption over the past seven days. Results showed that sugar-sweetened beverage consumption contributed to 30-50% of the respondents' recommended energy intake. Further, there is a significant relationship between daily money allowance and sugar-sweetened beverage consumption, sugar-sweetened beverage consumption and nutritional status, and level of nutrition knowledge and sugar-sweetened beverage consumption, however, level of nutrition knowledge did not affect the results of select group's nutritional status. The findings of the study suggest that there should be

a strong adherence in regulating the marketing of sugar-sweetened beverages among students, providing nutrition education, behavior-based interventions, and establishing health-promoting environments.

PP-A18 Factors affecting the nutritional status of Filipino elderly in home care settings

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Elderly people are generally at increased risk of malnutrition due to a number of age-related factors, insufficient food intake, and number of morbidities. However, there is little research in the local setting regarding the factors that affect the nutritional status of institutionalized elderly. The objective of the study was to explore the factors affecting the nutritional status of Filipino elderly in home care institutions. Ninety-nine elderly from five different home care institution participated in this study. A robofoto was used to obtain the demographic and general health information data, anthropometric procedures were performed to measure nutritional status, geriatric depression scale was adopted to identify possibility of depression, physical activity scale for the elderly (PASE) was used to measure physical activity, and a three day 24-hr food recall was used to quantify nutritional intake. The use of partial least square model revealed a significant influence of age on nutritional intake ($p = <0.01$) and number of morbidities ($p = 0.02$). Length of stay in home care institution affects nutritional intake ($p = 0.02$), and nutritional intake alters nutritional status ($p = <0.01$). Surprisingly, depression ($p = 0.30$) and morbidities ($p = 0.30$) shows no significant effect on nutritional intake, as well as age to the level of depression ($p = 0.30$), and physical activity to nutritional status ($p = 0.21$). Significant findings of this study imply the need to strengthen policies and practices as well as intensify efforts in ensuring proper nutritional care, feeding techniques, and quality of meals in home care institutions to avoid risks of malnutrition and its associated effects.

PP-A19 The impact of nutrition education on university students' knowledge and intake of street foods

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There is an estimated 2.5B people consuming street foods worldwide. Street foods may be a source of fat that may contribute to overweight and obesity. Overweight and obesity is a dangerous health problem that may decrease quality of life and increase risk in cardiovascular diseases. The objective of this study was to determine the possible effect of nutrition education through social media on nutrition knowledge and dietary intake among university students. Participants were randomly assigned to either control or experimental group. Anthropometric measurements, nutrition knowledge on street foods and dietary intake were measured at baseline and end of study period. T-test was used to analyze the results and a total of 60 participants completed the study. Results of the 3-week social media based nutrition intervention showed, on one hand, an insignificant increase in nutrition knowledge ($p=0.723$), kilocalories ($p=0.687$) and carbohydrate ($p=0.077$) intake of the experimental group. On the other hand, participants on the control group showed an insignificant increase in weight ($p=0.394$) and protein intake ($p=0.856$). Findings of the study showed that a 3-week social media-based nutrition education may not be enough to improve dietary intake and nutrition knowledge on street food. Longer duration of intervention and more interactive approach of social media can be considered.

PP-A20 Partial least square regression modeling of the factors affecting the risk for obesity of graveyard shift call center agents

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The continuous growth of the Philippine call center industry raises the need for the health and nutrition status of call center agents to be ensured since their work environment predisposes them to an increased risk for obesity which is known to lead to serious health consequences. This study attempted to identify the factors affecting the proneness of obesity of graveyard shift call center agents. Partial least squares (PLS) regression was the design used in this study. One hundred (100) respondents were included in the study. BMI, nutrition knowledge, and dietary intake measures were analyzed to test the study hypothesis. Fifty percent of the respondents were found to be overweight/obese. Significance between budget to eating pattern, eating pattern to total dietary intake, and budget to total dietary intake were seen in the study. Overall results suggest that enforcing said eating pattern and dietary intake with physical activity is of utmost relevance in decreasing the risk for overweight and obesity.

PP-A21 Food security status and its association with sociodemographic, psychosocial status and depression among Malaysian elderly in Mukim Ulu Kinta, Perak, Malaysia

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The objective of this study was to investigate food security status and its association with demographic, socioeconomics characteristics, psychosocial status as well as depression among the elderly in Mukim Ulu Kinta, Perak, Malaysia. A total of 116 free living Malaysian elderly from Mukim Ulu Kinta, Perak were involved in this study. Food insecurity was measured using the Six-Item Short Form of Food Security Survey Module (FSSM) by U.S Department of Agriculture (USDA). Psychosocial aspect among elderly was assessed by using the short form Lubben Social Network Scale-6 (LSNS-6) questionnaire, while depression status was measured using the Malay version of short form Geriatric Depression Scale (M-GDS-15). Data were obtained through face-to-face interview using a set of questionnaires. The association between the demographic and

socioeconomics characteristics, psychosocial status with food insecurity status were assessed using the Chi-square test. The association between food security score and M-GDS-15 score was tested using Pearson correlation. A total of 23.8% of the elderly experienced some kind of food insecurity which 15.3% and 8.5% were experiencing low food secure and very low food insecure, respectively. The personal income of elderly in food insecure group (RM1241 ± 999) was significantly lower ($p < 0.01$) than the food secure group (RM2108 ± 2000). Mean score of LSNS-6 was more than 12 for both food secure and insecure group, indicates that the elderly were not at risk of social isolation. There was also no association between psychosocial status of the elderly with food security status ($p > 0.05$). However, there was an association between perception of income adequacy and health perception status with food security status (both at $p < 0.05$). Overall, M-GDS-15 scores of the elderly was ranged from 0 to 13, where scores of 5 and above indicate mild to severe depression status. Food security score was found significantly correlated with M-GDS-15 score ($r = 0.307$, $p < 0.01$). In conclusion, the prevalence of food insecurity in this study is quite high. A low income status could be a factor contributing to food insecurity prevalence among the elderly, but not for psychosocial status. Food insecure elderly was prone to report of 'not having enough money for daily needs' and having a 'fair' health status. This study also found that there is a trend of increasing level of depression with the increased level of food insecurity. This study suggest a regular monitoring of food security status among elderly as they are a vulnerable group and the situations may affect their mental health conditions.

PP-A22 Experiential-based module development and lesson plans on nutrition for primary and secondary school teachers in Indonesia

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School is acknowledged as an effective setting for promoting good nutritional practices among children. However, nutrition topics have been inserted in various course subjects and teachers

as the main actors for delivering the nutrition messages often felt less competent. The objective of this presentation is to report needs assessment on school-based nutrition education (SBNE) and the development process of nutrition modules and their lesson plans for primary and secondary school teachers. The needs assessment (NA) used multiple approaches i.e. literature review, rapid appraisal of school books, and Delphi technique with school authorities. The development process involved 1) Development of draft module and lesson plan outline, 2) Writing up of the module and lesson plans, 3) Trial and review of the module and lesson plans prior to printing. From the NA, we gained understanding on school children's nutrition problems, the nature of school curriculum, and teachers' levels of nutritional knowledge. This stage also dictates the need to develop lesson plans for the teachers. In Stage One, we invited school teachers, school principals, other education personnel, and relevant stakeholders from Ministry of Health and Ministry of Education and Culture to discuss the draft module and lesson plan outline. This stage enlightens delivery methods, resources and other infrastructures needed by the teachers to perform SBNE. Stage Two was lead by two teams of module for primary school teachers and for secondary school teachers consisting of respective school teachers, experts from Ministry of Health and Ministry of Education and Culture Republic of Indonesia, and SEAMEO RECFON staff members. Stage Three involved finalization of the module and lesson plans through trial (for primary school teachers at one outreach study site) and review (for secondary school teachers by volunteer teachers). The two final modules focus on the balanced nutrition and food safety at school.

PP-A23 The relationship between bone width and bone quality with bone mineral density among Indonesian children

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Adequate bone material and strength structure is essential to overall health and quality of life.

The bone mineral density is reflected in the bone strength. The aim of the analysis was to assess the relationship between bone width and bone quality with bone mineral density (BMD) among Indonesian children. The sample was 238 children aged 6–11 years from the South East Asian Nutrition Study (SEANUTS). Bone width (in cm) was measured with Harpenden elbow, wrist and knee bone width. Bone quality was measured using a quantitative ultrasound technique in radius and tibia. BMD was measured with DXA in Cipto Mangunkusumo Hospital, Jakarta and Sardjito Hospital, Yogyakarta due to the availability of the equipment in these hospitals. The height was measured with Harpenden microtoice and converted into height by age z-score. The data analysis was carried out using correlation and linear regression. There was significantly correlation ($p < 0.01$) of elbow, wrist, knee, radius, tibia, and height with total BMD, the values were 0.388, 0.573, 0.520, 0.320, 0.263, and 0.349 respectively. The relationship between total BMD with bone width was 0.266 wrist + 0.437 knee – 0.268 elbow + 0.209 age (in years) – 0.393 gender (r -square=0.518). The relationship between total BMD and bone quality was 0.183 radius + 0.134 tibia + 0.311 height + 0.424 age (in years) – 0.323 gender (r -square=0.484). The bone width or bone quality could be used to predict the bone mineral density as well.

PP-A24 Hydration status and water intake of women during and after Ramadan fasting

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Women are prone to dehydration, but no study has been done to assess hydration status of young women at noon and in the evening of Ramadan fasting. The objective of this study was to analyze hydration status in young adult women during and after Ramadan fasting, and the correlation between water intake and hydration status. This study was designed as a longitudinal during and after Ramadan fasting. Subjects were 50 women aged 20–29 years old. This study used primary data obtained by interviewing subjects and analysing the urine in a laboratorial test. The food and beverage intake data were collected within three days in the middle of Ramadan. The urine samples were collected twice a day (at noon =

12.00–13.00 pm and in the evening = 17.00–18.00 pm) during the last two days of the food and beverage data collection, both during Ramadan fasting and a month after Ramadan fasting. The hydration status was determined by urine specific gravity (dehydration ≥ 1.015 g/mL). The results showed that, during Ramadan fasting, as many as 75.5% of subjects were categorized as dehydration at noon, and the rate was increased to 89.8% in the evening. Most of subjects experienced dry-lips during Ramadan fasting (82%). While a month after the Ramadan fasting the dehydration rate was 36.7% and 49.0% at noon and in the evening respectively. Total water intake from beverage and food during Ramadan and after Ramadan was 2044.85 ± 468.65 and 2342.44 ± 66.68 mL/cap/day respectively. All of the subjects prefer consume plain water to other beverages with the mean intake during Ramadan was 1209 ± 395.78 mL/day. The result also showed that there was a negative correlation between water intake and hydration status ($r = -0.334$, $p < 0.05$). This implies that women should drink more water at early morning eating before sunrise (sahur) during Ramadan.

PP-A25 Parent's physical activity associated with preschoolers physical activity in Taska Permata Keluarga, Kuala Nerus

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Physical activity can help to improve preschoolers' physical health and mental development as well as reduce the risk of getting childhood obesity. The main purpose of the present study was to identify the physical activity level of both preschoolers and their parents and to determine the association between parental and preschoolers' physical activity level. A total of 131 preschoolers aged 4 to 6 years old were recruited using convenient sampling from 9 Taska Permata Keluarga in Kuala Nerus, Terengganu. Anthropometry assessment of preschoolers on weight and height were taken. Body mass index (BMI) was calculated and categorized by using WHO BMI-for-age z-score references. Physical activity level of preschoolers and parents were identified by Malay version Preschool-aged Children's Physical Activity Questionnaire (Pre-PAQ). The mean age, weight, height and BMI of preschoolers were 4.3 (0.7) years old, 14.3 (2.8) kg, 97.9 (8.1) cm and 14.8 (2.1) kg/m²

respectively. Total of 8.4% of the preschoolers were found to be overweight or obese. The median time preschoolers spent in sedentary, light intensity and moderate-to-vigorous intensity physical activity (MVPA) were 210 minutes, 58 minutes and 100 minutes respectively while the median time parents spent in sedentary, walking and moderate-to-vigorous intensity physical activity (MVPA) were 540 minutes, 100 minutes and 60 minutes respectively. There was a significant positive correlation found between the parental and preschoolers' sedentary activity ($r= 0.365$, $P < 0.001$), moderate-to-vigorous intensity activity (MVPA) ($r= 0.370$, $P < 0.001$) and total physical activity ($r= 0.290$, $P= 0.001$). Hence, the findings suggested that parents have direct influence on preschoolers' physical activity level.

PP-A26 Effect of nutrition education using booklet and mobile phone communications on changes of motivation, self-efficacy, and breakfast practice in Indonesian adolescents

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Despite significant benefits of eating breakfast on health and cognitive performances, adolescents commonly omit breakfast in their dietary practices. Intervention is required to improve adolescents' breakfast habit. This research aimed to investigate the effect of nutrition education using booklet and mobile phone communications on the changes of motivation, self-efficacy, and breakfast practice in adolescents. This research was conducted in two Senior High Schools in Makassar city. 108 students (59 of each school) were recruited using stratified sampling method. The research applied quasi-experimental design with pre and post-intervention measurements. One school that was assigned as the intervention group (Int1) received nutrition education through booklet and SMS reminder while the comparison school (Int 2) received education through booklet and Line apps. Motivation, self-efficacy, and breakfast practice of the students were measured before and after four weeks of intervention. Wilcoxon test was used to examine differences in all variables before and after the intervention in each group. Mann Whitney test was used to examine differences in all variables between both groups. The results indicated that in group Int 1

all variables were significantly different at before and after the intervention: motivation (median 55 to 56, $p<0.05$), self-efficacy (median 42 to 45, $p<0.001$), and breakfast practice ($\Delta 19\%$ $p<0.05$). No significant differences were observed in group Int 2: motivation (median 57-56 $p=0.244$), self-efficacy (median 42 to 44, $p=0.111$), and breakfast practice ($\Delta 10\%$ $p=0.647$). There was no significant difference in all variables between both groups either at the beginning or at the end of intervention: motivation ($p=0.454$), self-efficacy ($p=0.436$), and breakfast practice ($p=0.362$). It can be concluded that delivering nutrition education through booklet and SMS can positively change the adolescents' motivation, self-efficacy, and breakfast practice. Using smart phone's application to accompany the paper-based nutrition education is promising but needs further investigations to determine its effectiveness.

PP-A27 Can food demonstration and intensive counseling to pregnant women improve food diversity? : Experience from 'Maternal Nutrition Intervention' project

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Lack of dietary diversity during pregnancy is a major problem as it is associated with nutrition sufficiency, micronutrient adequacy, and pregnancy outcomes. Maternal Nutrition Intervention (MNI) project of BRAC Bangladesh aimed to test the operational feasibility to deliver a package of maternal nutrition interventions through behavior change communication. One of the purposes of this project is to reduce maternal malnutrition through intensive counseling and trimester wise practical demonstration. The community health workers of BRAC counseled about the importance of 5 highly recommended varieties of food i.e. fish/meat, egg, milk/milk product, dark green leafy vegetables and yellow/orange fruits and vegetables beside rice and pulses. They also demonstrated the daily required amount of these foods in each trimester to the pregnant women and their family members. Total 3.4 million people from 10 upazilas of 4 districts of rural Bangladesh have been covered under this project. This abstract intends to reveal the program's achievement regarding food diversity from September, 2015 to March, 2017. All 10 intervention upazilas under this

project is considered. During this period, total 134,354 pregnant women were counseled and 297,648 number of demonstration sessions were conducted. Within this period, consumption of all 5 recommended varieties of foods by pregnant women dramatically increased from 20% to 85% which may result from demonstration with extensive counseling. Percentage of women who consume all 5 groups of foods increased to almost 80% whereas this percentage was 55% for fish/meat consumption, 30% for egg, 26% for milk, 31% for dark green leafy vegetables and 25% for yellow/orange fruits and vegetables previously. The result indicates that counseling and demonstration of food can be used as a tool to improve maternal dietary diversity as well as to reduce the malnutrition during pregnancy.

PP-A28 A regression model for predicting adiposity in Malaysian adult women

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Imbalance of energy intake with energy utilisation resulted in adiposity. The aim of this study was to determine the types of nutritional intake and physical activities that are able to predict accurate percentage of body fat together with known predictors such as age, BMI and ethnicity. Thus, a multiple regression model is developed. A total of 473 women aged 40 to 60 years old were recruited during health screening programme at multiple designated venues. Nutritional intake was assessed using validated Diet History Questionnaire (DHQ) and their level of physical activity were assessed based on Short Questionnaire to Assess Health-Enhancing Physical Activity (SQUASH). The domains of physical activities measured were commuting, leisure time activities, household activities and activities at workplace. Total time per week and activity score of each activity were calculated. Adiposity was classified based on body fat percentage measured via InBody 270 Body Impedance analyser. Multiple linear regression was used to evaluate the combination of different types of nutrition and physical

activity. Results indicate that the best nutritional and physical activity predictors of body fat percentage are calcium and vitamin C intake, total time of physical activity and total intensity of physical activity. Aggregation of the nutritional and physical activity predictors with the known predictors (BMI, age and ethnicity) provide a quadratic polynomial combination that led to accurate prediction of body fat percentage ($r^2 = 0.891$). Estimation of nutritional intake and physical activity accurately predict adiposity of Malaysian adult women.

PP-A29 Healthier logo in Thailand: Criteria and implementation

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Thailand's Healthier logo, a summary-type front-of-pack simplified nutrition labeling, was initiated by the National Food Committee in collaboration with Thailand's Food and Drug Administration, Ministry of Public Health and Institute of Nutrition, Mahidol University for consumer education and increasing more food choices for reducing NCDs risk. Since the launching in February, 2016, there are the healthier criteria available for 6 groups, including ready-to-eat meal, beverage, seasoning sauce, dairy products, instant noodle/porridge, and snacks. Criteria used include cut-off scoring and cut-off value. The cut-off scoring is implemented with food products that need several criteria with various serving sizes such as ready-to-eat meal. The passing score for desirable and limiting nutrients is 20 from 40. The cut-off value that established based on the clearly defined values of certain limiting nutrients are now implemented in beverages, dairy products, instant noodles, salty condiments, and snacks. Sugar is $\leq 6\%$ in beverages with limited fat content for tea, coffee and chocolate drinks. No-added sugar for dairy products with fat content $\leq 5\%$. Sodium in sauces is reduced by 30%. Sodium in instant noodles at ≤ 1000 mg per package. Snacks are controlled for energy ≤ 150 kcal/serving, sodium ≤ 500 mg/100 g, saturated fat ≤ 6 g/100 g and sugar ≤ 7 g/100g. Nowadays, there are 51 food companies joining with 232 products including 182 beverages, 8 seasoning sauces, 36 dairy products, 3 instant noodles, and 3 snacks.

PP-A30 Pattern of growth of exclusively breastfed infants 0-6 months of age, at Maternal Clinic Anny, Pasar Rebo, East Jakarta

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The adequacy of breast milk alone to support normal growth during 0-6 months of life is still debatable. Prevalence of breastfed infants in Indonesia was only 38% (Riskesdas 2013). This study aimed to determine the growth pattern of 0-6 months breastfed infants and to determine at what age growth faltering starts. Secondary data of monthly postnatal care of infant 0-6 months exclusively breastfed was analysed to determine their growth pattern with inclusion criteria: born in the same clinic, normal birth weight (≥ 2500 gram), visit the clinic monthly and not suffering from serious diseases. Birth weight and length, and monthly weight and length were recorded until six months of age. Ninety seven infants fulfilled these criteria. Birth weight and monthly weight were measured with SECA baby scale. Birth length and monthly length were measured. Attained growth was then compared to WHO growth standard. Well trained midwives were assigned at birth and monthly to take these measurements. A cutoff of -2 Z score until +2 Z score was used for classifying infant as normal growth. Data was analysed using descriptive method. Attained weight and length were plotted in a growth curve compared to WHO. The growth of infant boys and girls in weight/age, length/age, and BMI/age were between -2 Z score and +2 Z score WHO growth standard, which means normal. There was no weight faltering for girls during the first six months of age, but it occurred for boys which started at one up to six months of age. Height faltering started at one up till six months of age for girls and for boys started at birth up to six months of age. However, all faltering did not exceed -2 Z score. In conclusion, exclusively breastfed infants in the first 6 months of life are considered having normal growth.

PP-A31 Physical activity and dietary intake among Universiti Sultan Zainal Abidin (UniSZA) students

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This cross-sectional study was designed to determine the association level of physical activity and dietary intake among university students in UniSZA, Kuala Terengganu. A total of 295 respondents consisted of 79 male students (26.8%) and 216 female students (73.2%). Students were selected by using convenience sampling. Height and weight were measured to determine the weight status. The dietary intake was measured by using 24-hour diet recall. Macronutrients (energy, carbohydrate, protein and fat) were assessed by using Nutritionists Pro™ and were compared with Recommended Nutrient Intake (RNI). The physical activity of the respondents was measured using International Physical Activity Questionnaire (IPAQ). The results were analyzed using Statistical Package for Social Science (SPSS) version 20.0. There was significant difference of percentage of body fat percentage between male and female ($p < 0.05$). When compared between genders, there was significant mean difference of dietary intake of certain nutrient between male and female students. Almost half of the students have low physical activity but there are significant difference of physical activity between gender. Male show higher physical activity than female. Weight status shows no association with physical activity among UniSZA students. In conclusion, there was no association between dietary intake and physical activity among UniSZA students. Most of female students have low physical activity and practice sedentary lifestyle. Over nutrition among adolescents was due to excessive consumption of fat and sugary food. However, under nutrition probably caused by low family income, limited choice of healthy food, and also skipping meals.

PP-A32 Mid-upper arm circumference value, haemoglobin and body mass index among pre-conception women in Banggai Regency Central Sulawesi, Indonesia

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Nutritional status during pre-conception period is an important determinant that may affect the outcome of pregnancy. One of the causes of low birth weight neonates is nutritional status of women before and during pregnancy. The study aims to identify the nutritional status through mid-upper arm circumference (MUAC), haemoglobin (Hb) and body mass index (BMI) among pre-conception women in Banggai in the year 2016-2017. This study used cross sectional design with saturated sampling technique. The population of this research include 112 preconception women that met the inclusion and exclusion criteria were 53 preconception women. Results showed the average MUAC of pre-conception women was 26.6 cm and the median 26.6 cm, with range of 21.5 cm – 38 cm. The average of haemoglobin was 12.76 g/dL and median of 13.0 g/dL with range of 7.3 g/dL – 15.9 g/dL. The average body mass index (BMI) was 23.5938 kg/m² and median was 24.15 kg/m², with range of 16.02 kg/m² – 30.63 kg/m². The nutritional status of women before pregnancy is very important to achieve mother and fetal welfare and also considered as the most important thing for governing fetal growth. Hence, we need integrated and comprehensive approaches, with interventions to improve the overall health of the pre-conception women.

PP-A33 Occurrence of infection and nutrition on public perception in East Lombok

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The nutritional status is closely associated with a person's general health, in addition to predisposing factors that can aggravate directly infectious diseases can also cause health problems individually. The nutritional status of the fetus which is still in the womb as well as the breastfed infants is influenced by the nutritional status of pregnant women and lactation mothers. Several theories state that factors such as environmental sanitation, and health behavior, immunization and disease infection (ARI, diarrhea, etc.) will greatly affect the nutritional status of a person. The study design was cross sectional study design. The research sample is calculated by the formula single sample proportion, with a degree of confidence of 90% and 7% absolute precision. Data collection was done by interview and anthropometric measurements. Mothers who have children under

five years old were asked about information regarding the factors associated with nutritional and health status, and household characteristics. A qualitative approach was used to strengthen the quantitative results. Interviews were conducted on stakeholders from provincial, district, sub-district, village level; and focus groups (FGD). Nutritional status was determined by weight measurement (using digital scales) and height measurement (microtoise). There were a significant relationship between infectious diseases and nutritional status, the odds ratio of 1.2 for BB/U; Odds Ratio 1.2 TB/U and Odds Ratio 1.7 to BB/TB. Hence, areas with a prevalence of malnutrition turns unrelated infections significantly. It is important to continue to conduct research into the distribution ratio between the areas with a high prevalence of malnutrition to low.

PP-A34 Factors affecting the occurrence of less nutrition in children in coastal communities in East Lombok

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Nutritional status of children is one of the indicators that describe the level of welfare. One way of doing Nutritional Status Monitoring (PSG) is the anthropometric measured by the index Weight by Age (BB/U) or Weight by Height (W/H). Some theories mention that nutritional status is influenced by factors of health, food intake and maternal behaviour. At the same time, each of these three factors are influenced by other factors. Health is influenced by environmental sanitation, and health behaviour, immunisation and infectious diseases (ARI, diarrhea etc). Food intake is influenced by food consumption pattern. Mother's behaviour consists of the predisposing factors, enabling factors and reinforcing factors. The study was conducted in the coastal areas of the District Jerowaro in East Lombok. Respondents in the study were mothers who have children under five years old. Data were analysed in stages: univariate analysis (distribution frequency, mean value), bivariate analysis (test X-2 to assess the relationship between independent variables and the dependent), multivariate analysis (multiple logistic regression to determine the factors related to nutritional status baduta). SPSS version 15 was used. The findings obtained showed that some of the factors that are closely related to the incidence of malnutrition in coastal areas in East Lombok

regency is the behaviour of the composition of the side dishes and vegetables and giving of colostrum during breastfeeding. It is concluded that the need for the practice of feeding the toddler with the composition of vegetables and side dishes are correct, and provision for breastfeeding colostrum potentially prevent malnutrition. There is a need to increase insights into feeding of infants with the correct composition, and giving colostrum in early lactation.

PP-A35 Positive deviation of growth in low birth weight infants until five months old

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The research objectives were to determine the factors that influence the growth of positive deviants until five months old in low birth weight infants and to dig positive deviants behavioru in families with low economic status. This research used quantitative and qualitative method. A prospective cohort was used to observe the infants from the birth to five months old. Besides, this research also used the Rapid Assessment Procedure. The sample size was 61 low birth weight infants (2000-2499 grams) born in mature. The samples were obtained from 5 hospitals and 7 midwives clinics in Pekanbaru city. Monitoring was done every month for the variables of the frequency of breastfeeding, infant health, environmental care and cleanliness of the house and the neighborhood. Multivariate Logistic Regression, group discussion, and home visit with in-depth interview were used to analyze the data. The group discussion was divided into three groups. The informants of home visit were taken from quantitative data of low economic status. It consisted of 7 families with positive deviants and 6 families of non positive deviants. The quantitative results showed that positive deviation of growth until five month old was 65.6%. The factors that influenced significantly of positive deviants were breast feeding (at the age of 1, 2 and 5 months), the health of babies (at the age 2, 4 and 5 months) and nurturing environment (at the age of 3 months). The results of Positive behavior deviants were that the frequency of breast-feeding within 24 hours were more than 12 times, the baby was checked back to health facilities one week after birth, the fathers helped caring for the infants, the mothers and grandmas made decision on infant feeding.

PP-A36 Cross-site anthropometric assessment of school-based obesity interventions: A 12-month follow-up study

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The increasing prevalence of childhood obesity is a major public health concern and is predicted to continue rising worldwide. Schools are an ideal place for interventions and play a major role in preventing childhood obesity. *CERGAS*, *Juara Sihat* and *Great-Child Trial* are three childhood obesity interventions that were conducted in primary and secondary schools in Malaysia in 2015. Anthropometric data including BMI, body fat percentage and waist circumference were collected at 12-month follow-up after the interventions ended. A total of 52 secondary school children in *CERGAS*, 55 and 63 primary school children in *Juara Sihat* and *Great-Child Trial* respectively completed the 12-month follow-up. Repeated measures analyses of variance (ANOVAs) was used to compare data between baseline and 12-month follow-up. Significant decreases ($p < 0.001$) in BMI z-score between baseline and 12-month follow-up was recorded in *CERGAS* and *Juara Sihat*. However, a significant increase ($p < 0.001$) in waist circumference was found in *Juara Sihat*. For body fat percentage, significant reductions ($p < 0.001$) were found in *CERGAS* and *Juara Sihat* but there was significant increase in *Great-Child Trial*. These interventions focused on building the capacities of schools and families to promote healthy eating, physical activity, physical fitness, nutrition education, and/or whole-grains consumption. This cross-site anthropometric assessment of three interventions provide some evidence to facilitate the understanding of childhood obesity intervention programmes using different approaches. In conclusion, school-based interventions designed to improve healthy lifestyle behaviours by engaging overweight and obese children in nutritional and physical activities could be a good strategy for preventing childhood obesity.

PP-A37 Development of a nutrition education module for preschool students

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Knowledge regarding importance of good and adequate nutrition from an early age needs to be delivered through education not only at home, but also in educational institutions. However, there has not been an integrated nutrition education in the curriculum of schools in Indonesia, especially in the education of preschool students. The general objective of this community service activity was to develop a nutrition education module for preschool students. This activity took place in two branches of Star Kids School in August-October 2016. Sixteen students were given 12 sessions of nutrition education delivered in a class room by their teachers. Methods for this activity were developing the nutrition education module, conducting training of the module for the teachers and implementing the nutrition education among preschool students. The module consist of three main topics: my meal plate, fruits and vegetables and healthy snack which were delivered using several methods such as coloring, cooking class, playing picture card, planting seeds of fruits and vegetables, story telling, watching video and outing to farm. There was an increased knowledge of nutrition among the teachers after the training was conducted. The average score of final post-test among the teachers was 77.5 which increased 20 points from the pre-test. The average score of post-test among the students was 92.8. All materials contained in the module were understandable and applicable by teachers and students. In conclusion, this module was applicable and should be implemented in other schools with different educational concepts to see the effectiveness of this nutrition education.

PP-A38 Dyslipidemia and hypertension as risk factors for coronary heart disease

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Coronary heart disease (CHD) is a major cause of health problem worldwide. WHO estimated 9.4 million people died from cardiovascular diseases in 2013, in which 45% of those was due to CHD. According to American Heart Association (AHA), risk factors of CHD can be treated or modified, such as smoking, dyslipidemia, hypertension,

physical inactivity, obesity and diabetes. However, age, gender and genetics are non-modifiable risk factors. The objective of this study is to examine dyslipidemia and hypertension as risk factors for coronary heart disease. This study is descriptive analytic with a cross sectional design. It included a total sample of 182 in-patients, consisting of 126 men and 56 women aged greater than 45 years at the RSUP H. Adam Malik Medan with cardiovascular diseases from January to December 2015. Among those, 116 patients were diagnosed with CHD. Patients with risk factors hypertension and/or dyslipidemia were stated in the medical records by clinical and laboratory criteria. The most important finding in this study was that dyslipidemia (OR: 3.2963; 95% CI: 1.7264 to 6.2936; p value: 0.0003) and hypertension (OR: 2.6283; 95% CI: 1.3417 to 5.1486; p value: 0.0049) were significantly associated with coronary heart disease.

PP-A39 Community volunteer programme: Will it help to improve the knowledge on balanced diet among the rural Orang Asli communities?

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Balanced diet is vital for our body and all of its systems to function properly. The objective of this study was to examine the effectiveness of community volunteer programme in improving the knowledge of balanced diet among Orang Asli (OA) women. Community volunteer programme aims to achieve community empowerment through education, training and hands-on involvement in the wellbeing of own community members. Thirty-five OA volunteers from Kuala Lipis and Hulu Perak were selected who were influential individuals among their communities. They completed balanced diet training module which they were expected to educate the local OA women. Educational video in local dialect narrated by OA health personnel was used to further impart balanced diet knowledge. Four hundred thirty-five and 578 OA women (within reproductive age 15-49 years old) were surveyed pre and post-intervention. Quantitative data collection method was used comprising of guided face-to-face questionnaire. Respondents

who acknowledged that vegetable was part of balanced diet were significantly higher post-intervention (73.0% to 81.0%, $p=0.003$). Similarly, more respondents were knowledgeable about meat/chicken (70.6% to 78.4%, $p=0.005$) and fruits (62.9% to 72.0%, $p=0.003$) as part of balanced diet. More respondents perceived dry/preserved food and sweet/salty food were not part of balanced diet, from 76.1% to 88.3%, $p<0.001$ and 78.0% to 88.3%, $p<0.001$ respectively. However, there was no significant changes in recognition of rice/tapioca as part of balanced diet (88.0% to 88.5%, $p=0.823$) due to unawareness of staple food inclusion. In conclusion, community volunteer programme was effective in improving the knowledge on balanced diet among OA women and should be further expanded to other OA communities. Nevertheless, lack of financial means and scarcity of food supply at rural settings may inhibit the translation of knowledge into actual practice. Thus elevation of socioeconomic status is crucial in improving OA nutritional status and their overall health and wellbeing.

PP-A40 Community understanding of 13 general messages of balanced nutrition in East Lombok District

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Nutritional problems have already led to a double nutritional problems that is under nutrition and over weight. The most effective prevention is through balanced nutrition education. Considering the high rates of malnutrition among children under five (25.5%), mothers of children under fives have been chosen as subjects to study knowledge, attitudes and behaviour about 13 messages in the guideline on balanced nutrition. Preventing nutritional problems in the community can be done by information, education and communication (IEC) of the behaviour and good nutrition. However, the people have already been entrenched with the slogan “4 healthy 5 perfect”. It was not clear how the guidelines of food balance to classify food which only 4 groups can fulfill different requirement of society class. This assumption was not realised in Indonesia

and other countries (including the United States, the origin of “4 healthy 5 perfect”). Therefore internationally since the early 1990s guidelines “4 healthy 5 perfect” has been replaced by more detailed guidance called Balanced Nutrition Guidelines. This is a cross-sectional study with 200 respondents in the two sub districts. Data collection was done by interviewing respondents, in-depth interview to stakeholders, and FGD to specific groups. Data analysis carried out were univariate (frequency distribution, mean value), bivariate, and multivariate analysis to determine the factors related to the nutritional status of children. The results of the study showed that the majority of the people especially in the rural area found it rather difficult to implement the 13 messages of the guideline on balanced nutrition. This is because of the low education level of the subjects, and have receive less health education. However they are more exposed to “4 Healthy 5 Perfect” message. It can be concluded that the the 13 messages in the guideline of balanced nutrition was only understood at the officials level, whereas the grassroot groups still have difficulty in understand them. They are still more familiar with “4 Healthy 5 Perfect”.

PP-A41 Understanding cultural factors affecting nutritional status of children under five in East Lombok

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Nutrition plays an important role in the life cycle of humans, from conception until old age. Health legislation in 2009 mentions that the priority effort to improve nutrition are the vulnerable groups, the most important ones being babies and children under five years. The Global Nutrition Report (GNR) in 2014 mentioned that Indonesia is one of the 117 countries that have three high nutritional problems in children, namely stunting 37.2%, wasting 12.1% and 11.9% overweight. Research and development of nutritional problems, especially on social and cultural factors, is much need in Indonesia. This study was conducted by cross sectional method, using a questionnaire. The respondents were mothers with children under five years old, and stakeholders were at the provincial, district, sub-district, village level. Anthropometric measurements were used to

determine the nutritional status. The presumption will disturb the health of some foods, and some cultures are able to support the implementation of nutrition programs in East Lombok district. Cultural factors support before beginning to recite the message, how good food in accordance with Islamic teachings; Second, "Begibung" that all groups of society, both from toddlers, mothers, parents, to children gather to eat at the same place. Cultural factors that may adversely affect include: first, there is the name "rice papah"; second, feeding imbalanced, meaning the portion of the father is always greater; third, child under five year who live on the beach should not be given a fish, he will be wormy. Those cultural factors that are beneficial should be promoted and made in the area of cultural icon. Those cultural factors that are less supportive of nutrition programs should be made into a culture that is supportive.

PP-A42 Influence of parental support for healthy diet and physical activity behaviour on health-related quality of life among normal weight and overweight Malay adolescents

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Parental support is important in determining healthy diet and physical activity behaviour among children and adolescents. This cross-sectional pilot study was conducted to determine the relationship of parental support for healthy diet and physical activity behaviours on weight status and health-related quality of life (HRQoL) among Malay adolescents in Selangor. A total of 100 respondents were recruited from two secondary schools in Selayang and Hulu Langat. Height and weight were measured using standard procedure, and body mass index (BMI) was calculated. Self-administered questionnaires were used to assess HRQoL (PedsQL 4.0), parental support of dietary behaviour (PACE+), and physical activity behaviour (revised ACTS-MG). Respondents were grouped by BMI status, namely normal weight (n=55) and overweight (n=45) groups. Mean age, height, weight and BMI were 13.5 ± 0.5 years, 156.3 ± 6.3 cm, 60.8 ± 13.7 kg and 24.9 ± 5.5 kg/m², respectively. Mean score of HRQoL in all domains were comparable between BMI groups, except for psychosocial health; whereby

school functioning domain was significantly higher (p<0.05) in overweight group (68.1 ± 15.4) compared to normal weight (61.6 ± 15.7). Overall, level of parental support on healthy diet and physical activity behaviour was reportedly low with 24% and 22% for normal weight group; 38% and 16% for overweight group, respectively, with no significant differences between groups. Parental support on physical activity was positively correlated with HRQoL (r=0.306, p<0.01). In conclusion, both groups showed low parental support on healthy diet and physical activity, which could have influenced their quality of life and motivation to practice healthy lifestyle. These results suggest that parental support on healthy behaviours needs to be emphasised in nutrition intervention programmes.

PP-A43 Food insecurity, nutrient intakes and health-related quality of life among welfare recipients in Bangi and Kajang, Selangor, Malaysia

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Food insecurity exists whenever the availability of nutritionally adequate and safe foods or the ability to acquire acceptable foods in socially acceptable ways is limited or uncertain. This study aimed to determine food insecurity, nutrient intakes and health-related quality of life among welfare recipients in Bangi and Kajang, Selangor Malaysia. A total of 322 women age between 19-55 from households who received financial aids from the Social and Welfare Department were involved in this study. Face to face interviewed was carried out to obtain the information on sociodemographic background, food security status, nutrient intakes and health-related quality of life. Pearson correlation analysis and Analysis of Covariate (ANCOVA) were used to analyze all variables. A total of 66.7% of the respondents had experienced of food insecurity. There was a significant association between respondent's education, spouse's education, household income and total food expenditure with food security status (p<0.05). Meanwhile, there was a significant mean difference between energy intake (p<0.05),

protein ($p < 0.01$), calcium ($p < 0.01$), zinc ($p < 0.01$), thiamine ($p < 0.01$), niacin ($p < 0.01$), folate ($p < 0.05$) and vitamin A ($p < 0.01$) with food security status after controlling the covariate variables. Subsequently, there was a significant decrease in the mean of mental component score (MCS) for health-related quality of life, social function and emotion role as food insecurity worsened ($p < 0.05$). In conclusion, there are diverse risk factors contribute to food insecurity. Additionally, less nutrient intakes and poor mental health-related quality of life are the consequences of food insecurity. Government and responsible agencies should play important role to overcome food insecurity problem. In addition, programs to improve the socioeconomic status among welfare recipients should be planned and implemented.

PP-A44 The effect of home gardening and nutrition education on food consumption and nutrition status children under five years in Riau Indonesia

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The objectives of this study are to analyse (1) the change of home garden utilisation and food consumption of children under five years, (2) the factors that affect food consumption of children under five year and (3) the factors that affect nutrition status of children under five years. The research applied experimental design in two districts namely Bangkinang and Kuok in Indonesia. The samples of this research are 8 Posyandu, which are chosen from Bangkinang and Kuok. The results show that (1) utilisation of garden after the application of the programme is better than before (increase 22,9m²) (2) home gardening programme and mother nutrition knowledge have significant effect ($p = 0.005$; $p = 0.003$) on the food consumption of children under five years, and (3) home gardening programme and mother nutrition knowledge have significant effect ($p = 0.002$; $p = 0.003$) on the nutritional status of children under five years.

PP-A45 Socio-demographic determinants of serum 25-hydroxyvitamin D 25(OH)D insufficiency among 13 years old adolescents in the southern region of Peninsular Malaysia

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Very few studies have investigated the socio-demographic determinants of circulating 25-hydroxyvitamin D 25(OH)D among adolescents in Malaysia. The objectives of this study were to determine the prevalence of vitamin D insufficiency among 13-years old students in southern region of Peninsular Malaysia and its association with socio-demographic factor. This was a cross-sectional study conducted among 507 form 1 (13-years-old) students from 18 national secondary schools located in urban and rural areas of Negeri Sembilan, Melaka and Johor. Information on socio-demographic characteristics such as gender, race, state, parent's education level and household income were obtained using questionnaires while blood samples were obtained to determine the 25(OH)D level. Vitamin D was deemed insufficient if the level is below 50nmol/L. Logistic regression analysis was performed to assess relationships between 25(OH)D and socio-demographic characteristics. The majority of students were Malay 82.4% ($n=418$) and 69.6% of them were females ($n=353$). The mean value of 25(OH)D concentration was 60.7 ± 17.5 . The prevalence of students who were vitamin D insufficient of serum 25(OH)D level were 31.6% ($n=160$). There were statistically significant differences between gender ($p < 0.001$), state ($p < 0.001$), ethnicity ($p < 0.001$), father education level ($p = 0.014$) and mean serum 25(OH)D as determined by one-way ANOVA. Logistic regression analysis indicated that females (OR=10.900; 95% CI 3.745 to 31.723) and Malay ethnic group (OR=13.461; 95% CI 3.777 to 47.978) were more likely to be vitamin D insufficient. One in three Malaysian adolescents in this study was found to be Vitamin D insufficient. Being female and Malay-ethnic group were more likely to be affected. Recognising the risk factors is important for primary care physicians and dietician to advocate better nutrition amongst school children.

PP-A46 Evaluation of the 'Healthy Worker' multi-component workplace wellness programme targeting overweight and obese workers

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Sedentary lifestyle and unhealthy diets contribute towards obesity and increase risks for the early development of non-communicable diseases. The workplace has been targeted for lifestyle intervention. In this quasi-experimental study, the 6-month Healthy Worker Programme which was a multi-component intervention based on the Socio-Ecological Model, promoted improvement in diets and physical activity among overweight and obese government office workers. It included workplace environment modification, top management support, co-worker and individual motivation. Data was collected for weight, body mass index (BMI), physical activity and quality of working life (QOWL) at mid-programme, programme end and post-programme. Data from 183 workers were analysed, that is 93 respondents from the intervention group and 90 controls. At programme end, the proportion who lost at least five percent of their original weight was 14% among the intervention group and 4% among controls ($p=0.03$). There was also increased 'General Well-Being' and reduced 'Stress At Work' in the intervention group at programme end which continued modestly post-programme. Physical activity continued to improve post-programme, they were 1.8 times more likely to reach 10,000 steps a day (95% CI: 1.2; 2.5). The preliminary results show that the 'Healthy Worker Programme' can reduce weight and improve physical activity and QOWL among overweight and obese workers. However, the programme would benefit from further improvement and evaluation before implementation widely.

PP-A47 Bringing fruit and vegetable (FV) market to the office: simply recreational or innovative?

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Healthy eating could be luxurious in urban life where many men and women have to work during the day with limited time allowance for shopping variety of food, especially FV. The latest national survey 2013 confirmed the phenomena in which urban citizens tend to consume less FV than those at rural. Within a household (HH), mothers or adult females often play role as those whom are responsible for food availability and access for the other HH members. Here, the financial power may or may not guarantee access to certain kinds of food items if mothers - for any reasons - have no enough time to shop and select. In this situation, priority to purchase will always fall on macronutrient- instead of micronutrient-food sources. With respect to the commitment of Ministry of Health (MoH) - Republic of Indonesia to promote healthy eating, 'Friday FV market' at the MoH office has been initiated. With the purpose to ensure the accessibility of these food items for MoH staff, the initiators (Directorate of Community Nutrition aimed on the improvement of FV consumption to suffice the family diet of the staff. After 23 months, eleven female staff were in-depth interviewed for their opinions on the weekly FV market. Most of the interviewees purchased food items also for the other family members. Those whom live far from traditional market or have small kids at home also enjoyed the benefit of convenience access to FV with less time allocation (during lunch time) for shopping. Then one may conclude that bringing FV market to office might be a simple yet effective innovation to promote healthy eating in urban setting. Further study is needed to better proof the effectiveness and sustainability of such innovation in the other working environments.

PP-A48 Infant appetite and temperament as predictors of infant growth

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Early life is a sensitive critical window for infant programming that may affect later growth and health outcomes. However, the effects of early infant behaviours on infant growth are poorly understood. The aim of this study was to investigate the influence of infant temperament and appetite traits on infant growth. Pregnant women, recruited from antenatal clinics in Klang-Valley, Malaysia, were followed up postnatally

during home visits (HV) when the baby was 2-3, 6-8, 12-14 and 16-18 weeks old to assess weight, length and head circumference. During HV, infant appetite was assessed by Baby-Eating-Behaviour-Questionnaire and infant temperament by Rothbart-Infant-Behaviour-Questionnaire-Revised. Infant appetite (Food-Responsiveness; responsiveness to maternal cues for feeding, and Slowness-In-Eating; the pace of feeding) and temperament (Effortful-Control; ability to self-regulate emotions) traits were associated with infant growth: i) Mean Food-Responsiveness score was positively associated with weight-SD, weight-SD gain and infant BMI-SD (all $p < 0.05$), whereas Slowness-In-Eating was negatively correlated with infant weight-SD ($p < 0.05$); ii) Effortful-Control was positively correlated with BMI-SD and weight-SD gain. The associations remained significant when these behaviour traits were included in multivariate models, in which they were shown to predict infant growth at different time points. In conclusion, Food-Responsiveness and Effortful-Control were shown to be positive predictors of weight and BMI, whereas Slowness-In-Eating was a negative predictor of weight and BMI during early infancy. Therefore, early determination of these appetite and temperament traits could be helpful in predicting the potential risk of overweight or obesity later in life, especially if the results persist at later ages. Hence, further research with longer follow-up and a larger sample size is needed.

PP-A49 Social and economic predictors of stunting among Filipino adolescents

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In the Philippines, the nutritional status of adolescents is known but information of its determinants are scarce. Therefore, we aimed to establish the predictors of stunting among male and non-pregnant, non-lactating (NPNL) female Filipino adolescents thru cross-sectional secondary data analysis. For this study, we used the adolescent (10.0-19.0 years; $n=33,404$) data from the 2011 Updating of Nutritional Status

of Filipino Children and other Population Groups conducted by the Food and Nutrition Research Institute (FNRI). Selection of social and economic factors for inclusion in the analysis was determined based on empirical data and those found associated with stunting using chi-square tests. Predictors of stunting were determined through ordinal regression. Stunting (35.7%) was a considerable problem among Filipino adolescents. It was more prevalent among the males than the NPNL females ($n=6858$, 37.8% vs $n=5423$, 33.4%, $p < .001$). Analysis of pooled data revealed that an increase in household size decreased the odds of normal nutritional status (OR=.33, 95%CI, .28 to .38) as is belonging to the lower wealth quintiles (OR poorest quintile=.34, 95%CI, .31 to .38). Furthermore, adolescents living in urban areas (OR=1.10, 95%CI, 1.04 to 1.15) were more likely to have normal nutritional status than those in rural areas. Increasing educational level of adolescents improved odds of having normal nutritional status with the greatest for those who reached highschool (OR=1.82, 95%CI, 1.45 to 2.27). Similarly, the more educated the household head is, the greater the odds for normal nutritional status of the adolescent (OR advanced/double degrees=2.75, 95%CI, 1.02 to 7.40). Other parameters did not contribute much to the prediction of nutritional status. These results indicate the need for smaller household sizes. Moreover, given the stunting rate among boys, they should also be targeted for nutrition interventions. Finally, keeping the adolescents in school is suggestive of better nutritional outcomes for the Filipino adolescent.

PP-A50 Design of a worksite nutrition education intervention to prevent obesity for university staff based on trans theoretical model and social cognitive theory

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Overweight and obesity are major risk factors in the development of non-communicable diseases. It has emerged as a significant health problem in developing countries, with 3 in every 10 Filipino adults are considered as overweight or obese. Thus, this study aims to design a worksite nutrition education program intervention to prevent obesity for University Staff based on

Trans theoretical model and Social Cognitive Theory. These models were used as theoretical framework for the adoption of three identified specific behaviors for obesity prevention, which are, reduced consumption of fried and fatty foods, increased consumption of fruits and vegetables and increased physical activity. A total of 23 respondents completed the survey questionnaires during the development phase of the nutrition education program. The questionnaire included questions on respondent's profile, stage of change questions based on Trans theoretical model and assessment of enabling and barrier Statements based on Social Cognitive Theory. Participant's intention on achieving desirable body weight and stage of change on adoption of the three identified specific behaviors for obesity prevention were measured. Results of the stage of change and construct assessments were used in the design of nutrition education intervention activities included in the curriculum. This study was able to successfully design a nutrition education intervention program for obesity prevention in a worksite setting using the Trans theoretical Model and Social Cognitive Theory. The emergence of obesity as significant public health problem worldwide points to the importance of having obesity prevention strategies. Appropriate behavioral change models can be used in the design of nutrition intervention strategies for obesity prevention. Thus, this study was able to address one of the public health problem in the Philippines for which there is no prevention strategy in place.

PP-A51 The effect of food consumption and health examination on maternal nutritional status and infant birth weight and length in Bogor municipality

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The main aim of the study was to analyse the influence of food consumption and health examination on weight and length of babies born. In this cross-sectional study, samples were 45 pregnant women (trimester II) in Bogor City who were observed until delivery. This study found that almost all respondents did not consume a variety of foods, but have good quality of health examinations so as not to impact on maternal nutritional status (chronic malnutrition of energy and anaemia status) and infant weight and length. The results of multiple linear regression test showed that there were no variables that affect the

maternal nutritional status, while the variables that affect the iron status (ferritin) was perception of iron supplement ($p=0.031$). Associated with birth outcomes, it is known that infant birth weight influenced by Mid-upper arm circumference (MUAC) ($p=0.034$), so that every increase 1 cm of Mid-upper arm circumference (MUAC) will increase birth weight 41.201 gram. Whereas, the variables affect infant length is smoking ($p=0.001$), so that smoking would reduce the infant length at 3.402 cm.

PP-A52 Risk factors of dyslipidemia in male workers in a heavy equipment company in East Jakarta, Indonesia

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Dyslipidemia is considered as a public health problem in Indonesia as its prevalence keeps increasing every year. It causes severe complications not only in elderly but also those who are in productive age, such as workers. It is characterised by an increase of total cholesterol, LDL-C, triglycerides or low HDL-C level in the blood. The objective of this study was to identify the most significant risk factors associated with dyslipidemia, particularly among workers who are considered as an important population group for their productivity. This cross-sectional study employed simple random sampling method involving ninety-three men aged 25-55 years old with no history of diabetes mellitus/ other chronic diseases or consuming particular medicines that potentially affect their blood lipid profile. The results showed that 80.6% of respondents suffered from dyslipidemia. It was also suggested that carbohydrate intake was the most dominant factor (OR=10.8 95% CI 1.2-9.4, $p<0.05$) after the adjustment of multiple confounders, including age (OR=1.7 95% CI 0.5-5.6, $p<0.05$), Body Mass Index (BMI) (OR=3.9 95% CI 0.7-21.9, $p<0.05$), and waist circumference (OR=2.3 95% CI 0.6-8.4, $p<0.05$). It was predicted that inappropriate understanding about food substitution by shifting a high fat to a high carbohydrate food despite having isocaloric diet contributed to the blood lipid impairment. A wide range of strategy including health education, particularly on the comprehensive guidance of balanced nutrition and providing weight scale and waist circumference tape are considered to be

critical to encourage the workers to do their self-monitoring. Besides, routine exercises that can be facilitated by periodic sports competitions is also recommended to be managed by the company to achieve better chronic disease prevention. Therefore, workers' productivity will be better preserved.

PP-A53 Risk factors of hypertension in selected urban and rural areas in Indonesia

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The purpose of this study was to determine the prevalence of hypertension and to obtain a predictive model of the occurrence of hypertension among adults in selected urban and rural areas. Study design was cross sectional study. A cross sectional study was conducted on a total of 313 adult male and female aged 35-60 years living in selected rural (Bogor District) and urban areas (Depok City) and fulfill criterion inclusion and exclusion. The results showed the prevalence of hypertension was 25.9% (urban 16.3% and rural 32.6%, $p < 0.05$). Hypertension has a relationship with age, (OR:2.61, 95% CI 1.47;4.63), area of residence (OR:2.5, 95% CI 1.42;4.36), level of education (OR:2.78, 95% CI 1.51;5.44), body mass index (BMI) (OR:2.02, 95% CI 1.15;3.55) and high-sodium food consumption habits (OR:1.92, 95% CI 1.14;3.22). The most dominant risk factor related to hypertension in rural area was body mass index (OR: 3.35, 95% CI 1.45; 7.76) after controlled by age and level of education, while in urban area was age (OR: 2.92, 95% CI 0.91; 9.40) after controlled by body mass index and high-sodium food consumption habits. Hypertension is more prevalent in rural population, aged ≥ 40 years old, 'no regularly' exercise, low educational level, high-sodium food consumption habits, and obesity.

PP-A54 Nutrition assessment of People Living with Human Immunodeficiency Virus (PLHIV) in a treatment hub in the Philippines

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With increasing number of HIV cases in the Philippines and considering the impact of nutrition on diseases, appropriate and timely nutrition management is necessary to attain optimal nutrition and better quality of life. This study generally aimed to assess the nutrition status of PLHIV in a treatment hub in the Philippines. A cross-sectional research design was employed. A two-part questionnaire was used to gather primary data. For dietary data, individual diet diversity scores and mean intakes were recorded. Secondary data was used for the desk review and qualitative assessment of the nutrition service. Systematic random sampling was adopted and written consent was obtained from the respondents. Results revealed that there was a high prevalence of undernutrition (20.54%). There were also cases of overweight (10.71%) and obesity (1.79%). Nutritional and medical history results indicate some issues that may affect the nutrition and health of PLHIV such as NCDs, effect of smoking, taking of unnecessary vitamin and mineral supplements. Individual diet diversity scores and consumption of the different food groups can be related to nutrient adequacy and variety. Knowledge, attitude and practice (KAP) findings indicated good scores for knowledge (83.93%), attitude (78.57%) and total KAP (83.93%). However, this does not translate into practice (56.25%). Provision of micronutrient supplements ($\alpha = 0.014$), counselling on hand washing ($\alpha = 0.044$) and use of safe drinking water ($\alpha = 0.025$) were significantly associated with the nutrition status. A large-scale follow-up study is recommended to further validate the results of the study.

PP-A55 Process evaluation to sustain the improved performance of local government units in the delivery of package of nutrition interventions in regions V and VI, Philippines

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With support from United Nations Children's Fund and European Union, Helen Keller International implemented the "Enhancing Local

Nutrition Interventions (ELNI) project to train local government units (LGUs) and communities to improve the delivery of: 1) iron folic acid (IFA) supplementation to pregnant women, (2) micronutrient powders (MNP) supplementation to children 6-23 months, and (3) infant and young child feeding (IYCF) counseling to mothers. ELNI is the capacity building component of the Maternal and Young Child Nutrition Security Initiative in Asia (MYCNSIA). The project was implemented in 12 municipalities of Camarines Norte, Bicol; and Antique, Western Visayas, Philippines from April 2014 to August 2015. To assess program implementation, specifically the reach and quality of interventions, identifying gaps, challenges, and best practices, in order to inform and improve program impact in selected municipalities of Regions V and VI of Philippines. We conducted a process evaluation to assess the community coverage of interventions, and gaps, challenges, and best practices in maximizing coverage and use of promoted products and behaviors. We used a mix of qualitative methods: in depth interviews with key informants, forum discussions, focus group discussions, desk/document review, observation and household visitation. To complement this process evaluation, Lot Quality Assurance Sampling (LQAS) method was used to provide implementers a quick assessment of municipalities that were performing better or poorly on various project indicators. The information produced by the process evaluation provided local program managers and supervisors with an in-depth understanding on the performance of their respective municipalities across the three intervention areas. This allowed them to take appropriate action in adjusting project strategies and budget allocation to strengthen those interventions. Investing in process evaluations provides important information for decision makers and service providers on the strengths and weaknesses of community interventions and the adjustments needed to improve program coverage and impact.

PP-A56 Empowering and mobilizing the youth for preconception health and nutrition promotion in the Philippines

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Young Filipinos aged 15 to 30 comprise more than 25% of the country's population. As the country's future leaders and parents, the youth is a viable and dynamic target population for a health advocacy campaign on preconception health. Aside from its relevance in the prevention of birth defects and preterm births, preconception health promotes the health and well-being of individuals during their reproductive age. With the goal of creating a network of youth leaders and youth organizations in schools and communities in the Philippines that will champion in increasing public awareness on existing health programs and on the significance of a healthy lifestyle at an early age, Volunteer Youth Leaders for Health (VYLH)-Philippines was established in 2009 through the collaborative efforts of the Institute of Human Genetics - National Institutes of Health, UP Manila, the Department of Health, and a student organization, The UPLB Genetics Society. The youth advocacy campaign is a response to the call of the March of Dimes Global Network for Maternal and Infant Health (MOD-GNMIH) to mobilize the youth for health and complement on-going national efforts on improving preconception health promotion, birth defects surveillance and prevention. Since its formation, VYLH-Philippines has focused on the promotion of the importance of folic acid supplementation in the prevention of birth defects, specifically neural tube defects. The network has also continuously conducted volunteer orientations, trainings and workshops; developed print and accessible online resource materials; designed communication tools and strategies; organized community and school lectures, exhibits and year-round health promotion activities; and established partnerships with local agencies and professional organizations. At present, VYLH-Philippines is involved in projects directed towards organizing community youth organizations, and pioneering a youth-led community-based preconception health education program.

PP-A57 #FolicAcidPH: Utilizing social media in the promotion of folic acid awareness in the Philippines

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The use of social networking sites is one of the most common web-based activities in the Philippines. According to a global survey,

Filipinos spent the longest time on social media sites such as Facebook and Twitter. Both of these trends prove the popularity of social media in the Philippines as well as its potential in commercial, political and non-profit promotional campaigns. In observance of National Nutrition Month and National Disability Prevention and Rehabilitation Week, the Volunteer Youth Leaders for Health (VYLH)-Philippines launched the first National Social media day for Folic acid Awareness (#FolicAcidPH) last July 18, 2017. Although there are efforts directed towards promoting awareness and consumption of folic acid, there is no digital campaign directed for this purpose. There is also no existing legislation on folic acid fortification, supplementation and public education in the Philippines. With these considered, the social media campaign aimed to increase public awareness on folic acid particularly its sources and its role in good health and the prevention of neural tube defects or problems in the development of the brain and spine. The campaign used a simple networking strategy of collaborating with youth organizations, national alliances and online media websites. During its launch, the campaign was participated by 49 partner organizations (45 university-based organizations, 3 national student alliances/organizations and one non-government organization). Members of these organizations participated through the dissemination of campaign messages and infographics in social media. The campaign did not only utilized popular social media sites such as Facebook and Twitter but also a crowdsourcing app, Thunderclap. Aside from the online campaign, partner organizations complemented the campaign with on the ground activities such as lectures, educational discussion and fan sign campaigns that were also uploaded in social media.

PP-A58 The association between internet social media exposure with body image dissatisfaction and eating disorder among adolescents in Shah Alam, Selangor

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Internet social media exposure has been associated with an increased risk of body image dissatisfaction and eating disorder especially among adolescents who easier to access internet and spend most of

their time for social networking. Limited findings have been reported previously on internet social media exposure and eating disorder among Malaysian. Thus, the main objective of this study is to determine the association between internet social media exposure with body mass index (BMI), body image dissatisfaction and eating disorder among adolescents in Shah Alam. This cross-sectional study was conducted among adolescents (n=200), aged 13 to 17 years old living in Shah Alam using convenience sampling. The questionnaire included inquiries about the respondents' socio-demographic details, usage of internet social media, Eating Disorder Examination Questionnaire (EDE-Q) and Socio-cultural Attitudes Towards Appearance Questionnaire 4 (SATAQ-4). Data analysis was done by using Statistical Package for the Social Sciences version 23 for detailed interpretation. Spearman test was implemented to investigate the association between internet social media usage and eating disorder, the relationship between the BMI and body image dissatisfaction and eating disorder. Results showed that no significant association were determined between internet social media exposure and body image dissatisfaction and eating disorder ($p>0.05$). Significant association were determined between internet social media exposure and weight concern ($p<0.05$) and pressure of media to body dissatisfaction ($p<0.05$). In conclusion, internet social media exposure was associated with weight concern and internet media pressure on body images but not on overall BMI, body image dissatisfaction and eating disorder among adolescents. Strategies to improve on health and nutritional status of adolescent could include on social media exposure for better outcome.

PP-A59 Association of socio-demographic, eating behaviour and self-esteem characteristics with body weight status among secondary school students in Cheras, Selangor

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Eating behaviour has been identified as a major contributing factor that was associated with overweight and obesity especially among children and adolescents. This cross-sectional study attempted to investigate the relationship between

eating behaviour, self-esteem and body weight status among secondary school students. Subjects comprised of 188 participants aged 13 to 17 years old recruited through purposive sampling approach. Self-administered questionnaire were distributed among participants comprising socio-demographic information, Eating Behaviour Patterns Questionnaire (EBPQ) and Rosenberg Self-Esteem Scale. The height and weight of the participants were measured to determine BMI using standardized methodology. A significant relationship was found between emotional eating behaviour with body weight status ($p < 0.05$). However, there was no significant association between low fat eating behaviour ($p > 0.05$), snacking and convenience eating behaviour ($p > 0.05$) and meal skipping eating behaviour ($p > 0.05$) and self-esteem level ($p > 0.05$) toward body weight status. Age group was found to be associated with emotional eating behaviour ($\chi^2 = 11.178$, $p < 0.05$) and meal skipping eating behaviour ($\chi^2 = 10.806$, $p < 0.05$) with more participants aged 13-15 years have having poor dietary behaviour. It has been observed that ethnicity were found to be associated with snacking and convenience eating behaviour ($\chi^2 = 16.774$, $p < 0.05$) and meal skipping eating behaviour ($\chi^2 = 12.577$, $p < 0.05$), whereby Malay participants were more inclined to experience snacking and convenience eating behaviour (52.7%) and meal skipping eating behaviour (51.6%) compared to other ethnicity. However, there were no significant associations between gender and low fat eating behaviour, snacking and convenience eating behaviour, emotional eating behaviour and meal skipping eating behaviour with self-esteem ($p > 0.05$). Independent sample t-test showed that there was a significant difference between male ($n = 77$) and female ($n = 111$) in meal skipping eating behaviour ($p < 0.05$) with more female (2.14 ± 0.415) were having meal skipping eating behaviour compared to male (2.01 ± 0.380). This study highlights on socio-demographic, eating behaviour and self-esteem characteristics that were associated with body weight status and may lead to other unfavourable consequences among adolescents. Therefore, nutrition intervention would be helpful to enhance active and healthy lifestyle among adolescents in order to prevent future eating disorder and weight problems among them.

PP-A60 Acculturation and non-communicable diseases (NCD) risk factors among Nepal migrant workers in Klang, Malaysia

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Malaysia is a rapidly industrialised country having huge demands of foreign workers for economic development. Migrant workers undergoes acculturation process whereby dietary habit changes and this often results into NCD development. A cross sectional study was applied among 222 Nepalese migrant workers in Klang. All subjects were recruited through randomization process and provided informed consent before participating. Subjects were all males and completed anthropometric and clinical measurements. A self-administered questionnaire assessing acculturation status and NCD risk factors was completed by all subjects. Results showed that 47.5% of subjects were overweight/obese with 36.8% with abdominal obesity. Mean body mass index (BMI) and visceral fat level were 24.48 (2.80) kg/m² and 8.89 (3.31) respectively. Dietary salt was found to be above average level in 14.9% subjects. Close to 84% of subjects had lower fruits and vegetable consumption daily however, 83.6% of them were physically active daily. Almost 75% of the workers had elevated blood pressure levels. Mean acculturation and dietary acculturation scores were 3.09 (0.59) and 2.82 (0.25) respectively. There were no significant differences found between acculturation score with smoking, alcohol intake, fruits and vegetables intake and physical activity levels. Acculturation score was also not statistically different among those with different weight statutes. However, a positive significant association was found between dietary acculturation with overall acculturation ($r = 0.16$, $p = 0.021$). Increasing age was also found to significantly increase acculturation score as well ($r = 0.13$, $p = 0.047$). Besides that, higher acculturation was positively associated with higher dietary salt consumption ($r = 0.19$, $p = 0.004$). Identifying risk factors may help prevention of chronic diseases at early stages. Hence, tailoring specific nutritional intervention addressing NCD risk factors may help reduce chronic diseases burden among Nepal migrant workers in Malaysia.

PP-A61 Examining the relationship of nutrition literacy and daily food allowance to the nutritional status of a select group of farmers in the Philippines

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Poor nutritional status remains one of the major public health concerns in developing countries. Across the literature, majority of undernourished people live in rural areas and many of them are farmers who play an important role in ensuring food security but are often an overlooked part of society. While there have been numerous studies on malnutrition, little is known on the nutritional status of farmers in the Philippines. The objective of the study is to examine the relationship of factors affecting the nutritional status of farmers in rural setting. The researchers utilized the Structural Equation Model to examine the relationship between and among nutrition literacy, daily food allowance, and nutritional status. A total of 121 respondents of either sex, aged 20 and above were purposively selected. Demographic profile, nutrition literacy, physical activity and dietary intake were gathered in line with the study's objective. Nutrition literacy and daily food allowance did not show significant relationship with dietary intake. However, dietary intake was found to have significant relationship with BMI. Further, the hypothesis on the role of physical activity as a moderating variable was supported. Findings of this study suggest the need to strengthen nutrition knowledge and encourage dietary diversity which may significantly contribute to the adequacy of dietary intake and to sustain their normal nutritional status.

PP-A62 Major determinants of abnormal total cholesterol level in Indonesia

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Hypercholesterolemia is a condition with total cholesterol level above 240 mg/dl, but the level of 200-239 mg/dl is considered borderline high and categorized as abnormal and may have similar impact as hypercholesterolemia. This condition could facilitate accumulation of plaque in blood vessels, and lead to increased risk of cardiovascular disease. Based on the report of Riskesdas 2007, 2010, and 2013 it was found that there was an increased prevalence of abnormal total cholesterol levels among Indonesian population. Using Riskesdas 2013, we aimed to determine the determinant factors of abnormal total cholesterol level in Indonesia's population aged 18-59 years. This study used the cross-sectional design methodology, with 21,055 samples after shorting missing data. Data was analysed with Multiple Logistic Regression. The result of the statistical analysis found one-third or more (38.3%) had abnormal total cholesterol levels, and nearly half (40.5%) had central obesity. We found significant association between age, sex, marital status, central obesity, smoking, and physical activity with total cholesterol levels. After adjusting for potential confounding, we found that the age, central obesity, and physical activity are the three major determinants of total cholesterol levels. Overall, older person, with central obesity and lack of physical activity will increase the risk of abnormal total cholesterol levels. This research suggested that people 18-59 years old should maintain balanced nutrition, increase physical activity and stop smoking to avoid central obesity and resulting in abnormal total cholesterol levels.

PP-A63 Associations between socioeconomic status, maternal height risk, hemoglobin level, and sanitation and hygiene practices with stunting among Aboriginal children in Negeri Sembilan, Malaysia

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This cross-sectional study aimed to determine associations between socioeconomic status, maternal height risk, hemoglobin level, as well as sanitation and hygiene practices with stunting among aboriginal (*Orang Asli*) children in Negeri Sembilan, Malaysia. A total of 269 children (50.9% boys and 49.1% girls) with a mean age of

4.04 years (SD=1.21) and their mothers from 14 randomly selected aboriginal villages in Negeri Sembilan participated in this study. Mothers were interviewed to obtain information on socioeconomic status and sanitation and hygiene practices. Height and weight of the children and their mothers were measured. Capillary blood samples of both mother and child were obtained on-site to determine the hemoglobin level by using the HemoCue technique. Children were also screened for parasitic infection using stool samples. One third of the children was stunted (35.6%) and infected with parasites (35.0%). Two in five (38.3%) of the mothers and one in five (21.7%) of the children were anemic. A majority of the mothers were overweight (48.4%) and obese (23.1%). Children who were anemic [OR= 2.95; 95% CI:1.24, 6.98; p=0.014], had low birth weight [OR= 3.08; 95% CI:1.37, 6.95; p=0.007], mothers with primary education [OR=2.59; 95% CI:1.27, 5.28; p=0.009], stunted mothers [OR= 3.95; 95% CI: 1.11, 14.04; p=0.034], and no toilet at home [OR= 2.76; 95% CI: 1.29; 5.94; p=0.009] were more likely to be stunted. Improvement on child's anemia, birth weight, sanitation specifically presence of toilet at home, together with better maternal education and height would pronounce a positive effect on stunting among Aboriginal children.

PP-A64 Development of healthier choice initiative: Brunei Darussalam's perspective

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One of the ways to encourage food industries to reduce salt, sugar and fat content in food products is through product reformulation. Products that comply with the nutrient criteria are encouraged to carry healthier choice logo as part of a branding mechanism to attract customers' demand to purchase healthier options. From the *Nutritional Labelling Awareness and Uptake of Healthier Food Branding Survey* conducted by the Health Promotion Centre in 2014, it was found that 85.3% of consumers (n=265) read nutrition labels whereby 55.3% consumers stated the reason for doing so was 'to choose healthier items'. However, when asked if it is important to have nutritional labels on food products, the majority (95.1%) agreed it was either 'important' or 'very important'. Furthermore, 97.4% of consumers supported having a healthier choice logo on packaged

foods. The Healthier Choice Initiative aims to create a local market environment conducive for supporting healthier eating choices in Brunei Darussalam. The objectives of the initiative are to increase the number of food and beverage products with a healthier choice logo by 10% by the end of 2018 and to increase the percentage of consumers reading nutrition labels and choosing healthier food products by 20% before end of 2018. Several components constituted in the initiative include the Healthy Restaurant Programme that is responsible to increase supply of healthier products in food outlets and the Healthy Supermarket Programme that acts as a marketing platform to increase demand for healthier food options from potential customers. A continuous monitoring and evaluation of the initiative will be conducted on a regular basis to assess the effectiveness of the initiative.

PP-A65 Weight loss behavior and its perceived barriers: findings from in-depth interviews with overweight adolescents

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Unhealthy weight loss behaviors among adolescents such as maladaptive eating to be thin and practicing dietary restraint has become a significant public health concern. These harmful ways in losing weight may cause disturbance in adolescent's physical growth, cognitive development and social well-being. Therefore, this qualitative study aimed to explore the weight loss behavior among 33 overweight adolescent males (N = 15) and females (N = 18). Based on a thematic analysis on data from in-depth interviews, the present study found that adolescents engaged in various types of weight loss behaviour and these include attempts at dieting, engaging in physical activity and consuming slimming products. Even though overweight adolescents believe that a combination of balanced diet and exercise are the pivotal keys to effective weight reduction and lead to a healthy lifestyle, they were more likely to involve in dieting compared to any other approaches, particularly engaging in skipping meals. However, their preferences of weight loss behaviour are influenced by sources of information obtained from the family

members and the media, parents modelling in eating pattern, and are limited by some of the barriers that include laziness, desire for foods and inconvenience to exercise. Weight reduction intervention targeting overweight adolescents is therefore urgently required.

PP-A66 Prevalence of malnutrition among children referred to health clinic in Cameron Highlands during 2012 to 2016

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The objective of this study was to evaluate the prevalence of malnutrition among children aged between 6 months to 6 years referred to health clinic and to assess cases of children recovering in Child Rehabilitation Program for Malnourished (PPKZM). Children suffering from underweight within 6 to 24 months after receiving the food baskets were selected. National Registry System as database PPKZM case underweight children monitor the program to ensure run more effectively, orderly, rapid and accurate. The total of children aged less than 6 years referred to the health clinic in Cameron Highlands for year 2016 was 3,156. In year 2016, Nutrition counseling sessions have shown that children under 6 years were highest referred to the Nutritionist as many as 122 children. The total number of cases of child malnutrition which is still active for the year 2016 was 115 cases. This total is reduced as compared with the previous year. In year 2016, the detection of cases of underweight children actively carried out by the Mobile Teams Aboriginal which highest report cases of underweight children in Cameron Highlands, from Pos Telanok, a total of 39 cases (33.9%), followed by Health Clinic of Tanah Rata, a total 27 cases (23.5%). No cases of underweight children reported to Health Clinic Kampung Raja since 2013 to 2016. The percentage of new cases of underweight children increased weight in PPKZM program in 2016 was 22.2% (n = 8). In year 2016, the number of cases of underweight children in the program PPKZM recovered was 20.9% (n = 35). Through Government Transformation Program, the Ministry of Health improves the nutritional status of underweight children. Targets, covering the case, the distribution of food and service, the use of food ingredients and handling cases have been updated provide more benefits to the target

groups. By continuing this program, children who meet the eligibility criteria given food basket help them obtain a balanced and nutritious food, in order to achieve optimal physical and mental development.

PP-A67 Relationship of nutrition knowledge with food habits and physical activity of adolescents in Bogor City

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Nutrition knowledge is a predisposing factor for food habits of a person. Typical food habits of adolescents are different than those of other ages. Physical activity of adolescents is determined from how the adolescents allocate 24 hours everyday for activities as routine and repetitive. The aim of this study was to determine relationship of nutrition knowledge with food habits and physical activity among adolescents in Bogor city from different high schools or equivalent. A cross-sectional design was used in this research with a questionnaire administered to 162 adolescents in the Bogor city. Inclusion criteria were 137 healthy adolescents aged 14-18 years, while the exclusion criteria were adolescents not answering the questionnaire, totaling 25 adolescents. We evaluated nutrition knowledge (meaning of healthy and unhealthy food, affecting healthy food choices), food habits, physical activity, and body mass index (BMI). Data were analysed by the method of cross tabs by using SPSS. Results showed that based on food habits most adolescents already have good food habits (81.3%), more adolescents ate breakfast before school than skipping breakfast (84, 57% respectively) indicating that the behavior is already good amongst all adolescents in Bogor city. The worst food habits were fast-food consumption which showed was high in adolescents of Bogor city (81.48%). It was observed that a number of adolescents consumed fast-food everyday and 20 times a month. The consumption of fruits, vegetables and fish as well as other protein foods were high, ie 91.98%, 90.75%, 98.77% respectively. Most of the adolescents (92%) had a normal nutritional status and only small percentage were categorised as underweight and overweight. There was a significant difference between nutrition knowledge and physical activity ($p < 0.05$), whereas the nutrition knowledge and

food habits were not significantly different ($p < 0.05$). In conclusion, nutrition knowledge of adolescents influenced food habits and physical activity, may need to be considered in designing nutrition promotion programmes.

PP-A68 Associations between BMI, meal intake and physical activity with executive function among adolescents aged 13 to 16 years in Petaling Perdana, Selangor

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As mounting evidence links obesity to cognitive impairment, executive function (EF) as a cluster of cognitive processes that underlie planning, organizing, regulation of goal-directed behaviours is noteworthy, especially during adolescence. A cross-sectional study was conducted among two randomly selected government secondary schools in Petaling Perdana to determine factors associated with EF among adolescents aged 13 to 16 years. A total of 260 adolescents (34.2% males and 65.8% females) with a mean age of 14.0 ± 1.3 years participated in this study. They completed a self-administered questionnaire on socio-demographic background, meal consumption pattern and physical activity (PA). Weight, height and waist circumference of the adolescents were measured, while physical fitness (PF) was assessed using the modified Harvard-step test. The three domains of EF were measured using Stroop Colour-Word test (inhibitory control), Digit-span test (working memory, WM) and Trail-making test (cognitive flexibility, CF). Almost 30% of respondents were overweight and obese (OW&OB) with 13% had abdominal obesity, while 8.9% were underweight. Meal skipping was prevalent whereby 85.4% reported skipping at least one meal per day. Nearly 40% of respondents reported low PA level and 72.3% had low PF level. Females performed significantly better in CF than males ($t = 2.629$, $p = 0.009$). Relative to normal weight adolescents, OW&OB group had poorer inhibition ($p = 0.002$) and CF ($p = 0.046$). Older age, frequent lunch intake, lower BMI-for-age and PF predicted better CF. Older age, higher income, higher maternal age, high PA level and frequent dinner intake predicted better WM, while older age was the only predictor for greater inhibitory

control in adolescents. Given that adolescence is a critical stage for long-term cognitive stability, these findings highlight the importance of healthy weight management, regular meals and active lifestyle in promoting optimal EF development.

PP-A69 Associations between socio-demographic characteristics, body weight status and eating behaviours with cognitive performance among primary school children in Batu Pahat district

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This cross-sectional study aims to determine the associations between socio-demographic characteristics, body weight status and eating behaviours with cognitive performance among primary school children in Batu Pahat District, Johor. Based on stratified random sampling, two schools from each type of the schools, namely National Primary School (SK), National Primary School Chinese (SJKC) and National Primary School Tamil (SJKT), were randomly selected. A total of 634 children (Standard 1-5) were interviewed based on a standardized questionnaire that included socio-demographic characteristics, Children's Eating Behaviour Questionnaire and Eating Behaviour Questionnaire. While cognitive performance was assessed using Raven's Coloured Progressive Matrices, body weight and height were measured by the researchers. The findings showed that about one-third (36.1%) of the children were at average level of cognitive performance, with a mean cognitive performance score of 88.75 ± 15.27 . The prevalence of thinness and stunting were 8.2% and 7.6%; while the prevalence of overweight and obesity were 12.8% and 18.6%, respectively. Besides, lower attainment of father's education ($F = 7.112$, $p < 0.01$) and mother's education ($F = 12.808$, $p < 0.01$), and lower monthly household income ($r_s = 0.257$, $p < 0.01$), were associated with poorer cognitive score. On the other hand, Chinese had highest cognitive performance score (98.60 ± 12.72), followed by Malay (87.79 ± 12.72), Indian (79.15 ± 14.14) and

Indigenous people (77.50 ± 8.80) ($F=46.344$, $p < 0.01$). However, no significant correlations were found between height-for-age, weight-for-age and BMI-for-age with cognitive score. As for eating behaviours, lower satiety responsiveness ($r=0.080$, $p < 0.05$), slowness in eating ($r=0.084$, $p < 0.05$), food fussiness ($r=0.117$, $p < 0.01$), breakfast consumption ($r=0.111$, $p < 0.01$), lunch consumption ($r=0.181$, $p < 0.01$), dinner consumption ($r=0.166$, $p < 0.01$), but higher desire to drink ($r=-0.121$, $p < 0.01$), were correlated with poorer cognitive performance ($p < 0.01$). In conclusion, ethnicity, socio-economic status and eating behaviours were associated with cognitive performance of the children. While considering their background, future health program should focus on eating behaviours in improving cognitive performance of the children.

PP-A70 Iodine deficiency in pregnant women living in a coastal area of Mon State, Myanmar

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This cross-sectional, descriptive study was conducted to investigate consumption patterns of salt- and iodine-rich food and to determine iodine status of pregnant women living in a coastal area of Mon State, situated in the southern part of Myanmar with a long coast. A total of 144 pregnant women from two coastal villages (*Pa-Nga* and *Kalokepi*) of the Mon State were interviewed by using structured questionnaires including age, parity, socio-economic status and patterns of salt- and iodine-rich foods (seaweed, fish, prawn). Casual urine samples were collected from each pregnant woman and urinary iodine concentrations were measured. Three samples each of iodized salt and non-iodized salt from local markets were collected for determination of iodine content by the iodometric titration method. Only 83.3% of the study population consumed iodized salt and the remaining (16.7%) consumed non-iodized salt. The median urinary iodine concentration of the study population was 105 $\mu\text{g/L}$. The mean urinary iodine level of pregnant women who consumed iodized salt and that of pregnant women who consumed non-iodized salt were 110.47 ± 67.34 $\mu\text{g/L}$ and 95.83 ± 70.13 $\mu\text{g/L}$ ($p = 0.336$). Iodine content of iodized salt and non-iodized salt were 20.6 ± 9.2 ppm and 5.1 ± 1.2 ppm, respectively. In conclusion, the median

urinary iodine level of pregnant women was lower than that of the optimal iodine nutrition for pregnant women, i.e., 150-250 $\mu\text{g/L}$ and the mean iodine content of salt samples was lower than the permissible level of iodine in iodized salt, i.e., 30-40 ppm. Our findings indicate that iodine nutritional status of pregnant women in this area is deficient and salt iodization needs to be monitored for the optimal iodine content especially in certain pocket area.

PP-A71 Efficacy of nutrition education by religious marital advisors on nutrition attitude and knowledge of young marriage couples in Bogor Indonesia

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About a half and one-third of young women in Indonesia are suffering from chronic energy deficiency and anaemia respectively. One strategy to overcome these problems among young marriage couple of middle-up economy class was through nutrition education by religious marital advisor. The aim of the study was to determine the efficacy of nutrition education by religious marital advisors on nutrition attitude and knowledge of young marriage couples. A pre-post intervention study design was applied for 110 women and men of young marriage couples in six sub-district religion offices in Bogor City, Indonesia. Prior to intervention, the religious marital advisors was trained by researchers. The nutrition education intervention was given by trained religious marital advisors on nutrition through presentation and discussion for 20 minutes using flipchart in each session of each office. Each session involve about 15 subjects of young couple marriage. Each subject was asked to fill in a pretested questionnaire on nutrition attitude and knowledge before and after nutrition education intervention. Mean scores of nutrition attitude before intervention were significantly different from the mean scores after intervention. Nutrition attitude score was increased 15% after the nutrition education intervention. Mean scores of nutrition knowledge before intervention were significantly different from the mean scores after intervention. Nutrition knowledge score increased 10% after nutrition education intervention. This implies that trained religious marital advisors on

nutrition could play a role in improving nutrition attitude and knowledge of young marriage couples.

PP-A72 Physical activity, health and nutritional status of selected business process outsourcing employees: A comparison

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The rising number of lifestyle degenerative non-communicable diseases in the adult population is spanning across the world. The 2013 Philippine National Nutrition Survey revealed the prevalence of overweight and obesity that may have resulted in the increasing trend of high blood pressure, dyslipidemia, and physical inactivity. The study aimed to investigate the difference in the health, performance outcomes, physical activity, health and nutritional status of Day and Night employees of Business Process Outsourcing (BPO) Industry. Eating right and eating adequately plus being active and observing healthy lifestyle sum up the equation of disease prevention and improving the quality of life. The study is descriptive in nature specifically comparative and it was conducted at a Business Process Outsourcing Company in one of the Business District of the National Capital Region, Philippines. A probability sample used is simple random sampling where all the elements in the population frame have an equal chance of being selected via random numbers. A self-administered questionnaire was distributed, gathered then collected. The data was analyzed using statistical treatment mostly frequencies and percentages in describing the socio-demographics, health, and nutritional status. The result showed that there was no significant difference in the health, performance outcomes, physical activity, health and nutritional status of Day and Night employees. Empowering the BPO workforce on healthy lifestyle and nutritious food choices will be beneficial to the employees and their families. Ultimately it will benefit the investors and business sectors in enhanced work performance. The study recommends advocating the Nutritional Guidelines for Filipinos, 2012 and promoting the Pinggang Pinoy, a healthy plate for Filipino adults among BPO employees.

PP-A73 The effect of school environment on the body mass index (BMI) of school children: schools and obesity prevention

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Childhood obesity has become one of the most predominant health problems among our population today. Recently, the influence of school environment factor such as physical, economic, political and socio-cultural towards obesity becomes a great concern in obesity research. Therefore, the aim for this study was to investigate the effect of school environment on children's body mass index (BMI) with the dietary intake and physical activity level as the confounding factors. The school environment was assessed using a set of validated Malay version "Whole-school Environmental Mapping" questionnaire, which consists of 76 questions with four main domains. It involved a face-to-face interview session with 32 teachers from 16 schools (8 rural and 8 urban) in Terengganu. In addition, a total of 400 school children aged 9 to 11 years old were assessed for BMI according to WHO (2007) reference, dietary intake using food frequency questionnaire (FFQ) and physical activity using physical activity questionnaire for children (PAQ-C). For the statistical analysis, multiple linear regression was used to examine the school environmental factors associated with BMI of primary school children. Based on the findings, there was a significant difference in overall school environment score between school settings ($p < 0.001$), in which the rural area had significantly higher score than the urban area (64.9% vs 59.3%, $p < 0.001$). In addition, the findings showed that health professional involvement, simple exercise available before class, encouragement of walking or riding bicycle to school, no high calorie foods sold, existence of healthy foods and drinks at tuck shop, availability of policy for physical activity, and training teacher as a role model were significantly associated with BMI of the children, when adjusted for calorie intake and physical activity level ($R^2 = 31.3\%$). Overall, the present study showed that the school environment factors have significant effects on BMI of primary school children. Awareness and enhancement of the school environment are needed in order to reduce the prevalence of overall childhood obesity.

PP-A74 Development of recipe book as nutrition education media for weight reduction intervention programme

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Nutrition education materials play the important role in providing accurate information on healthy eating to the public. This study was part of Fit, Eat, Active and Training (F.E.A.T) research grant which aims to evaluate the effectiveness of a comprehensive lifestyle intervention in addressing obesity among Malaysian's adults. F.E.A.T. programme is a suburban community weight loss programme, focusing on physical, behavioural and socio-cultural aspects. However, the presentation was focused on development of a healthy recipe book that will be used in F.E.A.T intervention program. The study involved several steps, which consisted of needs assessment, recipe modification and food testing. Face to face interview was used in the needs assessment conducted among 23 obese and overweight adults in Alor Gajah, Melaka. Interviews were conducted to identify food choices and eating habits of the subjects. Recipes of food choices obtained from the interview were modified to provide lower calorie content in one serving. Food testing of the recipes was carried out by professional panels, included 3 nutritionists and 2 chefs. All recipes were successfully modified to have lower calorie and fat, and high fiber content compared to the original recipes. Food testing process showed that 80% of recipes were accepted based on taste and 92% based on texture. In conclusion, all recipes have been compiled in the form of recipe book. It will be published as reference for healthy cooking and may be useful in any weight reduction programs.

PP-A75 Development of new predictive equations for estimation of resting metabolic rate among Malay children

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Indirect calorimetry is the most accurate way to determine resting metabolic rate (RMR) but requires specialized equipment that is cumbersome. On the other hand, predictive equations have been recognized as the practical method for quick estimation of RMR. Nonetheless, accuracy of RMR predictive equations may be influenced by many factors including ethnicity; and thus, need to be population specific. Hence, this study aimed to develop and cross-validate new predictive equations to estimate RMR of children in Malaysia. A total of 70 healthy Malay children (35 boys; 35 girls) aged 9-14 years participated in this study. Age, weight, height, fat mass (FM) and fat free mass (FFM) were measured and BMI was calculated. RMR was measured with COSMED Quark RMR indirect calorimetry. RMR predictive equations were developed using stepwise backward multiple regression analysis and subsequently cross-validated using the Bland-Altman approach. RMR predictive equation developed is: $RMR \text{ (kcal)} = 589.009 + [(8.846 \times \text{weight (kg)})] + [(9.939 \times \text{FFM (kg)})] + [(65.205 \times \text{sex (male=1, female=0)})]$. There was no significant difference between measured RMR and predicted RMR for the whole cross-validation sample. Predicted RMR was under-estimated by 120 ± 298 kcal, with limits of agreement ranging from -423 kcal (95% CI: -590 to -256) to 200 kcal (95% CI: 33 to 367). Pure error (PE: 145 kcal) was close to the root mean square error (RMSE: 164 kcal) indicating good prediction. The findings of this study suggest that the newly developed equations are valid and can be employed for predicting RMR of Malay children aged 9-14 years old.

PP-A76 Attitude and readiness of elementary school teachers towards school-based nutrition education

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School is an appropriate channel to disseminate nutrition information to students. For this purpose, the role of teachers is crucial. The study aimed to assess attitude and readiness of elementary school teachers towards school-based nutrition education (SBNE). The study applied a mixed-method design, using four focus group discussions (FGDs) to explore main issues of SBNE implementation, followed by a quantitative survey on teacher's attitude and readiness. The questionnaires were developed based on findings of the FGDs, and validated (the Cronbach Alpha was 0.72 for the knowledge and 0.74 for the attitude questionnaires). The survey included 552 teachers from 46 public and private schools in Bandung City. They were majority women (77.9%), bachelor degree graduates (81.9%), had 19-year experiences. Generally, the nutrition knowledge was low, despite majority of teachers (63.8%) perceived having sufficient knowledge. Around one-third had favourable attitude. Most (>90%) agreed all teachers have ability to do SBNE and to include parents into SBNE activities despite its challenges. Unfavorable attitude included perception of less optimal SBNE due to stronger home (than school) influence to children's dietary habit (53.5%), unavailability of school policy (50%), inappropriate children's food preferences (63.6%). Female, young, and private school teachers had better knowledge and more favorable attitude. Teachers considered putting SBNE in the school policy (34.2%), involving parents (26.6%), and becoming role model to students (22.3%) as strategies for effective SBNE. Insertion of nutrition messages in some school subjects (76.8%) and discussion about nutrition while having meal together with students (70.2%) were considered most feasible SBNE activities, whilst organising special events (69.9%), making proposal with other teachers for funding (70.0%), and building communication with food vendors around schools (53.3%) were not. The finding highlights the needs of all stakeholders to assist teachers to be more ready (in term of knowledge and attitude) towards SBNE. Advocacy to policy makers is essential.

PP-A77 Effectiveness of F.E.A.T (Fit, Eat, Active, Training) programme for addressing adult obesity in suburban Malaysia: study protocol for a quasi-experimental trial

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According to National Health Morbidity Survey, the prevalence of adult obesity in Malaysia increased from 27.2% in 2011 to 30.6% in 2015. In general, exercise and diet intervention programs have little impact on producing sustainable weight loss, due to lack of intervention in other aspects of lifestyle. Thus, this study is conducted to evaluate the effectiveness of a comprehensive lifestyle intervention in addressing obesity among Malaysian adults. F.E.A.T. programme is a suburban community weight loss programme, focusing on physical, behavioural and socio-cultural aspects. The study employs pre-post quasi-experimental design to evaluate the impact of F.E.A.T. programme on overweight/obese adults aged 25-59 years, assigned to intervention (n=37) and control (n=37) group respectively. The 12-week programme consists of three major components: (1) dietary habit modification and nutritional counselling; (2) reduction of sedentary behaviour; and (3) participation in daily physical activities and exercise training. The module was developed based on needs assessment using focus group discussion to identify motivational factors and barriers towards weight loss. These factors are described within four levels (intrapersonal, interpersonal, community and public policy) of an Ecological Model highlighting the needs of a multi-faceted approach to address obesity in community setting. Mode of delivery comprised personalized nutritional counselling sessions, interactive health education sessions, supervised exercise sessions with peer support group, and behaviour therapy using behavioural change strategies with reference to Social Cognitive Theory. Assessment on nutritional status, food intake, physical activity and quality of life will

be conducted at baseline and at weeks 12 and 24 to evaluate the effectiveness, and on week 32 to evaluate sustainability of intervention. We opine that the F.E.A.T programme represents a novel approach to address obesity in a community setting and anticipate that it will contribute to best practice guidelines in managing obesity in Malaysia.

PP-A78 Correlation of body mass index and total leukocyte count in adolescents

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Obesity during adulthood has been associated with coronary disease, diabetes and hypertension. Although, obesity is associated with numerous medical complications in adults, the implications of obesity in growing child are not clearly defined. Leukocyte count is a clinical marker of inflammatory processes related to cardiometabolic disorders involved in the development of cardiovascular diseases, especially in obese individuals. This study was conducted to determine the correlation between Body Mass Index (BMI) and total leukocyte count in normal-weight and obese adolescents. We performed this study in 52 healthy adolescents (31 obese and 21 normal weight) aged between 12-14 years old from Yogyakarta City, Special District of Yogyakarta, Indonesia. BMI obtained from direct measures of height and body weight. Blood samples were collected from median cubital vein with tubes containing anticoagulant (EDTA). Total leukocyte count was determined by means of the fluorescent flow cytometry (Sysmex). Data were analysed using Spearman correlation test. Mean of BMI was 24.99 ± 5.25 kg/m² and mean of total leukocyte count was $7.6 \pm 1.76 \times 10^9$ /L. There was a significant correlation between BMI and total leukocyte count in healthy adolescents ($p=0.003$). BMI and total leukocyte had a positive correlation with moderate correlation size ($r=0.4104$). Obesity is associated with white adipose tissue inflammation, whereby the secretion of inflammatory adipocytokines can activate and recruit circulating leukocytes. Elevated total leukocyte is often associated with atherosclerotic disease and is accepted as a risk factor of cardiovascular disease. This finding

showed that the development of cardiometabolic disorder may happen during adolescent periods. Body mass index is related to an inflammatory process and adolescents with higher BMI presented higher amounts of total leukocyte count.

PP-A79 Is fast food consumption associated with nutritional status of primary school children in Kuala Lumpur?

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Studies have shown that increased frequency of fast food consumption could lead to paediatric obesity, including central obesity. This study aimed to investigate the association between fast food consumption and nutritional status among primary school children in Kuala Lumpur. Participants comprised 232 children (111 boys; 121 girls) aged 7 to 10 years from Malay, Chinese and Indian ethnicities. Body weight, height and waist circumference were measured and body mass index (BMI) was calculated. Information on frequency of fast food consumption was obtained from self-administered questionnaire. Fast food was defined as foods with minimal preparation sold at fast food restaurants and school canteen. Subjects were on average aged 8.9 ± 1.1 years, with mean weight, height, BMI and waist circumference of 29.9 ± 9.3 kg, 131.2 ± 8.9 cm, 17.0 ± 3.6 kg/m² and 58.1 ± 10.1 cm, respectively. Fast food was most frequently consumed by Malays (73.8%), followed by Indians (60.0%) and Chinese (31.7%). Results indicated that there was significant difference in frequency of fast food consumption among different ethnic groups ($\text{Chi}^2 = 26.43$ $p < 0.05$). Regression analysis revealed significant positive association of fast food consumption frequency with body weight and waist circumference, suggesting that children who ate fast food at least once weekly tended to have higher body weight (adjusted $R^2=0.021$, $F_{1,230}=5.841$, $p < 0.05$) and larger waist circumference (adjusted $R^2 = 0.016$, $F_{1,230}=4.797$, $p < 0.05$) compared to children who ate fast foods less once in a week. In conclusion, fast food intake is associated with body weight and waist circumference of primary school children. Hence, future obesity intervention should promote healthy eating that includes a component on limiting fast food consumption.

Group B: Dietary Intake, Consumption Pattern and Diseases

PP-B01 The relationship between lifestyle of pregnant mothers and place of residence on maternal vitamin D intake status

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Vitamin D deficiency in pregnancy will impact on pregnancy outcomes, include hypertension, preeclampsia, etc. Adequate vitamin D intake is essential for maternal and fetal health during pregnancy. The objective of this cross-sectional study was to examine the relationship between lifestyle of pregnant mothers and place of residence with maternal vitamin D intake status. The study was performed in two districts of coastal and mountainous areas in some parts of West Sumatera, Indonesia. 203 pregnant mothers were studied, 112 subjects from coastal area and 91 subjects from mountainous area. Lifestyles of pregnant mothers above 28 weeks of pregnancy were assessed using a questionnaire form and maternal vitamin D intake was assessed using a semi quantitative food-frequency questionnaire (SQ-FFQ). The mean maternal vitamin D intake was 7.92 (SD 5.26) mcg from food, which is about 52% of the recommended dietary allowance of 15 mcg (600 IU) for pregnant mothers and there were no pregnant mothers who take vitamin D supplements during pregnancy. Total 86.7% and 13.3% had low and adequate vitamin D intake status. Low vitamin D intake (<15 mcg) in pregnant mothers had a prevalence of 81.2% in coastal and 93.4% in mountainous area. There were a significant difference between maternal vitamin D intake status with place of residence (OR: 0.306; 95% CI: 0.11, 0.79; P=0.02) and mean average maternal vitamin D intake with pregnant mothers who lived in coastal and mountainous area (9.23 vs 6.92 mcg; P=0.01). No associations were observed between type of work, physical activity, economic status and education with maternal vitamin D intake status. The effect of lifestyles on vitamin D intake status in pregnancy is limited. Additional intake of vitamin D from supplements may be important to meet the recommended dietary allowance for pregnant mothers.

PP-B02 High intake of phytoestrogen food sources and a routine exercise were associated with lower risk of primary dysmenorrhea among adolescent girls

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More than half of Indonesian adolescent girls are experiencing primary dysmenorrhea. Primary dysmenorrhea may disrupt adolescent girl's psychological status and daily activity, increases number of absenteeism from school and workplace, and decrease the health-related quality of life. Current study aimed to identify the association of dietary pattern and physical activities with the risk of primary dysmenorrhea. This cross-sectional study, involved 104 adolescent girls who met the inclusion and exclusion criterias. Sample was drawn by a proportionate stratified random sampling from a state secondary high school in Jakarta. A pretested and structured questionnaire was used to assess the primary dysmenorrhea. Nutrients and other food component of interest in this study were calcium, calcium-inhibition food intake, and phytoestrogen food sources. Dietary intake was assessed with pretested and modified semi-quantitative food frequency questionnaire while physical activity was assessed with national standard physical activity questionnaire. Other covariate was body mass index which was expressed as ratio of weight (in kg) to height (in meter) squared. Both weight and height were measured twice and averages of the two measurements were used. Descriptive statistics, chi-square test, and logistic regression analysis were performed. The prevalence of primary dysmenorrhea was 62.5%. Respondent's calcium intake and nutritional status was not associated with primary dysmenorrhea. Respondent with a phytoestrogen intake lower than 80mg/day and lack of a routine exercise (3-5 times/week, 30-60 minutes each time) was 4.0 (95%CI=1.4-12.0) and 6.7 (95%CI= 2.4-18.5) times higher risk of primary dysmenorrhea, respectively, after adjustment for nutritional status, calcium and calcium-inhibition food intake. Diet, especially diet with high phytoestrogen containing food, and active physically may be protective factors for primary dysmenorrhea among adolescent girls.

PP-B03 Relative validity of a semi quantitative food frequency questionnaire for estimating dietary Ω -3 fatty acids intakes among urban pregnant women in Indonesia

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The objective of this study was to validate semi-quantitative food frequency questionnaire (SFFQ) for assessing dietary Ω -3 long chain polyunsaturated fatty acids (LC-PUFAs) among pregnant women in Indonesia. A cross-sectional study was carried out involving 315 pregnant women, in which 100 sub-sample was randomly selected for this study after exclusion of under and over reporting of energy intakes. The SFFQ, a test tool, was administered by trained nutritionists to the pregnant women before performing nonconsecutive two-day food recalls (2DRs), a reference tool. A standard food photograph and food weighing scale were used to estimate the portion size. Nutrients of interest were total Ω -3, eicosapentanoic acid (EPA), docosahexaenoic acid (DHA), α -linolenic acid (ALA), total Ω -6, linoleic acid (LA), and arachidonic acid (AA). Wilcoxon sign test, spearman correlation, cross classification, Kappa statistic and Bland Altman analysis were performed to find the agreement between tools. Mean \pm standard deviation energy intakes (kcal) from the SFFQ and 2DRs were 2025 \pm 635 and 2186 \pm 527, respectively. Energy-adjusted correlation coefficients between methods were 0.349, 0.352, 0.380, 0.338, 0.408, 0.409, and 0.331 for total Ω -3, ALA, EPA, DHA, total Ω -6, LA, and AA, respectively and were statistically significant ($p < 0.05$). Cross-classification of the nutrients from SFFQ and 2DRs placed $\geq 84.7\%$ into correctly and adjacent quintile, and $\leq 6\%$ were misclassified. Kappa test showed fair agreement while Bland-Altman plots showed acceptable agreement for DHA, EPA, and AA. The developed SFFQ is a relatively valid instrument for estimating Ω -3 LC-PUFAs intake among Indonesian pregnant women.

PP-B04 Intake of animal foods and their contribution to nutrient adequacy levels of Indonesian children 2-6 years

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Animal foods are rich in protein, iron, zinc, folic acid and vitamin B12, which are necessary for optimal growth and development of children. The purpose of this study is to analyse intake and participation rate of animal foods, intake of protein, iron, zinc, folic acid and vitamin B12 from animal foods, and their contributions to nutrients adequacy level of Indonesian children 2-6 years. The data used for this study are the secondary data of Riskesdas collected by the Agency for Health Research and Development Ministry of Health, Indonesia. Total subjects are 16,675 children aged 2-6 years who met the criteria. The food intake data was collected using a 24-hour recall method. The nutrient intakes were analysed by computer based on food composition. The results showed that the mean intake of animal foods among Indonesian children aged 2-6 years was 43.6 \pm 34.3 g/cap/day which fulfilled about a half (42.5%) of suggested serving of animal foods. Within the animal food group intake, fish intake was the highest and egg intake was the lowest. The contribution of the nutrient intake of animal foods in daily diet of the children was still low, especially for iron (10.7%), zinc (11.5%), and folic acid (6.8%). This implies that Indonesian preschool children diet need to be improved through increasing intake of micronutrient dense foods such as animal foods.

PP-B05 Development of dietary attitudes and habits scale for adolescents

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The objective of the study was to examine the validity and reliability of the instrument "Dietary Attitudes and Habits (DAH) Scale" developed by the researchers. The instrument was administered to 107 female high school students from an exclusive school for girls belonging from middle and high income families. The instrument determined the dietary attitudes and habits of

female adolescents through a 5-point Likert scale among the 30 items on the principles of meal planning; frequency, timing, and practices of eating; food groups based on food pyramid, processed and fast foods; and others such as celebrity endorsement and nutrition facts. These items were given the following scores: strongly agree = 1 point, agree = 2 points, neither agree nor disagree = 3 points, disagree = 4 points, and strongly disagree = 5 points. Potential scores ranged from 30 to 150 points such that if the score of the adolescent is low, then, she has positive dietary attitudes and habits. The total DAH Score ranged from 62.00 to 92.00 points with a mean of 77.00 (8.74) points which imply that the adolescents may be agreeable and are doing the positive dietary habits but not on a daily basis. Many of them might be aware of the positive dietary habits but neglect them sometimes or are not conscientiously doing them. The computed Cronbach's alpha of the instrument is slightly lower than 0.70 cut-off which means that the internal consistency of the DAH Scale is slightly questionable but can be considered as nearly acceptable. The researchers recommend that the instrument be administered to adolescents with different gender, age groups and nutritional status for better assessment of the validity and reliability of the scale and for better and more holistic view of the dietary attitudes and habits of adolescents.

PP-B06 Infant and young child feeding practices of Penan children in rural Sarawak

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Sarawak is home to an estimated 16,000 tribal Penans, living in rural and remote areas. The objective of this study was to determine nutritional status and infant young child feeding (IYCF) practices in a sample of Penan children, with focus on the IYCF indicators of minimum dietary diversity (MDD), minimum meal frequency (MMF) and minimum acceptable diet (MAD). Data collection was carried out in 14 localities in Belaga district between August to December 2016. Subjects consisted of 26 infants and 45 young children aged below 24 months. Nutritional status was assessed using anthropometric measurements of children and categorized according to WHO Growth Standards (2006). Mothers were

interviewed using a pre-tested questionnaire based on WHO Infant and Young Child Feeding (IYCF) Indicators. The prevalence of underweight was 33.8% and stunting was 49.3%. Prevalence of exclusive breastfeeding under 6 months was 50%. Proportion of children aged between 6 to 23 months achieving minimum dietary diversity was 83.1%. Achievement of minimum dietary diversity was lower (71.4%) in children from 6 to 11 months' age group. Most children were given 4 to 5 food groups; with 96.6% receiving grains, roots and tubers; 93.2% receiving Vitamin-A rich fruits and vegetables and 78.0% receiving flesh foods. Less than half of children received dairy products and eggs. Minimum meal frequency achieved was 83.1%. Minimum meal frequency achievement was 80.0% and 87.5% among breastfed children and non-breastfed children, respectively. The study revealed 59.3% of children aged 6 to 23 months achieved minimum acceptable diet. Compliance to minimum acceptable diet indicator was low. Effort to ensure that appropriate IYCF key messages reach Penan mothers can be strengthened to improve the overall feeding practices of this vulnerable group.

PP-B07 Factors of dietary intake and physical activity level associated with gestational weight gain among urban and rural pregnant women in Selangor

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Optimal diet intake and physical activity (PA) during pregnancy is important to secure both maternal and foetal health outcomes. A prospective cross sectional study was held to compare the differences of socio demographic (SD) background, dietary intake (DI), PA level, and gestational weight gain (GWG) among 498 pregnant women attending government clinics in urban and rural Selangor. A validated Pregnancy Physical Activity Questionnaire and 2-days diet recall were used. Anthropometry measurement of pregnant women was taken. Mean (SD) age of urban pregnant women (UPW) and rural pregnant women (RPW) was 29 (4.76) and 29 (5.23) years old respectively. More UPW were found to have normal weight than RPW (42.5% vs 31.2%) before pregnancy. Correspondingly, UPW gained excessive GWG than RPW (42.6%

vs 33.1%) meanwhile more RPW had inadequate GWG (30.1% vs 26.7). Median energy intake among UPW and RPW were 1685 (398.98) kcal/day and 1626 (432.25) kcal/day respectively. Poorer intake of dietary fiber and vitamin C were found to be significantly ($p < 0.05$) higher among UPW. Additionally, UPW were found to be sedentary ($p < 0.05$) while RPW were found to actively conducted light intensity PA ($p = 0.04$) and household/caregiving PA ($p = 0.03$). Multivariate analysis showed that higher intake of iron ($\beta = 0.36$, $p = 0.02$) and lower vitamin C ($\beta = -0.48$, $p < 0.01$) had prominent association to GWG among UPW while higher sugar intake ($\beta = 0.38$, $p = 0.04$) had association GWG among RPW. Prevalence of LBW was higher in rural (10.4%) than urban (2%). In conclusion, majority of UPW were found to gain excessive GWG while more RPW had inadequate GWG. Lastly, elevated intake of iron, and lower intake of vitamin C was associated with GWG among UPW whereas high sugar intake was found to be a predictor among RPW.

PP-B08 Fat intake and sedentary activity as dominant factors of diabetes among teachers in urban area

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According to WHO (2014), the prevalence of diabetes in Indonesia increased from 5.7% (2007) to 6.9% (2013). Sample Registration Survey in 2014 indicated that diabetes as the third leading cause of death in Indonesia. Teachers were chosen as subject in this study because they are a role model for their students. This study was conducted in Jakarta (capital city of Indonesia) involving 114 elementary school teachers. The sample was carried out using multistage random sampling. Blood sample was taken from vein and analyzed in an accredited laboratory. Diabetes status was determined based on the result of fasting blood glucose. Univariate analysis showed that 7.9% subjects has diabetes, 10.1% subjects classified as pre-diabetes, and 82.0% subjects classified as normal. Majority of the subjects were females (77%), had no history of diabetes (69%), age > 45 years (57.6%), had sedentary activities (44.6%), fat intake $> 25\%$ from calorie total (64%), overweight (53.3%), lack of nutrition knowledge (66.2%), frequency of eating $< 3x/day$ (64.7%), sugar consumption ≤ 1 spoon/day (73.4%). Lack of nutrition knowledge was found

out, particularly about high calorie and fatty food, including diabetes symptoms and treatments. Bivariate analysis showed risk factors for diabetes was male (OR 2.1; $p = 0.019$), sedentary activity (OR 1.8; $p = 0.054$), and fat intake $> 25\%$ (OR 3.5; $p = 0.056$). Multivariate analysis showed that fat intake ($> 25\%$ of energy total) as dominant factor of diabetes, followed by sedentary activity. Fried food consumption was associated with accumulation of fat in the body, indicated from approximately 70% subjects who consumed fried food > 2 pieces/day. Majority of the teachers sit while they teach, with approximately sitting time of 6 hours. The Local Education Office needs to arrange rules which comprised of providing nutrition education particularly about healthy diet pattern and exercise suggestions for teachers at least $3x/week$.

PP-B09 Changing snack food behaviour among school children through a nutrition education program

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Snack food contributes to nutrient intake significantly among school children. But children's behaviour of consuming a healthy and safe snack food are still an important issue. The study objectives were to analyse the changing of knowledge, attitudes and practices related to snack food at the elementary school children participants of a nutrition education program. A pre-post intervention study was conducted at 14 districts/cities from 8 provinces in Indonesia, and involved 1,856 school children (5th grade). The educational media such as posters, flip charts and games were used by the facilitators (local NGOs partner of PT Unilever in May 2016). Self-administered measurement by a validated questionnaire was applied to assess knowledge, attitudes and practices before and after the program. The results showed that before the intervention there were 50.9% of school children categorised as having good knowledge, 82.8% having good attitude, but there were still 34.0% of children having bad practices on snacks food. After the education programme, the good knowledge increased among 16.2% of children while the good attitudes increased among 7.4% of children. The number of children who had poor practices on snack foods reduced to 20.6%. In conclusion, having a good knowledge and attitude

is not always followed by good practices in snack food consumption. The education programme could improve the snacking behaviour in school children.

PP-B10 Characteristics of major dietary patterns and their associations with socio-demographic and lifestyle factors

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Diet is a major risk factor of non-communicable diseases. Understanding factors associated with dietary patterns contributes to evidence-based planning of public health interventions. Socio-demographic and lifestyle behaviors are the most widely explored factors. However, current evidence was mostly from the high-income countries. We aimed to describe the characteristics of major dietary patterns and assess their associations with socio-demographic and lifestyle factors in a working population. This was a cross-sectional study among teachers in Peninsular Malaysia. Socio-demographic and lifestyle characteristics were collected using a structured questionnaire. Dietary intake was assessed using a validated food frequency questionnaire, and dietary patterns were derived using factor analysis. Test for trends was used to examine the food and nutrient intakes across tertiles of diet scores. Multiple linear regression was applied. The participants (n= 6,742) were in their forties, majority being women, Malays, married, from urban area and had degree education. Western (high intakes of refined grains, additional fats, livestock, sweetened beverages, and fast food) and Prudent diet (high in pulses, legumes, vegetables and fruits) were two major dietary patterns identified. Younger ($\beta=-0.10$; 95% CI: -0.12, -0.07) and those with degree education (0.07; 0.02, 0.13) were more likely to adhere to the Western diet. Women (0.25; 0.16, 0.33), older participants (0.15; 0.12, 0.18), those with minimal physical activity (0.07; 0.01, 0.13) and higher BMI (0.22; 0.07, 0.37) had higher score for Prudent diet. This study adds to the current literature on the factors associated with dietary patterns. The findings may help researchers and health policy makers to design culturally tailored healthy eating programs.

PP-B11 Evaluation of dietary habits in primary school children

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Nutritional intake is an important element contributing to human health and well-being. The objective of this study was to determine the dietary habits among school children in primary schools. A total of 810 students of a primary school in Selangor were observed for their dietary habits during the recess time. They were divided into level 1 (age 7-9) and level 2 (age 10-12). All kind of foods/drinks available in the canteen were recorded. They are further classified into healthy and unhealthy category based on the Malaysian Food Dietary Guideline. Demographic data were also recorded for the whole one week. All data obtained from the study were analyzed using IBM Statistical Package for the Social Sciences (SPSS) 22.0 software. For level 1 student, results showed 66% of male student preferred healthy food but only 27% represent the non-sugar drinks. As for the female student, 63% of them more preferred healthy food and about 38% that represent the non-sugar drinks. However, if gender factor is excluded, 65% of the students preferred healthy food but only 49% of them preferred non sugar drinks. For level 2 student, results showed 44% of male student preferred healthy food but only 27% represent the non-sugar drinks. As for the female student, 45% of them more preferred healthy food and 35% preferred non-sugar drinks. However, if we exclude the gender factor, 38% of the students preferred healthy food but only 29% of them preferred non sugar drinks. In conclusion, level 2 students showed more preferences to unhealthy food compared to level 1 student but gender is not a factor to influence their dietary habits.

PP-B12 Factors associated with disordered eating among Malaysian female university students: Comparison among ethnicities

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Disordered eating is reported prevalent among university students, especially females. While literature suggests that factors associated with disordered eating may differ according to ethnicity, such association has not been examined in Malaysia. This cross-sectional study aimed to compare factors associated with disordered eating between Malay and non-Malay female university students. A total of 510 female university students (31.4% Malay and 68.6% non-Malay) with a mean age of 21.6±1.4 years were recruited from seven public and private universities in the Klang Valley, Malaysia. Each participant completed a self-administered questionnaire on socio-demographic background, depression, perception of body size, body satisfaction, body appreciation, self-esteem and disordered eating. Body weight and height were measured, and body mass index (BMI) was calculated. More Malays were overweight and obese (20.0% vs 9.7%) whereas more non-Malays were underweight (19.1% vs 12.5%). More than one in five of the participants (22.5%) reported having disordered eating, in which more Malays (31.3%) were engaged in this behaviour than non-Malays (18.6%, $\chi^2=9.39$, $p=0.002$). Body dissatisfaction ($b=-0.420$, $p<0.001$) was the most significant predictor for disordered eating among Malays, followed by depression ($b=0.259$, $p=0.001$) and low BMI ($b^2=-0.238$, $p=0.020$). For non-Malays, depression ($b=0.266$, $p<0.001$) was the most significant predictor for disordered eating, followed by low body appreciation ($b=-0.161$, $p=0.004$) and high self-esteem ($b=0.160$, $p=0.009$). Findings suggest that there were ethnic differences in the factors associated with disordered eating among female university students. Intervention programs that address disordered eating should take into account the different contributing factors for these groups.

PP-B13 Sodium and simple sugar intake as risk factors in occurrence of hypertension in obese adolescents

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Obesity and hypertension are conditions of excessive fat accumulation accompanied by an increase in blood pressure as its manifestation. Hypertension among obese adolescents is not an entity of disease, but a symptom of complex combination of various metabolic syndromes. Hypertension in obese adolescents not only occurs in adults but may also occur in adolescents. Intake of sodium and simple sugars are the causes of hypertension in obese adolescents. The study aimed to determine whether the intake of simple sugars and sodium are risk factors of hypertension in obese adolescents. The method used in this study is a case-control study. Subjects in this study, as many as 168 students of junior high school in Tangerang Selatan City (84 obese students with hypertension and 84 students with normal weight without hypertension). Data intake of sodium and simple sugars was taken by using SQFFQ (Semi-Quantitative Food Frequency Questionnaire). The data analysis showed that high intake of sodium and simple sugar contributed to hypertension in obese adolescents (<0.05). Thus the high sodium intake had 3.3 times the risk of hypertension in obese adolescents. A high intake of simple sugars has 4.6 times the risk of the occurrence of hypertension in obese adolescents. This increased risk was statistically significant. A high intake of sodium is a risk factor for hypertension in obese adolescents. High intake of simple sugars is a risk factor of hypertension in obese adolescents.

PP-B14 Training for nutrition ambassador among junior high school students to promote the Indonesian Dietary Guidelines

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Dietary guidelines have been developed to assist people to achieve adequate nutrition intakes through healthier eating habits. Despite that the

Indonesian Dietary Guidelines (locally known as *Pedoman Gizi Seimbang*) has been publicized since 1995, many Indonesians including adolescents are not aware of the guidelines. Moreover, research has shown that Indonesian adolescents have poor knowledge regarding balance nutrition concept and have not thoroughly implement the dietary guidelines. Many efforts are recommended by the Ministry of Health in order to increase public awareness of the most recent version of the Indonesian Dietary Guidelines 2014, including through educational campaigns using various media and through nutrition ambassador who recruited from local students. Therefore, this project aimed to recruit and train local students to become nutrition ambassadors. These ambassadors will act as peer educators to promote PGS 2014 among their peers. Three days-training was conducted at one public junior high school in Makassar for 25 students who were recruited from grade 7th and grade 8th. Educational materials consisted of the Indonesian Dietary Guidelines 2014 and peer education skills, which were delivered through modules, power point presentations, short videos and role plays. Interactive games were inserted during the session breaks. Pre- and post-tests were undertaken to evaluate the effect of training. Descriptive analysis was applied to determine changes in knowledge, attitude, and practice of the participants regarding balanced nutrition concept. The results indicate an improvement of knowledge, attitude, and practice in the majority of participants (ranging from 20%-100%). During the role plays, the participants showed ability to deliver nutritional messages for their peers. There were 20 ambassadors who were recruited by the end of the training. It is concluded that the training produced positive improvements in capacity of these young nutrition ambassadors.

PP-B15 Association between water intake, hydration status, and cognitive performance of elderly women in nursing homes, Tangerang Indonesia

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Previous studies have showed that elderly in nursing homes did not have adequate water intake and studies among children showed dehydration was associated with cognitive impairment. There

is no study on assessing association between water intake, hydration status and cognitive performance. The objective of this study was to analyse association between water intake, hydration status and cognitive performance of elderly women in nursing homes in Tangerang, Indonesia. The design of this study was a cross-sectional study which involved 29 elderly women. Total water intake was derived from food, beverages, and metabolic water. Water from food and beverages were based on 3x24h food and beverages recall method. Hydration status was determined by urine specific gravity (USG) using urine analyzer. Cognitive performance was assessed by a standard Mini-Mental State Examination (MMSE) questionnaire. The result showed that most of subjects were more than 70 years old and passed senior high school. Mostly, knowledge of drinking water of subjects was low. The mean of total water intake was 1955.3±1103.4mL/d. The mean of water adequacy level was 142.5±65.1%. As many as 31.0% of the subjects were dehydrated based on urine specific gravity. As many as 34.5% of the subjects were cognitively impaired. This research showed that there were no association between water intake, hydration status and cognitive performance.

PP-B16 Association between fast food accessibility and overweight among children 5-18 years old in Peninsular Malaysia

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There is increasing evidence that exposure to fast food outlets is closely associated with obesity among children; however some studies show otherwise. In Malaysia, it is unclear whether this association exists due to lack of evidence. This study is aimed at determining the relationship between fast food outlet access and overweight among Malaysian children aged 5-18 years. Data on weight and height measurements of 5,544 children (2797 boys, 2747 girls) were obtained from the National Health and Morbidity Survey 2011. Overweight is defined as BMI-for-age z-score > +1SD based on WHO growth reference for children aged 5-19 years. Geospatial buffer analysis was performed to determine the density of fast-food outlets and supermarket within 1000

meter radius from the subject's residential address. Multiple logistic regression was conducted to examine the association between overweight and fast food outlets density with adjustment for age, sex, ethnicity, household income, education level, residential area and supermarket density. The prevalence of overweight was 25.0%. There was a statistically significant association between overweight and fast food outlets density (Odds ratio: 1.23, 95% confidence interval: 1.03, 1.47). Our study suggests that a high density of fast food outlets in neighborhoods significantly increases the risk of being overweight among children. Therefore, restricting the availability of fast food outlets in residential areas could have a significant effect in reducing obesity rate among Malaysian children.

PP-B17 Fruits and vegetables intake of Malaysian preschoolers: findings from the South East Asian Nutrition Survey (SEANUTS Malaysia)

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The dietary pattern, especially related to fruits and vegetables intake, of Malaysian preschoolers has been little studied. This study aimed to assess fruit and vegetable intake patterns and their associations with socio-demographic characteristics and anthropometric status among Malaysian preschoolers aged 4 to 6 years using a nationally representative dataset from the South East Asian Nutrition Surveys (SEANUTS Malaysia). This survey is part of a larger multi-centric study carried out among 16,744 children aged 0.5 to 12 years in four countries in South East Asia. A total of 885 children (mean age: 5.4 ± 0.1 years) from six regions of Malaysia was included in this analysis. Dietary intake was assessed using validated food frequency questionnaires. Anthropometric measurements included weight, height and waist circumference. Socio-demographic information was obtained from a parent-administered questionnaire. Mean daily intake of fruits and vegetables were 1.10 ± 0.4 servings and 1.15 ± 0.07 servings, respectively. There were slightly more children who met daily recommended servings of vegetables (≥ 2 servings

per day; 17.7%) than fruits (≥ 2 servings per day; 15.6%). Intake of vegetables, but not fruits, was found to be associated with socio-demographic characteristics, including ethnicity, parental educational level and household income. There was no evidence of an association between fruits and vegetables intake and anthropometric status. Further studies on factors related to inadequate intake of fruits and vegetables among children from diverse backgrounds are much needed, and should be addressed in future childhood nutrition surveys.

PP-B18 Inadequate intake of micronutrients by healthy Malaysian toddlers: Project Bambino

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Adequate intake of nutrients during early childhood is of prime importance in optimal growth. Micronutrient deficiencies in young children may pose a major public health problem which results in increased morbidity and mortality. This cross sectional study aimed at assessing the nutrient intakes of 153 Malay toddlers, with special reference to their micronutrient intakes. Toddlers in the age group of 15 – 21 months, of both genders, were randomly recruited in Klang valley. Their height and weight were measured and the body mass index (BMI) was calculated. The BMI z scores were computed from the WHO growth charts. The information on dietary intake was accessed through Food Frequency questionnaires obtained from their parents. The socio-demographic information were also recorded. The nutrient intake was computed using Nutripro software. The data was described using proportions and mean. Statistical analysis was performed to study the association between socio-demographic information and nutrient intakes. Majority (53.8%) of the toddlers were predominantly breast fed up to a period of 6 months. The BMI Z scores was lower when the breast feeding was discontinued before 6 months. Majority (79%) of the toddlers were introduced to complementary feeding at the age of 6 months. Mean intakes by the subjects (15-21 months) for total energy and protein was higher than

the recommended nutrient intakes of Malaysia. However, their mean intakes of calcium, Iodine, zinc, selenium, niacin, folate, vitamin C, vitamin A, D and E were lower compared to the Malaysian Recommended Nutrient Intakes. Despite introducing the complementary foods at the right time, an inadequacy of micronutrients was observed, except folate. Though the toddlers at risk for overweight and obesity had an excess intake of energy and proteins, yet they lacked in the micronutrients as mentioned above too.

PP-B19 Validation of a Food Frequency Questionnaire among a multi-ethnic working population in the Klang Valley, Malaysia

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Food frequency questionnaire (FFQ) is commonly used to study diet-disease association due to its ease of administration and low cost. However, FFQ data are subjected to substantial errors. It is necessary to know its validity reflecting the relationship between reported and true intakes. Therefore, we aimed to develop and validate a FFQ to assess the dietary intakes of the three major ethnic groups in our country. The developed FFQ consisted of 136 food items with raw, cooked or mixed dishes, categorised into 17 food groups. The frequencies were times per day, week, month, year or never; over one year. The participants (n=238) were clerical staff and teachers from public schools in the Klang valley. They were required to record their dietary intake for seven days (DR), then to fill the FFQ twice over two weeks (FFQ1 and FFQ2). Nutrients intake derived from FFQ-1 were compared with DR. The agreement between FFQ-1 and DR was evaluated using cross-classification of quartiles analysis. Calibration coefficients were estimated using linear regression of the log-transformed nutrients intake from FFQ-1 and DR, adjusted for age and sex. Spearman correlation coefficients and Intra-class Correlation Coefficient (ICC) between two FFQs were computed. The results showed FFQ overestimated all values of macro- and micro-nutrients compared to DR. Classification into the same and adjacent quartiles ranged from 49.2% (riboflavin) to 55.8% (cholesterol), while grossly misclassified participants varied from 3.6% (retinol) to 9.1% (energy). The calibration coefficients ranged between 0.07 (thiamine) to 0.53

(cholesterol). Spearman correlation coefficients between the two FFQs fell within the range of 0.43 to 0.62. The ICCs ranged from 0.56 (carbohydrate) to 0.66 (fat) for macronutrients, and from 0.59 (potassium and thiamine) to 0.74 (vitamin C) for micronutrients. The developed FFQ, when used with calibration factors, is valid and reliable in estimating dietary intake among our multi-ethnic population.

PP-B20 Development and evaluation of a semi-quantitative food frequency questionnaire for estimating omega-3 and omega-6 fatty acid intakes in Indonesian children

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A balance ratio of dietary omega-3 (n-3) and omega-6 (n-6) fatty acids reduces childhood obesity. However, few studies have focused on validation of semiquantitative food frequency questionnaire (SFFQ) for determining the n-3 and n-6 intakes in children. Therefore, a valid SFFQ for assessing n-3 and n-6 intakes among Indonesian children is required. A cross-sectional study was conducted by selecting 89 healthy children through multistage random sampling. Dietary intakes were assessed using the SFFQ and a 3-day non-consecutive 24-h recall. Randomly selected children (n=35) were assessed for plasma phospholipid fatty acid (PFA). In total, 78 food items in the SFFQ, as in the Thai, Vietnamese, and American food composition databases, were validated using dietary recall and PFA. The SFFQ was readministered after 4 weeks to assess its reproducibility. The validity and reproducibility of the SFFQ were determined by Bland-Altman analysis. Favourable agreement was found between the SFFQ and recall for docosahexanoic acid, eicosapentanoic acid, docosapentanoic acid, and arachidonic acid, but not for total n-3, n-6, α -linolenic acid, or linoleic acid. Significant correlations were found between the SFFQ estimations and plasma n-6 and LA (r=0.40,

$p=0.025$; and $r=0.42$, $p=0.018$, respectively). A 95% limit of Bland-Altman agreement was observed between the first and repeat SFFQ for all fatty acids. The proposed SFFQ is sufficiently valid and reliable for assessment of essential fatty acids intakes in Indonesian children.

PP-B21 Dietary supplement use among university athletes in Thailand

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This cross-sectional descriptive study was aimed to investigate the dietary supplement use among university athletes in Thailand. Total of 190 students of Khon Kaen University who were athletes attending 41st Thailand University Games were recruited. A self-administration questionnaire was used for collecting data on demographical data and dietary supplement consumption. Energy and nutrient intakes were collected by 24-hr dietary recall method and analyzed by INMUCAL version 2.0 program. The respondents' mean age was 21 ± 1.0 years, and 54% were male. The results revealed that energy intake of the subjects was 114% of Thai recommendation. Energy distribution from carbohydrate, protein, and fat were 65.1%, 19.1% and 18.2% of total energy intake. The percentage of the subjects use dietary supplement was 40%. Popular dietary supplements used by the subjects were sports drink, vitamin and mineral supplements, and whey protein with 44.7%, 39.5%, and 15.8% respectively. Sixty-three percent of them reported using 1 product daily, and 26% using 2 products/day. Fifty percent of the subjects expensed 500-1000 Baht/month for dietary supplements. Most took supplements to improve performance (75.8%), 56.8% claimed to take supplements for muscle building, and 29.5% for body repairing. Internet was the main source of information on dietary supplements (98.4%). Coaches and friend were source of information by 50.5% and 27.9% respectively. They bought the products from drug stores (25.8%), the internet (14.7%) and convenient stores (11.6%). The people who influence decision of using dietary supplements were health personnel (92.6%), friend (55.3%), and coach (49.5%). Results indicate a need for

nutrition education on dietary supplements among university athletes and their coaches. This will enable them to make informed decisions and reduce the risks associated with the misuse of supplements.

PP-B22 Dietary vitamin D, calcium and body fat among adolescents in Jakarta, Indonesia.

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With the purpose to explore the relationship between dietary vitamin D, calcium and percentage of body fat in a group of adolescents, this cross-sectional study was carried out with 68 adolescents aged 13 to 14 years old; 37 girls (54.4%) and 31 boys (45.6%). Vitamin D was assessed by two non-consecutive-24 hour dietary recalls, calcium intake was assessed by a semi-quantitative food frequency questionnaire (SQ-FFQ) and percentage of body fat was measured by bioelectrical impedance analysis (BIA). BIA measurements were taken at least 2 hours after meals. The mean age was 13.2 ± 0.4 years. Mean daily vitamin D and calcium intake was $5.1 \pm 3.9 \mu\text{g}$ and $539.8 \pm 487.6 \text{ mg}$, respectively. The qualitative evaluation of the diet demonstrated that the main sources of calcium consumed by most adolescents were tofu, tempeh and sweetened condensed milk. Adolescents more often consume egg as a source of vitamin D that has less vitamin D content than fish. Mean percentage body fat was $23.1 \pm 5.7\%$. Negative correlations were found between body fat and vitamin D intake ($r = -0.28$, $p = 0.019$) and between body fat and calcium intake ($r = -0.39$; $p = 0.001$). In multivariate analysis, vitamin D intake showed a negative correlation with body fat, adjusted by energy intake ($\beta = -0.438$, 95% CI: -0.78, -0.09, $p = 0.012$). In conclusion, it was found a negative relationship between vitamin D intake and body fat in adolescents.

PP-B23 Intake of fiber, PUFA, omega-3 and calcium was associated with the reported incidence of primary dysmenorrhea among adolescent girls in Surabaya, Indonesia

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Adolescent girls have undergo rapid physical, hormonal, and psychological changes that

could lead them to a strict diet in order to attain perceived ideal body image. One of the common problems faced by adolescent girl is the painful cramps that might occur immediately prior to or during the menstrual period known as dysmenorrhea. Dysmenorrhea affects more than half of women in reproductive age in Indonesia. This study aims to analyse the association between nutrient intake and nutritional status with the reported incidence of dysmenorrhea among adolescent girls. This was a cross sectional study involving 47 early-adolescent girls within the age of 10 to 13 years old in Surabaya, Indonesia. The results showed that over one fourth of the girls participated in this study having menarche at the early age (<12 years old). Thirty girls (63.8%) reported that they had experience some degree of primary dysmenorrhea ranging from mild to moderate amount. Significant association was observed between the incidence of primary dysmenorrhea and the girls' intake of fibre (p-value=0.004), PUFA (p-value=0.031), omega-3 (p-value=0.006), and calcium (p-value=0.020). The level of dysmenorrhea was also significantly associated with the ratio of omega-6 and omega-3 (p-value=0.016) and nutritional status (p-value=0.001). Based on these results, it is suggested to incorporate nutrition education at the school setting especially related to balanced diet as a prevention effort towards dysmenorrhea.

PP-B24 The dietary perceptions and practices among community-dwelling elderly

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The elderly population is increasing worldwide including Malaysia. This projected growth in the elderly population has the potential to place significant burdens on healthcare services. Ensuring adequate nutrition needs and proper intake of elderly is crucial for the maintenance of health, functional independence and quality of life. Thus, a deeper understanding of elderly views on dietary practices are greatly needed. The purpose of this study was to gain an insight into perceptions of community-dwelling Malaysian elderly on their dietary practices by using qualitative research method. A qualitative study

was conducted using semi-structured interviews among twenty one individual aged 60 years and above which were recruited from FELDA settlements around Kuantan, Pahang. Thematic analysis was performed on transcriptions of audio-recorded interviews and was assisted using the NVivo software. The interviews ceased when data saturation was achieved. Thematic analysis revealed five themes that represent elderly dietary practices. These included: 1) Impact of aging on meal pattern; 2) Decreased food intake associated with physiological changes; 3) Influence of health condition on food intake; 4) Healthfulness of certain foods influence dietary intake and 5) Social factors influenced dietary practices. Results of this study provide better view on community-dwelling elderly challenges for the maintenance of good nutritional health. It is pivotal to pay attention to the individual problems and the associated factors that may influence their dietary practices in order to provide action for achieving the good nutritional status.

PP-B25 Exploring and developing practice model on induced lactation in Malaysia: A qualitative research methodology

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Qualitative research provides methodological tools for understanding deeper meanings associated with complex phenomena and processes. This study explains the phenomenological qualitative research methodology used to examine the perceptions and experiences of women undergoing induced lactation; explore the perception of support persons on induced lactation; and explore the practitioners' regimes on induced lactation practice in Malaysia. Selection and recruitment of respondents were conducted using purposive sampling. The sample size is estimated based on the saturation concept whereby data collection no longer contribute to new information on the topic of the study, thus the data collection is completed. By applying maximum variation technique in a purposive sampling, we manage to capture a thorough sample of 28 practitioners, 23 induced lactation's women and 23 support persons, taking into consideration their sociocultural plurality. Data collection took place in five states based on regions; South, Central, North, East and East Malaysia from June 2015 to December 2016.

In-depth interview method was used in data collection to obtain an understanding about their experiences, perceptions and practices. By applying in-depth interviews, the respondents were empowered to express their thoughts freely. The interviews are synthesized using thematic analysis for identifying, analysing and reporting patterns (themes) in the data. A theme is identified based on recurrence, repetition and forcefulness of the data. The rigor of this research was ensured with careful data and methodology triangulations, which enhanced our research credibility, dependability, confirmability and transferability.

PP-B26 Proliferative effects of Trigona honey and Ajwa dates on bone marrow-derived mesenchymal stem cells

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Bone marrow-derived mesenchymal stem cells (BM-MSC) serve as a natural source of undifferentiated cells which potentially act as key players in regeneration process of injured tissues. Besides, each organ is believed to have its own pool of stem cells which are activated during reparative event of the organ. Many attempts to cultivate and enhance the potential of stem cells *ex vivo* have shown some promising results. However, the practicality of this so called "modified cells" for clinical application is questionable and controversial. Natural ways of enhancing the properties of stem cells by consumption of healthy foods are new but evolving field of studies. Therefore, we aim to investigate the *in vitro* proliferative effect of selected foods which are Trigona honey and the Ajwa dates on BM-MSC. BM-MSCs were cultivated in basal medium, DMEM, containing 10% fetal bovine serum (FBS), 1% antibiotic antimycotic and 1% glutamax. Upon 80% confluent in 96-well plate, old media were replaced with basal media without FBS and enriched with different percentage (v/v) of Trigona honey; 0, 0.097, 0.195, 0.39, 0.78, 1.56, 3.125 and 6.25. For Ajwa dates treatment, the following concentrations (mg/ml) of dates extract were used; 0, 5, 10, 15, 20, 25 and 30. Proliferation of BM-MSCs after 24, 48 and 72 hours were measured by MTT assays and the cells viability represent the proliferative properties of

BM-MSCs after treatment. Addition of Trigona honey and Ajwa dates enhanced proliferation of BM-MSCs compared to control. The highest percentage of cell proliferation were seen in 0.097% and 0.195% of honey treatment while for Ajwa dates, concentration between 10 to 25 mg/ml showed highest BM-MSCs proliferation. These preliminary findings suggest a promising proliferative effect of Trigona honey and Ajwa dates on stem cells. However, further tests need to be conducted to suggest honey and dates for stem cell nutrition.

PP-B27 Nutritional status and micronutrient intake of female students in Faculty of Public Health, Gorontalo University

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The purpose of the study was to examine nutritional status and micronutrient intake of female students in the Faculty of Public Health, Gorontalo University. The study was conducted in September - December 2016 with total sampling of 50 students. A descriptive study was conducted to measure micronutrient intake with 2-days dietary food recall questionnaire and nutritional status measuring body mass index, upper arm circumference and waist circumference. The results of antropometric measurement and nutritional status of the students showed that body weight was 52.38±11.82 kg, body height 151.85±4.97 cm, body mass index 22.39±4.46, upper arm circumference 26.35±3.51 cm and waist circumference 75.9±8.10 cm. Based on the indicator body mass index and waist circumference there were 14% lean and 20% obesity categories. There was 20% of students with chronic energy malnutrition. Nutritional intake showed that intake of vitamin C = 3.87±8.10 mg (96% in low intake category), vitamin E = 1.22±0.89 mg, iron = 3.59±2.84 mg, zinc = 1.22±1.15 mg (100% in low intake category) and calcium intake = 172.93±302.02 mg (98% in low intake category). Bivariate analysis of student with obesity who have low intake of vitamin C 18.8%, vitamin E, iron and zinc 18.0% and low calcium intake 18.4%. There were no significant correlation between nutrition intake with nutritional status among the students, but students with obesity

tend to have decreased nutrient intake especially micronutrient intake.

PP-B28 The relation of dietary snacking with nutritional status in elementary school students in Gorontalo regency

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The aim of this study was to study the relation between dietary snacking and nutritional status in elementary school students. The type of study was observational study with design cross-sectional study. The sample was collected with total sampling, which included 134 students. The study was conducted in April-May 2016 and located in elementary schools in 11 Limboto Gorontalo regency. Nutritional status of the students was measured using body mass index for age which was categorised as lean (-3SD until <-2SD), normal (-2SD until 1 SD) and obesity (>1 SD until 2 SD). The study included 50.7% male and 49.3% female students. Student body weight was 43.43±9.75 kg and body height 139.29±8.36 cm. Only 64.9% of students had regular breakfast in the morning before going to school, 17.9% student had breakfast ≥ 3 time a week and 78.4% student had regular snacking at the school or at the home. The measurement of nutritional status showed that there were 13.4% student with lean nutritional status, 67.9% normal and 18.7% obesity. Bivariate analysis with pearson chi square between nutritional status with dietary snacking showed p value of 0.030, while dietary breakfast and frequency consumption of food with p value > 0.05. Dietary snacking in elementary school students can become a risk factor for obesity among the children.

PP-B29 Association of adolescents' knowledge, attitude and practice (KAP) of the Ten Kumainments and their nutritional status

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Food-based dietary guidelines (FBDGs) are developed according to a country's nutrition

situation, food availability, culinary cultures and eating habits. The Ten *Kumainments* is a less technical and more comprehensive version of the FBDGs for Filipinos. A cross-sectional study of 97 public high school students in Los Banos, Laguna was done to assess their knowledge, attitude and practice (KAP) on the Ten *Kumainments* as well as their diet diversity and nutritional status. Results showed that the prevalence of underweight was low at 7.22% while overweight was at 4.12%. No obese prevalence was recorded. About eighty eight percent (88.7%) were of normal nutritional status. The diet diversity average total score was 9.75. Rice and rice products had the highest score among the food groups followed by fruits (89.69%), protein sources, eggs and sweets (all three at 87.63%). Results also showed that the respondents' awareness of the Ten *Kumainments* was high at 87.63%. Positive results were gathered on the attitude and practice towards the FBDGs. Using Pearson's correlation, knowledge had positive very weak linear relationship with body mass index (BMI) ($r=0.0413$). Attitude ($r=-0.1475$), practice ($r=-0.1207$). A very weak negative correlation was established between nutritional status and KAP ($r=-0.0785$). It was recommended that the process of implementation of the Ten *Kumainments* be reviewed for revision and improvements be made to achieve better outcome for the campaign. Implementation of nutrition education strategies must be strengthened to further educate the adolescents.

PP-B30 Development of healthy balance diet at minimum cost using linear programming for low income female adults in Malaysia

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Food price has been identified as one of the main factors which deter the affordability of healthy diet and hence in achieving the standard set by the guidelines. Therefore, this study attempts to develop a healthy and balanced diet plan at minimum cost for low-income adults based on MDG 2010 and RNI 2005 using Linear Programming and assess its acceptance among low-income family. A cross sectional study was conducted among 410 low-income mothers, between the ages of 19 to 59 years, at several locations in Malaysia. This study involved the collection of socio demographic and nutritional status data and food prices. Linear programming analysis was then used to develop the cheapest food combinations that could fulfill all the nutritional recommendations and palatable constraints. This is followed by the creation of healthy menus using the optimal food servings estimated from linear programming model. Dietary data showed that the average energy intake among low income adult women is 1852±277 kcal/day with poor micronutrient intake; thiamine (0.93±0.64 mg), calcium (471.77±221.11 mg) and fiber (5.46±4.20 g). Meanwhile, sodium intake is higher than the recommendation (2883.81±1334.37 mg). Quality diet of low income group based on HEI score was also poor (50.0) with low consumption of vegetables, fruits, milk and nut and peanut food groups. Using linear programming analysis, average minimum food cost per individual has been estimated at RM 5.03±0.53 for 1500kcal, RM5.23±0.41 for 1800kcal and RM5.68±0.48 for 2000kcal per day per person which also met the recommendation of MDG 2010 and RNI 2005. Hence, the use of linear programming in developing a healthy and palatable diets at minimum cost can be beneficial in overcoming dietary problem among low income group where food prices becomes an important restraining factor.

PP-B31 Body weight status and dietary intake of adult homeless in Kuala Lumpur

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Homeless population is vulnerable to malnutrition but little is known about their situation in

Malaysia. This study surveyed the body weight status and dietary intake among the adult homeless in Kuala Lumpur. The diet quality and its association with the energy consumed from free meals provided by charitable organisation were also investigated. A total of 153 subjects aged 19 to 65 years old were selected through cluster sampling in three main food distribution areas in Kuala Lumpur. Questionnaires were used to record sociodemographic information, anthropometric data, dietary intake and free meals supplied by charitable organisations. Descriptive tests and Spearman-rho correlation were used for data analysis. The study found that male subjects generally have normal BMI (55.6%) and female subjects are in pre-obese category (44.8%). Both of their dietary intakes showed insufficient thiamine, riboflavin, folate, vitamin E, fibres, calcium and iron. 54.2% of subjects need improvement in diet quality with score of fruits, vegetables, dairy products and legumes falling below 50%. Energy consumed from free meals also correlated positively with the diet quality ($r=0.280$, $p<0.001$) assessed using HEI score. The nutritional status of subjects in pre-obese category and majority of subjects falling into category of diet quality which requires improvement indicate a need in addressing suitable intervention programs to increase the nutrient values in free meals as homeless rely mainly on free meals as their food source.

PP-B32 Prevalence and factors influencing exclusive breastfeeding practice in Malaysia: Findings from National Health and Morbidity Survey 2016

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The World Health Organization (WHO) recommends that infants should be exclusively breastfed for the first six months of life and complementary food should be introduced at the age of six months old. This study aimed to determine the prevalence of exclusive breastfeeding and its association with socio demographic factors. Data from National Health and Morbidity Survey (NHMS) 2016 were analysed. This is a

cross sectional study using sampling frame from birth registrations which was provided by the National Registration Department Malaysia. A face- to -face Interview was administered to the mothers of infants aged below six months at their residences. Data collection was carried out from March to May 2016 by trained nurses and research team members using mobile device. Descriptive analysis and logistic regression were used in data analysis. A total of 1,147 mothers with infants aged below 6 months were interviewed. Results showed that the overall prevalence of exclusive breastfeeding below 6 months was 47.1% (95% CI: 43.15-51.18). The prevalence was significantly higher among mothers who delivered in public facilities [48.1% (95% CI: 43.71-52.48)] and married mothers [47.4% (95% CI: 43.36-51.45)]. Logistic regression revealed that mothers who were working in other sectors [aOR:1.462(95% CI: 1.012-2.112)] and Chinese [aOR:1.750(95% CI 1.049-2.919)] were significantly less likely to exclusively breastfeed their babies. The findings indicate that the prevalence of exclusive breastfeeding in Malaysia shows some increment as compared with the previous NHMS 2006 (14.5%). Malaysia has to strengthen promotion activities in supporting breastfeeding to achieve the target of 70% exclusively breastfed babies by year 2025 (National Plan of Action for Nutrition of Malaysia III).

PP-B33 Red palm oil as a source of beta-carotene to address vitamin A deficiency

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Besides fruits and vegetables, crude palm oil and refined red palm oil are very rich sources of carotenoids. Crude palm oil contains 50-80 mg/100 g carotenoids, mostly of beta-carotene (55%). Beta-carotene is a precursor of vitamin A, a fat-soluble vitamin that performs very important roles in vision, growth and immunity. Vitamin A deficiencies are fairly common worldwide and in some areas it is a serious problem. People rely on carotene-poor foods are the most vulnerable. Consuming food rich in beta-carotene appears to be a safer approach in stemming vitamin A deficiency than taking synthetic vitamin A supplements. Palm oil is a superior source of pro-vitamin A not only because of its high content of beta-carotene but also because it is a fat. Carotenes are only efficiently converted to vitamin A when combined

with fat. Even diets with sufficient amounts of carotene-rich food will not prevent vitamin A deficiency if fat consumption is low. Many studies conducted to evaluate the impact of red palm oil supplementation on the serum carotenoids level showed a positive impact. Currently, red palm oil plays a role in fighting vitamin A deficiency of children and adults in several countries where the oil is readily available and used regularly in the diet such as Africa, Southeast Asia and others.

PP-B34 The association between body image perception, eating behaviour and weight management knowledge among secondary school children in SMK Seksyen 9, Shah Alam, Selangor

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A cross-sectional study was conducted to determine the association between body image perceptions, eating behaviour and body weight management knowledge among the secondary school children in SMK Seksyen 9, Shah Alam, Selangor. Respondents were 75 students, aged between 13 to 16 years old (mean age of 14.55 ± 1.19), which were recruited through purposive sampling method. Body image perceptions, eating behaviour, and weight management knowledge were measured by the Body Image Perception questionnaire, Eating Attitude Test-26 (EAT-26) and Weight Efficacy Life Style Questionnaire (WEL) respectively. Most of the respondents (61.3%) were having normal BMI, then 21.3% and 13.3% of the respondents were overweight and obese, while only 4% of the respondents were underweight. Approximately, 30% of the respondents reported of having dissatisfied body image with high risk of eating disorder while another 28% of the respondents reported of dissatisfied body image perception with low risk of eating disorder. On another matter, 22.9% students had satisfied body image perception with high risk eating disorder whereas 37.1% had dissatisfied body image perception with low risk of eating disorder. Weight management knowledge was significantly associated with BMI of the respondents ($X^2=12.85$, $p<0.05$) with normal weight respondents seemed to have medium weight management knowledge as compared to the others. Significant association was determined between body image perception and gender

($\chi^2=6.122$, $p<0.05$) with higher dissatisfaction of body image perceptions reported among male respondents as compared to female. This study shows the need of weight management knowledge, healthy eating and positive body image perception to prevent from overweight and obesity especially among adolescents.

PP-B35 The association of stress and body weight status with emotional eating among young adults in Shah Alam, Selangor

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This study was conducted to determine the association of stress and body weight status with emotional eating among young adults in Shah Alam, Selangor. A cross sectional study was conducted between October and November 2016 using convenient sampling approach. A total of 250 young adults, aged between 19 years old to 29 years old participated in this study. Subjects' anthropometric measurements were measured to determine their body mass index (BMI). Respondents completed questionnaire comprised of socio-demographic characteristics, Depression, Anxiety and Stress Scale (DASS) questionnaire and Dutch Eating Behavior Questionnaire (DEBQ). Data analysis was conducted using Statistical Package for Social Sciences version 24.0. Approximately, 51.6% and 48.4% of the respondents were male and female respectively with mean age of 22.59 ± 3.20 years old. Average BMI was 22.24 ± 4.39 which was in the normal category, with no significant difference between male (22.88 ± 5.01) and female (21.55 ± 3.51) subjects ($p>0.05$). The mean score of emotional eating was 2.54 ± 0.77 , with 92% of the respondents reported of having experienced emotional eating. The prevalence of depression, anxiety and stress were 73.6%, 74.4% and 35.6% respectively. Bivariate analysis showed that subscales of psychological distress were significantly associated with emotional eating (depression, $r_s=0.152$; stress $r_s=0.193$ with $p<0.001$). However, no significant association was identified between anxiety ($r_s=0.085$) or BMI ($r_s=0.78$) with emotional eating ($p>0.05$). This study suggested that it is important to have effective stress management in order to prevent unhealthy eating habit especially among young adults.

PP-B36 School canteen food environment: qualitative insights from students and parents

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Adolescence are at a period of rapid growth and development in which their nutritional intake are higher than any other period of lifecycle and by not fulfilling it, may potentially affect their growth and health. The school environment plays a significant role in developing adolescence dietary habits. Nowadays, unhealthy foods are being served in canteens which have been identified in contributing to the development of overweight and obesity among adolescents. Therefore the objective of this study is to gather information on the perceptions of adolescents and parents about school canteen food. A focus group discussion was conducted using structured questions with secondary school students aged between 14-16 years old and parents from two secondary schools in the Kuala Lumpur district. The focus group discussions were audio-taped, transcribed and analysed into themes and sub-themes. The results shows students have negative perception towards their canteen foods especially on the unappealing appearance of the food and poor method of preparation in their school canteen which contributed to their unhealthy eating patterns in school. Students also suggested how school can improve the school canteen environment. Besides that, parents showed concern on the selection of unhealthy foods that were sold in the school canteen. They have some knowledge on nutrition and healthy food but they have misconception on the perception of healthy eating of their children. Parents did showed interest in future improvement of school canteen by providing several suggestions. As a conclusion this focus group discussion provided insight on the opinions and views of secondary school students and parents on the food that is being sold in the school canteen. This information may help in developing appropriate school nutrition interventions in creating an environment that encourages healthy eating and to improve adolescent's eating habits in schools.

PP-B37 Effect of healthier choice logo on purchase decision among customers of restaurants in Brunei Darussalam

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The Healthy Restaurant Programme is a project conducted by the Health Promotion Centre, Ministry of Health. It aimed to raise awareness and knowledge about healthier food choices and increase accessibility and availability of healthier food choices in Brunei Darussalam. The aim of this study was to assess the effectiveness of the Healthier Choice Logo on the purchase decision among customers of restaurants in Brunei Darussalam. A modified bilingual Nutrition Environment Measures Study in Restaurants (NEMS-R) questionnaire was adapted and 600 questionnaires were distributed randomly among target customers aged 18 years and above in nine participating restaurants. The questionnaire included questions to assess socio-demography information, overall menu information, availability of healthier choice logo and healthier option menus, availability of health promotion resources and provision of supports from the restaurants. A total of 141 respondents (23.5%) completed the survey. The majority of the customers were aware of the availability of healthier choice logo (66.0%), 74.5% were aware of the healthy eating reminder, and 60.3% were aware of the availability of nutrition information in the menu. The availability of healthier choice logo including nutrition information, healthy eating reminder, point-of-purchase prompts in the menu, and provision of supports from the restaurants significantly influenced the purchase of healthier choice meals. However, it was shown that the socio-demography of the respondents did not have any significant influence in the purchase of healthier choice meals. The availability of healthier choice logo, nutrition information, healthy eating reminder, point-of-purchase prompts has the potential to influence customers' decision to choose healthier choice meals while eating out. More studies are needed to elucidate the role of the healthier choice logo on purchase decision among restaurants' customers.

PP-B38 Food supplement consumption and its perceived benefits among IIUM students: a comparison study between health-related and non-health-related undergraduate students

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It was suggested that the misperceptions towards the food supplement consumption and its perceived benefit among university students may lead to the misuse of it. Therefore, the present study aimed to compare the food supplement consumption and its perceived benefits among health-related and non-health-related undergraduate students of International Islamic University Malaysia (IIUM). A total of 178 participants comprising of 98 health-related and 80 non-health-related undergraduate students were participated in this cross-sectional study. The items in the questionnaire were adapted from the Malaysian Adult Nutrition Survey (MANS 2014). The food supplements assessed include non-vitamin and non-minerals (NVNM) and vitamins and minerals (VM). The results showed that non-health-related students were more likely to consume NVNM (46.3%) than health-related students (37.8%). For the consumption of VM, both health-related and non-health-related students reported a similar pattern of consumption which are 43.9% and 42.5%, respectively. The most frequently consumed NVNM supplement were fish oil and collagen whereas, vitamin C is the most VM supplement taken by participants. The main reason for taking NVNM and VM supplements was for health purposes and most of the participants claimed that they feel healthier after consuming food supplement. These findings revealed that food supplement consumption was prevalent among university students, regardless of their field of study because of its perceived benefits.

PP-B39 The association of maternal pre-pregnancy body mass index and breastfeeding initiation

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The health risks of not breastfeeding are broad and have been well documented for both mothers and infants. Despite of more women decided to breastfeed prior to pregnancy, little did we know the association between maternal body mass index (BMI) status and breastfeeding initiation given the knowledge that prevalence of obesity in child-bearing age women are increasing speedily. A prospective cohort study was undertaken of mothers attending eight antenatal clinics and followed up until 6 months postpartum. A total of 652 Malay mothers were recruited for the study at a response rate of 93.1 %. 67.8 % (442/652) of the mothers initiated breastfeeding within one hour after delivery. Early initiation of breastfeeding was more common among mothers with normal BMI (53.8 %: 238/442) followed by overweight (24.7 %: 109/442), underweight (12.2 %: 54/442) and obese (9.3 %: 41/442), $\chi^2 = 3.900$, df 1, $p < 0.05$. Odds of initiating breastfeeding, adjusted by maternal and infant factors, stratified by pre-pregnancy BMI and categorized into underweight and normal and overweight and obese. Overweight and obese mothers were less likely to initiate breastfeeding within 1 hour than mothers with lower BMI values were (crude OR: 0.712, 95% CI of crude OR: 0.508 – 0.998) and (adjusted OR: 0.736, 95% CI of adjusted OR: 0.517 – 1.049). Underweight and obese women have significantly lower rates of early initiation of breastfeeding compared to their normal weight counterparts. Future studies need to highlight the social, physical and health care barriers that hinder with breastfeeding initiation especially among underweight and obese women.

PP-B40 Calcium, vitamin D intake, physical activity and bone mineral density among Malay and Chinese female secondary school students in Malacca

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This study was to investigate the status of calcium and vitamin D intake, physical activity, bone mineral density (BMD) and relationship between calcium, vitamin D intake and physical activity towards BMD. A total of 240 female students aged between 14 to 16 years old from SMK Sultan Alauddin, SMK Ghaffar Baba and SMK Canossa Convent were recruited for this study. They were asked to record three days diet recall

and answer physical activity questionnaire. The BMD of randomly selected 53 Malay students and 53 Chinese students were measured. The results showed that there was no significant difference in mean consumption for calcium ($p=0.451$) and vitamin D ($p=0.339$) for Malays (436.7 ± 226.6 mg/day and 1.2 ± 2.2 μ g/day) and Chinese (453.6 ± 365.9 mg/day and 1.0 ± 1.2 μ g/day). There was no significant difference ($p=0.906$) in mean frequency of those involved in sports activity between Malay (5.16 ± 3.5 times/week) and Chinese (5.48 ± 4.2 times/week). However, there was significant difference ($p=0.001$) in mean of the time spent between Malay (117.6 minutes/week) and Chinese (187.8 minutes/week). The mean T-score of BMD for Malay (-0.03 ± 1.15) and Chinese (-0.17 ± 1.21) was normal. There was positive ($r=0.445$ and $r=0.618$) significant ($p=0.001$ and $p<0.001$) correlation between T-score with total calcium intake among Malay and Chinese. However, there was no significant ($p=0.810$ and $p=0.196$) correlation between T-score and total vitamin D intake among Malay ($r=0.034$) and Chinese ($r=0.181$). There was also no significant correlation between T-score with frequency and time spent in sports activity for Malay ($r= -0.044$, $p=0.753$ and $r=0.021$, $p=0.884$) and Chinese ($r= -0.143$, $p=0.305$ and $r=0.159$, $p=0.256$). In conclusion, calcium intake seems to be the determinant of BMD status among adolescence.

PP-B41 Impact of air pollution on food intake among indoor and outdoor workers: a comparison

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Exposure to air pollutants has been proven to adversely affect human health. However, the relationship between air pollution with food intake remains largely unexplored. Here we sought to investigate the association between PM_{2.5} and food intake between indoor and outdoor workers in Malaysia. A 3 months cohort follow up study was conducted among 220 working adults. They were recruited into 2 arms (indoor and outdoor workers), each consisting of 110 participants based on average hours spent outdoors per day. A questionnaire comprising items enquiring

demographic data, appetite and a 24 hours diet recall was distributed weekly from mid-August 2016 till mid-November 2016. Particulate matter (PM) detector was used to obtain PM_{2.5} distribution throughout the study period. Maximum PM_{2.5} dust level, 0.1229 mg/m³ was recorded at week 2 while minimum, 0.0616 mg/m³ at week 10 of the study. Among the 220 adult workers, male: female ratio was 2.1: 1.0 with mean age of 31 years. There was a significant change in the caloric intake ($p < 0.05$) throughout the study, and the changes was significantly different between the indoor and outdoor workers ($p < 0.05$), where the outdoor workers showed a greater food intake calories. No significant correlation was established between the PM_{2.5} dust levels and food intake among the adult workers. The greater calorie intake observed among the outdoor workers highly suggests that job nature plays a crucial role. It should be taken into consideration, that short-term exposure and measured amounts of air pollutants that may not have exceeded the admissible levels may not have cause an impact on the food intake pattern. On the whole, the findings suggests that the food intake among the indoor and outdoor workers are independent of the PM_{2.5} occurrence and is dependent on individual job nature.

PP-B42 *Eucheuma denticulatum* ethanolic extract reduced adipogenesis and inflammatory markers while enhancing glucose uptake in 3T3-L1 adipocytes

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Eucheuma denticulatum is an edible red seaweed commonly found in east coast Malaysia has shown to promote potential health benefits. The objective of this study was to determine whether *E. denticulatum* and its fractions (hexane, ethyl acetate and acetone) could act on adipocytes

to inhibit adipogenesis and pro-inflammatory markers while enhancing the glucose uptake *in vitro* using mouse 3T3-L1 pre-adipocytes. The effect of *E. denticulatum* on adipogenesis was determined by incubating the extract on maturing pre-adipocytes during the 6-day induction period with 0 to 100 µg/ml extracts, then stained with Oil-Red-O and analysed for lipid content. The effect on inflammatory markers such as interleukin-6 (IL-6), macrophage chemoprotectant-1 (MCP-1) and adiponectin activities on the interferon-gamma/lipopolysaccharide (IFN-γ/LPS) stimulated 3T3-L1 adipocytes were evaluated using the immunoassay kits. Glucose uptake was measured using fluorometry. Cell viability assay was performed in parallel with adipogenesis assays and immunoassays to determine if the decrease in lipid accumulation and inflammatory markers was due to cell death. To test the effect of *E. denticulatum* on viability, cells were incubated for 24 hours with 0, 1, 10 or 100 µg/ml. Result showed suppression of lipid accumulation in 3T3-L1 adipocytes by *E. denticulatum* crude (14- 32%) and its fractions (16-23%) at the concentration of 1-100 µg/ml after 6 days of treatment. All the tested samples inhibited IL-6 ($p < 0.05$) while only crude extract at 100 µg/ml inhibited MCP-1 and no significant effect on adiponectin expression compared to control. Furthermore, the *E. denticulatum* ethanolic extract and its fractions significantly enhanced glucose uptake in 3T3-L1 cell line. Taken together, these results suggest *E. denticulatum* exert potential anti-obesity effects by inhibition of adipogenesis via the down-regulation of lipid accumulation, reduction of selected inflammatory markers as well as enhancing glucose uptake in 3T3-L1 cell line.

PP-B43 Nutritional knowledge, dietary intake and its association with nutritional status of Thai school age children in Nakhon Si Thammarat province

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This survey research aimed to describe nutritional knowledge, food behaviours, dietary intake and nutritional status to examine the associations between these factors among Thai school age

children. The sample included 330 school age children (age 10 to 12 years) from Nakhon Si Thammarat Primary Educational Service Area. Nutritional knowledge and food behaviours data were collected by a self-reported questionnaire, dietary intakes were collected by using the food frequency questionnaire (FFQ) and 3-day food record. Energy and nutrient intakes were analyzed using the INMUCAL-Nutrients V.3 program. Weight for height (W/H) with INMU-ThaiGrowth program was used to assess nutritional status. Data were analysed through descriptive statistics and Pearson's correlation coefficient. Results showed that average scores as calculated by mean percent for nutritional knowledge and food behavior were 54.3 and 64.4%, respectively. The children had less mean score percentage of knowledge on fat and sodium consumption but understanding to sugar disadvantages. High fat and sodium diet intakes were reported when compared with other food intakes. The mean daily energy intake for the children was 92 % Thai RDA, which was enough for energy requirement and energy distribution for carbohydrate: protein: fat: was 56:13:31. In addition, the average daily intakes of sugar, fat, cholesterol, and sodium amount 42.46±2.42 g/day, 68.88±3.12 g/day, 312±8.68 mg/day, and 2,640 mg/day, respectively. With regards to nutritional status, the children were obese (>+3 SD) by 35.0%, while 28.9%, 24.6%, and 11.5% of them had overweight (+1.5 SD to +3 SD), normal (-1.5SD to +1.5 SD), and underweight (<-1.5 SD), respectively. Significant correlations ($p < 0.05$) were found between nutritional knowledge and food behavior and dietary intake but was not associated with nutritional status of the subjects. Results in this study should be used as information for developing a nutritional health promotion program as appropriate for this population.

PP-B44 Anthropometry status and dietary diversity analysis of SMAN 1 Dramaga Bogor students

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The objective of this study was to assess anthropometry status and dietary diversity and analyse the relationship between anthropometry status and dietary diversity in a group of adolescents. The subjects of this study were 65 SMAN 1 Dramaga Bogor students aged 14-16 years old. Anthropometry measurements

were weight, height, waist circumference, hip circumference, and body fat percentage. Dietary diversity assessment was carried out using IDDS score method which is divided into three categories. The results show that most of the male subjects had a normal body mass index for age (83.3%), normal waist-hip-ratio (77.8%) and normal body fat percentage with BIA (44.4%). Most of the female subjects had a normal body mass index for age (87.2%), normal waist-hip-ratio (80.9%) and normal body fat percentage with BIA (76.6%). Dietary diversity analysis with IDDS method showed that 86% of subjects consumed more than 6 kinds of food groups, 14% of subjects consumed 4-5 kinds of food groups, and none of the subjects consumed less than 3 kinds of food groups. Overall, 16.1% of subjects with normal nutritional status consumed 4-5 kinds of food groups and 83.9% consumed more than 6 kinds of food groups. Obese subjects consumed more than 6 kinds of food groups. Cereals, oil and fat were the food groups which were the most consumed (100%) and innards becomes the food group which is less consumed (20%). Chi-square test shows that there is no relationship between dietary diversity and BMI for age ($p = 0.432$), waist hip ratio ($p = 0.281$) and body fat percentage ($p = 0.400$) in the group of adolescents studied.

PP-B45 Knowledge on breakfast, breakfast habits and nutritional status of adults in two rural villages in Kuching, Sarawak

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Breakfast is the first and the most important meal of the day. It is a commonly skipped meal in Malaysia. Breakfast consumption is associated with positive outcomes related to dietary quality, lifestyle factors and body weight status. The study aims to determine the socio demographic factors, knowledge on breakfast, breakfast habits and nutritional status of adults in two rural villages, in Kuching, Sarawak. A cross sectional study covered 120 respondents randomly sampled from 191 households. Data instruments included a structured questionnaire to collect data on socioeconomic and demography, knowledge on breakfast (based on 12 items) and breakfast habits and type of breakfast food consumed through face - to - face interview and Body Mass Index measurement. Data analysis used SPSS version

22.0. Results showed that majority of respondents (72.5%) had good knowledge on breakfast. Although the knowledge was higher among respondents with a higher level of education and among manual workers (fisherman, housewives, and farmers) compared to office workers but the relationship are not significant (p value >0.05). Most respondents (91.7%) took breakfast everyday with 90.0% consumed home-cooked food. A small number (8.3%) skipped their breakfast mainly due to time constraint. They preferred having breakfast at home with their family as traditionally done in the villages (89.3 %). The type of food for breakfast was carbohydrates-rich food (88.3%), food containing fats, oil and sweets (70.8%), protein (46.7%), fruits and vegetables (37.5%), dairy products (25.8%) and drinks (95.8%). More than half of the respondents were either overweight or obese (55%), normal (38.3%) and underweight (6.7%). Healthy lifestyle campaign is recommended.

Group C: Nutrients and Other Components in Foods / Products

PP-C01 FoodTrack™ – development and application of a novel Australian food and nutrient database

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Tracking changes in the nutritional composition of the food supply is necessary to guide public health nutrition strategies. Previously, data collection methods have been costly and time-consuming, and the methods have impacted on data quality. To overcome some of these limitations, we have developed FoodTrack™ – a technology-based tool for collecting nutrition and product data for foods sold in supermarkets. The FoodTrack platform consists of a smartphone application (App), a cloud-based database, and a web-portal. The App is used to record product data (descriptors, nutrition information panel(s), ingredients, front-of-pack labels etc.) via fields that query erroneous data as a means of reducing entry errors. It also

uses barcode recognition software, which retrieves existing product data; improving efficiency and reducing duplication. The use of FoodTrack has led to improvements in data quality, significantly lowered data acquisition costs, and allowed for greater market coverage. Data processing time has reduced from ~14 minutes/product (using the paper-based methods) to ~6 minutes, and error rates have decreased from ~3% to <1%. FoodTrack was implemented in 2014 with data updated on an annual basis. On average, nutrition and product data has been collected for over 14,000 products each year, across all major categories in Australian supermarkets. This supermarket data suggests that the relative proportion of products from different food groups is not consistent with the dietary pattern recommendations in the Australian Dietary Guidelines – with discretionary foods over represented relative to guidelines. FoodTrack has been recognised as an innovative and comprehensive food and nutrient database in Australia; since its inception. The unique data has greatly improved our understanding of the nutritional quality of the food supply, allowed for the monitoring of government initiatives such as the voluntary front-of-pack labelling system – the Health Star Rating system, as well as the evaluation of food reformulation initiatives.

PP-C02 Nutritional quality of sago worm as rural children's food in Southeast Sulawesi, Indonesia

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Children under five years of age in rural areas of Kolono Subdistrict are facing undernutrition, especially protein-energy malnutrition (PEM). Sago worm (*Rhinophorus ferrugineus*) is a local food wisdom of Tolakinese and is commonly eaten by old people. Now, it serves as an important protein source for children under the age of five. Data on the nutritive values are scarce though some information is available concerning initial form of sago worm. However, there is still need of analysis in various cooking recipes, depending on each country to enhance acceptability of sago worm. The objective of this study is to conduct the proximate analysis of

sago worm. The protein, essential amino acids, and fatty acid content were evaluated by PT Saraswanti Indo Genetec through mail order marketing number: SIG.Mark.R.VIII.2016.012384. The samples were divided into two forms: fresh sago worm (frozen); and sautéed sago worm (sautéed for approximately \pm 5-8 minutes). Sago worm is a good source of protein and high value of fat. Nutrient content of sautéed sago worm was higher than fresh sago worm. Sago worm abon, sticky rice and fried tofu containing sautéed sago worm as snacks in particular were well-accepted by children under five. In conclusion, sago worm especially with sauteing process may provide the necessary energy, protein including essential amino acids, and fat for children's growth and development. For acceptability, sago worm can be considered in various form of children's snacks according to region.

PP-C03 Pecah Kaca (*Strobilanthes crispus*) leaves inhibit lipid metabolism and modulate leptin secretion in human adipocytes in vitro

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Pecah Kaca (*Strobilanthes crispus*), a native plant to countries from Madagascar to Indonesia, has been one of the most popular medicinal plants traditionally used to treat several diseases like diabetes mellitus, diuretic, and high blood pressure. Our aims in this study were to reveal the constituents of the *S. crispus* leaves extract (SCLE) that were extracted in subcritical water condition and to investigate the anti-obesity potential of this extract. Gas chromatography-mass spectroscopy (GC-MS) and liquid chromatography-mass spectroscopy (LC-MS) analysis were performed to identify the compounds in SCLE. Through a GC-MS analysis, we revealed 15 major components of the non-polar SCLE, the most abundant of which was oleamide. Using LC-MS, 14 compounds were discovered including anandamides. Treatment of SCLE on human preadipocytes *in vitro* showed that the extract reduced proliferation viability of human preadipocytes and decreased the number of adipocytes, demonstrating an inhibitory effect on lipogenesis. Moreover, it was found that SCLE

directly increased adiponectin and interleukin-6 (IL-6) gene expression. Therefore SCLE could be considered as bioactive factor, which are effective in adipose tissue mass modulation.

PP-C04 Antioxidant and antihypertension activities of selected Malaysian ulam, vegetables and herbs

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This study was conducted on selected Malaysian ulam, vegetables and herbs to investigate their antioxidative and antihypertensive activities. The selected ulam, vegetables and herbs were *petai* (*Parkia speciosa*), *pegaga* (*Centella asiatica*), *selom* (*Oenanthe javanica*), *ulam raja* (*Cosmos caudatus*), *cekur manis* (*Sauropus androgynus*), *pucuk paku* (*Diplazum esculentum*), *maman* (*Gynandrapus gynandra*), *turi* (*Sesbania grandiflora*), *kacang botol* (*Psophocarpus tetragonolobus*), *kacang kelor* (*Moringa oleifera*), *kacang bendi* (*Hibiscus esculentus*), *kacang panjang* (*Vigna sinensis*), *kari* (*Murraya koenigii*), *daun limau purut* (*Citrus hystrix*), *daun kunyit* (*Cucurma longa*) and *kesum* (*Polygonum minus*). Analysis carried out on ulam, vegetables and herbs aqueous extract were total phenolic content (TPC), antioxidant activities (2,2-diphenyl-1-picrylhydrazyl (DPPH) radical scavenging assay, 2,2-azino-bis(3-ethylbenzthiazoline-6-sulfonic acid (ABTS) radical cation scavenging assay and ferric reducing antioxidant power assay (FRAP)) and antihypertension activity (angiotensin converting enzyme (ACE) inhibitory activity assay). *Kesum* showed the highest phenolic compound at 48.23 \pm 0.17 mg GAE/g, the highest DPPH radical scavenging activity at 79.09 \pm 0.10% as well as the FRAP activity at 63.61 \pm 0.73 mmol Fe²⁺/g. Meanwhile, *cekur manis* had the highest percentage of ABTS radical cation scavenging activity at 95.10 \pm 0.26%. ACE analysis showed that *kari* had the highest percentage of inhibitory activity at 91.20 \pm 4.15%. Correlation analysis showed positive and significant ($p < 0.01$) correlation between TPC and FRAP ($r = 0.956$), TPC and ABTS ($r = 0.635$), TPC and DPPH ($r = 0.630$) and TPC and ACE inhibitors ($r = 0.645$). This shows that Malaysian ulam, vegetables and herbal plants especially *kesum* are potential source of natural antioxidants and antihypertensive.

PP-C05 Protective effect of Tualang honey against kainic acid-induced oxidative stress in the rat cerebellum and brain stem

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Oxidative stress has been suggested to play an important role in the mechanism of excitotoxicity-induced neurodegeneration. Systemic injection of kainic acid (KA) on rodents leads to seizure, oxidative stress, and neurodegeneration in the brain. Considering the role of oxidative stress in KA-induced neurodegeneration, antioxidants could serve as a potential therapeutic agent in preventing or treating neurodegenerative diseases. Honey is rich in antioxidants and possesses numerous beneficial effects including antioxidant, anti-inflammatory, antitumor, antimicrobial, and wound healing. Malaysian Tualang honey (TH) has been reported to contain high amount of phenolic compound, and to have strong antioxidant properties. Therefore, the aim of this study is to investigate the protective effect of TH against KA-induced oxidative stress in the cerebellum and brain stem of rats. Male Sprague-Dawley rats were allocated into the five following groups: Control, KA-treated, TH + KA-treated, Aspirin (ASP-anti-inflammatory agent) + KA-treated and Topiramate (TPM-antiepileptic agent) + KA-treated groups. Rats were pretreated orally with drinking water, TH (1.0g/kg BW), ASP (7.5mg/kg BW) or TPM (40mg/kg BW), respectively, five times at 12 hours intervals. Thirty minutes after last oral treatment, the rats were injected subcutaneously with saline or KA (15mg/kg BW) for control and KA treated-groups respectively. Rats were sacrificed at 2 hours, 24 hours and 48 hours after KA administration for the estimation of oxidative stress parameters. Administration of KA induced epileptic seizures

in all KA-treated rats. KA caused increases in lipid peroxidation, protein oxidation and nitric oxide, and decrease in the total antioxidant status in the rat cerebellum and brain stem. Pretreatment with TH reversed these KA-induced alterations. Results of the study suggested that TH may be beneficial in reducing KA -induced oxidative stress via its antioxidant property.

PP-C06 Antibacterial effects of citrus juices against *Streptococcus pyogenes*

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Fruit juices have been traditionally consumed to help prevent many diseases such as the common cold, flu, sore throat, cough and stomach ache since ancient times. Besides containing high concentrations of citric acid and ascorbic acid (vitamin C), fruit juices also have unique flavonoid compounds which are believed to have a wide range of health benefits including antioxidative, anti-inflammatory, antitumor, and antimicrobial activities. The emergence of bacterial resistance to most commonly used antibiotics is a growing concern at both national and international levels. Due to the rapid increase of antibiotic resistance, citrus juice may be feasible therapeutic alternatives to antibiotics. Hence numerous studies have explored the antimicrobial effects of fruit juices against many species of bacteria. The present study investigated the antimicrobial activities of different concentrations of local citrus fruits, *Citrus aurantiifolia* ("limau nipis") and *Citrus microcarpa* ("limau kasturi") against *Streptococcus pyogenes*, the causative agent of acute respiratory infections. Susceptibility of these two fruit juices against *Streptococcus pyogenes* were evaluated using disc diffusion assays. It was found that both juices of *Citrus aurantiifolia* and *Citrus microcarpa* showed highest inhibition at 25% (vol/vol) (15.4 ± 0.79 mm) and (13.4 ± 0.82 mm) respectively. Using broth dilution method, the antibacterial activity of *Citrus aurantiifolia* and *Citrus microcarpa* against *Streptococcus pyogenes* was determined using visual inspection and spectrophotometric reading. Briefly, ten-fold dilutions of *Citrus* sp. solutions were used to test

the minimum inhibitory concentration (MIC) against *Streptococcus pyogenes*. MIC test was done by visual inspection and spectrophotometric assay. The MIC values obtained using the two methods showed good correlation for both citrus juices. *Citrus aurantiifolia* and *Citrus microcarpa* showed inhibition towards *Streptococcus pyogenes* at 0.0005 and 0.005 dilutions (vol/vol), respectively. These findings attest to the promising potency of *Citrus aurantiifolia* and *Citrus microcarpa* juices to inhibit *Streptococcus pyogenes* infections.

PP-C07 Gender and breast feeding moderate the association between dietary intakes of gangliosides and its blood levels among Malaysian toddlers

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Gangliosides (GA) are complex bio-active lipids in plasma membranes of most vertebrates. GA have a prominent role in promoting early neural, gut and immune development. Thus there is an increasing interest in the role for GA in paediatric nutrition. This study evaluated the dietary intake and blood levels of GA in a cross-sectional study of 74 Malay toddlers aged 15 - 21 months, of both genders (41 boys, 33 girls), from Klang valley. Toddlers' anthropometric measurements, dietary intake, and socio-demographic information were also recorded. GA analysis of food sources and blood levels were performed using high performance liquid chromatography-mass spectrometry (HPLC-MS). Associations between dietary intake and blood levels of GA, and the moderating effects of nutritional status and socio-demographic factors in toddlers were statistically analysed. No significant correlation was observed between the overall dietary GA intake and serum GA levels in the toddlers. However, a significant but weak correlation existed between dietary GA intake from dairy products ($r = 0.241$; $p = 0.038$) and meat ($r = 0.298$; $p = 0.010$) with serum GA levels. While a trend for higher intake of GA was observed in boys (6.4 (9.0) vs 3.3(5.0) mg/day, $p = 0.056$), girls had higher blood levels of GA (10.3 (2.7) vs 9.3 (2.4) $\mu\text{g/ml}$, $p = 0.099$). For toddlers who had been weaned from breast feeding (were on infant formula and complementary feeds) at

the time of measurement, blood GA levels were lower despite their high dietary GA intake. In conclusion, dairy and meat are major contributors to serum levels of GA in toddlers. Findings suggest gender-specific differences in the bioavailability of GA. The roles of breast feeding and introducing appropriate complementary foods in improving GA status in toddlers need further investigations.

PP-C08 Honey stimulates production of IL-8 chemokine by HT-29 intestinal epithelial cells

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Inflammation is a fundamental response by the body towards counteracting infections or restoring damaged tissues. While inflammation is good, excessive inflammation can cause adverse effects including inflammatory bowel diseases (IBD) such as Crohn's disease and ulcerative colitis. Honey has been used since ancient times for various kinds of health disorders, many of which remain to be scientifically proven. Recent studies suggest that manuka honey has potential benefits in the treatment of IBD. In the present study, the effect of Malaysian honey samples towards synthesis of the pro-inflammatory chemokine IL-8 by the intestinal epithelial cell line HT-29 was compared to that of manuka honey. The Malaysian honeys tested included one tualang honey sample and four kelulut honey samples from different places in Peninsular Malaysia. The viability of HT-29 cells when treated with a series of doubling dilutions of honey in culture media (i.e. 50, 25, 12.5, 6.25, 3.125, 1.5625, 0.7813 and 0.3906 mg/mL) was first assessed using MTS cell proliferation assay. Concentration of honey at 1mg/mL was used to treat HT-29 cells in subsequent experiments. Lipopolysaccharide (LPS) was used as an inflammatory stimulant. Production of IL-8 by HT-29 cells when treated with the honey samples for 24 hours with or without LPS pre-stimulation was next quantified using ELISA. All honey samples were found to induce production of IL-8 by HT-29 cells at varying levels. While LPS stimulated IL-8 synthesis by HT-29 cells, the addition of honey further enhanced this effect. Further tests are needed to confirm if honey-induced stimulation of IL-8 from intestinal epithelial cells observed herein is partly related to the therapeutic effects of honey in IBD.

PP-C09 A comparative study on lipids and fatty acid analysis in fish and shellfish for excluding chloroform

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Chloroform (CF) has been used to extract lipids from various foods, as exemplified in the current official methods that include the AOAC Official Methods of Analysis. However, the International Cancer Research Institute has categorized CF into Group 2B, based on the possible carcinogenicity to humans. To reduce the risk to human health and the ecosystem, an alternative analytical procedure needs to be developed urgently. Considering the above background, an official program is under way to revise the use of CF in lipids extraction method currently described-in manuals to obtain data for the food composition table of Japan. From the existing extraction procedures, we chose the chloroform-methanol reflux method (CFM1), Folch method (CFM2), Soxhlet method, acid hydrolysis method, saponification method, and hexane-isopropanol-mixture extraction method (HIM) to compare their suitability, with focusing on fish/shellfish lipids. Considering the quantity and type of the lipids, together with the Japanese trend in seafood, the following ten fish/shellfish were selected; mackerel, northern shrimp, scallops, pacific cod, chum salmon, pacific saury, southern bluefin tuna, Japanese common squid, oyster, and sardine. The statistical data analysis performed on fat-content and fatty-acids-content/composition revealed that the difference in fat contents was insignificant between HIM and CF-using-methods (CFMs). The Soxhlet method yielded lower values than those by CFMs, when fat contents were less than 5%, probably due to thermal decomposition. For fatty acid content and composition, HIM also gave comparable data with CFMs, except for shrimp, scallops, and squid whose fat contents were low (less than 1%) but the polar-lipids-contents were high. As the results, HIM is judged to be a promising alternative to CF to determine the fat content and to analyze fatty acid content/composition in fish and shellfish of fat more than 1%. For samples of less than 1% fat content, the procedure should be improved in future.

PP-C10 Iodine content in commonly condiment and iodine enrichment in the feeding to Nile tilapia (*Oreochromis Niloticas*)

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Iodine deficiency can lead to a range of health conditions including goiter, cretinism and intellectual development. The iodine deficiency is the major health concern especially in the rural Thai population. Despite the presence of iodine in the condiment, iodine deficiency still found in the rural area of Thailand. The aim of the present study was to find an alternative source of iodine. To this end, we used potassium iodated (KIO₃) enrichment in the feeding to freshwater fish Nile Tilapia. The feed was enriched with iodine at concentrations of 0, 40 and 80 mg/kg (w/w). After 6 weeks, the color, texture and iodine content in meat and meat with skin of Nile tilapia and other natural freshwater fish (*Pristolepis fasciata* and *Hampala macrolepidota*) were determined. The results showed that the texture of the iodine enriched fish (I40 and I80) was not different from the control. The color of cooked fillets from the iodine enriched fish (I40 and I80) were more luminous (L*) and more yellowish (b*) than the control (p≤0.05). The iodine enrichment in the I80 group showed a significant increase in iodine content in meat (276.29 ± 27.06 µg/kg wet weight) and meat with skin (456.70 ± 16.72 µg/kg wet weight) as compared to the control (p≤0.05). The iodine content in the I40 group was not different from the control. The iodine content in meat with skin of the iodine enriched Nile tilapia (I40 and I80) was significantly higher than the other natural freshwater fish (39.17 ± 39.09 and 57.78 ± 12.75 µg/kg wet weights for *Pristolepifasciata* and *Hampala macrolepidota*). In conclusion, the present study showed that the iodine enrichment in Nile tilapia (I40 and I80) could increase the iodine content in freshwater fish. This method may be an alternative solution to increase the iodine consumption in the rural area of Thailand.

Group D: Clinical Nutrition / Intervention Trials

PP-D01 The difference in mother's motivation and compliance in giving Taburia (multimicronutrient powder) to children with different CIE Taburia packaging in Sidoarjo, Indonesia

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The study aimed to measure the differences in CIE (Communication, Information and Education) materials on Taburia packaging to the mother's motivation and compliance in giving Taburia to children aged 6-36 months at Tarik Sidoarjo, East Java. It was a part of Quasi Experiment study with 3 groups, but in this report we compare only 2 groups. Population was all the children aged 6-36 months in 12 villages at Tarik, Sidoarjo. Sampling was done by total sampling. First group was 373 mothers who received 30 sachets Taburia and the original brochure from Ministry of Health. The second group was 396 mothers who received 30 sachets Taburia and brochures with revised information and a hand fan for a description on advantages and how to use Taburia. Mother's motivation was measured by interview and compliance was measured by counting the Taburia consumed by children. Results showed that mother's age, level of education, employment, socioecomic status and exposure to taburia were homogeneous and comparable. After 30 days of intervention, there was a difference in mother's motivation in giving Taburia. Group 2 had better motivation in giving Taburia ($p=0.004$) than group 1 with reasons to improve children's appetite and increase endurance. In accordance with motivation, mother's compliance in giving Taburia was also better for group 2 ($p=0.000$). It was proven that Taburia with CIE in packaging giving better motivation and obedience of mothers in giving Taburia. In the future, it is important to give comprehensive information to mothers to increase the compliance and later will increase the appetite which will lead to better nutrition status of the children.

PP-D02 Effect of soybean co-ingestion with carbohydrate on postprandial glycaemic-induced reactive oxygen species in healthy men

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Postprandial hyperglycaemic-induced reactive oxygen species (ROS) toxicity has been shown to be improved through the co-ingestion of whey protein with carbohydrate (CHO) beverages. However, little is known on the effects of co-ingestion of soybean with CHO. The aim of this study was to investigate the postprandial glycaemic and insulinaemic effects of soybean-based beverage on ROS response in healthy men. Eight male volunteers (age 20 ± 1.2 years, body weight 59.2 ± 6.2 kg) consumed 500 ml of CHO mixed with soybean (SOY), CHO mixed with whey protein (WHEY) and CHO alone (Control) after an overnight fast, in a randomised counterbalanced order design, separated by one week period. The ratio for soybean and whey protein to CHO was 1:4 and all beverages were iso-caloric. Venous blood samples were collected at fasting (baseline) and at 30, 60, 90 and 120 min after consumption. Blood plasma was analysed for glucose, insulin and ROS levels. The area under the glucose and insulin curves were lower in SOY compared to WHEY although no significant difference was observed between both beverages. Glucose and insulin levels were significantly increased from baseline to 30 min and significantly decreased from 30 min to 90 min, and remaining the same until 120 min after SOY and WHEY ingestion. In comparison to Control, SOY and WHEY showed lower plasma glucose and insulin responses, however no significant difference was found between all beverages at all time points. SOY tended to have a lower postprandial ROS response than WHEY although no significant difference was observed between both beverages and when compared to Control. Soybean-based beverage may yield lower effect on postprandial ROS suggesting lower oxidative stress due to lower glycaemic and insulinaemic responses compared to whey protein when co-ingested with CHO. Further investigation with a larger sample size is warranted to confirm this.

PP-D03 The effect of tempe drink intervention on total cholesterol and blood pressure in hypertension and hypercholesterolemia subjects

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The aim of this study was to determine the effect of tempe drink intervention on cholesterol total and blood pressure of hypertension and also hypercholesterolemia subjects. This study used a Randomized Controlled Trial (RCT) design with 30 male and female subjects, who were divided into three treatment groups - tempe drink of A formulated from local sprouted soybean (TDA), tempe drink of B formulated from imported soybean (TDB), and control. The inclusion criterias were adults aged 25-55 years, not being menopause and pregnant, total cholesterol levels ≥ 200 mg/dl, systolic blood pressure level 121-139 mmHg, diastolic blood pressure level 81-89 mmHg and willing to participate in research by signing an informed consent. The tempe drink was given three glasses a day for four weeks continuously, contained at least 25 g of protein/day. The control group was not given the tempe drink. Blood samples for analysis of lipid profile (total cholesterol, LDL, HDL and TG) were collected before and after intervention. Blood pressure data were collected every week during intervention. The results showed that both TDA and TDB decreased cholesterol total level subjects significantly compared to control subjects. There as no significant difference on the effect of TDA and TDB compared to control subjects on systolic and diastolic blood pressure.

PP-D04 The predictive effect of sugar to dietary intake and lifestyle factors among children with attention deficit/hyperactivity disorder

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Attention Deficit Hyperactivity Disorder (ADHD) is a neurodevelopmental condition characterized by impulsivity, hyperactivity and low level of attention. Approximately, 3% to 5% of school-aged children are diagnosed with ADHD and most parents and teachers believe that consumption of sugar leads to hyperactivity. However, studies have yielded conflicting results on the effects of sugar consumption to children with ADHD. This study is to determine the predictive effect of sugar consumption to the dietary intake, sleep, manifestations of ADHD symptoms and school performance of children diagnosed with ADHD. A descriptive design and partial least squares approach of SEM was used to analyse the relationship between variables. A total of 45 children diagnosed with ADHD within Metro Manila were included in the study. The demographic profile, sugar consumption, dietary intake, sleep activity, manifestations of ADHD symptoms and school performance of the respondents were measured. Mean sugar consumption of the respondents contributed 17% of the total average energy intake which indicates excessive sugar consumption. In the PLS Regression, path coefficients demonstrated statistical data stating that sugar consumption has significant role on sleep ($p=0.05$), ADHD symptoms (<0.01) and school performance ($p=<0.01$), while dietary intake ($p=0.13$) shows insignificance. In children with ADHD, it was recognized that an excessive consumption of sugar may contribute to greater manifestations of ADHD symptom, sleep disturbance and poor school performance; thus, restriction of excessive sugar consumption should be observed. Strengthening policies and recommendations on sugar consumption and providing nutrition education among parents and teachers may help facilitate the children's diet and lifestyle factors.

PP-D05 Characteristic differences between young adults with and without family history of type 2 diabetes

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Public health initiative in assessing a family history of type 2 diabetes (T2DM) may provide initial information to influence a strategy for

early detection and prevention. The assessment is important as those with a family history had 2.5 fold increased the risk of developing T2DM. Hence, this cross-sectional study aimed to determine the differences in characteristics between young adults with and without a family history of T2DM. We recruited 143 undergraduate students in Universiti Putra Malaysia using a multistage sampling method and divided them to with (48.6%) and without (49.3%) family history of T2DM. Measurements include sociodemographic information, diabetes nutrition knowledge (Malaysian version of Michigan Diabetes Knowledge Test), risk assessment (The Australian T2DM tool), nutritional status (anthropometric and dietary intake) and physical activity level. Respondents with a family history of T2DM (72.6 + 9.1 cm) had significantly higher waist circumference than those without (69.2 + 8.0 cm, $p < 0.001$). Diabetes nutrition knowledge ($p < 0.01$) and risk of T2DM ($p < 0.001$) were significantly higher in respondents with than those without a family history of T2DM. A large proportion of respondents with a family history of T2DM had higher BMI and had lower physical activity level than those without ($p < 0.05$). In this population, young adults with a family history of T2DM had differential characteristics including knowledge level, risk assessment, nutritional status and physical activity level. While young adults with a family history were knowledgeable in diabetes, they were more likely to present with certain characteristics that put them at high risk than those without a family history of T2DM.

PP-D06 Is there any correlation between total number of fecal *Escherichia coli* and soil-transmitted helminths infection?

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Soil-transmitted helminths (STH) are carried by so many people in developing countries. STH live in the gut and may interact with gut microbiota. The objective of this study was to compare the

number of fecal *Escherichia coli* of helminth-infected children who live in rural areas, with children who were not colonized by helminths. We performed this study in 113 healthy children from West Lombok, West Nusa Tenggara. Stool samples were collected from all subjects. Total number of *E. coli* were analysed using traditional culture technique with selective media and total plate count method. Dietary intake of all subjects was also assessed using semi-quantitative food frequency questionnaire. Data were analysed using independent t-test between 2 groups. The result showed significant difference of total number of *E. coli* between infected and non-infected group ($p=0.040$). Helminth-infected children tend to have higher number of *E. coli*. Mean of fecal *E. coli* on helminth-infected group was 7.17 log CFU/g meanwhile on non-infected group was 6.82 log CFU/g, both numbers are considered normal number of gut microbiota. A potential mechanism by which helminth infection may alter the gut microbiota composition is its effect upon the host immune system, which could disrupt the homeostatic relationship between the gut microbiota and host. Helminth would have direct competition for niche space in the gastrointestinal tract. STH infection result in gut microbiota dysbiosis which is likely to impact host's health. These results suggest that helminths may have an impact on the diversity and function of the gut microbiota. Further study is needed to determine other various microbiota population using advanced microbiota determination technique as RT-PCR.

PP-D07 Glycaemic effect and palatability of brown rice

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Three varieties of brown rice, a store-bought brand, and two varieties (Bukit Kampung and Pandan Wangi Kampung) produced in Sabah, Malaysia were tested for their glycaemic index, the effect of soaking the raw rice on glycaemic index, and palatability. Ten healthy adults (BMI=20.83±1.15 kg/m², age=23.4±0.52 years) completed glycaemic response tests on nine separate occasions after an overnight fast lasting 10 to 12 hours. All tests provided 25g carbohydrate. Amylose content of cooked rice was determined using spectrophotometer at

620nm. Sensory evaluation was conducted by 50 adults. The glycaemic response was determined by calculating the incremental area under the curve (iAUC). The glycaemic index of the store-bought brand, BK and PWK were 61.99 ± 6.30 , 49.66 ± 8.25 and 44.47 ± 7.07 respectively. After soaking the raw rice grains for 24 hours prior to cooking, the glycaemic index were 58.13 ± 3.23 , 44.42 ± 12.31 and 55.09 ± 5.33 respectively. Amylose content of unsoaked rice were 20.73%, 26.24% and 23.34% respectively. Soaked PWK had significantly higher degree of gelatinization ($p < 0.05$) at 68.58 ± 3.58 compared to the store bought sample (48.77 ± 1.25) and BK (41.70 ± 7.07). However there was no significant association between the iAUC ($r = 0.407$, $p > 0.05$) and the GI value ($r = 0.537$, $p > 0.05$) with degree of gelatinization. The BK variety is the most widely preferred for its appearance, aroma, colour, taste and texture. The lowering of glycaemic index may be explained by the higher amylose content.

PP-D08 Nutrition and lifestyle behaviour among Malaysian adults with metabolic syndrome: A qualitative perspective

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Metabolic Syndrome (MetS) prevalence in Malaysia is found to be among the highest in the world causing a devastating economic burden and increasing demand and dependency on the country healthcare system. Therefore, there is an amplified need to find a cost-effective and multi-faceted approach for adults with MetS. An onward and progressive lifestyle diseases such as MetS needs an efficient primary care to support its prevention and management strategy. However, in Malaysia, MetS screening and diagnosis rates are very low thus elucidated a very vague picture of its associated lifestyle behaviour risk factors. To address this gap and prepare for an intervention development focusing on MetS awareness and its linkage to lifestyle behaviour, six focus groups (FGs) were conducted on Malaysian adults with MetS (N=21) whom attended a private clinic, MONASH Medical Precinct, in Subang Jaya. Three major themes reported as significant to influence poor lifestyles behaviour includes 1) limited knowledge on general wellbeing, 2)

not knowing the risk of MetS outcomes, and 3) concerns or doubts about primary care services. Consequently, five major themes were found to be influencing good lifestyles behaviour includes 1) a confidential peer and social support system, 2) an established healthcare professionalism, 3) continuous referral and support following diagnosis, 4) increase sense of risk through engagement in poor lifestyle (high-risk behaviours), and 5) sense of responsibility to protect self, family and community support. Findings from our study provide a relevant input for how to construct a current and effective MetS lifestyle interventions as well as to enhance management strategies for Malaysian adults with MetS.

PP-D09 Personal, organizational, environmental, and political factors influencing self-care management of diabetics as mediated by social support: basis for an empowerment program

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This study determined the personal, organizational, environmental, and political factors that influenced self-care management of diabetics as mediated by social support in Zimbabwe. Descriptive-correlation design was used. The structured equation modelling was used to come up with the new model for self-care management. Using convenience sampling 340 diabetic patients from all of the ten provinces in Zimbabwe, who were thirty five years old and above participated as respondents. The respondents had good knowledge about diabetes and a positive attitude towards self-care management. Medical supplies and utilities and a multi-disciplinary team were rarely available. Healthy foods were never available, and exercise facilities were often available. Furthermore, the political factors were seen to be of low priority to the government, as indicated by low prioritization by the government on diabetes management and food policies. Family and peer support were moderate. The respondents also had good self-

care management. Females are better in self-care management than men. Those whose income are higher and are younger do better in self-care management. Both peer support and family support mediated self-care management. Peer support fully mediated attitude and availability of medical supplies and utilities. Family support fully mediated knowledge. Both, family and peer support partially mediated availability of healthy foods, exercise facilities and prioritization by the government. Availability of multidisciplinary team has a direct effect on self-care management. Based on the results, an empowerment program was developed to improve self-care management of diabetics by addressing the predictor factors.

PP-D10 The effect of simple carbohydrate restriction on metabolic syndrome risk factors in obese adolescents

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The objective of this study was to assess the effect of simple carbohydrate restriction on metabolic syndrome risk factors in obese adolescents. One group pre and post test design was conducted in SMAN 8 Samarinda on obese adolescents aged 16-18 years. Twenty eight subjects were followed up for 9 days with intervention diet. The programme consisted of simple carbohydrate intake restriction and replaced with complex carbohydrate, protein, fat, vitamin and mineral through the school time which is snack time (at 10.15 a.m) and lunch time (at 12.15 p.m). The anthropometric, blood pressure and blood samples for fasting glucose and triglyceride were taken before and after 9 days intervention. The data were analysed with t-test. Twenty eight students (11 boys and 17 girls) completed the intervention. There were significant differences for BMI, waist circumference, blood pressure, fasting glucose and triglyceride. Body mass index decreased from 31.29 kg/m² to 30.84 kg/m² (p<0.001), waist circumference 97.78 cm to 94.69 cm (p<0.001), blood pressure 131.04/85,32 mmHg to 127.04/82,39 mmHg (p<0.001), fasting glucose 88.29 mg/dl to 84.43 mg/dl (p<0.001) and triglyceride 129.29 mg/dl to 113 mg/dl (p<0.001). The daily intake of energy was reduced 202.89 kcal/day. Simple carbohydrate restriction for 9 days improved body mass index, waist circumference, blood pressure, fasting glucose and triglyceride.

PP-D11 Perceived barriers of breastfeeding among postnatal mother at Pontian Health Clinic

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This cross sectional study aimed to determine the perceived barriers of breastfeeding towards exclusive breastfeeding among postnatal mother at Pontian Health Clinic. The study involved 411 postnatal mothers with postnatal aged ≤ 2 years-old were selected systematically. Mothers of infants with serious illness, congenital problems, inborn errors of metabolism and transfer out to other districts were excluded from the study. Data were collected via self-report and face-to-face interview using a structured questionnaire which comprised of socio-demographic background and Breastfeeding Perceived Barrier Scale. The measure consists of 22 items covering maternal, infant and socio-environmental factors (Cronbach's $\alpha = 0.838$). There was 63.7% postnatal mother who successfully practice exclusive breastfeeding and 36.3% were non-exclusive with mean age of 31.31 ± 5.44 years-old. Result showed total mean breastfeeding barrier among postnatal mother are 58.23 ± 10.86 which mean low level of breastfeeding barrier. Total mean maternal, infant and socio-environmental barriers factor score show less than 3 (low barrier) but there are specific barriers item show high barrier (score > 3) which are mothers' lack of knowledge (3.6 ± 1.13), infant unable to latch properly (3.3 ± 1.14), infant refusal on breast milk (3.3 ± 1.07), mothers' feel not enough milk (3.4 ± 1.12), uncomfortable breastfed in public (3.4 ± 1.04) and lack of husband encouragement (3.1 ± 1.09). Study also showed statistically significant difference (p < 0.05) for specific barriers item toward exclusive breastfeeding which are breastfeeding can disturb mothers body image, had not enough skills, insufficient or no milk, mothers' not good in breastfeeding, having previous bad experience, return to work, long working hours and lack of nurse or midwife encouragement. Thus, health care professionals together with the family members and community should work together to overcome these barriers and raise the awareness about the importance of breastfeeding.

PP-D12 Prevalence and risk factors of hyperglycemia and obesity in hypertensive patients in Indonesia

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The objective of this study was to determine the prevalence and risk factors of hyperglycemia and obesity in hypertensive patients. A cross sectional study was conducted on a total of 362 adult male and female adults aged 35-60 years who suffered from hypertension living in selected rural (Lampung Province) and urban areas (West Java Province), and fulfill criteria of inclusion and exclusion. The selection of samples was simple random sampling based on the medical records of hypertensive patients who visited the community health center 'regularly' for 6 months. The results showed that among hypertensive patients, prevalence of hyperglycemia, obesity (based on body mass index) and central obesity (based on waist circumference) were 10.8% (14.4% urban and 7.7% rural areas, $p < 0.05$), 24.3% (37.1% urban and 13.3% rural areas, $p < 0.05$) and 60% (85.9% urban and 41.1% rural areas, $p < 0.05$), respectively. The most dominant risk factors associated with hyperglycemia in hypertensive patient was area of residence after controlled by level of education (OR: 11.25, 95% CI 1.99; 63.44), rice consumption (OR: 3.86, 95% CI 1.03; 16.74), age (OR: 2.44, 95% CI 1.01; 8.84), and central obesity (OR: 2.15, 95% CI 1.30; 7.73). Respondents who lived in urban areas have 11.90 times higher risk for hyperglycemia than those who live in rural areas ($p = 0.01$, 95% CI 2.04; 29.39). The prevalence of hyperglycemia and obesity in all hypertensive patients were higher in urban population, aged ≥ 49 years old, female, 'no regularly' exercise, low educational level, rice consumption (> 3 times/day) and fat intake. Knowing the prevalence of these comorbidities is important for determining the size of the population that may benefit from strategies that reduce blood glucose and body weight while controlling blood pressure.

PP-D13 Serum 25-hydroxyvitamin D and risk of nasopharyngeal carcinoma at recruitment: a hospital based case-control study in Malaysia

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Serum 25-hydroxyvitamin D (25(OH)D) deficiency may be one of the underlying molecular mechanism through which chronic inflammation is associated with risk of nasopharyngeal carcinoma (NPC). However to date no study has been conducted to determine an association between the two. This study aimed to examine the association between serum 25(OH)D and risk of NPC. A multi-centric case-control study was conducted from 17th July 2012 until 31st January 2016. Patients with confirmed NPC based on histological report and cancer free hospital controls from two local hospitals were assessed for serum 25(OH)D status and other factors. Each of the 300 NPC cases was matched with a control for age, gender and ethnicity. A weak positive significant correlation between physical activity intensity and serum 25(OH)D concentrations were reported. Mean serum 25(OH)D was significantly lower in NPC patients compared with controls. In a multiple logistic regression analysis controlling for factors such as BMI, physical activity, smoking status, alcohol consumption, consumption of food high in vitamin D and salted fish consumption, higher levels of serum 25(OH)D had a protective effect on NPC risk (OR = 0.97, 95% CI : 0.95, 0.99). Concentration of serum Vitamin D from 23.68 - < 27.88 ng/mL (third quintile) was found to independently increase risk of NPC by more than two-fold (OR = 2.37, 95% CI: 1.20, 4.68). Serum 25(OH)D insufficiency was a significant mediator of the association of all risk factors with risk of NPC. Serum 25(OH)D insufficiency with accumulation of other risk factors showed a dose response relationship with NPC risk especially after addition of the second risk factor using fractional polynomial analysis. This study provides evidence for a positive association between the serum 25(OH)D deficiency and NPC risk. A prospective study on the Malaysian population is a high priority to confirm these findings.

PP-D14 The effect of tempe drink intervention on lipid profile in hypercholesterolemic subjects

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Clinical studies have shown that 25 g of soy protein per day has been able to decrease total cholesterol and LDL. In Indonesia, soybean is commonly processed into one of the traditional Indonesian food such as tempe. The aim of this study was to analyse the effect of tempe drink intervention on lipid profile of hypercholesterolemia subjects. This study used a Randomized Controlled Trial (RCT) design with 51 males and females subject with the inclusion criteria were adults aged 25-55 years, not being menopause and pregnant, total cholesterol levels ≥ 200 mg/dl and signed informed consent. The subjects were divided into three treatment groups - Tempe Drink of A (TDA) formulated from local sprouted soybean, Tempe Drink of B (TDB) formulated from imported soybean, and control. The tempe drink was given three glasses a day for four weeks, contained at least 25 g of soy protein per day. The control group was not given the tempe drink. Blood samples for analysis of lipid profile (total cholesterol, LDL, HDL and TG) were collected before and after intervention. The results showed that both TDA and TDB decreased LDL of subjects significantly, respectively 3.6 mg/dL dan 1.0 mg/dL compared to control subjects. There were no significantly different on the effect of TDA and TDB to total cholesterol, HDL and TG of subjects compared to control subjects. This implies that tempe drink had beneficial health effect on lowering LDL.

Group F: Food Science and Technology

PP-E01 Screening of aflatoxin M1 occurrence in selected milk and dairy products in Terengganu, Malaysia

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The study was conducted to screen the occurrence of aflatoxin M1 (AFM1) in 53 selected milk and dairy product samples (11 liquid milk, 12 powdered milk, 8 3-in-1 beverages, 6 condensed sweetened milk, 2 evaporated milk, 7 cultured milk drink, 5 yogurt and 2 cheese samples). These samples were purchased from selected markets in Terengganu, Malaysia in January 2014 based on a questionnaire survey among 212 respondents on the types and brands of milk and dairy products that were frequently consumed. Based on the responses, 53 milk and dairy products were purchased and the competitive enzyme-linked immune-absorbent assay (ELISA) method was used to determine the level of AFM1 in the samples. Of 53 samples, 19 samples were positive with AFM1 (35.8%) ranging from 3.5 to 100.5 ng/L. Although 4/53 (7.5%) of the tested samples had the contamination level greater than the European Commission (EC) limit (>50 ng/L), the contamination levels were still below the Malaysia Food Regulation 1985 limit (less than 500 ng/L). This study provided a pioneering data on the occurrence of AFM1 in milk and dairy products in Malaysia.

PP-E02 Quality characteristics of barley perling by-products with different cultivars and particle size

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This study evaluated the quality characteristic of barley perling by-products of different cultivars (*Dahan, Hinchalssalbori, Heukgwang, Huknuri* and *Boseokchal*) by particle size. Five barley cultivars were ground, sieved (100, 160, 425, 850 μ m) and we have analyzed the Arabinoxylan, β -Glucan, Total polyphenol contents and antioxidant activities to obtain grain fractions. Differences among barley cultivars were all items. Total Arabinoxylan was the highest in barley by-products from Boseokchal in medium particle size fraction. Total β -Glucan contents of Boseokchal, Hinchalssal, Dahan, Heukgwang and Huknuri were especially higher in medium particle size fractions, with content ranges of 2.52-3.83, 4.06-5.09, 3.95-5.56, 2.50-4.51 and 3.63-5.76 g/100g, respectively. The total polyphenol (TPC) of the barley by-products from samples were quantified spectrophotometrically, and their antioxidant activities were determined using DPPH and

ABTS radicals. The total polyphenol contents were the highest in by-products from Boseokchal and Hinchalssal medium particle size grains. TPC of Boseokchal and Hinchalssal, content ranges of 5.60-7.00 and 4.24-6.58. ABTS radical scavenging activities with content ranges of 5.06-7.25, 3.31-7.42, 5.19-7.53, 4.57-6.28 and 2.78-4.9 mg ascorbic acid eq/g, respectively. DPPH radical scavenging activities with content ranges of 3.92-4.48, 2.26-4.24, 2.58-4.82, 2.50-4.48 and 2.50-4.49 mg AA eq/g, respectively. ABTS and DPPH radical scavenging activities were the highest in barley by-products from Dahan in medium particle size fraction. In this study, medium particle size would enrich the functional components and it is desirable to consider the best particle size range to enrich the antioxidant activities. These results provide useful data for selection of an appropriate cultivars and perling by-products particle size to achieve a high quality in barley by-products processing.

PP-E03 Ultrasound-assisted extraction of antioxidant, total phenol and flavonoid from water and ethanol extract of *Trigona* spp. propolis collected from three provinces of Indonesia

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Propolis is resinous substance that is collected by honeybees to construct their hives. It is known as a natural product that has various compounds which depend on bee species, environment and preparation. This study was aimed to investigate the effect of origins and solvent on the quality of extracts obtained from *Trigona* spp. propolis. Ultrasound-assisted extraction was performed to yield the extract. The effect of the origins of propolis (Banten, South Kalimantan and South Sulawesi) and two solvents (water and ethanol) were evaluated on the basis of the antioxidant activity, total phenol and flavonoid of the propolis extract. The result showed that the origins of propolis, solvents and their interaction significantly affected antioxidant activity and total flavonoid ($P < 0.05$). Total phenol was only affected significantly by the solvents ($P < 0.05$). Antioxidant activity of *Trigona* spp. propolis from Banten ($IC_{50} = 571.59$ ppm) significantly higher than South Sulawesi ($IC_{50} = 637.97$) and Kalimantan ($IC_{50} = 747.71$ ppm) ($P < 0.05$). The extract from South Sulawesi (0.31 %wb) exhibited higher total flavonoid than

Banten (0.14 %wb) and South Kalimantan (0.21 %wb) ($P < 0.05$), while no difference was found in total phenol content. Regardless of the origins of propolis, ethanolic extract was significantly higher in antioxidant activity ($IC_{50} = 526.48$ ppm), total phenol (2.21 %wb) and flavonoid (0.25 %wb) than water extract (778.37 ppm, 1.38 %wb, 0.19 %wb, respectively) ($P < 0.05$). We conclude that, the origins of *Trigona* spp. propolis influence antioxidant and total flavonoid of the extract and the quality of ethanolic extract is better than water extract.

PP-E04 Developing fortified rice product rich in micronutrients for preventing anaemia of Indonesian teenage girls

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This study aimed to develop a micronutrient fortified rice for preventing anaemia among Indonesian teenage girls. The micronutrient to be fortified and their level were developed through literature review, expert review, and sensory test. Considering nutritional anaemia is mainly caused by deficiency of iron, zinc, folic acid, vitamin B1, B2 and A, therefore a mixture of these nutrients (the premix) were added to rice product developed. To produce 40 kg fortified rice kernel was produced from a mixture of 5 kg premix, 45 kg rice flour (variety of IR 42), and 4.5 L water using extruder machine. The rice kernel from extruder was dried at 80°C until the water content of the premix kernel is about 14%. The dried rice kernel was subsequently packaged into aluminium foil pack, each pack for 2 kg rice kernel then was stored in a cold room at 19-22°C before use. Sensory test was applied to identify the acceptable level of rice kernel to be mixed with natural rice. Five alternative levels of rice kernel (1%, 1.5%, 2%, 2.5%, and 3%) in 150 g cooked rice were selected for the sensory test. The results showed that the highest sensory test score (the sum of colour, odor and taste scores) of fortified cooked rice was for the rice kernel level of 1%, which was not significantly different from the sensory test score

of the rice kernel levels of 1.5% and 2%. However, it was different from the sensory test score of the rice kernel levels of 2.5% and 3%. Considering the rice kernel level of 2% could fulfill at least 70% of the micronutrients, the rice kernel level of 2% was selected as the best level. This implies that the fortified rice could be used for clinical trials to prevent nutritional anaemia of teenage girls.

PP-E05 TempeCal : The innovative product based on tempeh

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Tempeh is a traditional fermented soybean product, which is normally produced by cottage industry in Malaysia. It is normally consumed as fried, boiled, steamed or roasted. Fermentation process of tempeh increases the nutritional values of some nutrients, development of vitamins, phytochemicals and antioxidative constituents. The retention of the whole bean in tempeh making, give tempeh a higher content of protein, dietary fiber and vitamins. Fermentation process of tempeh decreases the phytic acid and enhances the bioavailability of minerals such as calcium, zinc and iron. In Malaysian diet, tempeh is also one of the calcium rich food source besides milk and dairy products. A local study (Hasnah et al. 2010) has reported that tempeh may provide readily available calcium for this population of women at risk for low bone mass. Due to differences in the calcium content of tempeh, four servings of tempeh would be needed to get the same amount of absorbed calcium as that obtained from a 4-ounce cup of milk. Thus, TEMPECal, a high calcium tempeh was newly developed and patented by The National University of Malaysia (UKM IKB/108/2/710). It contained calcium content that is three times higher than the normal tempeh. One serving of TEMPECal (50 g) contains calcium content that is equivalent to the calcium from a cup of milk. TEMPECal also contained higher amount of total ash, magnesium and potassium contents compared to the one in normal tempeh. In terms of appearance and sensory acceptance, TEMPECal is whiter and was well accepted as the normal tempeh, respectively. TEMPECal, the newly developed high calcium tempeh can be an alternative source of calcium

and adding to the different range of tempeh based products available in the market.

PP-E06 Physicochemical and radical scavenging properties of functional fruit beverages during storage

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A storage study of 60 days was conducted on mixed berries (MB), longan red dates (LD) samples and samples added with multi-enzyme complex (MBE and LDE) at room temperature ($25^{\circ}\text{C} \pm 2^{\circ}\text{C}$) and accelerated temperature ($45^{\circ}\text{C} \pm 2^{\circ}\text{C}$). Proximate analysis and antioxidant analysis (2, 2-Diphenyl-1-Picylhydrazyl (DPPH) Assay) was performed according to the Official Methods of Analysis of the AOAC. The initial moisture, protein, fat and ash content for all samples were reported to be low, ranging from 1.29% to 1.64%, 0.01% to 0.06%, 1.34% to 1.90% and 0.14% to 2.80% respectively. Nevertheless, the carbohydrate content found were high in all samples, ranging from 94.20% to 96.70%. The initial DPPH radical scavenging activities for MB, MBE, LD and LDE were 52.79%, 65.09%, 46.17% and 46.00% for 4.98, 5.81, 4.53 and 4.52 mg/100ml of juice respectively as vitamin C equivalents (VCEAC). The reduction in DPPH radical scavenging activity and increased in total soluble solids (TSS) content were shown as the results associated with the addition of multi-enzymes complex in MBE and LDE. All samples stored at $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $45^{\circ}\text{C} \pm 2^{\circ}\text{C}$ showed significant changes ($P < 0.05$) in their moisture, protein and fat content, DPPH scavenging activities and colour. These effects were notably greater when stored at accelerated temperature. Only LD was shown to have microbial growth on plate count agar and malt extract agar on the 30th and 60th day of storage. Viscosity, TSS and pH of LD had also varied significantly throughout the 60 days of storage at both storage temperatures. This research showed that only MB, MBE and LDE were microbiologically safe for consumption after the 60 days of storage at both temperatures, and there were notably loss of quality in physicochemical properties and DPPH scavenging activities throughout the storage duration.

PP-E07 Influence of organic acids and heat treatment on ginsenoside conversion

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Panax ginseng Meyer has been used as a medicinal agent for thousands of years, and is a well-known herbal medicine and functional food in East Asian countries. Heat treatments are applied to ginseng products for improving physiological activities through the conversion of ginsenosides, which are key bio-active components of ginseng. During heat treatment, organic acids can affect ginsenoside conversion. Therefore, the influence of organic acids during heat treatment should be considered. Raw ginseng, crude saponin, and ginsenoside Rb1 standards were treated at 130°C with different organic acids, and the chemical components, including ginsenosides and organic acids, were analyzed. The organic acid content in raw ginseng was 5.55%. Organic acids were not detected in crude saponin that was not subjected to heat treatment, whereas organic acids were found in crude saponin subjected to heat treatment. Major ginsenosides (Rb1, Re, and Rg1) in ginseng and crude saponin were converted to minor ginsenosides at 130°C; the ginsenoside Rb1 standard was very stable in the absence of organic acids and was converted into minor ginsenosides in the presence of organic acids at high temperatures. The major factor affecting ginsenoside conversion was organic acids in ginseng. Therefore, the organic acid content as well as ginsenoside content and processing conditions should be considered as important factors affecting the quality of ginseng products.

PP-E08 Changes in estrogenic activity of black soybean (*glycine max L*) with high hydrostatic pressure treatment and pre-germination

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We investigated the influence of germination and high hydrostatic pressure (HHP) treatment on the estrogenic properties and conversion of the phenolic compounds in black soybean. The black soybean was germinated for two- or four-days, and then subjected to HHP at 0.1, 50, 100, or 150 MPa for 12 or 24 h. The highest total polyphenol content (3.90 mg GAE/g), flavonoid content (0.79 mg CE/g), phenolic acid content (938.34 µg/g), and isoflavonone content (2562.77 µg/g) were observed after germination for four days and HHP treatment at 100 MPa for 24 h. Phenolic acids can be divided into two categories; those that exhibit increased content upon HHP treatment, and those that exhibit decreased content. The increasing phenolic acids were homogentisic acid, gentisic acid, (+) catechin, p-coumaric acid, ferulic acid, naringin, salicylic acid, and naringenin. In terms of isoflavone composition, the malonyl glycoside, β-glycoside, and acetylglycoside contents decreased, while the aglycone content increased with germination and HHP. The highest proliferative effect (147.43%) is observed at four days germination and HHP treatment at 100 MPa for 24h. These results suggest that application of HHP may provide useful information with regard to the utility of black soybean as alternative hormone replacement therapy with minimal risks.

PP-E09 Optimisation of fermented maman (*Cleome gynandra L.*) as probiotic food high in Lactic acid bacteria (LAB)

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Objective of this study was to optimise fermented maman (*Cleome gynandra L.*), local food from Rokan Hulu District Riau Province, as probiotic food high in lactic acid bacteria (LAB). Complete randomised design trial was carried out by modifying the salt concentration (2% and 7%) and the amount of rice (5% and 15%) along with one control (5% salt and 10% rice). Furthermore, sensory evaluation, microbiological analysis (availability of mold/yeast and level of LAB) and crude fiber were analysed. There were no effect of the addition of salt and rice to the level of preference of colour (p=0.387), aroma (p=0.290) and texture (p=0.644) of fermented maman (*Cleome gynandra L.*). However, the higher the concentration of salt and rice were added, increasing preference level of panelists to taste (p=0.005) of fermented maman (*Cleome gynandra L.*). The higher the

concentration of rice and salt was significantly enough to optimise the growth of LAB ($p=0.000$) and reducing dietary fiber ($p=0.000$) in the product. Nevertheless, fermented maman (*Cleome gynandra L.*) with salt concentration 5% and 10% rice was the most optimal product based on the level of LAB (2.40×10^8 cfu/gr), crude fiber (0.360 gr/100 gr) and the level of acceptance. The high level of LAB may be classified this local product as a source of probiotic food to prevent metabolic syndrome.

PP-E10 Changes in isoflavone composition and estrogenic activity of soybean (glycine max) with germination

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It not only contained a high content of isoflavone but also had estrogenic activity. Estrogenic activity of Aga 8 and Cheongja 3 soybean extracts increased from 116.21% and 101.60% to 135.34% and 121.05% after germination. Isoflavones are a class of phytoestrogens that structurally resemble 17 β -estradiol (E2) and have weak estrogenic activities, and they can mimic or modulate the actions of endogenous estrogens in vertebrates by binding to estrogen receptors (ERs). We confirmed that soybean had an estrogenic activity and that germination treatment improved this activity, enhanced extraction of genistein and conversion of isoflavone may positively impact estrogenic activities. These results suggest that germinated soybean of Aga 8 and Cheongja 3 might have a potential preventive effect on estrogen-deficient diseases.

PP-E11 High hydrostatic pressure treatment for enhancement of shelf-life and chemical characteristics of *Angelica keiskei* vegetable juice

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This study was investigated to changes in pH, color and microbial counts (aerobic bacteria) during storage of *Angelica keiskei* vegetable juice with non-sterilization, UV-irradiation and high hydrostatic pressure sterilization. *Angelica keiskei*

vegetable juice was pressurized at 600MPa for 5 and 15min as high hydrostatic pressure sterilization. UV-irradiation treatment conditions are 35~45Hz of speed and 254nm wavelength. Treatment volumes are 15~25L. And both samples are compared with non-sterilization. Storage periods are 7days and storage temperature is 4°C. All samples are decreased pH values from 6.10 to 5.66 during storage. ΔE_{ab} value of non-sterilization and UV-sterilization are increased after 4day. Non-sterilization juice is biggest change of color at 4day and UV-irradiation treatment is biggest at 7day. Pressure treatment *Angelica keiskei* vegetables juice were not difference during storage periods. Microbial counts of non-sterilization *Angelica keiskei* vegetable juice are the highest in 2day (3.06×10^7 CFU/mL) and decreased to 7day (5.20×10^6 CFU/mL). UV-sterilization juice are increased up to 1.19×10^7 CFU/mL during storage periods. Pressurized juice are decreased the microbial counts less than 1.00×10^3 CFU/mL. These results indicated that the high hydrostatic pressure can be used as a sterilization method for preserving *Angelica keiskei* vegetable juice better than UV-irradiation treatment.

PP-E12 Kelulut honey suppresses iNOS expression and NO production in lipopolysaccharides-induced RAW 264.7 murine macrophages cell line

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Kelulut honey (KH) is the honey produced by stingless bees from *Trigona* species. It has been shown that KH possesses strong antioxidant and anti-bacterial properties. This present study aims to examine the anti-inflammatory potential of KH in lipopolysaccharides (LPS)-induced RAW 264.7 murine macrophages cell line. Generally, RAW 264.7 cells were pretreated with KH up to the concentration of 1% (v/v) for 2 hours prior to the addition of LPS (1 μ g/ml) for another 22 hours. Results showed that KH did not increase the intracellular free thiols level in RAW 264.7 cells. On the other hands, Pretreatment of cells with KH can reduce the production of nitric oxide (NO)

in a concentration-dependent manner, with the highest inhibition was detected in cells pretreated with 1 % of KH ($71.09 \pm 1.74\%$ as compared to cells induced with LPS only; $p < 0.001$). Furthermore, the induction of inducible nitric oxide synthase (iNOS) by LPS was suppressed by KH pretreatment in a concentration-dependent manner as well ($p < 0.001$). However, pretreatment of cells with KH did not inhibit the induction of cyclooxygenase-2 (COX-2) by LPS. In summary, KH up to the concentration of 1 % (v/v) was able to suppress the induction of iNOS expression and hence, reduce the NO production in LPS-induced RAW 264.7 cells.

PP-E13 Effect of Adding Extra Dragon Fruit as Natural Dyes Based on making traditional cake as “Kue Talam” with pure basic taro (colocasia esculenta) on Glycemic index, Content of Nutrition and Power Received

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Dragon fruit extract and taro puree can be used as raw materials for baking trays which have an influence on the quality of the traditional cake, nutrient content, glycemic index, organoleptic and acceptability. The purpose of traditional cake with pure taro and dragon fruit extract is to identify quality, nutrient content, acceptability, and the glycemic index of traditional cake. The study is an experimental research and results showed that the addition of a dragon fruit extract and mashed taro affect the colour and texture of the cake tray, influence the content of nutrients and has no effect on the glycemic index. The addition of a dragon fruit extract and mashed taro affect the nutrient content when compared with SNI already meet the standards except the water content of the traditional cake, affect the texture and colour of the traditional cake, but does not affect the glycemic index, which includes the category of high glycemic index. Additionally, traditional cake is not recommended for use for people with diabetic syndrome, but it is still safe if consumed by non-diabetic persons.

PP-E14 Aflatoxin B₁ and aflatoxin M₁ binding by *Lactobacillus casei* Shirota and *Bifidobacterium breve*

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Aflatoxin B₁ (AFB₁) and aflatoxin M₁ (AFM₁) are fungal metabolites and ubiquitously found in food and agriculture commodities. Both aflatoxins have adverse health effects on humans. Probiotic bacteria have demonstrated potential to bind aflatoxins and reduce their bio-accessibility. It is hypothesized that co-incubation of probiotic bacteria with aflatoxins leads to the adsorption of aflatoxin molecules to the bacterial cell wall. Therefore, this study was conducted to determine AFB₁ and AFM₁ binding ability between viable and non-viable probiotic *Lactobacillus casei* Shirota (LcS) and *Bifidobacterium breve* (Bifido). LcS was cultured on MRS agar under aerobic condition (37°C, 48 hr), whereas Bifido was cultured using MRS agar supplemented with 0.05% cysteine HCl under anaerobic condition (37°C, 48 hr). Next, a few colonies were transferred to their respective broths (LcS: MRS broth; Bifido: MRS broth + 0.05% cysteine HCl), and further incubated. Then, bacteria ($>10^8$ CFU/mL) were harvested and incubated either as viable (in 4 mL of PBS, 1 hr), heat-treated (boiled in 4 ml of PBS, 1 hr) or acid-treated (incubated in 4 mL of 2 M HCl, 1 hr). All bacterial samples were centrifuged and supernatant was removed prior to aflatoxin binding assays (10 ng/g of AFB₁/AFM₁). Following the binding assays, the concentration of AFB₁ and AFM₁ was determined using HPLC-FLD. The percentage of AFB₁ removal was not significantly different between viable LcS (26.7±1.7%) and viable Bifido (24.2±2.4%). Although not significant, viable Bifido (31.6±2.1%) had higher AFM₁ binding than viable LcS (23.5±9.0%). In addition, heat-treated Bifido had higher percentage of AFB₁ (48.2±2.4%) and AFM₁ (37.8±9.2%) removal than acid-treated bacteria. It is postulated that heat exposure caused changes to the bacterial cell wall, which allowed more aflatoxin molecules to be adsorbed. Due to that, further studies on bacteria cell wall structure are warranted to explore aflatoxin binding by probiotic bacteria.

PP-E15 Food safety knowledge, attitudes and practices of food handlers at night markets in Selangor

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Foodborne disease is an important cause of morbidity and mortality around the world. Food handlers' knowledge, attitudes and practices regarding food safety are essential to prevent foodborne disease. This cross-sectional study aimed to determine the associations between socio-demographic factors, knowledge, attitudes and practices on food safety and also to compare food safety knowledge, attitudes and practices between food handlers in urban and rural areas of Selangor. A total of 354 night market's food handlers were recruited in this study. Data were collected using a modified self-administered questionnaire consisted of socio-demographic characteristics section and knowledge, attitudes and practices on food safety section. Majority of food handlers were Malaysian (97.7%) and male (74.4%), with mean age of 32.6 years. About 70.0% and 70.5% had attended at least secondary school and food handler training program, respectively. 34.4% of them had monthly income of less than RM 1000. In general, the food handlers had good level (>50%) of knowledge and attitude with mean score of 70.2% and 80.9% respectively. However, they have moderate level (60-80%) of practice with mean score of 74.5%. Significant correlations were found between age ($r=0.117$, $p<0.05$), sex ($r=0.277$, $p<0.01$) and attitude level ($r=0.485$, $p<0.01$) with food safety practice level. Although not significant ($p>0.05$), food handlers in urban areas had higher level of food safety attitudes and practices than food handlers in rural areas. Nonetheless, they were found to have lower level of food safety knowledge than food handlers in rural areas. Perhaps, there are still many food handlers in Selangor who do not realize the importance of food safety knowledge and how it should be translated into attitude and practice. Therefore, programmes related to food safety education should be implemented especially among food handlers as they play a crucial role in preventing foodborne disease throughout the chain of food production.

PP-E16 Degradation features of ginsenoside Rb₁, Re and Rg₁ with citric acid by thermal treatment

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Heating temperature and acid concentration were major factors affecting conversion of ginsenoside, which are major active components in ginseng by thermal treatment, and ginsenoside Rb₁, Re, and Rg₁ are major ginsenosides of raw ginseng. Therefore, more research is necessary to determine thermal degradation features of major ginsenosides. Ginsenoside Rb₁, Re, and Rg₁ standard solutions were treated with different concentrations (1, 2, and 3 mM) of citric acid at different temperatures (110-150°C), and ginsenoside compositions of these ginsenoside samples were analyzed using a HPLC. All ginsenosides were stable at high temperature, however all ginsenosides with citric acid were easily converted to their minor ginsenosides by thermal treatment. Ginsenoside Rb₁ was converted to Rg₃(S), Rg₃(R), Rk₁, and Rg₅, and Re was converted to Rg₂(S), Rg₂(R), Rg₆, and F₄, and Rg₁ was converted to Rh₁(S), Rh₁(R), Rk₃, and Rh₄ by thermal treatment. Conversion ratio of ginsenosides increased with increasing temperature and acid concentration, and loss of ginsenoside content occurred at 150°C. Correlation between ginsenoside and factors, including temperature and acid concentration were similar in ginsenoside Rb₁, Re, and Rg₁, and these factors were negatively correlated with major ginsenosides, including Rb₁, Re, and Rg₁, and positively correlated with minor ginsenosides. The results from this study indicated that appropriate temperature was below 140°C due to loss of ginsenoside content, and organic acid content should be considered on thermal treatment for ginsenoside conversion.

PP-E17 Functional and antioxidant properties of novel snack crispy crackers substituted with dried indigenous vegetables powder

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Mon-pu (*Glochidion perakense*) is indigenous vegetables from Southern Thailand. Scientific research has strongly suggested that were rich in antioxidant content and high nutritional value. The aim of this study was to examine the suitability of substituting different amount of dried mon-pu powder (0.0%, 2.5%, 5.0%, 7.5% and 10.0% w/w) in novel crispy crackers to enhance dietary fiber and antioxidant content. Physicochemical properties, nutritional value, antioxidants activity and sensory evaluation of samples were examined and compared with control crispy crackers. The results showed that moisture content (%), bulk density (g/cm³), linear expansion (%), expansion index (%) and oil absorption (%) of new crispy crackers showed different from control. Redness value (a*) and Hardness (N/cm²) increased when increase in the level of powder (p<0.05). But, crispness were decreased (p<0.05). Fat and Carbohydrate contents decreased as dried mon-pu powder increased from 0.0% to 10% while ash increased. The total dietary fiber (%), total phenolic content (mg GAE/100 g), and exhibit potent antioxidant activity as assessed by DPPH radical scavenging activity, and FRAP assay showed different from control. Finally, 9-point hedonic scale was done with consumers. Color (7.5-8.7), odor (from 6.5-7.9), taste (from 6.5-7.8), crispness (from 7.2-8.8), and overall-liking (6.5-8.6) were found. This study demonstrated that dried mon-pu powder affects important characteristics of novel crispy cracker. In addition, 7.5% w/w of dried mon-pu powder crispy cracker gave the highest overall acceptability scores (8.6). The results from this study suggest that substituting indigenous vegetables powders into the crispy crackers can be improved the functional properties of the snack and it is a potential functional food ingredient high in fiber content and antioxidants activity that may be processed into flour and used in food applications, such as crispy crackers to be a healthy snack.

Group F: Experimental Nutrition

PP-E01 *Coleus amboinicus* leaves extract to attenuate creatinine and macrophage inhibitory factor (MIF) in gout arthritis induced mice

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The present study described the phytochemical profile of *Coleus Amboinicus* leaves extract, collected in the area of Surabaya East Java of Indonesia, as well as their protective effects against renal dysfunction in induced gout arthritis in mice. *Coleus amboinicus* extract were obtained from the leaves of the plant by 96% ethanol maceration and analysed by spectrophotometry. This was randomised pretest-posttest control group design with single blind approach. Thirty (30) mice were divided into five groups: Control with Placebo (K); Induced Group (P1); induced + 32 mg/kg BW extract (P2); induced + 64 mg/kg BW extract (P3); induced + allopurinol (P4). Renal dysfunction was induced by intraperitoneally injection of oxonic acid (OA) 2% and uric acid (UA) 1.5% to mice during 15 days. *Coleus amboinicus* leaves extract was administered in P2 and P3 group for 7 days after induction. The principal compounds detected are: Phenol Galic Acid (16.6%), Flavonoid Quercetin (1.83%), Alkaloid Quinine (8.2%). Furthermore, we found that *Coleus amboinicus* extract significantly decreased the creatinine of induced mice (p=0,005) as well as increased of Macrophage Migration Inhibitory Factor (MIF) activities in treatment group (p=0,046). These findings suggested that *Coleus amboinicus* leaves extract protected against renal dysfunction in oxonic and uric acid induced mice. These effects are partly due to the potent antiinflammation properties of these leaves.

PP-E02 Study on the effect of glutamate on satiety and perceived hunger among primary school children in Malaysia

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Satiety is an important determinant of energy intake. Monosodium glutamate (MSG) has been shown to enhance satiety and reduce hunger among infants, adults and elderly; however, its effect among Asians, specifically Malaysian children, remains unknown. Thus, this crossover study is planned with the aim of investigating the effects of glutamate on perceived hunger and satiety among Malay, Chinese and Indian primary school-aged children. A total of 102 participants aged 9-11 years with equal numbers of the three ethnicities will be recruited into this study. Children with severe food allergies, any

medical conditions or developmental issues that influence body weight, metabolism or appetite, will be excluded. A preload meal (with MSG or without MSG) will be given on the experimental day, followed by an *ad-libitum* meal 45 minutes later. Appetite ratings of hunger, fullness, desire to eat, desire to snack, and thirst will be recorded using visual analogue scale before the preload and at intervals of 15 minutes post-ingestion for a total of 75 minutes. Participants have to carry out sensory evaluation test using seven facial hedonic scale after the preload and *ad-libitum* meal. Objective satiety will be assessed by calculating total energy intake consumed during the *ad-libitum* meal by food weighing method. In light of the unknown relationship between biochemical effects of glutamate and obesity among Southeast Asian population, and specifically in Malaysian children, this study will examine the role of glutamate on appetite regulation among children using validated methodology. It is hypothesized that glutamate will affect satiety and perceived hunger among 9-11 year-old children.

Nutrition Society of Malaysia 32nd Annual Scientific Conference

Abstracts for

Poster Presentations (Undergraduates)

Group A: Nutritional Status (Various Groups) and Community Interventions

A-UG-01 Social media use, body image and body weight status: comparison between university students with and without disordered eating in Universiti Putra Malaysia

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Disordered eating and body dissatisfaction are increasingly common among university students. Its risk increases with the increasing use of social media and Internet exposure among university students. This cross-sectional study aimed to compare social media use, body image, and body weight status between disordered eating (DE) and non-disordered eating (NDE) university students. A total of 505 university students (22.6% males and 77.4% females) with a mean age of 21.26 ± 1.41 years from three randomly selected faculties in UPM were screened for disordered eating. Sociodemographic background and anthropometric measurements including weight, height, waist circumference, and body fat percentage of respondents were obtained. One in five of the respondents (21.0%) were engaged in disordered eating with no sex difference was observed ($\chi^2=0.976$, $p=0.323$). These 106 disordered eating (DE) university students were matched with another 106 non-disordered eating (NDE) university students by sex, age and ethnicity to compare their body image, social media use, and body weight status. More DE respondents (21.7%) were overweight and obese when compared with NDE respondents (19.8%). No significant differences were observed in body dissatisfaction, selfie sharing, social media use, photo investment, and photo manipulation between DE and NDE groups. However, DE respondents reported to have significantly higher frequency of selfie taking as compared to NDE respondents ($t=-2.338$, $p=0.020$). Findings suggest that frequency and volume of social media use and self-photo-related activities may not be distinguishable between university students with and without disordered eating. Longitudinal research is recommended to be carried out to identify the contribution of specific characteristics of social media use in terms of its content and context to the development of disordered eating.

A-UG-02 Comparing player's experience (enjoyment, self-efficacy and perceived exertion) between exergame and aerobic dance exercise among primary school student in Kota Bharu, Kelantan

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Lack of physical exercise is one of the major factors contributing to childhood obesity. Thus, to overcome this problem, some of the countries have implemented exergame as one of the activities in the Physical Education (PE) to attract the student to be physically active. Therefore, the aim of this study was to compare the player's experience in term of enjoyment, self-efficacy, and perceived exertion between exergame and aerobic dance exercise. This cross-sectional study was conducted at four primary schools in Kota Bharu, Kelantan. The participants ($n=104$, male=48: female=56) were randomly selected by choosing only one class from each school. All of them were Year Five student. The study was conducted during PE period. The finding showed that there was statistically significant difference on the perceived exertion ($p = 0.010$) between exergame (mean = 2.10, SD = 1.47) and aerobic dance exercise (mean = 1.70, SD = 1.68). Conclusion, aerobic dance exercise may not be replaced with exergame in physical education. However, this interactive video game may be excellent tool to promote physical activity among children.

A-UG-03 Agreement between PAQ-C and pedometer in classifying physical activity levels of children aged 7 to 10 years in Kuala Lumpur, Malaysia

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Physical Activity Questionnaire for Older Children (PAQ-C) and pedometers are commonly used to assess physical activity of children. However, there has been only one international study that assessed convergent validity of self-reported PAQ-C with objective method of pedometer step counts. This study aimed to determine agreement between PAQ-C and pedometer in classifying physical activity levels of children aged 7 to 10 years. A cross-sectional study was conducted on 102 children (46 boys; 56

girls) from 10 primary schools in Kuala Lumpur, Malaysia. Physical activity level was assessed by PAQ-C and pedometer (Yamax Digiwalker CW-700) for seven consecutive days. Based on PAQ-C summary scores and pedometer step counts, 25th and 75th percentiles were used as cut-off points to classify children into three physical activity levels (sedentary, moderately active, and active). Mean PAQ-C score was 2.38 ± 0.55 , with significantly ($p < 0.01$) higher scores obtained among boys (2.56 ± 0.58) compared with girls (2.24 ± 0.47). The children recorded average pedometer steps of 8925 ± 2649 per day, with weekday step counts (9318 ± 3207) significantly ($p = 0.001$) more than weekend step counts (8387 ± 2940). Only 10.9% boys and 14.3% girls achieved recommended pedometer step counts. PAQ-C scores and pedometer steps were not significantly correlated ($r_s = 0.181$, $p = 0.068$). Kappa result indicated no agreement between PAQ-C and pedometer in classifying physical activity levels ($\kappa = 0.071$, $p = 0.321$). Only 42.2% children were correctly classified in the same physical activity levels by these two methods. In conclusion, PAQ-C and pedometer did not show acceptable agreement in classification of children's physical activity levels. These two methods should not be used interchangeably in classifying physical activity levels of children. To avoid confusion, future studies may consider using only one method that is accurate in determining the physical activity levels of children.

A-UG-04 Development of the equation to estimate body weight among Malaysian elderly

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Body weight is an important measurement for many medical and nutritional procedures. When it is impossible and difficult to measure in bedridden elderly, the body weight can be estimated through equations based on anthropometric measurements. The objective of this study was to develop the equation to estimate body weight among Malaysian elderly by anthropometry measurements. A cross sectional study was carried out among community dwelling elderly aged 60 years old and above in Klang Valley area.

Subjects were recruited through convenience sampling method. Weight, height, knee height (KH), demi span (DS), subscapular skinfold (SSF), calf circumference (CC), waist circumference (WC), hip circumference (HC), mid upper arm circumference (MUAC) and wrist circumference (WrC) were measured according to International Society for the Advancement of Kinanthropometry (ISAK) protocol. Equation was generated using stepwise multiple regression analysis. First, the correlation between weight and anthropometric measurements were determined. The weight was dependent variable, meanwhile the anthropometric measurements, sex and age were independent variable. The independent variables were included progressively to obtain the best model. The measured and estimated body weight were compared by paired t-test. 170 ambulatory elderly were assessed consist of 37.6% male and 62.4% female. 68.2% of total subjects were Malay, 27.6% were Chinese and 4.1% were Indian. Mean age was (68.40 ± 5.74 years) meanwhile mean of measured body weight was (66.60 ± 12.38 kg). The resulting equation was: estimated body weight = $(0.14 * \text{Age}) + (5.48 * \text{Sex}) + (1.24 * \text{KH}) + (0.62 * \text{SSF}) + (0.16 * \text{WC}) + (0.61 * \text{HC}) - (0.16 * \text{WrC}) - 77.32$ ($R^2 = 0.88$, $p < 0.001$). Mean difference between measured and estimated body weight was statistically not significant (-0.01 ± 4.32) with $p = 0.97$. In conclusion, this equation can be used to estimate body weight among Malaysian elderly. However, further study is warranted to explore this equation in different setting specifically to local population.

A-UG-05 Development and acceptability evaluation of a nutrition education module to prevent obesity among KEMAS preschoolers

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Nutrition education becomes increasingly important as obesity rate rises among Malaysians. This cross-sectional study aimed to develop and evaluate the acceptability of an education module on healthy nutrition and active lifestyles for young children aged 4-6 years old. This study was conducted in three phases. Phase 1 was a needs assessment study conducted among 36 parents or guardians of preschoolers. A questionnaire

was used to obtain parental views on the need for nutrition education for their children prior to developing the module. Phase 2 comprises module development and content validation. The module was named 3P for “*piramid makanan, pinggan sihat, piramid aktiviti fizikal*”, and comprised three topics; (1) food pyramid; (2) healthy plate and (3) physical activity pyramid. The 3P module was presented in the form of booklets and games. Content validation was conducted among eight individuals, including health professionals, teachers and parents. Phase 3 was the evaluation on the acceptability of module, which was conducted among 36 KEMAS preschoolers. Overall acceptance score among KEMAS preschoolers towards the 3P module was 14.9 ± 0.1 out of a maximum of 15. Mean score for each criterion evaluated was the same 2.9 ± 0.1 out of 3 for information understanding, font type and ease to reading, graphic and design, liking to read the module, and 3.0 ± 0.0 out of 3 for potential of future implementation of module. In conclusion, the 3P nutrition education module for the prevention of obesity was well-accepted by KEMAS preschoolers. With some adaptation and further improvements, we expect that the 3P module could become a useful tool for teaching good nutrition and active lifestyles to young Malaysian children aged 4-6 years old.

A-UG-06 Development of interactive game-based nutrition education module for primary school children: C.H.E.F (Choose Healthy Eating and Fitness)

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An interactive game based approach is proven to enhance knowledge and promote interactive learning process. This study aimed to develop and evaluate the interactive game-based nutrition education module, C.H.E.F (Choose Healthy Eating and Fitness) for primary school children in school setting. Need assessment was conducted amongst 52 primary school children from both high performance school and non-high performance school. Based on the findings, we developed the interactive games module consist of 4 independent module. Key messages from the nutrition and physical activity guidelines was simplified and illustrated to develop our interactive game module. Content validation

was conducted among health professionals and teachers, revealed that each of the criteria evaluated has mean score more than 70%. With the revised game module, we further tested the efficiency and usability of this innovation among 78 primary school children (39 from high performance school and 39 non high performance school). An increase in total nutrition knowledge score was observed ($p < 0.05$) for participants from both schools. Pre-test total nutrition knowledge score was not different significantly among both schools. However, a significant different was found in the score for post-test ($p < 0.05$) with participants from high performance school obtained higher scores (15.5 ± 2.5) as compared to the counterpart (14.2 ± 3.3). Based on these findings, C.H.E.F (Choose Healthy Eating and Fitness) game module is suitable to be applied as an effective educational tool to increase nutritional knowledge among primary school children. Further study is warranted to test this innovative game to a larger audience and in different setting.

A-UG-07 The beauty of facebook in promoting healthy lifestyle

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Malaysians are exposed to various new social media such as Facebook, Instagram and Twitter. This study was part of Fit, Eat, Active and Training (F.E.A.T) research grant which aims to evaluate the effectiveness of a comprehensive lifestyle intervention in addressing obesity among Malaysian's adults. F.E.A.T. programme is a suburban community weight loss programme, focusing on physical, behavioural and socio-cultural aspects. However, the presentation was focused on using facebook on messaging about healthy eating and active living. The objective was to observe on responses to health messages on F.E.A.T Facebook page. F.E.A.T Facebook was created by one of the researchers and open for public view. Content posted on F.E.A.T Facebook was based on printed educational materials developed for the intervention. Data of post, reply, reach, like and share were observed for three months (from 21st November 2016 to

21st February 2017) to identify the interactions and conversations qualitatively. A total of 564 individuals liked F.E.A.T Facebook and 109 messages were posted on the facebook. Posts were characterised into six main themes based on comment on each post. Results explored six themes which were *sharing opinions, sharing practices, message delivery, barriers, persuasion and promotion of advocacy*. The highest comment was found on message delivery theme (25.6%), followed by sharing practices (22.3%), promotion of advocacy (16.5%), sharing opinions (13.3%), barriers (12.7%) and persuasion (9.7%). However, mean number of comment was the highest on barriers themes (16.50±7.23). In conclusion, this study showed facebook plays an important role in disseminating health messages.

Group B: Dietary Intake, Consumption Pattern and Disease

B-UG-01 Associations between carbohydrate intake, white rice consumption, and dietary flavonoids with indices of obesity among Malaysian adults

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The prevalence of obesity in Malaysia has risen from 4.4% in 1996 to 27.2% in 2015 as per the National Health and Morbidity Surveys. Sedentary lifestyles have been reported to be the main cause of this adverse phenomenon, but it is uncertain whether carbohydrate and white rice consumption influence obesity amongst the Malaysian population. Growing evidence shows that dietary flavonoids may help prevent obesity, but there is no local information in this regard. In this cross-sectional study, carbohydrate, white rice and flavonoid intakes of 116 adult Malaysian subjects (72% females, 28% males, which were adequate to detect a weak-to-moderate $r=0.30$ at 80% power for normally-distributed data) obtained by convenience sampling in a few communities in the Klang Valley, were assessed by using a previously-evaluated semi-quantitative food frequency questionnaire. The food items of interest were then quantified using the excel-driven innovative tools- DietPLUS and FlavonoidPLUS which were developed at the IMU. Obesity indices including body mass index (BMI), percentage body fat (%BF), waist circumference (WC) and waist-to-height ratio

(WHtR) were assessed as per anthropometric standard protocols. Negative correlations were found between carbohydrate intake (g) and %BF ($r = -0.249$, $p = 0.007$) white rice intake (g) and %BF ($r = -0.253$, $p = 0.006$), and flavonoid intake with WHtR ($r = -0.186$, $p = 0.045$). Lower flavonoid intake was found in the diet of female with higher WC. ($X^2 = 4.48$, $p = 0.034$) but not among males. We believe that our findings represent early information on the negative influence of carbohydrate and white rice intakes on obesity, while flavonoid intake has the opposite beneficial effect, amongst adult Malaysian subjects.

B-UG-02 Associations between socio-demographic factors, feeding practices, eating habits and body weight status with cognitive performance among pre-schoolers in Petaling Perdana district, Selangor

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Children experience rapid cognitive growth during preschool years. This study aimed to determine associations between socio-demographic factors, feeding practices, eating habits, and body weight status with cognitive performance among pre-schoolers. Through multistage sampling, 197 pairs of pre-schoolers aged 4-6 years (Boy: 47.2%; Girl: 52.8%) and their parents participated in this study. Parents completed a set of parental-administered questionnaire that assessed socio-demographic factors, feeding practices, and eating habits. Height and weight were measured, while cognitive performance was assessed using the Raven's Coloured Progressive Matrices (RCPM). Results show that 43.7% of pre-schoolers' cognitive performance were at an average level, with a mean standard cognitive score of 105.59 ± 14.17 . There was no difference in the cognitive score between sexes ($p = 0.481$), but age was positively correlated with cognitive score ($r = 0.245$, $p < 0.05$). Moreover, Chinese (109.53 ± 14.60) had the highest cognitive score as compared to Malays (102.68 ± 12.88) and Indians (90.00 ± 0.01 ; $p < 0.05$). Pre-schoolers whose parents with tertiary education attainment had a higher cognitive score than their counterparts (Father: $p < 0.05$; Mother: $p < 0.05$). Monitoring in child feeding practices was positively correlated with cognitive score of pre-schoolers ($r = 0.172$, $p < 0.05$). The mean cognitive score was lower among those

who skipped meals than those who had regular meals (Breakfast: 100.93±9.81 vs. 106.32±14.63; Lunch: 98.00±6.32 vs. 105.99±14.37; Dinner: 96.00±7.75 vs. 106.10±14.27; $p<0.05$). For cooking methods, children who preferred steaming food (108.70±14.41) had higher cognitive score than those who do not (103.46±13.67; $p<0.05$), but not for other cooking methods. No differences in cognitive score were found by body weight status of the children. In conclusion, younger and non-Chinese children with lower parental educational level, poorer parental monitoring in feeding, skipped meals, and disliked steaming food may have poorer cognitive performance. Hence, future nutrition education should emphasize on feeding practices, cooking methods, and eating habits in improving cognitive performance of young children.

B-UG-03 Dietary glycemic index and glycemic load are associated with blood pressure among Malaysian adults

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Hypertension is associated with increased cardiovascular risk and is a leading risk factor for premature deaths worldwide. Around 30% of Malaysians suffer from hypertension. Emerging evidence suggests that dietary carbohydrate quality (denoted by glycemic index (GI) and glycemic load (GL)) can affect cardiovascular risks, including blood pressure (BP). However, the association of dietary GI and GL with BP in Malaysian adults remains unknown. The objective of this study was to determine the association of dietary GI and GL with BP in apparently healthy Malaysian adults. This cross-sectional study included 85 participants (42.4% males) aged 25-50 years in Kuala Lumpur. Dietary intake including GI and GL were assessed using Malaysian Adult Nutrition Survey food frequency questionnaire. BP was measured using a digital sphygmomanometer, following standard protocol. Confounders including BMI, sodium intake, physical activity and stress levels were evaluated. Mean dietary GI and GL intake of the participants were 56±5 and 169±67, with reported energy and macronutrient intakes being within acceptable ranges. Thirty-seven (42%) subjects had a low-diet-GI with the rest consuming moderate-GI-diets. A significant proportion of the subjects showed pre-hypertension (26 (30.6%)) and

hypertension (17 (20%)). Median (IQR) systolic and diastolic BP were 116 (22) and 75 (18) mmHg. While 30 (62.5%) subjects with moderate GI diets had prehypertension or hypertension only 13(35%) with low-diet-GI had these abnormalities ($p= 0.038$). GI was significantly associated with systolic ($r=0.321$, $p=0.003$) and diastolic ($r=0.325$, $p=0.002$) BP. GL per 1000 kcal showed weak but significant associations with systolic ($\rho=0.274$, $p=0.011$) and diastolic ($\rho=0.306$, $p=0.004$) BP. These associations were independent of BMI, sodium intake, physical activity and stress levels. Thus, higher the GI and calorie adjusted GL, higher the BP among the participants. There is an urgent need to investigate the effect on lowering dietary GI and GL for preventing hypertension in Malaysians.

B-UG-04 Nut consumption among adults in Klang Valley and its association with selected CVD risk factors

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Cardiovascular diseases (CVD) has accounted for the highest percentage of death for all ages in Malaysia. Some of the risk factors for CVD can be controlled, treated or modified such as tobacco use, hypertension, overweight or obesity and physical activity. Evidences showed that nuts can give protection against CVD though it is an energy-dense food. Besides packed with vegetable protein, most nuts contain at least some cardio-protective substances such as unsaturated fat, dietary fibre, vitamins, minerals and many other bioactive compounds. Up-to date, we found no research on the association of nut consumption and CVD risk factors have ever been conducted in Malaysia. Therefore this study was carried out to determine the association between nut consumption and selected CVD risk factors (body mass index, waist circumference, blood pressure) among Malaysian adults. A cross-sectional study was conducted on 92 participants in Klang Valley from August to November 2016. Anthropometry data were collected using Tanita weighing scale for weight, SECA stadiometer for height and SECA measuring tape for waist circumference. Omron (HEM-7130) blood pressure monitor was used to measure blood pressure. Two-day dietary recall with one for weekday and one for weekend and nut consumption food frequency questionnaire were used to access the macronutrient intake

and nut consumption. Results showed among all types of nuts consumed, peanuts was consumed the most (76.9% in male and 67.9% in female). The amount of nuts intake was significantly associated with body mass index ($r=0.222$, $p=0.033$) but not significantly associated with waist circumference ($r=0.120$, $p=0.255$), systolic blood pressure ($r=-0.139$, $p=0.187$) and diastolic blood pressure ($r=-0.110$, $p=0.298$). We conclude that nut consumption was associated with at least one of the CVD risk factor (body mass index) though not with the others (waist circumference and blood pressure).

B-UG-05 The association of dietary glycaemic index and glycaemic load with body weight status in Malaysian adults

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Data from National Health and Morbidity Survey (NHMS) 2015 shows that more than half of Malaysian adults are overweight or obese. A meta-analysis has shown there is a weight reduction in individual with a lower Glycaemic Index (GI) and Glycaemic Load (GL) diet. However, the association between carbohydrate quality with body weight status in apparently healthy middle aged Malaysians is currently unknown. The objective of this study was to determine the association between GI and GL with body weight status among Malaysian adults. A total of 85 healthy Malaysian adults (58% female, 42% male) aged 25 to 50 y were recruited. Malaysian Adults Nutritional Survey (MANS) Food Frequency Questionnaire (FFQ) was used to capture the dietary intake including calories, macronutrients, GI, and GL, and analysed using DietPlus version 3. To assess body weight status, Body Mass Index (BMI), Waist circumference (WC), Waist-Hip Ratio (WHR) and Body Fat Percentage (BF%) was measured and calculated as per standard guidelines. The mean BMI was 25.72 ± 5.65 kg/m², but 64% of the subjects were overweight or obese. However, majority of the subject had a normal WC and WHR. The mean GI was 56 ± 5 , mean GL was 169 ± 67 with the macronutrient nutrient intakes being within acceptable ranges. No significant association was observed between GI with BMI, WC and BF%. Similarly, no significant association existed between GL with BMI, WC, WHR and BF%). Nevertheless, GI was associated with WHR; subjects with higher WHR had a higher diet GI (44% in low GI and 56% in moderate GI,

X^2 Fisher exact result = 5.831, $p = 0.019$. Therefore, higher dietary GI is associated with higher WHR among middle aged Malaysians. The effect of lowering dietary GI in combating central obesity in Malaysians needs to be further investigated.

B-UG-06 Determination of healthful food decision making in response to traffic light colour-coded nutrition labelling in pre-packaged foods of two major types of retail food outlets in Kelantan

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Although nutrition labelling on food products has emerged as a prominent and powerful policy tool for promoting healthy eating, it is typically underutilized by consumers. Implementation of practical and easy way of reading nutrition labelling is highly crucial to guide the selection of foods among consumers. None of the studies have been carried out to assess the nutrition labelling of pre-packaged foods by employing the colour-coded traffic light systems (TLS) among retail food outlets in Malaysia. Therefore, the aim of the present study was to assess the nutrition labelling of all pre-packaged foods for key nutrients such as total fat, saturated fat, sugar and salts in two major types of retail food outlets in Kelantan, based on the colour-coded TLS. Two convenience stores and two supermarkets, respectively, were randomly selected from the lists of all retail food outlets available in Kota Bharu, Kelantan. Detailed information of pre-packaged foods such as name, brand and nutritional content per serving and/or per 100g for five main categories of fresh food, beverages, chilled and frozen foods, grocery and infant food products were collected. Nutritional contents of four nutrients in these five food groups were then assessed by the TLS as low (green), medium (amber) and high (red) levels. A total of 6683 pre-packaged food products were sold in these four retail outlets. Of these, only 38.1% (2549) pre-packaged food products were presented with a complete nutrient profiles for four key nutrients studied. Overall, almost half of the food products marketed 52.7% (1345) were "less-healthy" products (TLS score \geq 9); while 38.9% (990) of these products were classified as "medium-healthy" products. Using the TLS score, only 8.4% (214) food products were classified as "healthy" (TLS score \leq 5). Moreover, almost similar

patterns were found in terms of healthiness of food products sold in convenient food outlets and supermarkets, in which most of the products were classified as "less healthy" (51.9%-55.6%), and "medium healthy" (34.4%-39.7%), in contrast to food products being classified as "healthy" (7.7%-10%). Thus, further nutrition promotion efforts should be required to encourage manufacturers to improve the nutritional profile of all pre-packaged foods, and not just those specifically labelled as healthier-based foods.

B-UG-07 Dietary intake and healthy eating index among Malaysians young adults

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Young adults tend to practice unhealthy eating behaviour and this has contributed to the rise in obesity. A case-control study was conducted on 294 private universities students to explore the differences in dietary intake and quality between normal-weight (NW) and overweight/obese (OW/OB) young adults in Klang Valley, Malaysia. Respondents completed a set of questionnaire and three days 24-hour dietary recall. Weight, height, body fat percentage, visceral fat and waist circumference of respondents were measured. Dietary intake of respondents was analysed and their diet quality was evaluated using a healthy eating index (HEI) scale. Results displayed OW/OB group had significantly higher water ($p=0.029$), energy, protein, carbohydrate, fat and sugar intake ($p<0.001$) than NW group. OW/OB group also had significantly higher micronutrient intake than NW group except for vitamin C and D. The total HEI score was significantly lower in OW/OB group [45.14 (11.13)] than NW group [51.43 (11.61)]. OW/OB group achieved a significantly higher component score for cereals, grains ($p<0.001$) and meat, legumes ($p=0.005$) than NW group. HEI analysis also displayed OW/OB had significantly higher percentage of energy from fat ($p<0.001$) and saturated fat ($p=0.023$), cholesterol ($p<0.001$) and sodium intake ($p<0.001$) than NW group. The highest component score was found to be meat and legumes serving [8.69 (2.13) and 9.32 (1.67) for NW and OW/OB group, respectively] whereas the lowest component score was found to be fruits serving [1.47 (3.08) and 1.0 (2.38)]. Inconclusively, though OW/OB group had higher consumption of cereals, grains and meat, legumes than NW group, both of the groups had low fruits, vegetables, milk and milk products

consumption and less varied, high fat and sodium diet. Therefore, present findings suggest the need for appropriate intervention on food groups' diversification which relates to increment and reduction of macronutrients and micronutrients intake can be conducted among young adults.

Group C: Nutrients and Other Components in Foods / Products

C-UG-01 Total lipid and vitamin E content in conventional and free-range eggs of chicken, duck and quail

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Poultry eggs have long been acknowledged as nutrient-rich food. In Malaysia, duck and quail eggs are also commercially available with the most commonly consumed chicken eggs. There is a perception in public that the nutritional quality of free-range eggs is superior to the conventional eggs. The objective of this study was to determine and compare the total lipid and vitamin E content of the conventional and free-range eggs of chicken, duck and quail. Three eggs from each types of poultry eggs from conventional and free-range production systems were collected and analyzed. The total lipid of the raw eggs was extracted using chloroform/ methanol (2:1, v/v) and the vitamin E content was analyzed by high performance liquid chromatography. The total lipid ranged from 22.8-32.6% in yolk and 8.0-13.5% in whole eggs with duck eggs and quail eggs possessed significantly higher total lipid in conventional and free-range eggs respectively. Only quail eggs showed a significant difference in yolk lipid among eggs of different production systems. Alpha-tocopherol isomer was found to be predominant in all egg samples, followed by β -, α - and γ -tocotrienols that occurred in smaller quantities, and δ -tocotrienol isomer ranged rarest to none in the egg samples. The total vitamin E of eggs ranged from 1.51-8.20 mg/100g with quail eggs contained significantly higher amount of total vitamin E in both conventional and free-range production systems. Compared with eggs of different production systems, chicken and quail eggs showed significantly higher total vitamin E in free-range eggs whereas duck eggs possessed significantly higher total vitamin E in conventional eggs. Although there were significant differences

in total lipid and total vitamin E among the eggs from different bird species and production systems, the differences can be attributed to other factors such as feed and environment.

C-UG-02 Proximate composition of chicken burgers from night stall and selected fast food restaurants

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Burger is one of the most popular fast food in Malaysia because it is convenient and easy to serve and eat. In Malaysia, the use of chicken in burger is more preferred due to religious reason. The purpose of this study was to determine and compare the proximate composition of chicken burgers from night stall and selected fast food restaurants. The analyses used to determine proximate composition of burgers were AOAC Official Methods 973.48, 960.39, 991.43, 990.19 999.11 for protein, fat, fiber, moisture and ash, respectively except total available carbohydrate where the values were calculated using differential weights of all compounds. Energy contents of samples were calculated based on 4, 4, 9 kcal/g for carbohydrate, protein and fat, respectively. The results showed that protein content of fast food restaurants samples ranged from 14.48%-18.6%, while for night stall samples the protein ranged from 13.26%-19%. Meanwhile, fat content of fast food restaurants burgers ranged from 18.57%-19.11% where fat content of samples from night stall ranged from 26.33%-28.0%. Most night stall chicken burgers had lower levels of protein and higher levels of fat content. Night stall burgers had higher fiber content ranging from 0.14%-0.20% compared to fast food restaurant burgers which ranged from 0.11%-0.16%. Burgers from fast food restaurant had higher carbohydrate content ranging between 17.77% -18.55% compared to night stall samples (7.70%-8.94%). Fast food restaurant burgers had lower ash content than night stall chicken burgers. Overall, energy content ranged between 296-360 kcal. In general, significant differences were observed in protein, fat, carbohydrate, energy and ash contents but not for moisture and fiber contents of the studied burgers indicating nutritional composition can be affected by source of purchased besides method of preparation.

C-UG-03 Proximate composition analysis of *Nephelium mutabile* Seed (Pulasan's Seed), *Anacardium occidentale* (Almond) and *Prunus dulcis* (Cashew)

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Almond and cashew nuts can be served as snacks due to its healthy properties and high availability in Malaysia. However, lack of reliable nutrient composition of these snacks and its expensive cost may cause consumers to opt for unhealthy snacks instead of healthy nuts such as almond and cashew because there is no cheaper alternative available for them. This study aimed to determine the proximate compositions of pulasan's seed as a cheaper potential alternative snack compare to almond and cashew. All the analyses were performed according to AOAC Official Methods except for available carbohydrate content which calculated based on 'by-difference'. All the analyses were conducted in one to two independents experiments and duplicate for each experiment. Total energy content was calculated by the summation of the multiplication of protein, fat, available carbohydrate and fiber content by 4,9,4 and 2 kcal/g respectively. The results obtained showed that cashew has the significantly higher moisture content (18.46%) compare to almond (5.595%) and pulasan's seed (8.635%). Meanwhile, all the samples have low ash content (2.145-2.785%) on wet weight basis. Almond (26.76%) has the significantly highest protein content among pulasan's seed (13.59%) and cashew (22.00%). Pulasan's seed (61.29%) has the higher lipid content compare to almond (46.63 %) and cashew (44.79%). All the samples were reported to have low total dietary fibre (0.435-1.721%). Almond (16.55%) has the highest available carbohydrate among pulasan's seed (13.90%) and cashew (11.43%). All the samples have high energy content (537.9-662.5kcal/100g edible portion). The mean values of the results were significantly differences ($p < 0.05$) among the samples in one-way ANNOVA. Pulasan's seed can be used as an alternative snack to almond and cashew. However, overconsumption of the snack should be avoided because it may result in excessive energy intake. The consumption of pulasan seed, almond and cashew snacks according to nutritional need is recommended.

Group D: Clinical Nutrition / Intervention Trials**D-UG-01 Serum nitric oxide level is associated with blood pressure among Malaysian adults**

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Metabolic syndrome (MetS) is considered as a global time bomb and the most common metabolic risk factor is hypertension. One of the associated risk factors that may lead to hypertension is the endothelial dysfunction, which is characterized as the impairment of vasodilator, particularly the bioavailability of nitric oxide (NO). However, evidence in the literature on the association between serum NO with blood pressure is unclear. To the best of our knowledge, none of the studies on the association of serum nitric oxide level with blood pressure has been reported among Malaysian population. The objective of this study was to investigate the association of serum vitamin D level and serum nitric oxide level with blood pressure amongst Malaysian adults. This is a cross-sectional study among 78 participants, aged 20 to 50 years. The weight and height of the participants were determined using a weighing scale and a collapsible stadiometer respectively. Dietary intake were assessed by using Food Frequency Questionnaire and 2-days 24-hour dietary recall method. Blood pressure was measured using an automatic blood pressure monitor. Serum nitric oxide level were assessed using Griess method. Spearman's correlation test showed that serum nitric oxide level were significantly associated with right arm ($r = 0.290$, $p < 0.05$) and left arm ($r = 0.365$, $p < 0.001$) systolic blood pressure as well as with right arm ($r = 0.323$, $p < 0.05$) and left arm ($r = 0.295$, $p < 0.05$) diastolic blood pressure. Meanwhile, vegetables intake was also significantly associated with right arm systolic blood pressure ($r = -0.255$, $p < 0.05$) and left arm diastolic blood pressure ($r = -0.248$, $p < 0.05$). In the present study, health effect of NO towards a lower BP was not observed in this study, nevertheless the study reaffirms the protective effects of vegetables intake in promoting healthy blood pressures.

D-UG-02 Association of serum nitric oxide with body mass index and waist circumference among Malaysian adults

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Obesity is one of the major risk factors of chronic diseases. Various studies have shown that vitamin D deficiency is associated with obesity. Emerging evidence showed that obesity is correlated with nitric oxide (NO) bioavailability, however, the results were contradicting. No studies on the association of vitamin D and NO with body weight status was conducted in Malaysia. The objective of this study is to examine the association of serum vitamin D and NO levels with body weight status among Malaysian adults. This was a cross-sectional study in which 78 subjects aged 20 to 50 years were recruited using convenience sampling. Social demographic profiles and physical activity level were obtained using questionnaire. Dietary intake was derived from the average of 2-day 24-hour diet recall and Food Frequency Questionnaire (FFQ). Body mass index (BMI), waist circumference (WC) and percent body fat were assessed. Fasting blood samples were collected and analysed for serum 25-hydroxyvitamin D [25(OH)D] and NO levels. Mean serum 25(OH)D level was 50.84 ± 22.23 nmol/l. Median serum NO level was 16.13 (8.97) nmol/l. Serum 25(OH)D level was found to be inversely associated with percent body fat ($r = -0.334$; $p = 0.004$). Higher serum NO level was significantly associated with higher BMI and WC ($r = 0.366$; $p = 0.001$ and $r = 0.462$; $p < 0.001$ respectively). In the current study, no associations could be observed between NO and indicators of obesity, nevertheless having healthy levels of vitamin D levels may have an effect in prevention of obesity.

D-UG-03 Association of serum vitamin D and nitric oxide (NO) Levels with lipid profile among Malaysian adults in Klang Valley

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Evidence has shown that vitamin D and nitric oxide (NO) levels are associated with serum

lipids. However, data from the Asian population is limited. Hence, the objective of this study was to investigate the association of serum vitamin D and NO levels with lipid profile among Malaysian adults in Klang Valley. A cross-sectional study was conducted among 78 Malaysian healthy adults aged 20 to 50 years. Fasting venous blood was used for the analysis of serum 25-hydroxyvitamin D [25(OH) D], NO levels and lipid profile. The serum 25(OH) D was analysed using electrochemiluminescence binding assay (ECLIA), serum NO was analysed using Griess Assay, and serum lipid profile was analysed using enzymatic methods. Socio-demographic data was also collected. Descriptive statistics and correlation test were used in analysing the data. The mean age of the respondents was 36.4 ± 9.4 years. The average serum 25(OH) D and NO levels were 50.8 ± 22.2 nmol/L and $16.1 (9.0) \mu\text{M}$ respectively. Significant positive moderate correlation was found between serum 25(OH) D and triglyceride (TG) ($\rho = 0.274$, $p = 0.015$). Significant positive moderate correlation was also found between serum NO and TG ($\rho = 0.603$, $p < 0.001$), as well as total cholesterol to high-density lipoprotein cholesterol ratio (TC: HDL-C ratio) ($\rho = 0.384$, $p = 0.001$). A significant negative moderate correlation between serum NO and HDL-C ($r = -0.320$, $p = 0.005$) was also observed. Serum 25(OH) D was significantly associated with serum NO levels ($\rho = 0.392$, $p < 0.001$). Higher levels of serum vitamin D and NO levels was associated with specific indices of hyperlipidaemia. Hence this study indicates that healthy levels of vitamin D and nitric oxide levels may be beneficial in maintaining healthy levels of blood lipids.

D-UG-04 Association of serum vitamin D and serum nitric oxide levels with fasting blood glucose level among Malaysian adults

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Elevated fasting blood glucose (FBG) levels is an important risk factor of Metabolic Syndrome (MetS). It was reported that approximately 85% of people who have Type 2 Diabetes Mellitus (T2DM) also have MetS leading to a higher risk for cardiovascular diseases. Various studies reported that serum vitamin D and serum nitric oxide (NO) levels may also be closely associated with FBG levels. Vitamin D plays a major role in absorbing

minerals such as calcium and phosphorus which are essential for the development and maintenance of strong bones. NO plays an important role in normal endothelial function. Currently, no local studies have been carried out to determine the associations between serum vitamin D and serum NO levels with FBG levels. The objective of the present study was to determine the associations between serum vitamin D and serum NO levels with FBG levels among Malaysian adults. This cross-sectional study was conducted on 78 subjects in the age group of 20-50 years, in Klang Valley. A self-administered questionnaire comprising of demographics, medical history, and gynaecological history was used to obtain information from the subjects. Serum vitamin D, serum NO and FBG levels were evaluated using electro-chemi-luminescence binding assay (ECLIA), Griess Assay, and auto analyser respectively. There was a significant moderate positive correlation between serum vitamin D and serum NO levels ($r = 0.392$, $p = 0.001$). No significant association was observed between serum vitamin D and FBG levels ($r = -0.010$, $p = 0.931$) as well as between serum NO and FBG levels ($r = 0.083$, $p = 0.473$). In the present findings, no associations could be observed between vitamin D and fasting blood glucose, nevertheless the present study indicates that having healthy levels of vitamin D levels may be crucial to support the role of nitric oxide at cellular levels. Further studies are required to determine the roles of vitamin D and nitric oxide in prevention of non-communicable diseases.

Group E: Food Science and Technology

E-UG-01 Physicochemical and morphological properties of chicken sausages added with selected vegetables

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Physicochemical and morphological properties of chicken sausages added with selected vegetables (baby corn, carrot and cabbage) and commercial sausage were determined. The preliminary formulation was conducted with various percentages (4%, 6%, 8%, and 10%) of vegetables addition in sausage formulations. The best percentage formulation of sausages was selected for further analyses such as microstructure, chemical composition and sensory evaluation.

Based on the preliminary study which focuses on the sensorial properties, sausages formulated with 6% vegetables were selected as the best formulation. The result of proximate contents showed significant differences ($p < 0.05$) among the samples. The range of moisture content was 65.85-67.15%, the ash content was 1.90-2.40%, while protein content was 11.89-15.68%. Control sausage and sausage added with baby corn were significant differences in the folding test, with the highest score (5.00) compared to commercial sausage. The pH values of control and chicken sausages containing selected vegetables were significantly higher, which in range 6.7-6.9, than the commercial sausage, whereas, cooking yield of commercial sausage was significantly higher than the sausage added with carrot and cabbage. The texture profile showed that both adhesiveness and springiness attributes were not significantly different among all sausages. However, control and sausages added with baby corn and cabbage were significantly harder than commercial sausages due to different in fat level contents. Microstructure of sausages was also studied by scanning electron microscopy (SEM). The analysis of microstructure showed that sausage with vegetables had a less dense microstructure mainly due to the high in moisture content. Sensory evaluation result demonstrated that no significant differences in colour, taste, flavour and aroma attributes of all samples. However, there were slightly significant differences in overall acceptance attribute between sausages with selected vegetables and commercial sausage. In summary, sausages added with selected vegetables resulted higher in moisture, ash and protein content but unchanged adhesiveness and springiness attributes. The addition of vegetables in sausages formulation were not affecting sensory descriptors which the consumer is familiarized.

E-UG-02 Nutritional and physico-chemical properties of baked-based products formulated with natural sweetening agents

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Excessive refined-sugar consumption affects all age groups and has been linked to obesity, type 2 diabetes and heart disease, which lead to higher health costs. Therefore demand for increased utilization of 'healthier' alternative source of sugar sounds promising. Due to this interest, the

development of chiffon cakes formulated with natural sweetening agents such as honey, nypa palm sugar and palm sugar were investigated to analyse its nutritional compositions, textural properties and sensory acceptability. The different types of sweeteners used as ingredients in chiffon cakes were standardized by its brix value and mass. Fat content decreased from nypa palm sugar (11.2 ± 1.1), palm sugar (11.0 ± 0.6) and honey formulated chiffon cake (9.84 ± 0.6) which were significantly lower than in control chiffon cake (13.5 ± 0.9 , $p = 0.004$). Control chiffon cake (23.4 ± 4.3) has the lowest moisture compared to nypa palm sugar, palm sugar and honey (45.20 ± 0.05 , 43.8 ± 0.1 , 42.0 ± 0.14 , $p < 0.00$) with statistical difference. The content of both protein and ash has no significant differences in all four cake formulations. The highest scores of all sensory attributes were recorded by control chiffon cake (30.9 ± 5.4 , $p = 0.08$) followed by cake formulated with palm sugar (29.4 ± 5.2) while honey had the least scores for all attributes (28.6 ± 4.2). However there were no significant differences between all types of chiffon cakes with control chiffon cake in all sensory attributes evaluated by all panellists. The texture profile analysis parameters such as firmness, resilience, chewiness and gumminess of chiffon cakes had significant differences in some of the treatments while cohesiveness and springiness parameter did not ($p = 0.5$, $p = 0.05$). In conclusion, the different types of natural sweeteners can be used in bakery products without affecting much the sensory properties and texture while it may increase nutritional compositions.

E-UG-03 Comparison of antioxidant content and activity by different solvents and polarities of pulasan rind

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Pulasan (*Nephelium mutabile*) which have similar attribute to rambutan was believed to possess high antioxidant potential. This study was aimed to determine and compare effect of solvent polarities on total phenolic (TPC), total flavonoid content (TFC) as well as antioxidant capacities of pulasan rind extracted with water and ethanol (40, 60, 80%). TPC and TFC were evaluated by using Folin-Ciocalteu and aluminium chloride colorimetric method respectively, while antioxidant capacities were determined by

DPPH radical scavenging and FRAP assays. The maximum phenolic content was found in water extract of pulasan rind at 1.071 mg GAE/g DW followed by 80% ethanolic extract (1.002 mg GAE/g DW). Whereas for TFC, the maximum flavonoid content was found in 60% ethanolic extract of pulasan rind at 1.738 mg QE/g DW followed by 80% ethanolic extract (1.423 mg QE/g DW). Similar to TPC, the pulasan rind exhibited the highest antioxidant activity when extracted with water 0.508 mg Fe²⁺/g DW followed by 80% ethanolic extract (0.476 mg Fe²⁺/g DW). However, antioxidant activity as assessed by DPPH radical scavenging assay showed the highest antioxidant activity in 80% ethanolic extract of pulasan rind (88.85%) followed by water extract (80.41%). A strong positive relationship ($r = 0.655$) was found between TPC and antioxidant capacities of Pulasan rind as shown by Pearson correlation test. This indicated that high antioxidant capacities of Pulasan rind were partly due to high TPC. Results from this study also showed that there was no significant different ($p > 0.05$) on antioxidants capacities between water extract and 80% ethanolic extract, which suggest that water could be used as extractor of antioxidants for Pulasan rind. In conclusion, water and 80% ethanol Pulasan extracts may be used as nutraceutical in the future.

E-UG-04 Determination of total microorganisms count and *Vibrio* species profile in freshwater fish

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Fish consist of freshwater fish and marine fish are known as one of the main protein sources in human diet. Freshwater fish has a great taste, rich with nutritive values and many health benefits. Freshwater fish appealed to be a potential vector of *Vibrio* microorganisms such as *V. cholerae*, *V. parahaemolyticus* and *V. vulnificus*. However, little is known about the microorganisms risk assessments especially *Vibrio* microorganisms in freshwater fish as there is no standard of permissible for *Vibrio* microorganisms in Malaysia. Therefore, it is crucial to acknowledge the presence of *Vibrio* microorganisms in freshwater fish to ensure food safety pertaining freshwater fish consumption. To assess the microorganisms risk and presence of *Vibrio* microorganisms in freshwater fish, different species of freshwater fish ($n=10$) were obtained from wet markets and supermarkets within

Kota Bharu, Kelantan. The total plate count and *Vibrio* microorganisms' profile were determined according to Bacteriological Analytical Methods. The results had shown that 'Tilapia Hitam' had the highest microorganisms count at 2.75×10^6 cfu/ml as compared to the other freshwater fish samples. The limit for total microorganisms count in fishery products of Malaysia is at 10^6 cfu/ml, and 100% of the freshwater fish samples in this study were within the permissible limit. For the *Vibrio* microorganisms' profile, *V. cholerae* was 100% detected throughout the freshwater fish samples. In conclusion, it was suggested that *Vibrio* microorganisms can be found in freshwater fish, thus proper handling of freshwater fish must be practiced in order to decrease the incidence of foodborne illness due to these microorganisms. Further research should be done to enhance the food safety of freshwater fish consumption, hence able to set the standard of permissible for *Vibrio* microorganisms in Malaysia.

E-UG-05 Sensory preference and detection threshold for sweet taste among undergraduate university students

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This study was carried out to determine the sensory preference and detection threshold for sweet taste among Malay, Chinese and Indian undergraduate students in Health Campus, Universiti Sains Malaysia. A number of 90 students from three ethnic groups (Malay, Chinese and Indian), aged from 19 to 27 years old were conveniently selected as panellists in this sensory laboratory study. Detection threshold for sweet taste was conducted using Three-Alternative Force Choice (3-AFC) method in standard sucrose solutions. Sensory preference test was ranked using 9 point hedonic scale for sweetness in tea beverage. The results indicated that Chinese panellists had the lowest detection threshold for sweet taste (4.41 mM) compared to Malay (6.46 mM) and Indian panellists (8.53 mM). Detection threshold for sweet taste based on gender differences showed that female panellists had lower detection threshold (5.52mM) for sweetness, compared to male panellists (7.21 mM). Ethnicity and gender among panellists did not show significantly difference in the detection threshold for sweet taste. For sensory preference ranking, Indian and Malay panellists preferred higher level of sweetness (7.5% w/v)

in tea beverage, compared to Chinese panellists (2.5% w/v). Sensory preference based on gender differences showed that Chinese male and female panellists had the lowest preference for sucrose concentration in tea (2.5% w/v) as compared to Malay males and females (7.5% w/v) and Indian males (7.5 % w/v) and females (5.0 % w/v). Ethnicity and gender among panellists did not show significantly difference in the preference of sucrose concentration in tea beverage. The result in this study showed that there are some difference in detection threshold and preference towards sweet taste substance observed among Malay, Chinese and Indian students. Female panellists were more sensitive in detecting sweetness.

E-UG-06 Determination of total microorganisms count and *Vibrio spp.* profile in crustaceans

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Vibrio microorganisms are very common in coastal environments, thus they are usually present in seafood. The most prevalent *Vibrio* microorganisms discovered in seafood, particularly crustaceans are *V. parahaemolyticus*, *V. cholerae*, and *V. vulnificus*. However, currently in Malaysia, there is no set standard for the permissible limit of *Vibrio* microorganisms in crustaceans, hence the aim of this study was to acknowledge their presence in crustaceans available in Malaysia. The methodology being utilized in this study was as according to Bacteriological Analytical Methods from the Food and Drug Administration. For this study, 10 different species of crustaceans were purchased from markets around Kota Bharu, Kelantan and were analyzed both for the total microorganisms count and *Vibrio* microorganisms' profile. The results had shown that *Metapeneopsis barbata*, or sand prawn is the type of crustacean which had the highest microorganisms count at 1.33×10^{10} cfu/ml as compared to the other tested crustaceans. 30% of the samples tested had a higher microorganisms count than the established standard, in which that the limit for total microorganisms count in fishery products stated by Ministry of Health Malaysia is at most at 10^6 cfu/ml. Around 60% of the crustaceans harbored both *V. parahaemolyticus* and *V. cholerae*, which could lead to health complications if prepared inappropriately. In conclusion, by making this

information accessible to the general population, the incidence of food poisoning due to *Vibrio* microorganisms could be decreased and proper handling of crustaceans during preparation could be widely practiced.

E-UG-07 Nutritional composition and sensory acceptability of traditional kueh (*Cek Mek Molek*) incorporated with pumpkin

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Pumpkin is considered as a very healthy food due to its abundance of carbohydrate, pectin, mineral salts and vitamins inside. It is consumed in various ways, either it is freshly cooked, baked or boiled with or without additional ingredients. The use of pumpkin as the main ingredient in making delicious traditional local desserts are quite popular in Malaysia. In view of its naturally desired colour, flavour, sweetness and health benefits, pumpkin was chosen to partially substitute sweet potatoes in the formulation of making one of Malaysian traditional delicacies, *Cek Mek Molek*. The present study was undertaken to evaluate the effect of different level of pumpkin incorporation in enhancing the nutritional composition of *Cek Mek Molek*. The pumpkin was incorporated at two different levels, specifically at 25 and 50 percent replacing sweet potatoes in the formulation. The products were analysed for various nutrient and sensory attributes. Moisture (0% incorporation: 64.7g/100g; 25% incorporation: 64.0g/100g; 50% incorporation: 60.3g/100g), fat (0% incorporation: 2.8g/100g; 25% incorporation: 1.9g/100g; 50% incorporation: 1.6g/100g) and calorie (0% incorporation: 160g/100g; 25% incorporation: 158 g/100g; 50% incorporation: 109g/100g) content of the products showed significantly ($p < 0.05$) decreasing trend with increasing levels of pumpkin incorporation. However, there was a significant ($p < 0.05$) increase in the carbohydrate content. Similar trends was observed for zinc concentration (0% incorporation: 0.091mg/100g; 25% incorporation: 0.123mg/100g; 50% incorporation: 0.126mg/100g). Sensory evaluation results showed that *Cek Mek Molek* with 0, 25 and 50 percent pumpkin incorporation were significantly ($p < 0.05$) different in terms of colour, taste, flavour and overall acceptance. Overall, the finding suggests that pumpkin may be potentially used as a functional ingredients to

further enhance the nutritive values of the *Cek Mek Molek*.

E-UG-08 Development of diabetic friendly drink formulated with winter melon (*Benincasa hispida*) using different natural sweeteners

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Winter melon (WM, *Benincada hispida*) was traditionally recognized as diabetic friendly fruit. Presently, the consumption of artificial sweeteners was associated with the risk of prediabetes, diabetes mellitus type 2 and obesity. Natural sweeteners (NSs) such as honey, palm sugar syrup, and palm sap of nipah syrup were increasingly popular for exploration of the health benefits especially in diabetes care. This study was conducted to develop diabetic friendly drink formulated from WM using natural sweeteners, to analyze the physico-chemical properties and to evaluate the acceptability of WM-based drinks using different natural sweeteners. WM extracts were prepared by using low heating method. NS were prepared by using double boiling method to standardize the sweetness level ($^{\circ}$ Brix) before preparing the drinks. In physico-chemical properties, pH showed a significant difference for all WM drinks. Winter melon-palm syrup (WMPS) had significantly higher pH value (4.910 ± 0.061) compared to winter melon nypa syrup (WMNS) (5.673 ± 0.042) and winter melon honey (WMH) (5.390 ± 0.017). While, WMNS had significantly higher titratable acidity value (0.120 ± 0.010) compared to WMH (0.070 ± 0.010) and WMPS (0.050 ± 0.010). Whereas, WMH had significantly higher total soluble solid value (5.033 ± 0.05) compared to WMPS (4.967 ± 0.058) and WMNS (4.933 ± 0.058). Winter melon-nipah syrup drink had significantly increased in vitamin C content (693.533 ± 11.801 mg/g) than WMH (648.367 ± 21.950 mg/g) and WMPS (628.833 ± 17.334 mg/g). In sensory evaluation, the results of aroma showed there was no significantly difference in all WM drinks. Winter melon-palm syrup drink had a significantly higher score in taste preference compared to WMH and WMNS drinks. Winter melon-palm syrup had significantly higher score in flavour preference compared to WMH and WMNS drinks. There were no significantly differences in colour preference in all WM drinks. Most respondents preferred WMPS drink for aftertaste- attribute compared to WMNS and

WMH drinks. Based on the result of overall acceptance, WMPS drink had significantly higher score compared to WMNS and WMH drink.

E-UG-09 Physicochemical, sensory evaluation, radical scavenging activity, and consumer acceptance of a prune-based functional drink during storage

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This study aimed to study the physicochemical, DPPH radical scavenging, microbial, sensory properties, consumer acceptance, and general health assessment of prune-based functional drink during storage. For stability test, prune-based functional drinks were separated into two groups to be stored in room temperature (25° C) and accelerated temperature (45° C) and laboratory tests were carried out at baseline, 30 days, 60 days, and 90 days. Laboratory tests included DPPH analysis, physicochemical properties include pH, water activity, total soluble solids, and colour, bacteria plate count and yeast and mold plate count. For sensory evaluation, hedonic scale, JAR scale, and food action rating scale were conducted. General health assessment was determined by SF-36 and GIT questionnaire before and after they take functional drink twice a day for 60 consecutive day. Anthropometry assessment was taken biweekly. Considering the dry weight portion of proximate composition, the largest portion was crude carbohydrate (92.2%). Storage stability study demonstrating DPPH scavenging activity, pH, and TSS of functional drink was more stable at 25° C than 45° C. Fifty-eight untrained panelists in sensory evaluation showed acceptable response on functional drink except colour. Twenty subjects in consumer acceptance and general health assessment show positive improvement with significance different in emotional health and social functioning with p-value of 0.002 and 0.004 respectively. Based on gender, male (n=9) show increase in all parameters of anthropometry assessment while female (n=11) show decrease in all the parameter at 8th week of measurement. Based on level of compliance, subjects with compliance between 80 to 90% (n=4) showed decrease of visceral fat up to 25% at 8th week of measurement. Future study of antioxidant activity test on functional drink is needed to test the functionality of the functional drink.

Group F: Experimental Nutrition**F-UG-01 Investigation of inflammation biomarkers on the obese rats treated with *Spondias dulcis* (Kedondong fruit)****Chen ZS¹ and Zulhabri O²**¹Department of Healthcare Professional, Faculty of Health and Life Sciences, Management and Science University; ²Department of Diagnostic & Allied Health Science, Faculty of Health and Life Sciences, Management and Science University

Meta-inflammation is an obesity-linked inflammation affected by excessive fat accumulation in the body and may lead to non-communicable diseases. *Spondias dulcis* was illustrated as a valuable source of antioxidants. Studies show natural antioxidants may have effect on treating several human diseases, especially inflammation status. This research is aimed to investigate the effect of *Spondias dulcis* extract on inflammation status and lipid profile of obese rats. A total of 24 obese rats were divided into four groups (control (C), high dose (HD), medium dose (MD) and low dose (LD)). Obese rats were treated with *Spondias dulcis* extract for 21 days and left without treatment for 2 days after 21 days. The cholesterol levels are not significantly different between treatment groups and control group (P=0.053). The cholesterol level were significantly lowered in the treatment group as compared to non-treatment group (P=0.017). Difference in HDL levels between treatment groups and control group (P=0.00001) were significantly different. The HDL level is higher in non-treatment (P=0.00002) as compared to treatment group. There was no significant difference in LDL levels between treatment groups and control group (P=0.084). It also showed no significant difference in treatment and non-treatment (P=0.563). The treatment groups indicated a decrease of triacylglyceride level (P=0.001) as compared to control group. Interestingly, the triacylglyceride level in non-treatment (P=0.002) was increased as compared to those with treatment. Besides, tumor necrosis factor-alpha (TNF- α) of treatment groups (mean range= -40.12 to 5.73pg/mL) were lower than control group (mean= 7.87pg/mL). Whereas interleukin-6 (IL-6) decreased in LD group (mean= -2.06pg/mL) and control group (mean= -40.03pg/mL) as compare to MD group (mean= 5.5pg/mL) and HD group (7.81pg/mL). In conclusion, the amount of *Spondias dulcis* affects the inflammation status and lipid profile of obese rats. Moreover,

Spondias dulcis exhibit certain anti-lipidemic and anti-inflammation effect by reducing triglyceride level and TNF- α level.

F-UG-02 The potential of *Pithecellobium bubalinum* (kerdas) and *Pithecellobium jiringa* (jering) seeds to inhibit pancreatic lipase, α -amylase and α -glucosidase activities *in vitro***Zulika A¹, Nurul Husna S¹, Hasnah B²**¹Department of Nutrition and Dietetics; ²Department of Human Anatomy, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor.

Pithecellobium bubalinum (kerdas) and *Pithecellobium jiringa* (jering) are among the local appetizers in Malaysia that are also traditionally used for therapeutic purpose by the local folks. Further utilization of *kerdas* and *jering* seeds to be used as therapeutic agent will require more accessible information. This present study aimed to determine the potential of *P. bubalinum* and *P. jiringa* seeds to inhibit pancreatic lipase, α -amylase, and α -glucosidase activities *in vitro*. The grounded sample was extracted either in 70% ethanol, cold aqueous or hot aqueous, and a series of different concentration was prepared for all sample extracts (0 μ g/ml- 200 μ g/ml). Enzymatic inhibition assays were performed with porcine pancreatic lipase, α -amylase, and α -glucosidase assay kits. All extract types in both *P. bubalinum* and *P. jiringa* were found to inhibit pancreatic lipase, however there is no significant difference between different types of extraction and different types of samples. Whereas, all extract types were found to have the potential to inhibit α -amylase in both *P. bubalinum* and *P. jiringa*. For *P. jiringa*, there is a significant difference of inhibitory effect within same plant applies on all extraction types. For *P. bubalinum*, there is a significant difference between hot and cold aqueous as well as cold aqueous and ethanolic extract. There is also significant difference between cold and hot aqueous extract of both sample. In α -glucosidase inhibition assay, no significant difference was found between different types of extraction within the same sample and also between the same types of extraction of both plants. In conclusion, this study shows *Pithecellobium bubalinum* and *Pithecellobium jiringa* as potent plants for the inhibitory of key digestive enzymes for lipids and carbohydrate digestion, which useful in combating obesity and diabetes.

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- Annual scientific conferences
- Scientific update sessions
- Malaysian Journal of Nutrition
- Berita NSM
- Consultation with health, regulatory & scientific bodies
- Roadshows & exhibitions with nutrition screening & dietary advice for the public
- Public talks & workshops
- A comprehensive and authoritative website on nutrition for Malaysians – <http://www.nutriweb.org.my>
- Nutrition promotion programmes in collaboration with other professional bodies and private sector (eg Nutrition Month Malaysia, Healthy Kids Programme, Positive Parenting)
- Conduct research on specific community groups

Our Major Publications

- Malaysian Journal of Nutrition
- Junior Chef Cookbook Vol 1 Let's Play Healthy Cooking
- Nutritionists' Choice Cookbook (Vol 1: Healthy Recipes for Your Little Ones, Vol 2: Resipi Untuk Seisi Keluarga)
- Resipi Sihat, Pilihan Bijak (Vol 1 & 2)
- Women@Heart *Wanita & Pemakanan* manual for professionals and leaflets for public
- Malaysian Dietary Guidelines leaflets
- NMM booklets on healthy eating and active living



Nutritionists' Choice Cookbook (Vol 1 & 2), Resipi Sihat, Pilihan Bijak (Vol 1 & 2), Junior Chef Cookbook Vol 1 Let's Play Healthy Cooking



Women@Heart *Wanita & Pemakanan* manual for professionals and leaflets for public



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