



# MyBreakfast Study of School Children:

*Findings, Implications & Solutions*



## Symposium Programme & Abstracts

3 December 2015

Hotel Istana, Kuala Lumpur



Supported by:





Nutrition Society of Malaysia

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As a professional organisation, we are guided by a simple belief – the more people understand food and nutrition, the better they can care for their health and well-being.

For that reason, we support the advancement of research, sharing practical insights and important discoveries for the benefits for all.

We also support the Government's efforts in promoting healthy nutrition in the society to combat nutrient deficiencies as well as diet-related chronic diseases in the country (e.g. obesity, diabetes, hypertension and coronary heart disease).

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- Nutrition promotion programmes in collaboration with other professional bodies and private sector (eg Nutrition Month Malaysia, Healthy Kids Programme, Positive Parenting)
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## 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 Selsi 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



Malaysian Dietary Guidelines leaflets

Baby's First Bites

Breastfeed With Confidence

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## ABOUT THE SYMPOSIUM

This one day symposium will share the key findings and implications from the MyBreakfast Study to all stakeholders.

### SYMPOSIUM GOALS

- To provide update on nutritional status and physical activity level of Malaysian primary and secondary school children.
- To provide an understanding of breakfast habits and its associations with nutrient intakes, body weight status and physical activity level.
- To provide platform for discussing effective intervention programmes to further promote healthy eating and active living amongst Malaysian school children including healthy breakfast habits.

# Symposium Programme

11.00am – 11.30am

Registration of participants & welcome refreshment

11.30am – 11.40am

**Welcome Remarks**

**Presentation 1:**

Introduction to MyBreakfast Study  
by Dr Tee E Siong

11.40am – 12.00pm

**Presentation 2:**

Research methodology  
by Ms Nurliyana Abdul Razak

12.00pm – 12.20pm

**Presentation 3:**

Nutritional status of primary & secondary school children  
by Dr Tee E Siong

12.20pm – 12.40pm

**Presentation 4:**

Breakfast intake and body weight status  
by Assoc Prof Dr Mohd Nasir Mohd Taib

12.40pm – 2.00pm

**Lunch**

2.00pm – 2.20 pm

**Presentation 5:**

Breakfast foods and beverages choices  
by Assoc Prof Dr Hamid Jan Jan Mohamed

2.20pm – 2.40pm

**Presentation 6:**

Whole grain consumption  
by Prof Dr Norimah A Karim

2.40pm – 3.00pm

**Presentation 7:**

Breakfast intake, body weight status and association  
with physical activity level  
by Dr Mahenderan Appukutty

3.00pm – 4.00pm

**Presentation 8:**

Summary, key findings and recommendations  
by Dr Tee E Siong

Open Discussion

4.00pm – 4.30pm

**Refreshment & END**

# About MyBreakfast Study

**MyBreakfast Study of School Children** is a cross-sectional study that was carried out among primary and secondary school children and adolescents, aged 6 to 17 years. Initiated in 2013, MyBreakfast Study is the first comprehensive nationwide study on breakfast habits that involved a total number of 8,705 school children. Data collection was carried out in five regions of Malaysia, including Central, Southern, Northern, East Coast and East Malaysia. Sampling was based on the proportion of primary and secondary children living in the urban and rural areas of each state of the regions by ethnic groups.

The study aimed to determine socio-demographic background, breakfast habits, including the types of food and beverages that are most commonly consumed at breakfast among Malaysian school children and adolescents. The associations between body weight status, physical activity and breakfast habits were also determined.

Findings from the study will provide useful information on breakfast habits of Malaysian school children that can be used to direct promotion activities to encourage school children to consume breakfast regularly. The findings will also serve as a basis to relevant ministries, agencies and stakeholders to develop/implement appropriate intervention programmes to improve bodyweight status, dietary intake and physical activity level of Malaysian school children, building a healthier nation. This study was funded by an unrestricted research grant from Cereal Partners Worldwide, Switzerland and Nestle R&D Center, Singapore.

## **Publications from MyBreakfast Study**

### **Published:**

1. Norimah AK, Koo HC, JM HJ, MT MN, Tan SY, Appukutty M, et al. (2015) Whole Grain Intakes in the Diets Of Malaysian Children and Adolescents – Findings from the MyBreakfast Study. PLoS ONE 10 (10): e0138247. doi:10.1371/journal.pone.0138247

### **Manuscripts under review:**

1. Hamid Jan JM, Loy SL, Mohd Nasir MT, Norimah AK, Tan SY, Appukutty M, Nurliyana AR, Thielecke F, Hopkins S, Ong MK, Ning C and Tee ES. Characteristics associated with consumption of malted drinks among Malaysian children: Findings from the MyBreakfast Study
2. Tee ES, Nurliyana AR, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Tan SY, Appukutty M, Hopkins S, Thielecke F, Ong MK and Ning C. Breakfast Consumption among Malaysian Primary and Secondary School Children and Association with Body Weight Status – Findings from the MyBreakfast Study

### **Manuscript under preparation:**

1. Mohd Nasir MT, Nurliyana AR, Norimah AK, Hamid Jan JM, Tan SY, Appukutty M, Hopkins S, Thielecke F, Ong MK and Ning C and Tee ES. Breakfast Choice among Malaysian Children and Association with Nutrient Intakes – Findings from the MyBreakfast Study

# Acknowledgement

The Nutrition Society of Malaysia would like to thank the following for their significant contributions to enable this research project to be successfully concluded:

## **Research Committee**

Dr Tee E Siong (Principal Investigator)  
Prof Dr Norimah A Karim  
Assoc Prof Dr Mohd Nasir Mohd Taib  
Assoc Prof Dr Hamid Jan Jan Mohamed  
Dr Mahenderan Appukutty  
Dr Tan Sue Yee

## **Research Assistants**

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## **Cereal Partners Worldwide**

Dr Frank Thielecke  
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## **Nestle R&D Centre, Singapore**

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Celia Ning

## **Secretariat: Versacomm Sdn Bhd**

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We would also like to express our gratitude to the Ministry of Education Malaysia and Department of Education in each of states involved for approving our study. We also thank all the schools, teachers, parents and children who were involved in this study.

# MyBreakfast Study Research Committee



**Principal Investigator**

**Tee E Siong PhD**, is the President of the Nutrition Society of Malaysia (NSM) since 1996 and an Adjunct Professor for the School of Biosciences, Taylors University, Malaysia. He has led the implementation of various community promotion programmes which included the publication of various education booklets and press articles. He is also Chair of the National Steering Committee for Nutrition Month Malaysia since 2002. He represents NSM in several Technical Working Groups in the Ministry of Health Malaysia, including the National Coordinating Committee for Food and Nutrition (NCCFN) and the Technical Working Group for Nutritional Guidelines. He was Advisor to the Food Safety and Quality Division of the Ministry of Health Malaysia from 2002 till 2011, and is still a member of several sub-committees related to food regulations and Codex Alimentarius. Dr Tee is nutrition consultant for TES NutriHealth Strategic Consultancy. He is also a member of the Board of Scientific Directors of the International Life Sciences Institute (ILSI) (Southeast Asia Region) and is Coordinator for ILSI Malaysia Country Committee.

He initiated the formation of the Southeast Asia Public Health Nutrition (SEA-PHN) Network and was elected the Founding Chairman in the inaugural meeting of the Network on 2 June 2014.

Dr Tee was Head of the Cardiovascular, Diabetes and Nutrition Research Centre of the Institute for Medical Research (IMR) until his retirement in February 2002, after serving for 30 years.



**In-charge of the Southern region**

**Norimah A. Karim PhD**, is a Professor of Human Nutrition in the Nutritional Science Programme, School of Healthcare Sciences, Faculty of Health Sciences, UKM in Kuala Lumpur. She has been a lecturer in Nutrition for almost 30 years. Her research expertise includes dietary assessment methods, in particular developing and validating food frequency questionnaire, public health nutrition, community nutrition, body image and development of nutrition education packages.

She is the Chairman of Technical Working Groups for Nutrition Research, Ministry of Health which is responsible for Nutrition research under Malaysia's National Plan of Action for Nutrition. She is a member of the Task Force of Policy Priorities in combating obesity in Malaysia as well as a member in the National Plan of Action for Nutrition Malaysia (2016-2025) working group. Prof Norimah is the Chairman of the Working Group of the Editorial Bibliography of Nutrition Research in Malaysia. She is a contributor to chapters in Recommended Nutrient Intake for Malaysia and Malaysian Dietary Guideline for adults, children and adolescents.

She is actively involved in research having led several projects on public health nutrition and food consumption habits of the community. Prof Norimah has received grants from the Malaysian Government, international agencies and industries.

Prof Norimah has published locally and internationally, and has been invited to speak in conferences. She is currently the Vice President of the Malaysian Association for the Study of Obesity (MASO) and the Honorary Secretary of the Nutrition Society of Malaysia (NSM). She has served as a member of the Steering Committee and Expert Panel of the Nutrition Month Malaysia since 2005 and Expert Panel of Positive Parenting, an official guide series on maternal, child and family care since 2006.



**In-charge of the Northern region**

**Mohd Nasir Mohd Taib DrPH**, is an Associate Professor at the Department of Nutrition and Dietetics, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia. His area of specialization is Community Nutrition and Behavioral Epidemiology. He has been teaching courses at the undergraduate and postgraduate levels.

He supervises local and international postgraduate students and has published in various local and international journals. His research relates to body image, disordered eating behaviors and body weight status including obesity among children, adolescents and young adults.

Apart from his normal duty as a lecturer, he is also active in voluntary and professional organizations. He has been a Council member of the Nutrition Society of Malaysia (NSM) since 2002, a council member of the Majlis Cegah Obesiti Malaysia (MCOM), a life member of the Malaysian Association for the Study of Obesity (MASO) and a member of a number of other committees in the faculty, university, and other organizations.



**In-charge of the East Coast region**

**Hamid Jan B Jan Mohamed PhD**, is an Associate Professor of Nutrition at the Nutrition Programme, Universiti Sains Malaysia (USM). He joined this institution immediately after completing his PhD (Nutrition) at King's College London, United Kingdom. He holds a Masters Degree in Nutrition and Bachelor Degree in Nutrition and Community Health.

He received extensive training on laboratory skills from the Diploma in Medical Laboratory Technology Program at USM. The diversity of his education background contributed towards the creation of several interesting research related to nutrition and disease in Malaysia. He initiated the first pregnancy cohort in Malaysia named the USM Pregnancy Cohort Study which started in year 2009. This pregnancy cohort is aimed at investigating the role of maternal nutrition, oxidative stress and adipokines in the development of obesity and diabetes. Preliminary findings of this study are available in several local and international journals.

He is a Life Member of the Nutrition Society of Malaysia, Life Member of the Malaysian Association for the Study of Obesity and Member of the Malaysian Endocrine and Metabolic Society. He also works closely with the Ministry of Health Malaysia by being committee member of the Technical Working Group for Nutrition Guidelines. He is one of the editorial board member and author of the Malaysian Dietary Guidelines for Children and Adolescence.





**In-charge of the  
East Malaysia  
region**

**Mahenderan Appukutty PhD**, is currently the Head, Centre of Postgraduate Studies and Senior Lecturer at the Faculty of Sports Science & Recreation, Universiti Teknologi MARA, Shah Alam and working since 2001. He holds a PhD in Nutritional Sciences focusing on nutrition, immunity and exercise performance from Universiti Kebangsaan Malaysia, his Master of Sports Science from Universiti Sains Malaysia and Bachelor of Science (Hons) in Nutrition and Community Health from Universiti Putra Malaysia. He is also Asst Hon Secretary of the Nutrition Society of Malaysia (NSM). He also serves as Council Member of Malaysian Association for the Study of Obesity (MASO), Hon Treasurer for Malaysian Association of Sports Medicine (MASM), Hon Secretary for Confederation of Scientific & Technological Associations in Malaysia (COSTAM). He also serves as Specialist Representative for Exercise Physiology/Sports Medicine for World Obesity (WO) formerly known as International Association for the Study of Obesity (IASO). His research interests and focus are on functional food, health and exercise science.

He has published scientific articles in local and international referred journals, newspaper and magazine. He also presented papers at international and local conferences and seminars in nutrition, health and exercise science. Dr Mahenderan currently serves as the Editorial Board Members for Malaysian Journal of Sports Science & Recreation, International Journal of Therapies and Rehabilitation Research and International Journal of Physical Education, Sports and Health. He collaborates with government and private agencies for many community nutrition promotion and research projects.



**In-charge of the  
Central region**

**Tan Sue Yee PhD**, possesses a BSc (Hons) in Nutritional Science from the Universiti Kebangsaan Malaysia (UKM), MSc (Merit) in Human Nutrition (Sports) from London Metropolitan University and PhD in Nutrition from UKM. She is currently a lecturer at the Department of Nutrition and Dietetics, International Medical University (IMU).

Sue Yee is a council member of the Nutrition Society of Malaysia (NSM) since 2010. In her capacity as a council and member of NSM, she has participated actively as expert panel for several nutritional collaborative efforts between NSM and the industry, notably in projects such as *TryMasak Sihat*, Mother's Smart Choice, Unichef competition and MyNutriBaby programme. Sue Yee has also contributed in the NSM publication of recipe books *Buku Masakan Pilihan Pakar Pemakanan Jilid 2: Resipi untuk Seisi Keluarga* and *Junior Chef Cookbook: Let's Play Healthy Cooking Volume 1*. In addition, she is also a member of the Technical Working Group on Nutritional Guidelines 2013 and Technical Working Group on Nutritional Guidelines for Pregnant and Lactating Women.

Sue Yee has published several scientific articles and made oral presentations with a research focus on energy requirements and metabolic determinants (body composition, dietary intake and physical activity) of paediatric patients with acute leukaemia in the clinical setting. Through this theme of research, she has won several prizes including the NNI Young Research Award (top 5 finalists), the Malaysian Paediatric Society of Haematology and Oncology Conference 2nd Best Poster Award and the 9th Asia Pacific Conference on Clinical Nutrition (APCCN) Best Young Investigator's Award.



**Head Research  
Assistant**

**Nurliyana Abdul Razak MSc**, was the head research assistant for the MyBreakfast Study. She obtained her Bachelor of Food Science (Food Science and Nutrition) from Universiti Malaysia Sabah (UMS) and Master of Science (Community Nutrition) from Universiti Putra Malaysia (UPM). She is currently doing her PhD in UPM, her current research is on early nutrition, growth and cognitive development of infants from birth to 2 years. She is a member of the Nutrition Society of Malaysia (NSM) and has been actively involved in NSM activities.

# Abstracts

## **Presentation 1: Introduction to MyBreakfast Study**

*Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Tan SY, Appukutty M, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C*

Regular breakfast consumption has been recognised to confer important benefits to children and adolescents, including healthier bodyweight status and better nutrient profiles. Previous studies on breakfast consumption among children in the country have indicated unsatisfactory practices. Breakfast was found to be the most commonly skipped meal among school children in Malaysia. Although breakfast consumption was found to be high in some rural areas, the quality of the foods consumed was low. There is no nationwide study on breakfast habits involving both primary and secondary school children in Malaysia. Recognising this, the Nutrition Society of Malaysia (NSM) conducted a comprehensive nationwide study on breakfast habits among school children aged 6 to 17 years. This study aimed to determine breakfast habits among Malaysian school children, including consumption of wholegrain foods, ready-to-eat cereal (RTEC) and fortified beverages among the children. Bodyweight status, physical activity level and dietary intake of children and their associations with breakfast habits were examined. This study is expected to provide useful information on breakfast of Malaysian children that can be used to direct promotion activities to encourage children to consume breakfast regularly, as well as providing basis for intervention programmes to improve bodyweight status, dietary intake and physical activity level of Malaysian children. A total of 8705 children participated in the study, 5581 from primary schools and 3124 from secondary schools. The proportion of children recruited from the urban and rural area was 68.4% and 31.6% respectively. There were 61.1% Malays, 18.6% Chinese, 8.2% Indian, 11.3% Bumiputera Sabah/Sarawak and 0.7% children of other ethnic groups. These distributions by location and ethnic groups are very similar to those in the Population and Housing Census 2010.

## **Presentation 2: Research methodology**

*Nurliyana AR, Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Tan SY, Appukutty M, Thielecke F, Hopkins S, Ong MK and Ning C*

The MyBreakfast Study is a cross-sectional study involving primary and secondary school children aged 6 to 17 years. A multi-stage sampling method was carried out based on geographical location and ethnic group distribution. The estimated sample size was calculated based on the total population of children aged 6 to 17 years in Malaysia derived from the Population and Housing Census 2010. Ethical approval was obtained from Universiti Kebangsaan Malaysia Research Ethics Committee (UKMREC). Permission to conduct the study was given by Ministry of Education Malaysia (MOE). Data collection was conducted from April to October 2013. Socio-demographic background was obtained from parents through a questionnaire. For children aged 6 to 9 years, a breakfast habits questionnaire (BHQ), food frequency questionnaire (FFQ), two food record forms (one for a weekday and one for a weekend) and physical activity questionnaire were self-administered by parents. For children aged 10 years and above, the BHQ, FFQ, physical activity questionnaire and a two-day 24-hour dietary recall were administered by interview in school. The 24 hour record/recall was administered on one weekday and on one weekend day. Height and weight of all the children were measured; BMI-for-age and height-for-age were determined. Data were analysed using SPSS software version 19. Energy and nutrient intake were analysed using NutritionistPro™ Software based principally on the Nutrient Composition of Malaysian Foods. Adequacy of nutrient intakes was compared to the Recommended Nutrient Intakes (RNI) for Malaysian.

## **Presentation 3: Nutritional status of primary and secondary school children**

*Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Tan SY, Appukutty M, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C*

This study aimed to determine bodyweight status among primary (n=5567) and secondary (n=3094) school children aged 6 to 17 years old in Malaysia. Besides providing updated information, the association between BMI status and the breakfast consumption habits and physical activity level of the children was studied. A high prevalence of overnutrition was observed as 28.4% of the children were either overweight or obese, with a breakdown of 14.0% and 14.4% respectively. There were more overweight boys (14.4%) than girls (13.7%). The prevalence of obesity was also higher in boys (18.5%) than girls (11.0%). There were more overweight children in the secondary school (15.6%) than primary school (13.2%), but more obese children in the primary school (15.1%) than secondary school (13.2%). Similar prevalence of overweight and obesity was observed in the urban (28.8%) and rural (27.8%) area. More Indian children were overweight and obese (33.0%) than Bumiputera in Sabah/Sarawak (29.5%), Chinese (28.7%) or Malay (27.7%) children. There was also a significant problem of undernutrition among the school children. The overall prevalence of stunting was 7.2%. The prevalence of stunting was higher among rural boys (9.7%) and

girls (10.7%) than urban boys (6.8%) and girls (6.0%). The prevalence of stunting was also higher among Bumiputera in Sabah/Sarawak (11.1%) than Malay (7.8%), Indian (5.1%) and Chinese (4.2%). Urgent intervention programmes need to be implemented throughout the country to combat the high prevalence of overweight and obesity among school children as well as addressing the significant problem of undernutrition. Nutrition education should be systematically conducted in all schools, utilizing educational modules that have been proven effective. It is imperative that nutritionists are assigned to effectively implement nutrition related activities in schools, including carrying out nutrition education activities, various nutrition promotion activities, monitoring and referral of under- and over-nourished children and ensuring implementation of school canteen guidelines. Parents should be role models and be actively involved in all efforts to promote healthy eating and active living among children.

#### **Presentation 4: Breakfast intake and bodyweight status**

*Mohd Nasir MT, Tee ES, Norimah AK, Hamid Jan JM, Tan SY, Appukutty M, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C*

This study aimed to determine the prevalence of breakfast skipping and its association with socio-demographic background and body mass index among 6 to 17 year-old school children in Malaysia. It was found that 1 in 4 children (24.6%) skipped breakfast at least 3 days per week. More girls (26.4%) skipped breakfast than boys (22.5%). The prevalence of breakfast skipping was higher among secondary school children (31.9%) than primary school children (20.1%). There was no significant difference in breakfast skipping between urban and rural children. However, breakfast skipping was more prevalent among Bumiputera in Sabah/Sarawak (28.5%) and Malay (27.3%) compared to Indian (19.8%) and Chinese (14.5%) children. There were more children from low income families (28.2%) who skipped breakfast than middle and high income. Children whose fathers had primary education and below were more likely to skip breakfast (26.6%) than children whose fathers had secondary (26.1%) and tertiary education (19.2%). Findings in this study are consistent with findings from other studies that breakfast skipping is associated with higher body mass index and prevalence of overweight and obesity among children. There was a greater prevalence of breakfast skippers among overweight and obese children ( $p < 0.001$ ). Breakfast skippers were 1.34 times more likely to be overweight or obese (CI = 1.15 – 1.57,  $P < 0.001$ ). Interventions to promote regular breakfast consumption should be one of the approaches undertaken to combat the serious problem of overweight and obesity in the country. Parents should make an effort to prepare breakfast for children and encourage them to consume it before school. It is also important for parents and family members to play a more active role in encouraging breakfast consumption and should be role models for children by consuming breakfast themselves.

#### **Presentation 5: Breakfast foods and beverages choices**

*Hamid Jan JM, Tee ES, Mohd Nasir MT, Norimah AK, Tan SY, Appukutty M, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C*

Breakfast plays an important role in supplying the body with sufficient energy that is needed to regulate homeostasis after long hours of sleep. It has been proposed that breakfast should provide about 25 percent of the daily nutrient needs. This study aimed to determine energy and nutrient intakes at breakfast and throughout the day, types of foods and beverages consumed at breakfast, and contribution of breakfast to daily energy and nutrient intakes in 6 to 17 year-old Malaysian school children. The overall mean daily energy intake of the children was 1859 kcal (SD=354). About 49% of the energy came from carbohydrate, 18% from protein and 33% from fat. Only 29.9% girls and 41.3% boys achieved at least 80% of the recommended nutrient intake (RNI) for Calcium. Breakfast contributed to 26.8% of the total daily energy intake of the children, 21.4% of daily protein intake and 29.1% of fat intake. Bread (38.9%), eggs (30.1%), chicken/meat (22.5%), nasi lemak (21.5%) and fried rice (20.6%) were the most common types of breakfast foods consumed by the children. The majority of children consumed a malted beverage (60.6%) at breakfast followed by tea/coffee (24%), UHT milk (14.4%) and powdered milk (12.8%). Ready-to-eat cereals (RTEC) which were consumed by 18% of the children at breakfast were associated with significantly higher intakes of calcium, iron, vitamin C and the B vitamins, including thiamin, riboflavin and niacin at breakfast and throughout the day. Furthermore, RTECs contributed 34 – 49% to daily intakes of these micronutrients in consumers. Malted beverages contributed only 5.7% to daily energy intake in consumers but provided 19 – 26% to daily intakes of calcium and B vitamins. Malted beverage consumers had similar total energy intake but higher micronutrient intakes than non-consumers. It is essential that breakfast foods are balanced and nutritious to enable children to have greater achievement of RNI for vitamins and minerals. It is essential that breakfast foods are balanced and nutritious to enable children to have greater achievement of RNI for vitamins and minerals. Greater emphasis need to be given to consumption of nutritious breakfast among school children. Breakfast meals should not be too sweet, salty or oily, and should be of appropriate serving size for children. National dietary guidelines should include recommendations on consuming appropriate food and beverages for breakfast along with recommended serving size to help educate children on how to achieve a balanced breakfast.

## **Presentation 6: Whole grain consumption**

*Norimah AK, Tee ES, Mohd Nasir MT, Hamid Jan JM, Tan SY, Appukutty M, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C*

Consumption of whole grain among children and adolescents has been found to improve nutrient intakes and diet quality. However, little is known about whole grain consumption patterns in Malaysia. This study aimed to assess whole grain intakes and dietary sources of whole grain in Malaysian primary and secondary school children aged 6 to 17 years old. It was found that only 25% of primary school and 19% of secondary school children consumed whole grain. However, even among consumers, the mean daily intake of 9 g/day was far below the recommended intake. Almost all the children (97.7%) did not meet the Malaysian recommendation for wholegrain intake of 2 – 4 servings per day. Only less than 1% of the children achieved the US quantitative whole grain recommendation of 48g/d. In both primary and secondary school children, ready-to-eat breakfast cereal (RTEC) was the main source for majority of the children contributing about 60% to total whole grain intake. Consumption of whole grains was higher among children in the urban area than rural area, as well as among children from family with higher income than lower income. Consumption of whole grains was also higher among children whose fathers had tertiary education than secondary or primary education. Efforts are needed to understand the barriers to whole grain consumption among Malaysian children. Increased nutrition education in schools on the health benefits of whole grain and how to identify whole grain foods is also warranted. Encourage children to consume a greater variety of wholegrain foods, for example, wholemeal cereal, wholemeal bread, brown rice, wholemeal noodle and pasta. Steps should be taken by the regulatory authority in Malaysia to encourage manufacturers to add or increase whole grain in products such as approval of a definition for whole grain and a wholegrain food and development of a distinctive food label logo which signifies that a food is a good source of whole grain.

## **Presentation 7: Breakfast intake, bodyweight status and association with physical activity level**

*Appukutty M, Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Tan SY, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C*

Physical activity level among school children has been found to be low in previous cross-sectional studies in the country. This study aimed to determine physical activity pattern and its association with socio-demographic background, bodyweight status and breakfast consumption among 6 to 17 year-old school children in Malaysia. Physical activity was assessed using the Physical Activity Questionnaire for Children (PAQ-C) and Physical Activity Questionnaire for Older Children (PAQ-A). It was found that 1 in 3 school children had low physical activity level. Almost 50% of secondary school children had low physical activity level and almost 60% of secondary school girls had low physical activity level. The prevalence of low physical activity level was about the same among children in the urban (35.0%) and rural (34.5%) area. There appears to be greater prevalence of overweight and obesity among children with low physical activity level (27.1%) compared to children with medium (25.7%) and high physical activity level (23.3%). The prevalence of low physical activity level was higher among breakfast skippers (42.0%) than breakfast eaters (32.5%). Participation in Physical education should be compulsory for every child in school and ideally should be taught by a trained teacher. Classes intended for physical activity education should be strictly utilised for this purpose. Participation in physical education modules could be improved by offering a greater variety of activities and providing appropriate facilities. Efforts to reduce sedentary lifestyle of children and increasing physical activity level are both essential to reduce the serious prevalence of overweight and obesity in country.

## **Presentation 8: Summary, key findings and recommendations**

*Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Tan SY, Appukutty M, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C*

MyBreakfast Study, the first comprehensive nationwide study on breakfast habits in the country, was carried out by the Nutrition Society of Malaysia, in 2013. It is a nationally representative, cross-sectional study among 8,705 primary and secondary school children, aged 6 to 17 years. A multi-stage sampling method was carried out based on geographical location and ethnic group distribution, utilising the Population and Housing Census 2010. The study aimed to determine breakfast habits, including the types of food and beverages that are most commonly consumed at breakfast among these school children. In addition, bodyweight status, physical activity level and daily dietary intakes of the children were measured and associations with breakfast habits were examined.

Findings from the study revealed that a high proportion of the primary and secondary school children were overweight or obese. The overall prevalence was 28.4% while more boys (32.9%) were overweight or obese compared to girls (24.7%). The prevalence was similar among secondary school children (28.8%) compared to primary school children (28.3%). It was observed that 1 in 4 of these children (24.6%) skipped breakfast at least 3 days per week. Breakfast

skipping was found to be associated with higher body mass index (BMI); children who skipped breakfast were 1.34 times more likely to be overweight or obese. About a third of the children (34.8%) were found to have low physical activity level and there was a higher percentage among secondary (46.7%) compared with primary (28.3%) school children. There was a higher prevalence of overweight/obesity among children with low physical activity (27.1%) compared to children with medium physical activity (25.7%) and high physical activity (23.3%). Among breakfast skippers, there was a higher proportion of children with low physical activity level (42%) than breakfast eaters (32.5%).

Breakfast was found to have contributed to less than one-third of total daily intake of energy (26.8%), protein (21.4%) and fat (29.1%) intake. The 5 most commonly consumed breakfast foods were: bread, eggs, chicken/meat, nasi lemak and fried rice, while the 5 most commonly consumed beverages were malted drink, tea/coffee, ultra-heat treated and powdered milk and fruit drink/cordial.

Consumption of ready-to-eat cereal (RTEC) at breakfast (18% of the sample) contributed significantly to total daily intake for several micronutrients, namely calcium, iron, vitamin C and several B vitamins, ranging from 34.6 to 49.2%. RTEC consumption was also found to contribute to higher intake of these nutrients at breakfast and for the total day compared to the consumption of other breakfast foods. Malted beverages (consumed by 60.6%) contributed to 5.7% of daily energy intake and intake of calcium and several B vitamins, ranging from 19.4% to 26.0%. Malted drink consumers had similar total energy intake but higher micronutrient intakes than non-consumers. Whole grain consumption among the children was very low (about 2 g/day in the total sample) and almost all the children studied (over 99%) did not meet the recommended intake of 48 g/day. Even among whole grain consumers, the mean intake was about 9g/day, well below the recommendation intake. Wheat was the main source of whole grain intake while ready-to-eat cereal was the main source of wholegrain food.

Findings from this study should be utilised by relevant ministries, agencies and other stakeholders to develop and implement appropriate intervention programmes to improve the high prevalence of overweight and obesity observed among the full range of school-going children, from primary to secondary school. Urgent intervention programmes should be systematically implemented throughout the country, directed at both dietary habits and physical activity level.

Various dietary interventions should be carried out, including those that have been found to play key roles in determining the body weight status of school children in this study. Interventions to promote regular breakfast consumption should be one of the approaches undertaken. National dietary guidelines should include recommendations on consuming nutritious foods and beverages for breakfast along with recommended serving size to help educate children on how to achieve a balanced breakfast. Another dietary factor that should be given close attention is wholegrain foods. Greater efforts must be undertaken to increase nutrition education in schools on the health benefits of whole grain and how to identify wholegrain foods. In addition, steps could be taken by the regulatory authority in Malaysia to encourage manufacturers to add or increase whole grain in products.

Efforts to reduce sedentary lifestyle of children and increase physical activity level should also be carried out to reduce the serious problem of overweight/obesity in the country. Participation in physical education should be compulsory for every child in school and ideally should be taught by a trained teacher. Classes intended for physical activity education should be strictly utilised for this purpose.

Urgent attention should be given to implementing intervention programmes throughout the country to combat the high prevalence of overweight and obesity among school children as well as addressing the significant problem of undernutrition. It must be emphasised that nutritional wellbeing and excellent health of the children are prerequisites to academic excellence. All stakeholders must collaborate in designing and implementing comprehensive programmes. Nutritionists must be assigned to effectively implement nutrition related activities in schools, including carrying out nutrition education activities, various nutrition promotion activities, monitoring and referral of under- and over-nourished children and ensuring implementation of school canteen guidelines. Parents should be role models and be actively involved in all efforts to promote healthy eating and active living among children. Investing in the nutritional wellbeing of children today is the only way to ensure a healthier generation of adult Malaysians tomorrow.

MyBreakfast Study:

# Posters of Key Findings



# Poster 1: Introduction to MyBreakfast Study

**Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Appukutty M, Tan SY,  
Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C**

## Introduction

Breakfast consumption is recognised to confer important benefits to children and adolescents, including healthier body weight status, better nutrient profiles, higher cognitive and academic performance, improved school attendance and better mood and psychological functions (Rampersaud et al., 2005).

Previous studies on breakfast consumption among children in the country have indicated worrying findings. Breakfast was found to be the most commonly skipped meal among school children and adolescents in Malaysia (Moy et al., 2006; UKM, 2008; Chin & Mohd Nasir, 2009). Although breakfast consumption was high in rural areas such as in Tuaran, Sabah, the quality of breakfast foods were found to be low (Foo et al., 2006).

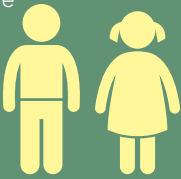
There is no nationwide study on breakfast habits involving both primary and secondary school children in Malaysia. Recognising this, the Nutrition Society of Malaysia (NSM) has initiated a comprehensive nationwide study on breakfast habits among school children aged 6 to 17 years. In this study, weight and height, physical activity, and dietary intake were also measured.



## Objectives

**1**

To determine breakfast habits among Malaysian school children



**2**

To determine consumption of wholegrain foods, ready-to-eat cereal (RTEC) and fortified beverages among the children



**3**

To determine bodyweight status, physical activity level and dietary intake of the children and their association with breakfast habits

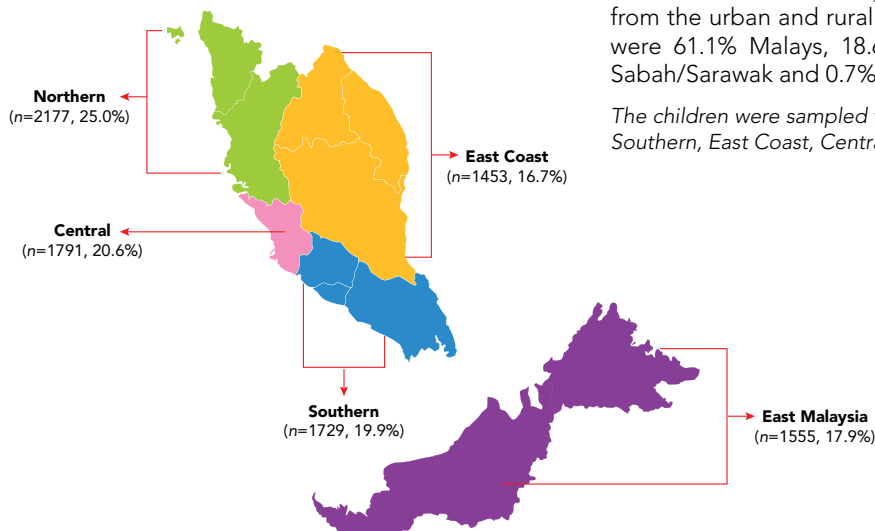


## Utilisation of findings by policy makers and programme managers

This study is expected to:

- Provide useful information on breakfast habits of Malaysian school children that can be used to direct promotion activities to encourage school children to consume breakfast regularly
- Provide basis to develop/implement appropriate intervention programmes to improve bodyweight status, dietary intake and physical activity level of Malaysian school children

## Study Participation



A total of 8705 children participated in the study, 5581 from primary school and 3124 from secondary school. The proportion of children recruited from the urban and rural area was 68.4% and 31.6% respectively. There were 61.1% Malays, 18.6% Chinese, 8.2% Indian, 11.3% Bumiputera Sabah/Sarawak and 0.7% children of other ethnic groups.

*The children were sampled from all five regions of Malaysia, including Northern, Southern, East Coast, Central and East Malaysia.*

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# Poster 2: Research methodology

Nurliyana AR, Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Appukutty M, Tan SY, Thielecke F, Hopkins S, Ong MK and Ning C

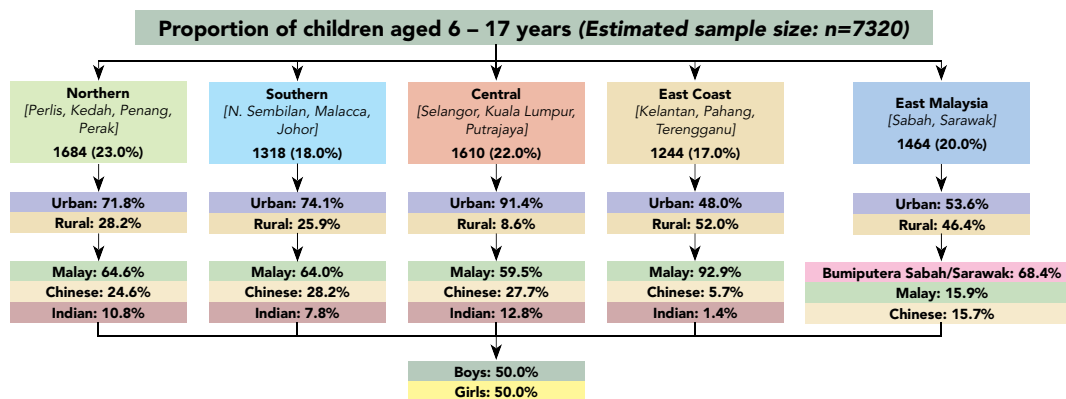
## Introduction

The MyBreakfast Study is the first comprehensive nationwide study on breakfast consumption pattern among school children in Malaysia. In this study we determined breakfast habits, the type of foods and beverages that are most commonly consumed at breakfast, as well as consumption of wholegrain foods. Weight and height of the children were measured, physical activity and dietary intake were assessed. The associations between breakfast consumption with bodyweight status and physical activity, as well as the contribution of breakfast towards daily energy and nutrient intakes were determined. Ethical approval was obtained from Universiti Kebangsaan Malaysia Research Ethics Committee (UKMREC). Permission to conduct the study was given by Ministry of Education Malaysia (MOE). Data collection was conducted from April to October 2013.



## Sampling Procedure

The MyBreakfast Study is a cross-sectional study involving primary and secondary school children aged 6 to 17 years. A multi-stage sampling method was carried out based on geographical location and ethnic group distribution. The estimated sample size was calculated based on the total population of children aged 6 to 17 years in Malaysia derived from the Population and Housing Census 2010 (Department of Statistics, 2010). Below is the sampling procedure.



## Parameters studied/Instruments

### 1 Socio-demographic Background

- Completed by parent/guardian
- Child's age, sex, ethnicity, birth order
- Parents' educational attainment, occupation, monthly household income, number of children, household size



### 2 Weight and Height Measurements

- Breakfast Habits Questionnaire (BHQ)
- 14 items
- Breakfast frequency and location
- Types of foods and beverages usually consumed at breakfast
- Consumption of ready-to-eat cereal (RTEC), hot cereal and malted beverages at breakfast.
- Household size



### 3 Breakfast Habits

- Food record
- Completed by parents of 6 – 9 year olds
- 24-hour dietary recall
- Interview by trained research assistants to 10 – 17 year olds
- Mini food album used to facilitate portion size estimation



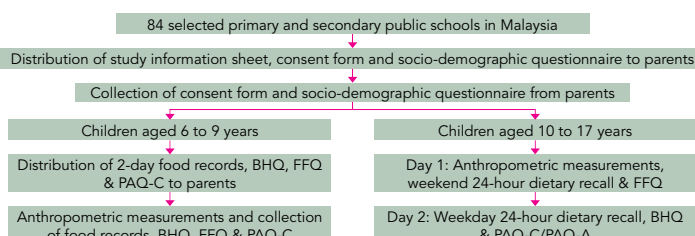
### 4 Current Dietary Intake

- Food Frequency Questionnaire (FFQ), adapted from Food Frequency Questionnaire for Adolescents (Irma, 2001).
- 75 items + 15 items on whole grain foods
- Mini food album → Whole grain products section to facilitate identification of whole grain foods

### 5 Habitual Dietary Intake

- 6 – 13 years: Physical Activity Questionnaire for Children (PAQ-C) (Crocker et al., 1997; Kowalski et al., 2004) (10 items)
- 14 – 17 years: Physical Activity Questionnaire for Older Children (PAQ-A) (Crocker et al., 1997; Kowalski et al., 2004) (9 items)
- Additional questions on screen time, bedtime & wake-up time on school days & weekends

## Flow chart for data collection



## Data Analyses

- Data were analysed using SPSS software version 19
- Energy and nutrient intake were analysed using NutritionistProTM Software based principally on the Nutrient Composition of Malaysian Foods (Tee et al., 1997)
- Adequacy of nutrient intakes was compared to the Recommended Nutrient Intakes (RNI) for Malaysian (NCCFN, 2005)

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# Poster 3: Nutritional status of primary and secondary school children

Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Appukutty M, Tan SY, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C

## Introduction

Childhood obesity has become a global epidemic, with the worldwide prevalence of overweight and obesity among children estimated to have increased by 47.1% between 1980 to 2013 (Ng et al., 2014). A nationwide survey conducted between 2010 and 2011 found that 9.8% and 11.8% of Malaysian children aged 6 months to 12 years old were overweight and obese respectively (Poh et al., 2013). While in 2012, from the Malaysia School-Based Nutrition Survey (MSNS) involving older children aged 10 to 17 years, the prevalence of overweight and obesity were 14.6% and 12.3% respectively (Institute for Public Health, 2013).

## Objective

This study aimed to determine bodyweight status among primary (n=5567) and secondary (n=3094) school children aged 6 to 17 years in Malaysia.

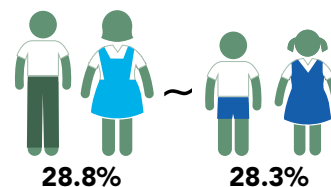
## Prevalence of overweight and obesity among the children

**1 in 4 children was either overweight or obese**



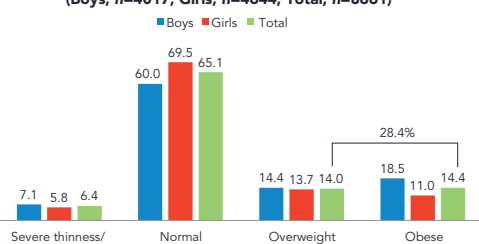
28.4% of the children were either overweight or obese

**More boys were overweight/obese**



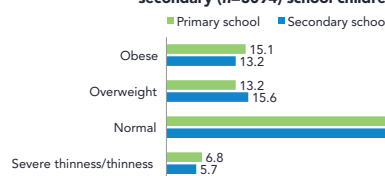
**The prevalence of overweight & obesity was similar among secondary school children and primary school children**

Overall distribution of BMI status of the children, % (Boys, n=4017; Girls, n=4644; Total, n=8661)



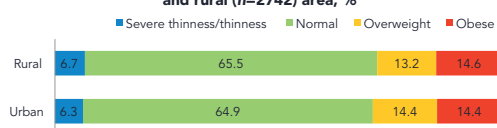
The prevalence of overweight/obesity among boys was 32.9%, while that of girls was 24.7%. There were more overweight boys (14.4%) than girls (13.7%). The prevalence of obesity was also higher in boys (18.5%) than girls (11.0%).

BMI status distribution between primary (n=5567) and secondary (n=3094) school children, %



The prevalence of overweight was higher among secondary school (15.6%) than primary school (13.2%) children, but there were more obese children in the primary school (15.1%) than secondary school (13.2%).

Distribution of BMI status among children in the urban (n=5919) and rural (n=2742) area, %



Prevalence of overweight/obesity was similar in the urban and rural area

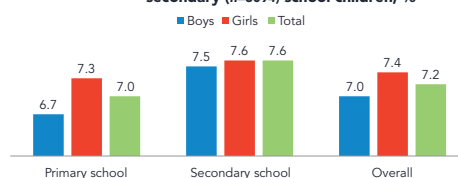
Distribution of the BMI status by ethnic group, % (Malay, n=5297; Chinese, n=1608; Indian, n=709; Bumiputera, n=986)



Overweight and obesity highest among Indian; similar prevalence among Bumiputera Sabah/Sarawak, Chinese and Malay

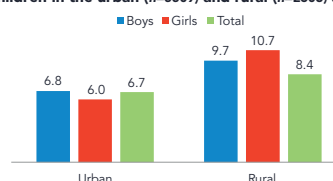
## Prevalence of stunting among the children

Prevalence of stunting among primary (n=5567) and secondary (n=3094) school children, %



The overall prevalence of stunting was 7.2%. Prevalence was marginally higher among secondary school (7.6%) than primary school (7.0%) children.

Prevalence of stunting among children in the urban (n=5509) and rural (n=2603) area, %



Prevalence was higher among rural (8.4%) than urban (6.7%) school children.

The prevalence of stunting was also higher among Bumiputera Sabah/Sarawak (11.1%) than Malay (7.8%), Indian (5.1%) and Chinese (4.2%) (data not shown in graph)

## Recommendations

- Urgent intervention programmes need to be implemented throughout the country to combat the high prevalence of overweight and obesity among school children as well as addressing the significant problem of undernutrition.
- Nutrition education should be systematically conducted in all schools, utilizing educational modules that have been proven effective.
- It is imperative that nutritionists are assigned to effectively implement nutrition related activities in schools, including carrying out nutrition education activities, various nutrition promotion activities, monitoring and referral of under- and over-nourished children and ensuring implementation of school canteen guidelines.
- Parents should act as role models and be actively involved in all efforts to promote healthy eating and active living among children.

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# Poster 4: Breakfast intake and bodyweight status

Mohd Nasir MT, Tee ES, Norimah AK, Hamid Jan JM, Appukutty M, Tan SY, Nuriyana AR, Thielecke F, Hopkins S, Ong MK and Ning C

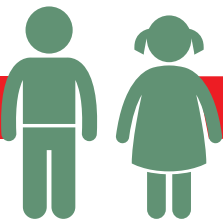
## Introduction

Breakfast skipping has been found to be associated with higher body mass index (Kapantais et al., 2011; Deshmukh-Taskar et al., 2010) and prevalence of overweight and obesity (Ahadi et al., 2015; Papoutsou et al., 2014; Moy et al., 2006) among children and adolescents. Breakfast skipping tends to increase with age and was more prevalent among girls compared to boys (Moy et al., 2006).



**1 in 4 children  
skipped breakfast**

24.6% of school children aged 6 – 17 years skipped breakfast  $\geq$  3 days a week



22.5%

26.4%

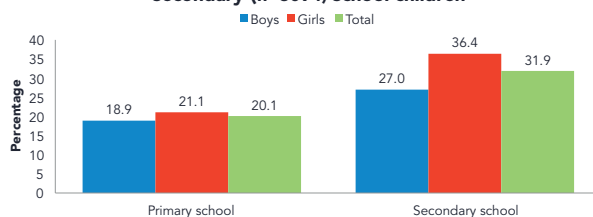
**More girls skipped breakfast  
than boys**

The prevalence of breakfast skipping was 26.4% among girls and 22.5% among boys

## Objective

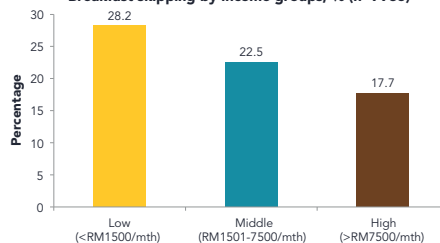
This study aimed to determine the prevalence of breakfast skipping and its association with socio-demographic background and bodyweight status among 6 to 17 year-old school children and adolescents in Malaysia.

Prevalence of breakfast skipping among primary (n=5567) and secondary (n=3094) school children



- The prevalence of breakfast skipping was higher among secondary school children (31.9%) than primary school children (20.1%). There was no significant difference in breakfast skipping between urban and rural children.
- Among primary school children, breakfast skipping was more prevalent among Bumiputera Sabah/Sarawak (24.7%) and Malay (22.3%) compared to Indian and Chinese children (not shown in graph).

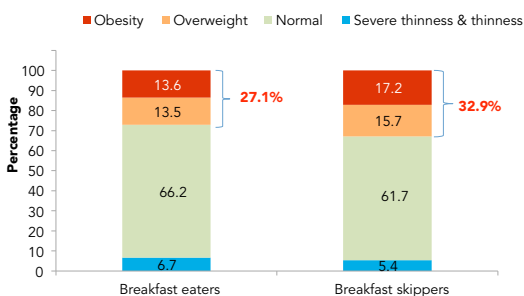
Breakfast skipping by income groups, % (n=7986)



- There were more children from low income families (28.2%) who skipped breakfast than middle and high income.
- Children whose fathers had primary education and below were more likely to skip breakfast (26.6%) than children whose fathers had secondary (26.1%) and tertiary education (19.2%) (not shown in graph).

## Breakfast skipping and bodyweight status

Bodyweight status among breakfast eaters (n=6536) and breakfast skippers (n=2125)



There was a higher prevalence of overweight and obesity among breakfast skippers (32.9%) than breakfast eaters (27.1%) ( $p < 0.001$ )



**Breakfast  
skippers were  
1.34 times  
more likely to  
be overweight/  
obese\***

\*adjusted for potential confounders including age, sex, ethnicity, father's education level, income and physical activity

## Recommendations

- Interventions to promote regular breakfast consumption including through schools, should be one of the approaches undertaken to combat the serious problem of overweight and obesity in the country.
- Parents should make an effort to prepare breakfast for children and encourage them to consume it before school.
- It is also important for parents and family members to play a more active role in encouraging breakfast consumption and should be role models for children by consuming breakfast themselves.

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# Poster 5: Breakfast foods and beverages choices

Hamid Jan JM, Tee ES, Norimah AK, Mohd Nasir MT, Appukutty M, Tan SY, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C

## Introduction

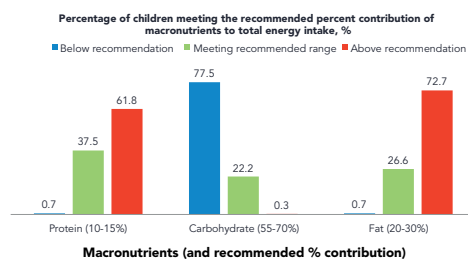
Breakfast plays an important role in aiding the body with sufficient energy that is needed to regulate homeostasis after an overnight fast. (Hill, 1995). It has been suggested that ideally, breakfast should provide about 25 percent of the daily nutrient needs (Grovenor & Smolin, 2002). Inclusion of specific foods at breakfast such as ready-to-eat cereal (RTEC) and milk has been associated with increased intakes of fibre, calcium and other micronutrients such as vitamin A and C, riboflavin, zinc and iron (Rampersaud et al., 2005).

## Overall nutrient intake

The overall mean daily energy intake of the children was 1859 kcal (SD=354).

The mean contribution of macronutrients to total energy intake was 49% from carbohydrate, 18% from protein and 33% from fat. The mean % fat contribution exceeded the recommended range of 20-30%.

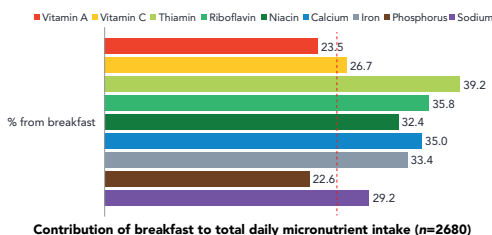
Figure below shows that almost three-quarters (72.7%) of the children exceeded the recommended percent of energy from fat.



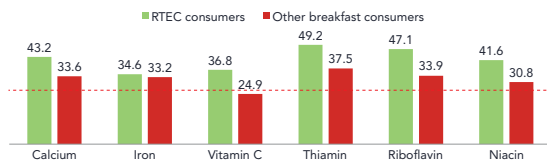
## Contribution of breakfast to daily nutrient intake

Breakfast contributed to 26.8% of the total daily energy intake of the children, 21.4% of daily protein intake and 29.1% of fat intake. It can be noted breakfast contributed to about 25% of the total daily energy, protein and fat intake.

Figure below shows the mean contribution of breakfast to micronutrient intake of the children. All the micronutrients (except vitamin A) contributed to more than 25% of the daily nutrient intake.



Consumption of RTEC at breakfast contributed to higher intake of calcium, iron, vitamin C and the B vitamins, including thiamin, riboflavin and niacin (Figure below).



## Recommendations

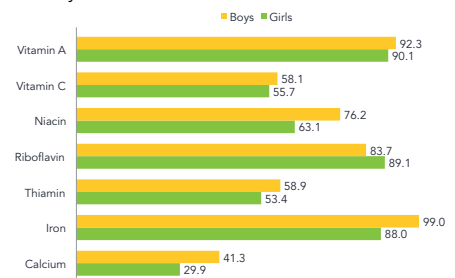
- It is essential that breakfast foods are balanced and nutritious to enable children to have greater achievement of RNI for vitamins and minerals.
- Greater emphasis need to be given to consumption of nutritious breakfast among school children. Breakfast meals should not be too sweet, salty or oily, and should be of appropriate serving size for children.
- National dietary guidelines should include recommendations on consuming appropriate food and beverages for breakfast along with recommended serving size to help educate children on how to achieve a balanced breakfast.

## Objective

This study aimed to determine daily energy and nutrient intakes, types of foods and beverages consumed at breakfast, and contribution of breakfast to daily energy and nutrient intakes in 6 to 17 year-old Malaysian children.

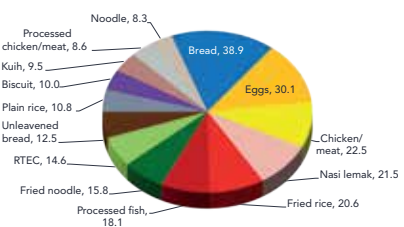
## RNI Achievement

Figure below shows that, except for calcium, more than 50% of the children achieved at least 80% of the recommended nutrient intake (RNI) for selected micronutrients. For calcium, only 29.9% girls and 41.3% boys achieved this recommended intake.



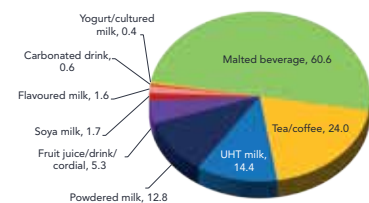
## Breakfast foods & beverages

The 5 most commonly consumed foods are: Bread, eggs, chicken/meat, nasi lemak and fried rice.



Common breakfast foods, % (n=2680)

The 5 most commonly consumed beverages are malted beverage, tea/coffee, UHT and powdered milk and fruit drink/cordial.



Common breakfast beverages, % (n=2680)

Malted beverages contributed only 5.7% to daily energy intake in consumers but provided 19 – 26% to daily intakes of calcium and B vitamins. Malted beverage consumers had similar total energy intake but higher micronutrient intakes than non-consumers.

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# Poster 6: Whole grain consumption

Norimah AK, Tee ES, Mohd Nasir MT, Hamid Jan JM, Tan SY, Appukutty M, Nuriyana AR, Thielecke F, Hopkins S, Ong MK and Ning C

## Introduction

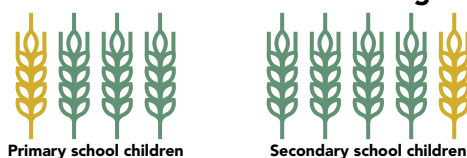
A growing body of epidemiological evidence indicates that consumption of whole grain may be protective against several chronic diseases in adults including diabetes (De Munter & Hu, 2007; Ye et al., 2012) and obesity (Harland & Garton, 2008; Mozaffatian et al., 2011). In children and adolescents, the association between consumption of whole grain and health benefits has been less explored but several studies have reported improved nutrient intakes and diet quality among whole grain consumers compared to non-consumers (Mann et al., 2015; Bellisle et al., 2014; Devlin et al., 2013; O'Neil et al., 2010). Little is known however, about whole grain consumption patterns in Malaysia.

## Objective

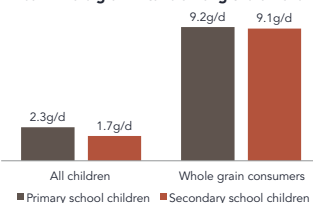
This study aimed to assess whole grain intakes and dietary sources of whole grain in Malaysian primary and secondary school children aged 6 to 17 years old.

## Whole grain consumption

**Only  
25% of primary school & 19% of secondary  
school children consumed whole grain**



Mean whole grain intake among the children



Even among consumers, the amount consumed (about 9g/d) was far below the recommended intake

## Intake vs Recommendation

The Malaysian Dietary Guidelines for Children and Adolescents recommend that half of the cereal intake should come from wholegrain foods/products, equivalent to 2 – 4 servings (NCCFN, 2013). **Almost all the children (97.7%) did not meet the recommendation for wholegrain intake.**

Less than 1% of the children who consumed whole grain achieved the US quantitative whole grain recommendation of 48g/d (USDA, 2010).

| Servings (Absolute intake) | <1/2 (<8g/d) | >1/2 – 1 (≥8 – <16g/d) | >1 – 2 (≥16 – <32g/d) | >2 – 3 (≥32 – <48g/d) | ≥3 (≥48g/d) |
|----------------------------|--------------|------------------------|-----------------------|-----------------------|-------------|
|                            | n (%)        |                        |                       |                       |             |
| Primary school children    | 665 (51.7)   | 453 (35.2)             | 138 (10.7)            | 22 (1.7)              | 8 (0.6)     |
| Secondary school children  | 252 (45.4)   | 233 (42.0)             | 58 (10.5)             | 11 (2.0)              | 1 (0.2)     |
| Total                      | 917 (49.8)   | 686 (37.3)             | 196 (10.6)            | 33 (1.8)              | 9 (0.5)     |

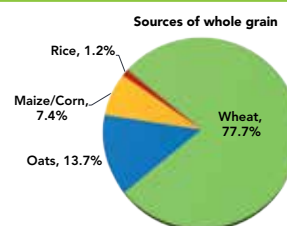
## Recommendations

- Efforts are needed to understand the barriers to whole grain consumption among Malaysian children
- Increased nutrition education in schools on the health benefits of whole grain and how to identify whole grain foods is also warranted
- Encourage children to consume a greater variety of wholegrain foods, for example, wholemeal cereal, wholemeal bread, brown rice, wholemeal noodle and pasta
- Steps should be taken by the regulatory authority in Malaysia to encourage manufacturers to add or increase whole grain in products such as:
  - approval of a definition for whole grain and a wholegrain food
  - development of a distinctive food label logo which signifies that a food is a good source of whole grain

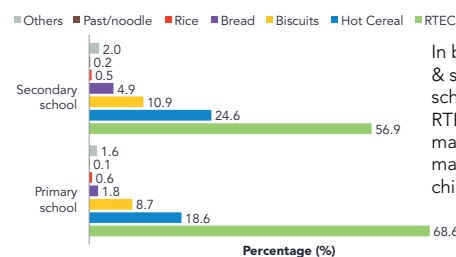
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## Sources of whole grain & wholegrain foods



Sources of wholegrain foods

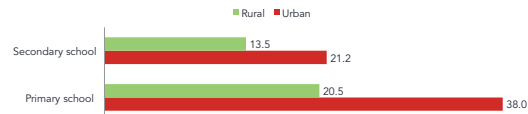


In both primary & secondary school children, RTEC was the main source for majority of the children

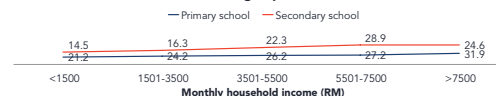
## Wholegrain consumption & socio-demographic background

Consumption of whole grains was higher among children in the urban area than rural area, as well as among children from families with higher income.

Percentage of wholegrain consumers in urban and rural areas (Primary school, n=1286; Secondary school, n=555)

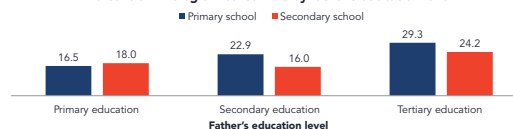


Percentage of wholegrain consumers by monthly income (RM) group



Consumption of whole grains was also higher among children whose fathers had tertiary education than secondary or primary education.

Percent of wholegrain consumers by father's education level



# Poster 7: Breakfast intake, bodyweight status and association with physical activity level

**Appukutty M, Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Tan SY, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C**

## Introduction

Physical activity level among school children has been found to be low in previous cross-sectional studies in the country. In 2007, 35.5% of adolescents in Kuantan, Pahang had low physical activity level (Dan, Mohd Nasir & Zalilah, 2007), while in 2011, the prevalence of low physical activity level among adolescents from the same district was 74.7% (Farah Wahida, Mohd Nasir & Hazizi, 2011). Low energy expenditure has been found to be associated with overweight and obesity among Malaysian children and adolescents aged 11 to 15 years (Zalilah et al., 2006).

## Objective

This study aimed to determine physical activity pattern and its association with socio-demographic background, bodyweight status and breakfast consumption among 6 to 17 year-old school children and adolescents in Malaysia.

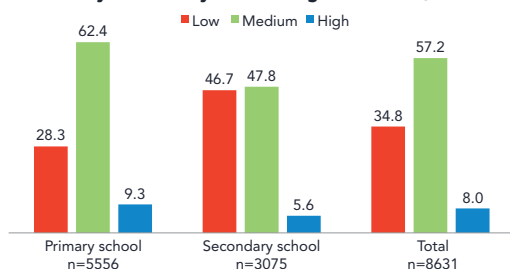
## Physical Activity Pattern

**1 in 3 school children had low physical activity level**



34.8% of school children had low physical activity level.

**Physical activity level among the children, %**



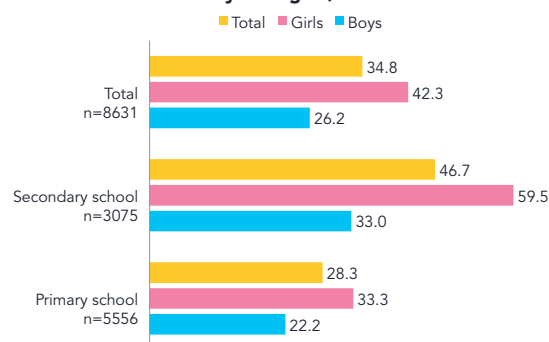
The prevalence of low physical activity level was higher among secondary (46.7%) than primary (28.3%) school children.

The prevalence of low physical activity level was about the same among children in the urban (35.0%) and rural (34.5%) area (not shown in graph).

**Girls had lower physical activity levels than boys. Almost 60% of secondary school girls and 33% of primary school girls had low physical activity level**

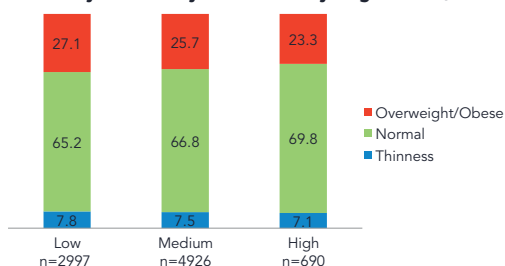


**Prevalence of low physical activity among boys and girls, %**



## Physical activity and bodyweight status

**Physical activity level and bodyweight status, %**



There appears to be greater prevalence of overweight and obesity (27.1%) among children with lower physical activity level

## Physical activity and breakfast skipping

**Physical activity level between breakfast eaters and skippers, %**



Low physical activity level was higher among breakfast skippers (42.0%) than breakfast eaters (32.5%)

## Recommendations

- Participation in Physical education should be compulsory for every child in school and ideally should be taught by a trained teacher.
- Classes intended for physical activity education should be strictly utilised for this purpose.
- Participation in physical education modules could be improved by offering a greater variety of activities and providing appropriate facilities.
- Efforts to reduce sedentary lifestyle of children and increase physical activity level should be carried out to reduce the serious problem of overweight/obesity in the country.

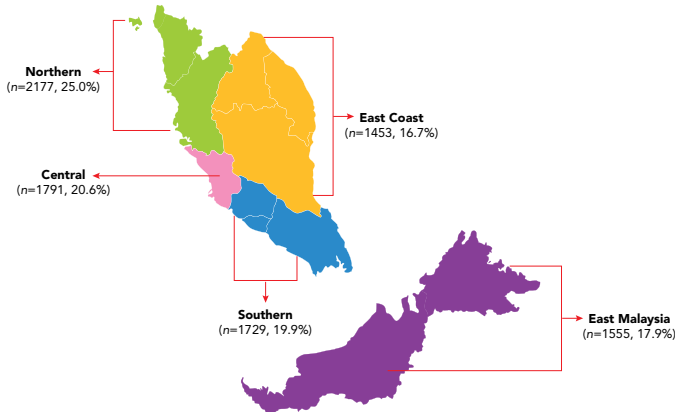
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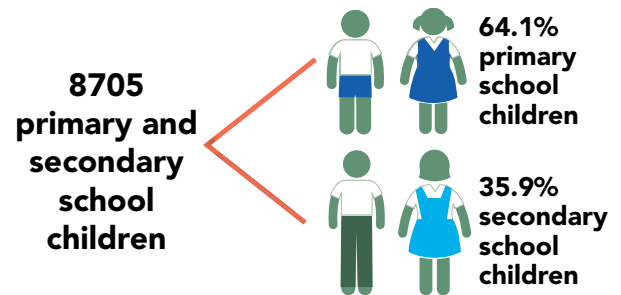
# Poster 8: Summary, key findings and recommendations

Tee ES, Mohd Nasir MT, Norimah AK, Hamid Jan JM, Tan SY, Appukutty M, Nurliyana AR, Thielecke F, Hopkins S, Ong MK and Ning C

## Summary



MyBreakfast Study, the first comprehensive nationwide study on breakfast habits in the country, was carried out by the Nutrition Society of Malaysia, in 2013.

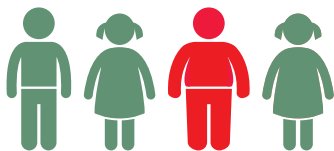


A multi-stage sampling method was carried out based on geographical location and ethnic group distribution, utilising the Population and Housing Census 2010.

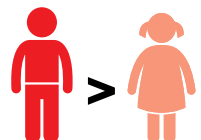
The study aimed to determine breakfast habits, including the types of food and beverages that are most commonly consumed at breakfast among these school children. In addition, bodyweight status, physical activity level and daily dietary intakes of the children were measured and associations with breakfast habits were examined.

## Key Findings

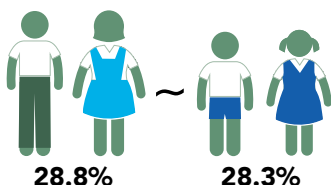
### 1 High proportion of overweight and obesity among children



28.4% of the children were either overweight or obese



32.9% 24.7%  
More boys were overweight than girls



28.8% 28.3%

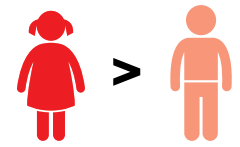
The prevalence of overweight & obesity was similar among secondary school children and primary school children

### 2 High proportion of breakfast skippers among school children



1 In 4 children skipped breakfast

24.6% of school children aged 6 – 17 years skipped breakfast  $\geq$  3 days a week



26.4% 22.5%  
More girls skipped breakfast than boys



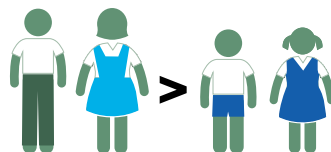
Breakfast skippers were 1.34 times more likely to be overweight/obese\*

\*adjusted for potential confounders including age, sex, ethnicity, father's education level, income and physical activity

### 3 Physical activity level among the children was low



1 In 3 school children had Low physical activity level



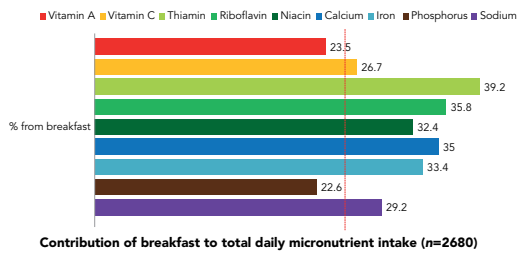
There was a higher percentage of secondary school children with low physical activity level when compared with primary school children

There was a higher prevalence of overweight/obesity among school children with low (27.1%) compared to children with medium (25.7%) and high physical activity level (23.3%).

Among breakfast skippers, there was a higher proportion of children with low physical activity level (42%) than breakfast eaters (32.5%).

## Key Findings

### 4 Contribution of breakfast to daily nutrient intake



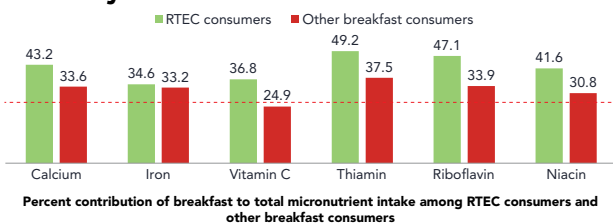
Breakfast contributed to 26.8% of the total daily energy intake of the children, 21.4% of daily protein intake and 29.1% of fat intake. It can be noted breakfast contributed to about 25% of the total daily energy, protein and fat intake.

All the micronutrients (except vitamin A) contributed to more than 25% of the daily nutrient intake.

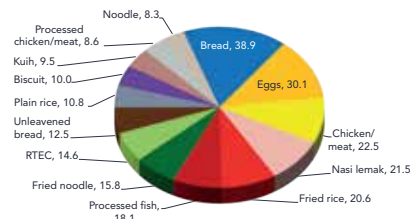
### 6 About 18% of the children consumed RTEC



#### Breakfast with RTEC contributed a greater amount of daily micronutrients than other breakfasts

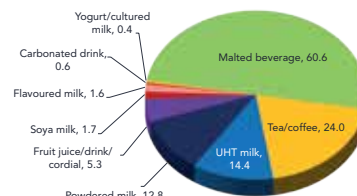


### 5 Top 5 most commonly consumed breakfast foods and beverages



1. Bread
2. Eggs
3. Chicken/meat
4. Nasi lemak
5. Fried rice

Common breakfast foods, % (n=2680)

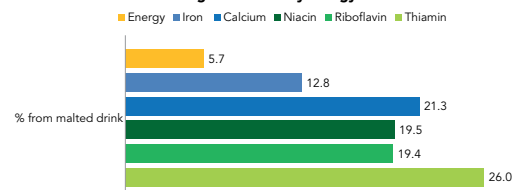


1. Malted beverage
2. Tea/coffee
3. Ultra-heat treated milk
4. Powdered milk
5. Fruit drink/cordial

Common breakfast beverages, % (n=2680)

### 7 Malted drink consumers had similar total energy intake but higher micronutrient intakes than non-consumers

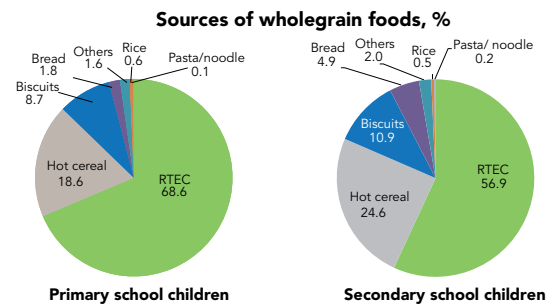
Contribution of malted beverage to total daily energy and micronutrient intake



Malted beverages contributed only 5.7% to daily energy intake in consumers but provided 19 – 26% to daily intakes of calcium and B vitamins.

### 8 Wholegrain consumption among children was very low

- Only 25% of primary school & 19% of secondary school children consumed wholegrain.
- Almost all the children studied (over 99%) did not meet the recommended intake of 48 g/day.
- Even among whole grain consumers, the mean intake was about 9 g/day, well below the recommendation intake.
- Wheat was the main source of whole grain intake.
- Ready-to-eat cereal was the main source of wholegrain foods (see pie charts on right).



## Recommendations

- Findings from this study should be utilised by relevant ministries, agencies and other stakeholders to develop and implement appropriate intervention programmes to improve the high prevalence of overweight and obesity observed among the full range of school-going children, from primary to secondary school. Urgent intervention programmes should be systematically implemented throughout the country, directed at both dietary habits and physical activity level.
- Interventions to promote regular breakfast consumption should be one of the approaches undertaken.
- National dietary guidelines should include recommendations on consuming nutritious foods and beverages for breakfast along with recommended serving size to help educate children on how to achieve a balanced breakfast.
- Greater efforts must be undertaken to increase nutrition education in schools on the health benefits of whole grain and how to identify wholegrain foods. In addition, steps could be taken by the regulatory authority in Malaysia to encourage manufacturers to add or increase whole grain in products.
- Participation in physical education should be compulsory for every child in school and ideally should be taught by a trained teacher. Classes intended for physical activity education should be strictly utilised for this purpose.
- Nutritionists must be assigned to effectively implement nutrition related activities in schools, including carrying out nutrition education activities, various nutrition promotion activities, monitoring and referral of under- and over-nourished children and ensuring implementation of school canteen guidelines.
- Parents should be role models and be actively involved in all efforts to promote healthy eating and active living among children. Investing in the nutritional wellbeing of children today is the only way to ensure a healthier generation of adult Malaysians tomorrow.

**99%** *of our* **CHILDREN**  
*are not* **EATING ENOUGH**  
**Whole Grain**

