

**THE ASSOCIATION BETWEEN OBESITY AND
EATING BEHAVIOUR AMONG PRIMARY SCHOOL
CHILDREN IN KOTA KINABALU**



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UMS
UNIVERSITI MALAYSIA SABAH

**FACULTY OF MEDICINE & HEALTH SCIENCE
UNIVERSITY MALAYSIA SABAH**

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EATING BEHAVIOUR AMONG PRIMARY SCHOOL
CHILDREN IN KOTA KINABALU**

LILY SHUZEEN KIMIN



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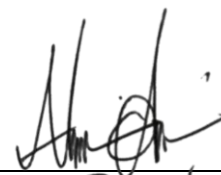


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DECLARATION

I hereby declare that this thesis is my original work, except where otherwise indicated. All the references has been duly acknowledges. This thesis contains no material that has been submitted previously, in whole or in part, for the award of any other academic degree or diploma.

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ABSTRACT

Background: Childhood obesity has become one of our country's major concerns, and has been rising dramatically over the years. The latest statistic from National Health and Morbidity Survey (NHMS) shows that the national prevalence of obesity in 2015 was 11.9% and has escalated to 14.8% in 2019 (NHMS, 2019). According to Roy et al., 2011, specific eating behaviours that have been associated with obesity include under-responsiveness to internal satiety cues and over-responsiveness to external food cues such as taste, smell, availability and emotions. Yet there is inadequate number of study present in Sabah to describe children eating behaviours despite of the increasing disease burden.

Objectives: This study aims in determining the prevalence of childhood obesity in Sabah as well as look into the association in eating behaviours between children nutritional status in Kota Kinabalu.

Methods: A cross-sectional study involving 484 students (aged 6-12 years old) was conducted in five primary schools at Kota Kinabalu, Sabah. The schools were selected based on multistage stratified sampling method and convenience sampling method. Primary school children with a known medical condition such as bronchial asthma, type-1 diabetes mellitus or those with a prolonged use of oral steroids was excluded from the study. Sociodemographic details and anthropometric measures both parents and children, and eating behaviours of children were assessed using Children eating behaviour questionnaire (CEBQ). Age-adjusted body mass index (BMI) z-scores were calculated according to the WHO recommendations to assess nutritional status.

Results: Out of 484 respondents, there were 198 (40.9%) male participants and 286 (59.1%) female participants. The prevalence of childhood obesity among primary school children is 13.2%. The mean scores of 'Food Approach' subscales (FR, EF, EOE, DD) showed higher mean score in overweight and obese groups as compared to mean score in normal weight group. The mean scores of 'Food Avoidance' subscales (SE, EUE, FF)

showed lower mean score in overweight and obese groups as compared to mean score in normal weight group.

Conclusion: This study has proved that “Food approach” subscales were positively associated to excess weight in children.



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ABSTRAK

PERKAITAN ANTARA OBESITY DAN TINGKAH LAKU MAKAN DALAM KALANGAN MURID SEKOLAH RENDAH DI KOTA KINABALU

Latar Belakang: *Obesiti dalam kalangan kanak-kanak telah menjadi salah satu kebimbangan utama negara kita, dan telah meningkat secara mendadak beberapa tahun ini. Statistik terkini daripada National Health and Morbidity Survey (NHMS) menunjukkan bahawa prevalens obesiti negara pada 2015 ialah 11.9% dan telah meningkat kepada 14.8% pada 2019 (NHMS, 2019). Menurut Roy et al., 2011, tingkah laku makan yang dikaitkan dengan obesiti termasuklah kurang responsif terhadap isyarat kenyang dalaman dan tindak balas berlebihan terhadap isyarat makanan luaran seperti rasa, bau, ketersediaan makanan dan emosi. Namun bilangan kajian untuk menggambarkan tingkah laku makan kanak-kanak sekolah rendah di Sabah adalah tidak mencukupi walaupun beban penyakit yang semakin meningkat.*

Objektif: *Kajian ini bertujuan untuk menentukan prevalens obesiti kanak-kanak di Sabah serta melihat perbandingan dalam tingkah laku pemakanan antara kanak-kanak dalam golongan berat normal, berat berlebihan dan obesiti.*

Kaedah kajian: *Kajian keratan rentas melibatkan 484 pelajar (berumur 6-12 tahun) telah dijalankan di lima buah sekolah rendah di Kota Kinabalu, Sabah. Sekolah-sekolah tersebut dipilih berdasarkan kaedah persampelan berstrata berbilang peringkat dan kaedah persampelan mudah. Kanak-kanak sekolah rendah dengan masalah kesihatan seperti asma bronkial, kencing manis jenis-1 atau mereka yang menggunakan steroid oral berpanjangan telah dikecualikan daripada kajian. Butiran sosiodemografi dan antropometri kedua-dua ibu bapa dan kanak-kanak diambil, dan tingkah laku makan kanak-kanak dinilai menggunakan Children eating behaviour questionnaire (CEBQ). Skor z indeks jisim badan (BMI) umur dikira mengikut garis panduan WHO untuk menilai status pemakanan.*

Hasil kajian: *Daripada 484 responden, terdapat 198 (40.9%) peserta lelaki dan 286 (59.1%) peserta perempuan. Prevalens obesiti dalam kalangan kanak-kanak sekolah rendah ialah 13.2%. Skor min subskala 'Pendekatan Makanan' (FR, EF, EOE, DD)*

menunjukkan skor min yang lebih tinggi dalam kumpulan berat badan berlebihan dan obes berbanding skor min dalam kumpulan berat normal. Skor min subskala 'Pencegahan Makanan' (SE, EUE, FF) menunjukkan skor min yang lebih rendah dalam kumpulan berat badan berlebihan dan obes berbanding skor min dalam kumpulan berat normal.

Kesimpulan: *Kajian ini telah membuktikan bahawa subskala "Pendekatan makanan" mempunyai kaitan positif dengan berat badan berlebihan pada kanak-kanak.*



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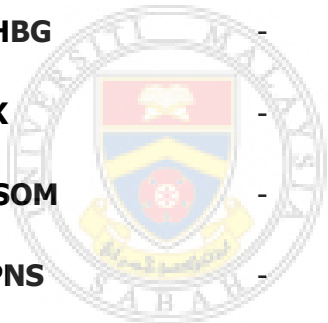
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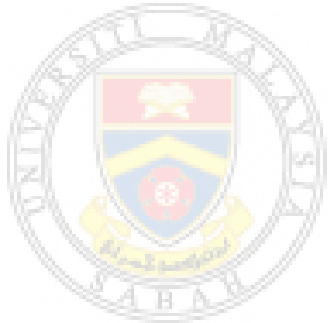
WHO	-	World Health Organization
NHMS	-	National Health and Morbidity Survey
CEBQ	-	Children Eating Behaviour Questionnaire
UMS	-	University Malaysia Sabah
DEBQ-C	-	Dutch Eating Behaviour Questionnaire for Children
ORI-CEBI	-	Oregon Research Institute Child Eating Behaviour Inventory
CFQ	-	Child Feeding Questionnaire
FR	-	Food responsiveness
EF	-	Enjoyment of Food
EOE	-	Emotional Overeating
DD	-	Desire to drink
SR	-	Satiety responsiveness
SE	-	Slowness in eating
EUE	-	Emotional undereating
FF	-	Food fussiness
BMI	-	Body mass index
IASO	-	International Association for the Study of Obesity
IOTF	-	International Obesity Task Force

SD	-	Standard deviation
CDC	-	Centers for Disease Control and Prevention
DXA	-	Dual energy x-ray absorptiometry
NHANES	-	National Health and Nutrition Examination Survey
CPG	-	Clinical Practice Guideline
NAFLD	-	Non alcoholic fatty liver disease
SCFE	-	Slipped capital femoral epiphysis
OSA	-	Obstructive sleep apnea
SHBG	-	Sex hormone-binding globulin
SK	-	Sekolah kebangsaan
DSOM	-	Department of Statistics
JPNS	-	Jabatan Pelajaran Negeri Sabah
CI	-	Confident interval



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CHAPTER 1

INTRODUCTION

1.1 Preface

This chapter consists of the research background, problem statement, research objectives, research questions, significance of study, hypothesis and conceptual framework.

1.2 Background

According to World Health Organization (WHO), more than 1 billion people worldwide are obese namely 650 million adults, 340 million adolescents and 39 million children. It is more worrisome as this number is still increasing. WHO estimates that by 2025, approximately 167 million people including both adults and children will become less healthy because they are overweight or obese. In Malaysia itself, obesity is one of the biggest public health challenges as our country has the highest rates of adult obesity in Southeast Asia (Ming M F *et al.*, 2021). As adult obesity in Malaysia getting more attention and need to be tackled, our children is another raising issued need to be take into attention as well. The prevalence of childhood obesity is increasing at an alarming rate in Malaysia. The latest statistic from National Health and Morbidity Survey (NHMS) shows that the national prevalence of obesity in 2015 was 11.9% and has escalated to 14.8% in 2019 (NHMS, 2019). These numbers are worrying in view of overweight and obesity are considered risk factors for various chronic diseases such as type 2 diabetes, high blood pressure, heart diseases, stroke, and some forms of cancer. Many serious health problems relating to obesity manifest in adult life, co-morbid illnesses are becoming increasingly apparent in paediatric populations. At the same time overweight child are more likely to be overweight or

obese in their adulthood and therefore are at greater risk of developing heart disease, diabetes, and other chronic ailments (Balkish *et al.*, 2013). According to WHO, people with obesity are also three times more likely to be hospitalized for COVID-19. Not to forget that obesity not only impacts the health of individuals and communities but also has far-reaching complications for healthcare systems and the economy.

Generally, overweight and obesity are defined as abnormal or excessive fat accumulation that may impair health. The fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. Changes in dietary and physical activity patterns are often the result of environmental and societal changes associated with development and lack supportive policies in sectors such as health, agriculture, transport, urban planning, environment, food processing, distribution, marketing and education (WHO). While it is agreed that the energy intake of overweight children exceeds their energy expenditure, less is known about the specific behaviours involved. Studies have shown differences in several dimensions of eating behaviours among children (Passos *et al.*, 2014). According to Roy *et al.*, 2011, specific eating behaviours that have been associated with obesity include under-responsiveness to internal satiety cues (low satiety responsiveness, high speed of eating) and over-responsiveness to external food cues such as taste, smell, availability and emotions (high enjoyment of food, food responsiveness and emotional overeating). On the other hand, underweight children seem to be more selective in relation to food, consuming small meals, with a limited number of foods and more slowly, thus reflecting a lack of interest in food (Passos *et al.*, 2014).

It is known that eating behaviors are developed in the first years of life and eating habits in adulthood are related to those learned in childhood (Passos *et al.*, 2014). Eating behaviours established in childhood persist, with implications such as fussiness and poor dietary variety, or high responsiveness to food cues and increased obesity risk (Scaglioni *et al.*, 2018). The study of children's behaviour should thus be seen as a starting point for targeted and effective nutrition education programmes, while at the same time suggesting further research strategies to elucidate the interactions between the various

factors influencing children's eating behaviours (Scaglioni *et al.*, 2018). Numbers of psychometric instruments have been developed to assess eating behaviour in children, these include Children Eating Behaviour Questionnaire (CEBQ), Dutch Eating Behaviour Questionnaire for Children (DEBQ-C), Oregon Research Institute Child Eating Behaviour Inventory (ORI-CEBI) and Child Feeding Questionnaire (CFQ) (Sirirassamee et al 2016). CEBQ chosen in this study is a 35 item questionnaire, designed as a parent reported questionnaire to measure eating behaviour traits related to nutritional status among children. The CEBQ contains eight dimensions of eating styles; four subscales that measure food approach behaviours [Food Responsiveness (FR), Enjoyment of Food (EF), Emotional Overeating (EOE), Desire to Drink (DD)] and another four subscales that reflect food-avoidant behaviours [Satiety Responsiveness (SR), Slowness in Eating (SE), Emotional Undereating (EUE) and Food Fussiness (FF)].

Kota Kinabalu as a state capital of Sabah with easily available fast food chain restaurant, outside foods straight to the door through foods application services, parents with longer working hour and more sedentary environment with less time spend for preparing more healthy and physical activity. With current alarming issue of childhood obesity that has been rising dramatically over the years, more studies need to be done to look for causation factors and subsequently further intervention to be constructed. Yet there is inadequate number of study present in Sabah to describe children eating behaviours despite of the increasing disease burden. Thus, the aim of the present study is to determine the prevalence of obesity in Kota Kinabalu and the comparison in eating behaviours between children nutritional status in Kota Kinabalu.

1.3 Problem Statement

Obesity among children poses a global public health threat and has been raising to an alarming level all over the world. WHO has stated that childhood obesity is steadily affecting many low- and middle- income countries, particularly in urban setting. A study done in West Malaysia in 2021 shows that 15.5% and 18.4% of urban adolescents were categorised as obese and overweight whilst, 14.6% and 15.2% of rural adolescents were

with obesity and overweight (Aryati Ahmad *et al.*, 2021). Urbanization is one of the most important actors of an obesogenic environment. A study done by Sobal J. *et al.*, 2001, suggested that rapid urbanization accounts for significant shifts in dietary patterns and for physical activity levels that tend to increase risks for obesity in children. In Sabah, Kota Kinabalu as the capital state of Sabah is definitely an urban area in which these issue should be looked into. In addition, a study on children eating behaviour was done recently in inferior district of Sabah (Eric *et al.*, 2021) shows higher prevalence of underweight compared to overweight group and this study did not include those children from urban area like Kota Kinabalu. In view of diversity of ethnicity in Sabah as well as different choices of foods available compared to urban area in West Malaysia, exploring eating behaviour in association with nutritional status among children in Kota Kinabalu is needed.

The main cause of obesity in children is exogenous obesity, which is due to external factors (Janet HYH, *et al.*, 2020). Zalilah MS *et al.*, 2006 has identified that unhealthy dietary intake and lack of physical activity level associated with higher body mass index among Malaysian children and adolescents. Eating behaviours of children plays a major role in the diet and food intake of children which is an important determinant in variation of nutritional status (Roy *et al.*, 2020). The correlation between nutrients, foods, and dietary patterns has important implications, especially for prevention and development of chronic diseases, such as cardiovascular diseases, cancers, diabetes and chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) (Scaglioni *et al.*, 2018). Jansen *et al.*, 2012 in their study describe the associations between childrens' eating behaviour and BMI was due to relations between parental practices and child BMI, suggesting complex associations between these variables. Among the obese, overweight and non-overweight children, eating behaviours were found to be different (Demir *et al.*, 2020). Eating behaviors of young children, such as eating in response to environmental food cues, increase the likelihood of children to have a high BMI, while responsiveness to internal satiety cues and pickiness have been associated with a lower mean BMI (Gregory JE *et al.*, 2010). These dietary habits are shaped at a young age and maintained during later life. These

situations demonstrate the importance of determining children eating behaviors at early ages and the actions aimed at promoting healthy eating habits should focus with greater emphasis on children. However, less studies conducted on evaluating the eating behaviours which differs among normal, overweight and obese children. Though some study conducted support the relationship between eating behaviour and children BMI, there are few studies too with association not consistently found between eating behaviour and children BMI. Hence, this study aims in determining the prevalence of childhood obesity in Sabah as well as look into the comparison in eating behaviours between children nutritional status in Kota Kinabalu.

1.4 Research Question

1. What is the prevalence of childhood obesity among primary school children in Kota Kinabalu?
2. What is the distribution of CEBQ subscales mean score by ethnicity, nutritional status and age group?
3. Is there a difference in eating behaviour between children with normal weight, overweight and obese?

1.5 Objectives

1. To determine the prevalence of childhood obesity among primary school children in Kota Kinabalu.
2. To describe the distribution of eating behaviour mean score by ethnic group, nutritional status and age group in Kota Kinabalu.
3. To compare eating behaviours between normal, overweight and obese primary school children in Kota Kinabalu.

1.6 Hypotheses

Children with higher mean score of food approach subscale are likely to be obese.

1.7 Significance of the Study

This research provides profile and baseline data of how does the eating behaviour impacting on the growth of childhood obesity among the primary school children in Kota Kinabalu, focusing in five (5) primary school in Kota Kinabalu. We believe that eating behaviours is associated with nutritional status of the primary school children in Kota Kinabalu, Sabah. And the result of our finding will provide an evidence-based information to understand about the impact of these changes on the growth of prevalence of childhood obesity among primary school children in Kota Kinabalu, Sabah. This finding enables early detection and possible prevention of diseases by identifying predictors of childhood obesity in Kota Kinabalu. The outcome from this study will assist in the development of future pragmatic public health interventions to reduce the prevalence of childhood obesity, and support the plan by Ministry of Health. The findings of this study will also contribute to a theory or existing literature by adding on to the available literature and may provide practical information that can be used for community intervention. Most importantly, it would help to increase the quality of life of these communities as a whole.