

**SNACKING HABIT AMONG ADOLESCENTS (AGED 10 TO 18) IN KOTA  
KINABALU, SABAH**

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**DECLARATION**

The materials in this thesis are original except for quotations, excerpts, summaries and references, which have been duly acknowledged.

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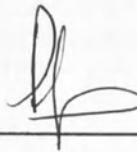
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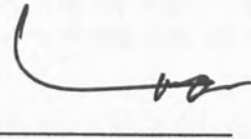
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## ABSTRAK

## TABIAT PENGAMBILAN SNEK DI KALANGAN REMAJA (10 HINGGA 18 TAHUN) DI SEKITAR KOTA KINABALU, SABAH

Objektif utama kajian ini adalah untuk mengklasifikasikan remaja kepada '*high snackers*' dan '*low snackers*', menentukan sumbangan tenaga daripada snek dan membandingkannya di antara jenis '*snacker*'. Kajian ini juga bertujuan untuk menentukan jenis snek yang kerap diambil serta mengkaji hubungan tabiat pengambilan snek dengan faktor jantina, umur, status pekerjaan dan tahap pendidikan ibu, pendapatan keluarga, dan kekerapan menonton televisyen. Pengukuran ketinggian dan berat badan dilakukan bagi menentukan indeks jisim tubuh (IJT) dan klasifikasi berat badan. Seramai 454 orang remaja telah diambil sebagai responden dalam kajian ini. 54.4% daripada responden diklasifikasikan sebagai '*high snackers*' manakala 45.6% '*low snacker*'. Min pengambilan tenaga harian bagi '*high snacker*' didapati tinggi (2011kcal  $\pm$  395.1) berbanding '*low snacker*' (2167kcal  $\pm$  421.0). Perbezaan signifikan didapati wujud dalam jumlah pengambilan tenaga dan sumbangan tenaga daripada snek antara kedua-dua kategori remaja tersebut ( $p=0.000$ ). Snek didapati menyumbangkan 28.6% daripada min pengambilan tenaga harian bagi '*high snacker*' dan 17.1% bagi '*low snackers*'. Didapati 9.9% responden mempunyai kekurangan berat badan, 7.3% berlebihan berat badan, 2.0% obes manakala selebihnya normal. Klasifikasi berat badan didapati tidak mempunyai hubungan signifikan dengan kekerapan pengambilan snek ( $p=0.062$ ). Snek seperti keropok, gula-gula, keropok lekor, pisang goreng, makanan segera serta minuman berkarbonat kerap diambil oleh remaja. Majoriti remaja (94.3%) menggemari makanan ringan seperti kentang goreng, ayam goreng dan mee segera. Jantina didapati tidak mempunyai hubungan dengan kategori '*snacker*' ( $p=0.277$ ), namun terdapat hubungan signifikan diantara jenis '*snacker*' dan umur ( $p=0.000$ ). Hubungan signifikan juga didapati di antara jenis '*snacker*' dan tahap pendidikan dan status pekerjaan ibu, pendapatan keluarga serta kekerapan menonton televisyen ( $p<0.05$ ). Kesimpulannya, kebanyakan remaja didapati tergolong dalam '*high snackers*' manakala tabiat pengambilan snek remaja didapati mempunyai hubungan signifikan dengan faktor umur, tahap pendidikan dan status pekerjaan ibu, pendapatan keluarga serta kekerapan menonton televisyen masing-masing.



**ABSTRACT****SNACKING HABIT AMONG ADOLESCENTS (AGED 10 TO 18) IN KOTA KINABALU, SABAH**

*The main objectives of this study were to classify adolescents into high snackers and low snackers according to the amount of snacks consumed in a day, to determine the contribution of energy from snacks and to compare between snacker types. This thesis also aimed to determine the types of snack food most frequently consumed and the relationship between snacking habit and factors such as gender, age, maternal employment status and education level, family income and television viewing frequency. Measurements of height and weight were taken to determine adolescents' body mass index (BMI) and their weight classifications. A total of 454 adolescents were taken as respondents in this study. It was found that 54.4% of the respondents were high snackers while the other 45.6% were low snackers. Mean daily energy intakes for high snackers were found higher (2011kcal  $\pm$  395.1) compared to low snackers (2167kcal  $\pm$  421.0). Significant difference existed between the total energy intakes and the contribution of energy from snacks between the two snacker categories ( $p=0.000$ ). Snack foods were found to contribute 28.6% of the total mean daily energy intakes for high snackers and 17.1% for low snackers. BMI measurements showed that 9.9% of the respondents were underweight, 7.3% overweight and 2.0% obese while the rest normal weight. Weight classifications were found not related to snacker types ( $p=0.062$ ). Savoury and sugary snacks, fast food, carbonated drinks and local delicacies were snacks frequently consumed by adolescents. Majority of the respondents (94.3%) likes fast foods such French fries, fried chicken and instant noodles. Gender was found not related to snacker types ( $p=0.277$ ), but there was significant relationship between adolescents' age group and snacker types ( $p=0.000$ ). Significant relationships were also found between snacker types and maternal education level and employment status, family income and television viewing frequency ( $p<0.05$ ). To conclude, it was found that most of the adolescents were 'high snackers' and snacking habit among adolescents was significantly related to age group, maternal education level and employment status, family income and television viewing frequency respectively.*



**SYMBOLS**

%	percentage
≥	More or equals to
≤	Less or equals to
N	Total respondents
<	Less than
>	More than
±	Plus or minus
=	Equals to
&	and
$\chi^2$	Chi-square value
p	Significant value at 5%
df	Degree of freedom
cm	centimeter
mm	milimeter
kg/m <sup>2</sup>	kilogram per meter square
kcal	kilocalorie
g	gram



**ABBREVIATION**

MOH	Ministry of Health Malaysia
RNI	Recommended Nutrient Intakes
BMI	Body Mass Index
WHO	World Health Organization
CDC	Center for Disease Control and Prevention
HS	High Snacker
LS	Low Snacker
ANOVA	Analysis of Variance
SSMP	Sekolah Sains Makanan dan Pemakanan
UMS	Universiti Malaysia Sabah
SPSS	Statistical Package for the Social Sciences



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# CHAPTER 1

## INTRODUCTION

Rapid development in Malaysia's socio-economic has caused significant changes in Malaysian dietary patterns including food habits, food purchasing and consumption pattern (Pon, Mirmalini & Mohd Nasir, 2004; Tee, 1999). Eating pattern including snacking among younger generation has been a concern to our society as poor dietary foundation will lead to health implications in later life especially with the prevalence of childhood obesity in the western world (Green & Burley, 1996; Taylor, Gallagher & McCullough, 2004). Studies such as Doyle and Feldman (1997) have revealed that the snacking patterns of adolescents are mostly consists of crisps and sugary confectioneries as well as fast foods which are high in sugar, salt and fat, but low in vitamins, minerals and fibre rather than fruits and vegetables. Moreover in this globalization era, different varieties of snacks from abroad are introduced and thus diversify the snacking habit among adolescents.

Adolescence is a period of marked changes in physical, emotional and intellectual growth and development (Pon, Mirmalini & Mohd Nasir, 2004; Boyle, 2003). Adolescents play an important role in our society as adolescents today are the leaders of tomorrow. According to the age group categorized in the Malaysian Recommended Nutrient Intake (RNI) (Ministry of Health, 2005), adolescents are those who fall under the age of 10 to 18 years old. Adolescents' nutrition and lifestyle is important to build a healthy new generation in the future. The maturation process of adolescents which began and controlled by various body hormones are highly





influenced by their dietary intake and nutrition status (Tur *et al.*, 2004; Öner *et al.*, 2005). Compared with childhood years, parents' role in deciding on adolescents' food choices is less as adolescents probably consumed more food away from home (Story, Neumark-Sztainer & French, 2002). During adolescence, the energy and nutrient needs increase in order to meet the growth demand of adolescence. Snacking has become common among adolescents where they snack whenever they feel like munching. Snacking can be beneficial if it is done in proper manner as snack food may play its role in providing the extra energy and nutrient needs (Ruxton, Kirk & Belton, 1996; Waller, Du & Popkin, 2003).

Snacking can be defined as food consumption besides breakfast, lunch and dinner (Ruxton, Kirk & Belton, 1996). Snacking habit varies depending on the types and amount of snack food consumed. Snack foods can be a variety of food including fresh fruits, local delicacies, fast foods, potato chips, chocolate confectionery and soft drinks. The word 'snack' often viewed as an 'unhealthy' eating habit, nevertheless snacking on 'healthful' snack foods such as fruits and vegetable are encouraged (Bower & Sandall, 2002). There are many factors which affects snacking habit of adolescents. Young generations' food choices are shaped by individual, societal, and cultural factors. Mothers play an important role in a child's dietary habit (Pon, Mirnalini & Mohd Nasir, 2004; Cooke, 2004; Chee & Lee, 2003). Meals are often prepared by mothers and mothers are the ones who decide on the food intake since young. Working mothers has less time in preparing meals and this increased the popularity in snacking especially on convenient yet unhealthy snack food such as burger, fast food, crisps and other savoury snacks (French *et al.*, 2001). Television viewing also increased the consumption of snacks through advertisements as well as snacking during viewing (Sherina & Rozali, 2004; French *et al.*, 2001). Family income is also one of the affecting factors as money affects the buying power (Taylor,



Gallagher & McCullough, 2004). A family with low income may not afford to provide extra allowance for their children thus this reduces snack consumption.

It is not unusual to find that majority snack foods consumed by most adolescents such as fast foods, carbonated drinks, potato chips, and sweets are high in fat, sugar and energy, but low in nutrients. Excessive consumption of 'unhealthful' snacks may not only lower the adequacy of a diet but also caused health implications. The main concern of improper snacking habit on health is obesity as these snack foods contain high calories which may increased the total energy intake and predisposes adolescents to be in positive energy balance, and thus to gain weight. Besides obesity, improper snacking habit also may cause dental caries. Sugary snacks such as sweets, candies, chocolates and carbonated beverages tend to be favorable among young generation. Snacking habit had caused children's dental health worsen between 1999 and 2001 (Bower & Sandall, 2002; Oliver, 2002). Dental caries among adolescents is bad as it may probably affect the permanent teeth. Diabetes also may occur due to excessive intake of sugar. It is not queer to know that even younger generations nowadays have high glucose level in the blood. All these health implications are due to the improper eating habit including the way they snack.

Despite the health consequences mentioned above, snacking also has its own health benefits. Snacking habit need not be a problem as long as children know what to snack on. Youngsters tend to be very active and so they need more energy. Energy needs per kilogram are higher during period of rapid growth such as adolescence (Grosvenor & Smolin, 2002). Thus, they need to eat more often where 3 main meals a day may not be sufficient for them to obtain the entire nutrient they need daily.



Dietary survey on snacking habit among adolescents aged 10 to 18 in Kota Kinabalu, Sabah was done to study on few aspects as mentioned in the objectives.

### **Objectives**

1. To determine the types of snack food most frequently consumed; the typical contribution of energy from snacks in respondents' daily energy intakes and to classify respondents into high snackers or low snackers
2. To determine respondents' body mass index (BMI) and weight classifications well as their relationship to snacker category.
3. To evaluate the relationship between snacking habit and potential factors that influence it such as gender and age group, maternal employment and education level, family income and television viewing frequency.



## CHAPTER 2

### LITERATURE REVIEW

#### 2.1. Snack Foods

Snack foods are foods not meant to be eaten as part of one of the main meals of the day (Ruxton, Kirk & Belton, 1996; Bower & Sandall, 2002; Hampl, Heaton & Taylor, 2003). Rather, snacks are intended as a contribution to temporarily tide a person's hunger, and provide a brief supply of energy for the body. Snacks are often served in social gatherings, business functions, family functions and even in school functions. As a whole, snack food can be defined as food or drink not taken at recognized mealtimes, which make an important contribution to mean daily intakes, particularly to intakes of energy, fat, carbohydrate, total sugars, and vitamin C (Ruxton, Kirk & Belton, 1996).

Rapid economic growth and globalization introduce varieties of snack food in our market today. Besides locally manufactured snack food, imported snacks are also found to be widely distributed in local stores. Snack food can be divided into two categories which are the 'healthful' type and the 'unhealthful' type. 'Healthful' snacks are in the form of fresh fruits and vegetables as well as cereal bars, while 'unhealthful' snacks consists of crisps, sugar confectionery, chocolate and carbonated drinks (Sweeting & West, 2005). Besides commercially manufactured snack foods, Malaysians also consumed local delicacies as snacks such as *keropok lekor*, *pisang goreng*, currypuff and fried spring roll especially in the evening.

### 2.1.1. 'Healthful' Snack Foods

In order to promote healthy dietary intake, adolescents are encouraged to consumed 'healthful' snack food. 'Healthful' snacks are those which contain low fat, salt and cavity risk. Examples of 'healthful' snack foods which are not only tasty but also nutritious are fresh foods and vegetables, nuts and seeds, dairy products and whole grain products.

Fresh fruits and vegetables such as carrot, celery, cucumber, tomato, apple and banana which are rich in complex carbohydrates, dietary fiber, vitamins and minerals (Pon, Mirmalini & Mohd Nasir, 2004; Xie *et al.*, 2003) are among the 'healthful' snack food. Nuts and seeds such as peanuts, green peas, pistachios and pumpkin seeds are also 'healthful' snacks which can be widely available in local convenience stores. Unsweetened popcorns, wheat bread, oatmeal are also good to be consumed as snack food. Besides that, adolescents are also encouraged to consume snacks from dairy products such as low-fat yogurt, milk and cheeses as adequate calcium is important to build stronger bones especially during adolescence.

Snacking is important for adolescents as these growing young children need more energy for their growth and body development. Nevertheless, excessive energy will cause energy imbalance and this will lead to the prevalence of overweightness and obesity among adolescents. Adolescents need to be encouraged to make proper decision in choosing appropriate snack food. Adolescents who were trained to practice healthy snacking habit during childhood, will most likely to maintain this healthy habit in adolescence and adulthood.



### 2.1.2. 'Unhealthful' Snack Food

'Unhealthful' snacks are found to be more popular among adolescents compared to 'healthful' snack foods (Ruxton, Kirk & Belton, 1996; Hampl, Heaton & Taylor, 2003). 'Unhealthful' snacks include snack food which are high in sugar, fat and salt such as carbonated drinks, fast foods, crisps and sugary snacks such as sweet, chocolates and candies (Sweeting & West, 2005). These snacks are often known as 'junk food' as snack foods in this category mostly consists of high calories, high glycaemic level and cavity risk.

## 2.2. Adolescents' Snacking Habit and Trend

Snacking habit can be defined as optional consumption of food and or beverages in between breakfast, lunch and dinner which are considered main meals of a day (Devasahayam, 2003; Ruxton, Kirk & Belton, 1996). Snacking habit varies depends on the types of snack food consumed and its frequency of consuming snacks.

Adolescence can be defined as the evolution from childhood to adulthood which is also the beginning period of maturity process that involve a series of physical, emotional and intellectual growth and development accompanied with a rapid biological change (Pon, Mirmalini & Mohd Nasir, 2004; Boyle, 2003; Porte, Sherwin, & Baron, 2003). Adolescence can be expressed in two phases which are pubescence and adolescence (Owen, Splett & Owen, 1999). According to the age group categorized by Recommended Nutrient Intake for Malaysia 2005 (Ministry of Health, 2005), adolescents are those aged from 10 to 18 years old. At this period, energy and nutrient requirements are at its peak especially during the years of maximum growth. Adolescents' dietary intake including their snacking habit need to be well taken care of as this indicates the nutrition status of adolescents.



Adolescents' snacking habit is very important as it shapes the personal nutrition status and dietary intakes. The maturation process of an adolescent which is commenced and restricted by a diversity of hormone such as growth hormones, sexual hormones and the thyroid hormones is highly influenced by dietary intakes and nutrition status (Boyle, 2003). Proper snacking among adolescents can not only be beneficial but also helps prevent certain medical problems such as becoming overweight or developing dental caries and diabetes.

As reported by Dr. Abdullah Al Mamun in his article on 'Family Meals Cut Teenage Fatness' (2005), having regular family meals could minimize snacking and promote healthy habits. This is because meals prepared at home are healthier and well-balanced compared to food available away from home. Compared to childhood years, adolescents tend to spend more time away from home (Story, Neumark-Sztainer & French, 2002). Most adolescents are the decision-maker of their own diet. Parents tend to play lesser role in deciding on adolescents' dietary intake if compared to during their childhood years. During adolescence, the snacking pattern may differ compared to during childhood years due to the changes in their lifestyle in coping between academic and social activities (Story, Neumark-Sztainer & French, 2002).

Adolescents' snacking habits today are diversified due to the globalization and this leads towards a dietary pattern similar to the western countries such as United State of America, in developing countries including Malaysia (Pon, Mirmalini & Mohd Nasir, 2004). International fast food restaurants had grown so rapidly in our country in order to meet the needs and demands of today's consumers. Fast food restaurants had been a popular hang-out especially among adolescents (French *et al.*, 2001). Fast foods are normally served in large portion sizes which contain high energy density and high glycaemic index (Sherina & Rozali, 2004). Frequent consumption of



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