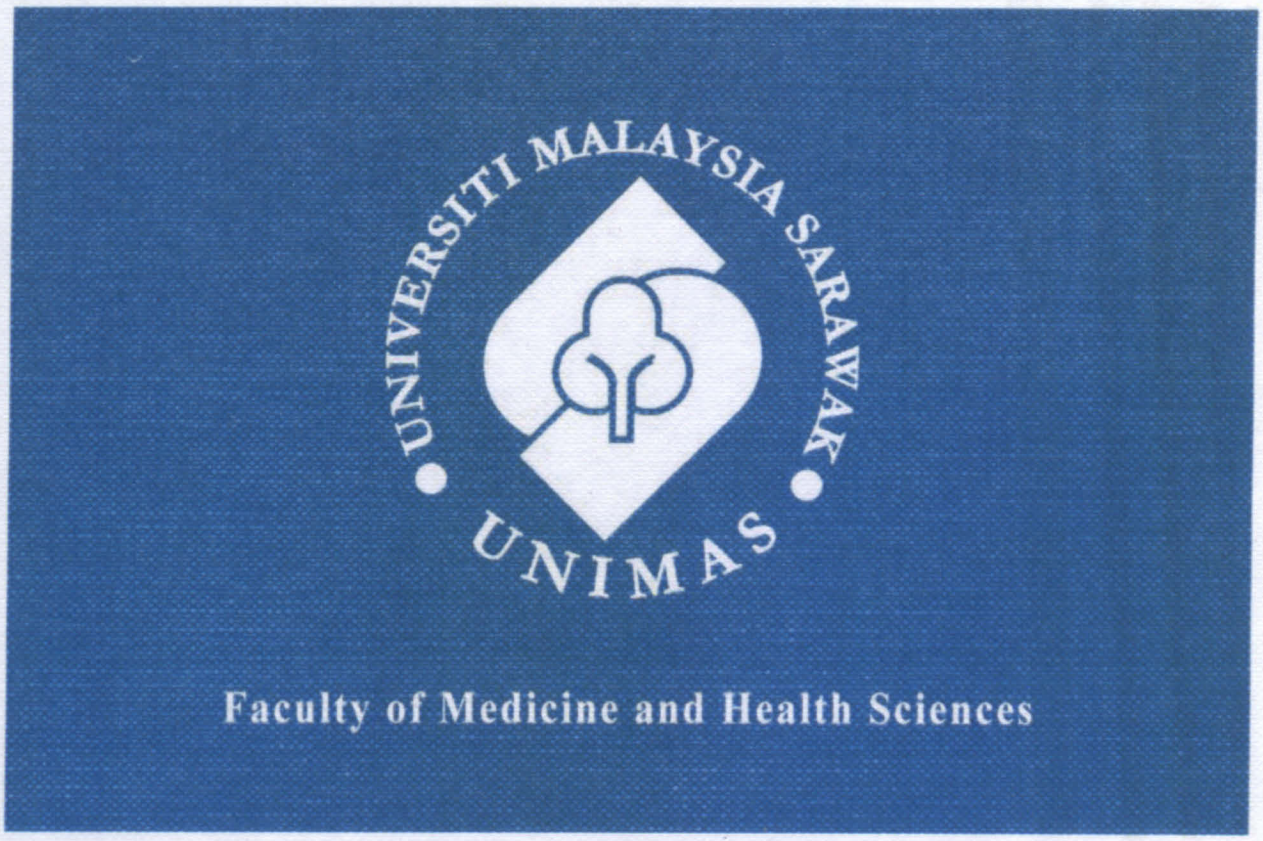


THE PREVALENCE OF UNHEALTHY SNACKING BEHAVIOUR AND ITS ASSOCIATION WITH INDIVIDUAL AND ENVIRONMENTAL FACTORS AMONG COLLEGE STUDENTS IN KUCHING, SARAWAK

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LIST OF ABBREVIATION

ACC	American College of Cardiology
ASM	Academy of Sciences Malaysia
CDC	Centers for Disease Control and Prevention
IPH	Institute for Public Health
MCMC	Malaysian Communications and Multimedia Commission
MQA	Malaysian Qualifications Agency
NCCFN	National Coordinating Committee on Food and Nutrition
WADOH	Washington State Department of Health
NCDs	Non-communicable diseases
NHMS	National Health and Morbidity Survey
SCT	Social cognitive theory
SPSS	Statistical Package for the Social Sciences
SSBs	Sugar-sweetened beverages
WHO	World Health Organisation

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ABSTRACT

Introduction: Unhealthy snacking behaviour among young people is a growing public health concern because of its negative consequences on health. The present study was to determine the prevalence of unhealthy snacking behaviour and its determinants among college students in Kuching. **Methodology:** In this cross-sectional study, 12 colleges in Kuching were stratified into private and government colleges. Three private and three government colleges were selected through a stratified random sampling method. A total of 422 respondents (male 49.5%, female 50.5%) were recruited in this study. A self-administered questionnaire was used to gather data regarding unhealthy snacking behaviour and its determinants (gender, food preferences, type of school and courses, taste-and-sensory perception, nutritional knowledge, perceived self-efficacy, and cost/price sensitivity, perceived parental control, easy accessibility, and media advertisements influence) among respondents. The survey was conducted online via e-mail and Whatsapp. Multiple binary logistic regression analysis was used to analyse the data. **Result:** Nearly a quarter of the respondents (24.6%) practised unhealthy snacking behaviour. More than half of the respondents (58.3%) consumed unhealthy snacks one to three times per week. Only a minority of the respondents (17.1%) claimed that they did not consume any unhealthy snacks for the past month. The final model explained 15.7% of the total variance. Taste-and-sensory perception (Adjusted OR = 2.20, 95% CI = 1.55 – 3.13, $p < 0.001$) and nutritional knowledge (Adjusted OR = 1.48, 95% CI = 1.12 – 1.97, $p < 0.05$) were positively associated with unhealthy snacking behaviour among respondents. **Conclusion:** The present study suggested the stakeholders for future intervention development by concentrate on nutritional knowledge and taste-and-sensory perception among college students. Moreover, governments may also intervene in unhealthy snack companies by refining certain food policies and strengthen the enforcement of food laws.

Keywords: Unhealthy snacking behaviour, Individual factors, Environmental factors, College students, Kuching, Sarawak.

ABSTRAK

Pendahuluan: Tabiat pemakanan snek yang tidak sihat di kalangan golongan muda adalah masalah kesihatan awam yang semakin meningkat kerana kesan negatifnya terhadap kesihatan. Kajian ini adalah untuk menentukan kelaziman tabiat pemakanan snek yang tidak sihat dan faktor penentunya di kalangan pelajar kolej di Kuching. **Metodologi:** Dalam kajian keratan rentas ini, 12 kolej di Kuching dikelompokkan kepada kolej swasta dan kerajaan. Tiga kolej swasta dan tiga kerajaan dipilih melalui kaedah persampelan rawak berstrata. Sebanyak 422 responden (lelaki 49.5%, perempuan 50.5%) direkrut dalam kajian ini. Soal selidik yang dikendalikan sendiri telah digunakan untuk mengumpulkan data mengenai tabiat pemakanan snek yang tidak sihat dan penentunya (jantina, makanan pilihan, jenis sekolah dan kursus, persepsi rasa dan sensori, pengetahuan pemakanan, kepercayaan jangkaan keupayaan kendiri, dan kepekaan kos/harga, kawalan ibu bapa, akses mudah, dan pengaruh media pengiklanan) di kalangan responden. Tinjauan ini dijalankan secara atas talian melalui e-mel dan Whatsapp. Analisis regresi logistik binari berganda digunakan untuk menganalisis data. **Keputusan:** Hampir seperempat responden (24.6%) mengamalkan pemakanan snek yang tidak sihat. Lebih daripada separuh responden (58.3%) makan snek yang tidak sihat sekali hingga tiga kali seminggu. Hanya sebahagian kecil responden (17.1%) yang menyatakan bahawa mereka tidak mengambil snek yang tidak sihat dalam sebulan yang lepas. Model terakhir menjelaskan 15.7% dari jumlah varians. Persepsi rasa dan sensori (nisbah odds yang diperbetulkan = 2.20, 95% sela keyakinan = 1.55 – 3.13, $p < 0.001$) dan pengetahuan pemakanan (nisbah odds yang diperbetulkan = 1.48, 95% sela keyakinan = 1.12 – 1.97, $p < 0.05$) berhubungan positif dengan tabiat pemakanan snek yang tidak sihat. **Kesimpulan:** Kajian ini mencadangkan pihak berkepentingan untuk perkembangan intervensi pada masa depan dengan menumpukan perhatian pada pengetahuan pemakanan dan persepsi rasa dan sensori di kalangan pelajar kolej. Selain itu, pihak kerajaan juga boleh melaksanakan intervensi dalam perusahaan snek yang tidak sihat dengan menambahbaik polisi makanan tertentu dan memperkuat penguatkuasaan undang-undang makanan.

Kata kunci: Tabiat pemakanan snek yang tidak sihat, Faktor individu, Faktor persekitaran, Pelajar kolej, Kuching, Sarawak.

CHAPTER 1: INTRODUCTION

1.1 Background

Most people perceived that snacks are small portion packaged, nutrient-poor, low-price foods or beverages (Brian Wansink et al., 2010; Pries et al., 2019), and snacking refers to consume energy outside of breakfast, lunch, and dinner (Institute for Public Health [IPH], 2017). Nevertheless, the definition of snacks was remaining inconsistent (Hess et al., 2016). This was because of the scientific consensus about what constitutes a snack does not exist, either the snacks consumed between meals or the snacks consumed during the meal as a meal replacement (Murakami, 2017). By definition, snacks can commonly be divided into unhealthy snacks and healthy snacks (Mancuso, 2019). The key difference between unhealthy snacks and healthy snacks is related to their negative or positive consequences on health (Schlinkert et al., 2020).

Widely, unhealthy snacks refer to nutrient-poor food or beverages that are high in calories, fat, sodium, and/or sugar, such as bubble tea, popcorns, chips, crackers, pickles, cakes, ice cream, chocolate, candy, sugar-sweetened beverages (SSBs), nuggets, sausages and french fries (Bellisle, 2014; IPH, 2017; O'Connor et al., 2015). In contrast, a healthy snack must be a grain product (as the first ingredient) that at least contains one-half of whole grains by weight; or have as the first ingredient a vegetable/fruit, a dairy product or protein food; or a combination food which contains at least a quarter cup of vegetable/fruit. Additionally, a healthy snack must

also meet the nutrient guidelines for calories, sugar, sodium, and fats (Washington State Department of Health [WADOH], 2017).

Adolescence is a period associated with critical changes in physical, mental, emotional, social lifestyle, as well as eating behaviour (Deforche et al., 2015; Mithra et al., 2018). Although college-going age populations are usually sceptical; they are still vulnerable under the influence of media advertisements (Folkvord, 2019). Therefore, these young people are often targeted by unhealthy food advertisements and marketing strategies in the environment, which may lead them favourable to adopt unhealthy eating habits, such as a high intake of unhealthy snacks and low intake of vegetables, fruit, dairy products, and grains. (American Cancer Society Cancer Action Network, 2020; Davis et al., 2007; Martens et al., 2005; Vallianatos et al., 2010; World Health Organisation [WHO], 2020d). Unhealthy eating was described in terms of eating foods containing high fat, sugar, salt, fried foods, fast foods, and foods with additives (Povey et al., 1998). Furthermore, those who frequently consumed unhealthy food was one of the risk factors associated with diet-related non-communicable diseases (NCDs), especially obesity, cardiovascular diseases, diabetes, and hyperlipidemia (Ezzati & Riboli, 2013; Nickols-Richardson et al., 2014). Due to its negative consequences on health, the issue started to gain attention from researchers around the world. For instance, Mithra et al. (2018) suggested that any individual that repeatedly consumed unhealthy snacks more than three times per week was defined as unhealthy snacking behaviour.

Unhealthy snacking behaviour is considered modern eating behaviour that common in young people (Whiteside, 2019). Because of the sales of unhealthy snacks in low- and middle-income countries were growing rapidly, which puts these young people

at a higher risk of getting NCDs (Wilde, 2020). In Malaysia, studies showed evidence that almost a quarter of school-going age adolescents practised unhealthy snacking behaviour (Chin & Nasir, 2009; Gan et al., 2019; Hoque et al., 2016; Majid et al., 2016; Nurliyana et al., 2015; Teo & Sedek, 2012); nevertheless, the similar studies among college-going age populations were relatively limited in Malaysia (Gan et al., 2011; Isa & Masuri, 2011).

Previously, most of the similar local studies merely investigated on sugary snacks and SSBs consumptions among the young people (Fadzly et al., 2018; Hamirudin et al., 2018; Mohd Fahmi Teng et al., 2019; Nizar Abdul Majeed et al., 2015; Oo et al., 2019), which may underestimate the true prevalence of unhealthy snacking behaviour among the study populations. Therefore, the main purpose of this research was to determine the prevalence of unhealthy snacking behaviour and its associated factors among college students in Kuching. The implication of this study may provide advantages of concentrating on the significant determinants in the intervention programme on similar study populations in the future.

1.2 Statement of problems

Unhealthy snacking behaviour is considered modern eating behaviour that common in young people (Whiteside, 2019). The systematic review found the unhealthy snacking behaviour and its determinants among young people were multi-dimensional in nature and inconsistent (Blaine et al., 2017; Desbouys et al., 2020).

Story et al. (2002) proposed an integrated theoretical framework based on social cognitive theory (SCT) and the ecological model in order to easily understand the

factors associated with eating behaviour among young people. In that framework, the eating behaviour among adolescents was considered as being a function of multiple levels of influence, which included individual, social-environmental, physical-environmental, and macrosystem influences. Several similar studies adopted this framework in their research (Larson et al., 2017; Mithra et al., 2018; Yazdi Feyzabadi et al., 2017). These influences can generally be divided into two major domains, which include individual factors and environmental factors, as below:

The domain of individual factors included biological factors (such as age, gender), socio-demographic characteristics (such as socioeconomic status, education level), and psychosocial factors (such as food preferences, taste-and-sensory perception, nutritional knowledge, self-efficacy, cost/price sensitivity). For instance, studies demonstrated that the periodical fluctuating sex hormone in females causes gender differences in eating occasions (Asarian & Geary, 2006, 2013; Eckel, 2011). In addition, private college students were found positively associated with unhealthy snacking behaviour in a study (Yazdi-Feyzabadi et al., 2019). Besides, researchers revealed the disparities in nutritional knowledge between non-science courses and science-course students lead the differences in eating behaviour (Ahmad et al., 2019; Mithra et al., 2018). Moreover, studies provided evidence that vegetarians were negatively associated with unhealthy snacking behaviour (Movassagh et al., 2018; Perry et al., 2002; Segovia-Siapco et al., 2019). Additionally, researches found that taste-and-sensory perception as one of the essential factors influenced consumers to choose unhealthy snacks (Crofton et al., 2014; Kourouniotis et al., 2016; Oogarah-Pratap & Heerah-Booluck, 2005). Moreover, studies demonstrated that nutritional knowledge was positively associated with unhealthy snacking behaviour among people (Al-Yateem & Rossiter, 2017; Grosso et al., 2013). Furthermore, a negative

association between self-efficacy and unhealthy snacking behaviour had confirmed in some researches (Rezali et al., 2015; Tavassoli et al., 2018; Zeinab et al., 2017). Besides, several studies showed that cost/price sensitivity and unhealthy snacks purchase intention was negatively associated among young people (Ashoka & Rakesh, 2016; Block et al., 2010; Guerrero-López et al., 2017).

The domain of environmental factors included social-environmental (such as perceived parental control on unhealthy snacks), physical-environmental (such as easy accessibility to unhealthy snacks), and macrosystem influences (media advertisements influence). For instance, several studies demonstrated that parental control on unhealthy snacks was positively associated with unhealthy snacking behaviour among their children (Larson et al., 2017; Rhee et al., 2015). In addition, several studies revealed a positive association between easy accessibility to unhealthy snacks and unhealthy snacking behaviour among school-age adolescents (Larson et al., 2017; Mohd Fahmi Teng et al., 2019; Nurliyana et al., 2015). Besides, several studies showed a positive association between media advertisements influence and unhealthy snacking behaviour among young people (Gan et al., 2019; Lwin et al., 2017; Norman et al., 2018b).

1.3 Research objectives

1.3.1 General objective

- To determine the prevalence of unhealthy snacking behaviour and its association with individual and environmental factors among college students in Kuching.

1.3.2 Specific objectives

i. To determine the socio-demographic characteristics of respondents.

ii. To determine the prevalence of unhealthy snacking behaviour among respondents.

iii. To determine the individual factors related to unhealthy snacking behaviour among respondents.

iv. To determine the environmental factors related to unhealthy snacking behaviour among respondents.

v. To determine the association between individual and environmental factors with unhealthy snacking behaviours.

1.4 Research questions

i. What are the socio-demographic characteristics of respondents?

ii. What is the prevalence of unhealthy snacking behaviour among respondents?

iii. What individual factors are related to unhealthy snacking behaviour among respondents?

iv. What environmental factors are related to unhealthy snacking behaviour among respondents?

v. Is there an association between individual and environmental factors with unhealthy snacking behaviour?

1.5 Research hypothesis

- Individual factors and environmental factors are significantly associated with unhealthy snacking behaviour among respondents.

1.6 Conceptual framework

Fig 1.1 shows the conceptual framework of unhealthy snacking behaviour and its determinants, which was adapted from Yazdi Feyzabadi et al. (2017). Those independent variables were categorised into two major domains, which were the individual factors and environmental factors. The individual factors were as follows: socio-demographic, taste-and-sensory perception, nutritional knowledge, cost/price sensitivity, and perceived self-efficacy. Whereas, the environmental factors were included social-environmental (perceived parental control over unhealthy snacks), physical-environmental (easy accessibility to unhealthy snacks), and macro-system (media advertisements influence) factors. In this study, those who consumed unhealthy snacks more than three times per week for one month were classified as unhealthy snacking behaviour (Mithra et al., 2018).

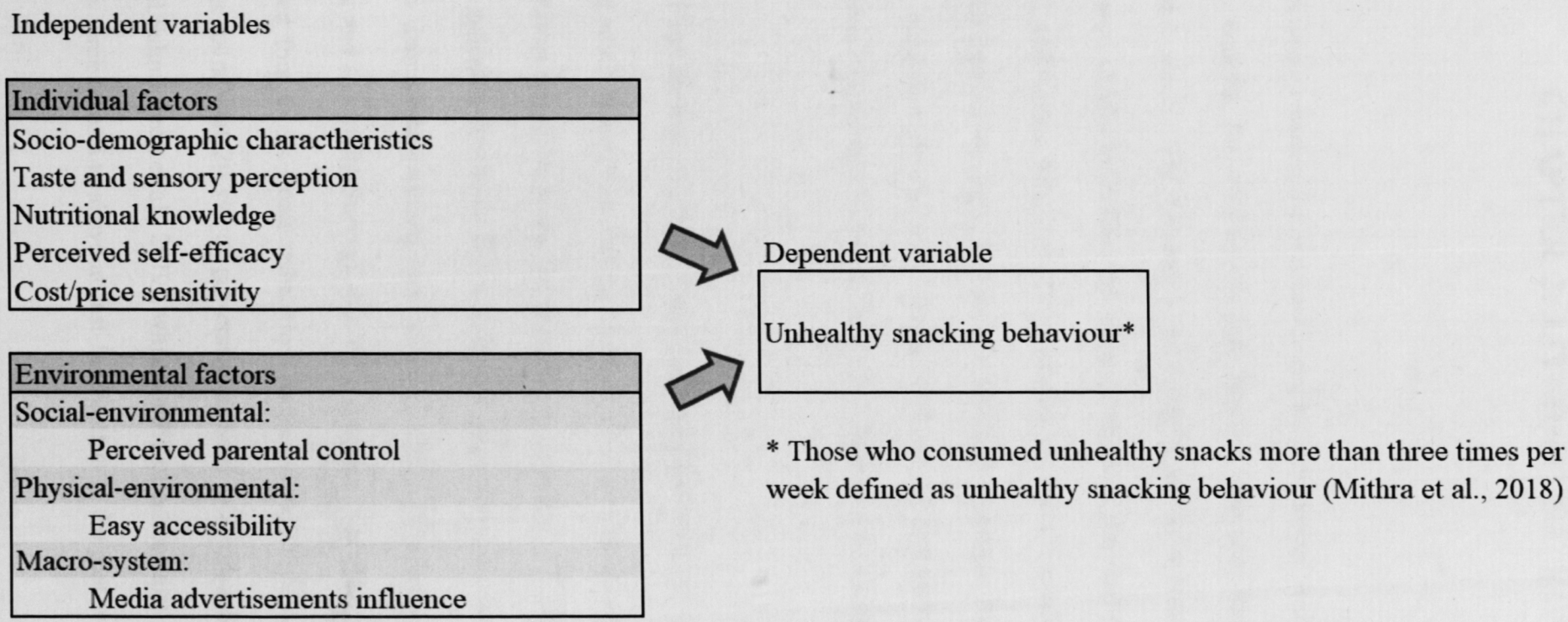


Fig 1.1: The conceptual framework of unhealthy snacking behaviour and its determinants

CHAPTER 2: LITERATURE REVIEW

The literature review for this research project commenced with the common internet search engines, for instance: Google Scholar, Pubmed, Refseek, and Microsoft academic search. The primary search was using keywords: unhealthy snacking behaviour, snacks, individual, social-environmental, physical-environmental, macro-system, and school. Afterward, those articles had met the needs of references for this research topic, were stored to Zotero, a reference manager. Records were organised into a collection for easier to manage and cite bibliographic references using the American Psychological Association (APA) style of referencing.

2.1 Prevalence of unhealthy snacking behaviour

Young adults begin to be responsible for their eating behaviour and lifestyle, which is a critical transition period in their life; in addition, a study revealed that young adults generally consumed fewer fruits and vegetables but consumed more unhealthy snacks than adults (Allman-Farinelli et al., 2016). Furthermore, NHMS (National Health and Morbidity Survey) showed a quarter of (23.8%) Malaysian adolescents ingested four to six times unhealthy snacks per week (IPH, 2017). Similar local studies found that 20.3% of university students consumed SSBs on a daily basis (Mohd Fahmi Teng et al., 2019), while 26.9% of school-age adolescents consumed snacks three times and above at fast-food outlets in the past week (Gan et al., 2019).

In addition, 25.6% of university students reported they "often" and "always" ingested unhealthy snacks (Nizar Abdul Majeed et al., 2015).

Some other countries, such as the United Arab Emirates and Sri Lanka, reported the prevalence of unhealthy snacking behaviour among adolescents more or less the same as Malaysia (Al-Yateem & Rossiter, 2017; Talagala & Arambepola, 2016); whereas, Mithra et al. (2018) provided evidence that more than half (54.3%) of India college-going students practised unhealthy snacking behaviour. Moreover, half of the American adult consumes a sugar drink every day (Centers for Disease Control and Prevention [CDC], 2020a), while most of the school-going age adolescents consumed an average of two servings of unhealthy snacks every day (Larson et al., 2017). These results showed that the prevalence of unhealthy snacking behaviour might vary in different regions and different populations.

Additionally, research provided evidence that the frequency of consumed unhealthy snacks was positively associated with metabolic syndrome, (Adjusted OR = 3.04, 95% CI = 1.11 – 8.49, $p < 0.05$), and hypertension (Adjusted OR = 2.99, 95% CI = 1.00 – 8.93, $p < 0.05$) (Asghari et al., 2016). Moreover, some studies demonstrated a positive association between unhealthy snacking behaviour and diabetes (Hamirudin et al., 2018; Xu et al., 2018). Hence, unhealthy snacking behaviour is a problem worth pondering because frequently consuming unhealthy snacks are related to negative consequences on health (Schlinkert et al., 2020; WHO, 2020e), while these negative consequences increased the burden of NCDs premature death in Malaysia (Ministry of Health, 2016).

The following subsections in this chapter discussed the published information related to individual and environmental factors associated with unhealthy snacking behaviour.

2.2 Individual factors associated with unhealthy snacking behaviour

2.2.1 Socio-demographic characteristics

The college-going age population, mainly around 18–24 years old, is also called late-adolescents / young adults (Lewis Gilbert et al., 2018; McDonagh et al., 2018). It is a time for them to adapt to the changes in the social and physical context, also to develop their personality, identity, and individuality, to become more autonomous and independent (Kemph, 1969). During this critical period of physical, emotional, mental, and neurological transformation in life, they face a range of health risks and health challenges due to a lack of rational risk perception (WHO, 2020a). Those adolescents who increased exposure to unhealthy food via the internet and social media might increase the risks of getting obesity and diet-related NCDs (WHO, 2020a). Unhealthy snacking behaviour was one of the essential contributors to become overweight or obese during this period (Deforche et al., 2015). NHMS (2014) showed that 20.8% of late-adolescents and 24.3% of the young adult were overweight; 20.2% of late-adolescents and 20.8% of the young adult were obese in our country (IPH, 2014). The systematic review found that adolescents and young adults with lower levels of educational attainment were preferentially consumed more energy-dense, nutrient-poor (EDNP) foods, and lesser consumption of dairy products, vegetables, and fruits. (Desbouys et al., 2020).

The differences in unhealthy snacking behaviour between males and females adolescents might vary in different regions and different populations (Mithra et al., 2018). In general, college-going age males required more energy than females based

on the recommended nutrient intake every day (National Coordinating Committee on Food and Nutrition [NCCFN], 2017). Compared with feminine females, those males with masculine characteristics were more inclined to consume high-calorie foods to satisfy their hunger (Monge-Rojas et al., 2015). In addition, males generally lesser care about the calories of food and gaining weight compared with females; hence, males were more inclined to consume unhealthy snacks (Chan, 2017). Consistent with this evidence, several studies revealed a significant finding that males had a positive association with unhealthy snacking behaviour (Borgogna et al., 2015; Genena & Salama, 2017; Yazdi-Feyzabadi et al., 2019).

However, several studies were found no significant association between gender with unhealthy snacking behaviour (AlJohani et al., 2019; Caine-Bish & Scheule, 2009; Fadzly et al., 2018; Gan et al., 2019; Hamirudin et al., 2018; Larson et al., 2017; Mithra et al., 2018). Some studies explained that the easy accessibility of unhealthy snacks, particularly SSBs within the school canteen, maybe the reason that no gender differences were observed in consuming unhealthy snacks (Mohd Fahmi Teng et al., 2019; Nurliyana et al., 2015).

Nonetheless, another evidence demonstrated that males (22.7%) college students practised healthier eating behaviour compared with female (6%) college students (El Ansari & Berg-Beckhoff, 2017). Research had proven that the menstrual cycle and fluctuating sex hormone in females could make them change the total energy intake accordingly (Asarian & Geary, 2006, 2013; Eckel, 2011). These periodic physiological changes usually make female craving for sweets, carb, and fat, particularly during pre-menstrual (Frank et al., 2010; Hormes & Timko, 2011; Twogood, 2019). Moreover, some studies revealed obese females were positively

associated with unhealthy snacking behaviours (Cleobury & Tapper, 2014; Musaiger et al., 2016). In addition, Cleobury and Tapper (2014) revealed that females were significantly given a higher rating for consuming unhealthy snacks, particularly for social reasons ($p < 0.05$) and in response to stress ($p < 0.01$). Furthermore, as a novel finding, a study stated that the gender differences in the effects of superior temporal sulcus (STS) stimulation in the human brain could causally influence the food choices. The authors reported that female tends to choose more high calories food ($p < 0.05$) compared to males for STS stimulation (Manippa et al., 2017).

In Malaysia, all the government higher education institutions, which included universities, colleges, and institutes, are mostly subsidised by the Malaysia government, and therefore their fees have remained relatively stable for decades and affordable by most of the Malaysians, hence, getting a place to study in these higher education institutions is highly competitive. In contrast, private higher education institutions are relatively easier to get into than the government higher education institutions; however, they receive no funding from the government. Therefore, private higher education institutions required expensive fees, and the fees are rising on a yearly basis. With the prices rising still and purchasing power decreasing, the affordability is diminishing, particularly those lower socioeconomic status (SES) families (Desiree, 2017). Furthermore, a study demonstrated that private school adolescents were positively associated with unhealthy snacking behaviour ($\beta = 0.12$, $p < 0.01$) because those private school students mostly received pocket money and tended to purchase unhealthy snacks (Yazdi Feyzabadi et al., 2017)

Nevertheless, researchers found that nearly half (53.5%) of the government university students practised unhealthy snacking behaviour (Ahmad et al., 2019). In

accordance with the results, another study found that government school students were positively associated with unhealthy sacking behaviour, (Adjusted OR = 1.14, 95% CI = 1.11 – 1.17, $p < 0.01$) (Noll et al., 2019). Nonetheless, the association between school type and unhealthy snacking behaviour was found not significant in another study (Adjusted OR = 1.16, 95% CI = 0.29 – 4.62, $p > 0.05$) (Mithra et al., 2018). Although college students were relatively independent, the easy accessibility of unhealthy snacks in the environment might influence their food choices, regardless of the type of college (Nurliyana et al., 2015; Mohd Fahmi Teng et al., 2019).

Any courses related to natural sciences, namely, chemistry, microbiology, biology, physics, environmental studies, ecology, botany, geology, zoology, and astronomy will be defined as science majors or courses (College Factual, 2020). A study demonstrated that those enrolled in non-science courses had a positive association with unhealthy snacking behaviour, (Adjusted OR = 1.51, 95% CI = 1.01– 2.25, $p < 0.05$) because non-science courses students got a lower knowledge of food nutrition (Mithra et al., 2018). In contradiction to these findings, another study showed evidence that those enrolled in science courses were positively associated with unhealthy snacking behaviour ($\chi^2 = 20.036, p < 0.05$) (Ahmad et al., 2019). Whereas, several studies suggested that the association between the type of courses and unhealthy snacking behaviour were not significant regardless of the basic nutritional knowledge among the respondents (Gamage & Jayawardana, 2018; Nizar Abdul Majeed et al., 2015; Pahari et al., 2017). Based on the above research findings, it showed that although science courses students got a certain level of nutritional knowledge, the association between the type of courses and unhealthy snacking behaviour remained inconsistent. Therefore, researchers recommended the college

administrators to give opportunities to create a sustainable environment toward healthy diet habits on the campus for students to put their nutritional knowledge into practice (Croll et al., 2001; Hoque et al., 2016; Sogari et al., 2018; Woodruff & Hanning, 2009). In general, vegetarian food defined as diet does not include meat, meat products, poultry, seafood, and flesh from any other animal (IPH, 2017). Therefore, lesser of vegetarian adolescents practised unhealthy snacking behaviour because vegetarians often consume whole wheat, high-fibre foods, beans, nuts, seeds, legume in their daily menu and serve as staple foods or even serve as snacks, while these foods can easily make people feel full and satisfied (Leiva, 2019). Several studies demonstrated similar findings that vegetarian adolescents had a healthier food list than non-vegetarians (Movassagh et al., 2018; Perry et al., 2002; Segovia-Siapco et al., 2019). In addition, research confirmed a significant finding that non-vegetarian college students had a positive association with unhealthy snacking behaviour (Adjusted OR = 1.74, 95% CI = 1.29 – 2.35, $p < 0.05$) (Mithra et al., 2018). However, this evidence was not consistent in all researches, as some of the vegetarians reported themselves frequently consumed unhealthy snacks, such as potatoes, sweets, refined grains, and SSBs (American College of Cardiology [ACC], 2020).

Furthermore, a study found no association between food preferences and unhealthy snacking behaviour (Joseph et al., 2015). In accordance with this finding, some researches provided similar evidence that the total daily energy intake between vegetarians and non-vegetarians had no significant differences (Gan et al., 2018; Nebl et al., 2019). Commonly, scholars stated that individual dietary habits were mainly shaped during childhood and adolescence (Boswell et al., 2018; Montaño et al., 2015). In spite of that, the systematic review provided findings that even late-

adolescents and young adults were still at the ages to improve their unhealthy snacking behaviour (Plotnikoff et al., 2015). Hence, experts suggested the relevant stakeholders to incorporating nutrition strategies into their respective programmes among the college-going age population (NCCFN, 2017).

2.2.2 Taste-and-sensory perception

The common concept of the 'taste' of foods and beverages include chemo-reception that forms the sense of taste and sense of smell (Adam Drewnowski, 1993; Choi & Han, 2015). Studies revealed that sensory perception, as well as the preferences of aroma, visual, texture, and taste of foods or beverages, will affect the foods and beverages intake (McCrickerd & Forde, 2016).

Witherly (2007) explained why people like unhealthy snacks with theories behind taste-and-sensory perception in human (as below):

First. The food-pleasure equation. It highlights the importance of gathering sensation and calories together in food, in which Food pleasure = sensation + calories. It was a function of sensation (sensory factors) and calories stimulation (carbohydrate, protein, and fat). Hence, to make the tastiest foods, should maximise both dimensions. For instance, a cup of black coffee was lowered in calories to increase the pleasure, shall add more sensation, such as sugar, aroma, and colour.

Second. Taste hedonic. Studies showed that the taste of salt and sugar, particularly sucrose, contribute most to food pleasure. Additionally, monosodium glutamate (MSG) taste or "umami" (also called savoury taste) was now firmly entrenched as one of the five hedonic taste. These were well-documented drivers of taste hedonics and ingestion. Hence, the majority of unhealthy snacks contain high salt, MSG, sugar, and/or flavor-active compounds (Witherly, 2007; Iatridi et al., 2019).

Third. Energy density. Drewnowski (1998), a nutritionist and sensory expert, stated that high food pleasure was often associated with high energy density food. Moreover, high energy density foods usually tastier but not filling; in contrast, low energy density foods usually less tasty but more filling (Adam Drewnowski, 1998). Energy density was calculated by dividing the calories (kcals) by the weights (grams) of food (Witherly, 2007). The values vary from 0 to 9 kcal/g. The plain water was 0 kcal/g, whereas fat at around 9 kcal/g. Additionally, the Brain-gut axis played an important role in food consumption as well as determining diet habits. Thus, the stomach and intestine give our body a second chance to evaluate the taste, amount, and the composition of food and carry this information to the brain. The Brain-gut axis can be affected by neurohormonal stimuli and the nature of the food stimuli (Konturek et al., 2004; Korner & Leibel, 2003). In general, food with an energy density 4 to 5 was most preferred and could make our stomach and intestine feel good. However, the energy density of 4 to 5 can always be found in unhealthy snacks (Witherly, 2007).

Fourth. Dynamic contrast. People commonly prefer foods with sensory contrasts, for instance, "dark and light, salty and sweet, and so on." These were important contributors to food pleasure. This kind of sensory perception was called "Ping-Pong Pleasure." It refers to a consumption pattern. People prefer to alternate between foods that can cleanse their palate—this theory was directly related to unhealthy snacks. For example, people like to consume SSBs with high-sodium unhealthy snacks. (Witherly & Hyde, 1996).

Fifth. Emulsion theory. Human taste buds like emulsions, particularly sugar-fat or salt-fat combinations. Studies showed, when people consuming emulsions in mouth,

the emulsion structures and ingredients were undergoing significant changes, enhancing the taste and flavour perception. Many kinds of unhealthy snacks were emulsions—for instance, chocolate, ice-cream, and processed foods (Mao et al., 2017).

These above theories were supported by research; the authors demonstrated that taste-and-sensory perception was positively associated with unhealthy snacking behaviours among young people (Larson et al., 2017; Wang et al., 2016; Yazdi Feyzabadi et al., 2017); additionally, a study found that most consumers were difficult to compromise the taste of food for healthier reasons (Ballco et al., 2020). Furthermore, several studies provided evidence that taste-and-sensory perception as one of the essential factors influencing the consumers to purchase the unhealthy snacks among young people (Connors et al., 2001; De Pelsmaeker et al., 2017; Drewnowski & Rock, 1995; Glanz et al., 1998; Kearney et al., 2000; Kourouniotis et al., 2016; Mok, 2009). Thus, experts suggested the policymakers refine some food industry policies in order to reduced fat, sugar, salt in certain products (Academy of Sciences Malaysia [ASM], 2014).

Nonetheless, the association between unhealthy snacking behaviour and taste-and-sensory perception was inconsistent. A study revealed no significant association between unhealthy snacking behaviour and taste-and-sensory perception among college-going adolescents (Mithra et al., 2018). Another study found the same finding, and the students claimed they choose to eat unhealthy food/snacks, mostly due to lack of time for preparing healthier food and the easy accessibility of unhealthy snacks (Poobalan et al., 2014).

2.2.3 Nutritional knowledge

Nutritional knowledge, in a broad sense, refers to knowledge related to nutrition and health, including diets related to health and disease, the main nutritional components of food, and knowledge of dietary recommendations and guidelines (McKinnon et al., 2014). One study demonstrated that those school-age adolescents with lower nutritional knowledge (Adjusted OR = 0.96; 95%CI = 0.91 – 0.99, $p < 0.05$) were associated with higher unhealthy snacking per week (Yazdi Feyzabadi et al., 2017). In addition, several studies provided evidence that nutritional knowledge had a negative association with unhealthy snacking behaviour (Al-Yateem & Rossiter, 2017; Grosso et al., 2013; Yahia et al., 2016). In accordance with these findings, some studies demonstrated evidence that nutritional knowledge had a positive association with healthy diet habits among school-age adolescents (Asakura et al., 2017; Dissen et al., 2011; Krešić et al., 2009). Hence, nutritional knowledge among adolescents played crucial roles in determining healthy diet habits and prevent unhealthy snacking behaviour (Grosso et al., 2013; Sogari et al., 2018).

However, contrary to the findings, studies also reported that some adolescents chose to consume unhealthy snacks frequently, despite the fact that they had well nutrition knowledge (Croll et al., 2001; Ranjana et al., 2013; Swetaa et al., 2018). Consistent with these findings, a local study provided similar evidence that, although the students understood the definition of unhealthy snacks and had a certain level of nutritional knowledge, half of them still consumed unhealthy snacks occasionally; moreover, nearly a quarter of them practised unhealthy snacking behaviour (Hoque et al., 2016). In addition, a study found that Malaysian adolescents had low usage of nutrition labels during food selection was mainly due to time constraints, craving the taste of food, and not interested in nutrition information (Jefrydin et al., 2019).

Therefore, to address these problems, experts suggested the college administrators systematically combine the college environment and curriculum through multi-component approaches in order to collaborate with students, parents, school staffs to strengthen nutritional knowledge and promote healthy diet habit for college students; meanwhile, prohibited unhealthy snacks sold in the canteen (CDC, 2019; Khairuddin, 2014).

2.2.4 Perceived self-efficacy

Self-efficacy refers to people's belief in their ability to achieve the goals of action in specific tasks. Self-efficacy reflects an individual's confidence and beliefs in his/her capacity to carry out a task or to make the right decision in order to achieve the desired goals. Thus, it is theorised to affect the behaviour that he/she chooses to practice (Bandura, 1977). In addition, self-efficacy is the self-perceived ability for performing behaviour changes necessary in order to accomplish the goals (Bandura, 2004), also known as a crucial predictor of nutritional behaviour and health risks. Those people with high self-efficacy were more optimistic about their ability to perform positive behaviours to carry out their desired outcomes (Turner et al., 2006). Those who have higher motivation, a stronger sense of commitment usually could cope with a variety of circumstances and tend to face the challenge (Bandura, 1994). In spite of that, if someone obtained a high score in general self-efficacy, it did not mean that the person had a high diet self-efficacy because of the general self-efficacy scale, which was not specifically used to evaluate individual eating behaviour. Hence, researchers stated, the diet self-efficacy scale would be more appropriated to use for measuring eating behaviour (Nastaskin & Fiocco, 2015). Many studies demonstrated a negative association between self-efficacy and unhealthy snacking behaviour among school-going adolescents (Churchill et al., 2019; Luesse et al., 2019; Rezali et

al., 2015; Shieh et al., 2015; Stephens et al., 2017; Tavassoli et al., 2018; Vardanjani et al., 2015; Zeinab et al., 2017).

Interestingly, some studies revealed that improve the cooking skills can enhance self-efficacy for healthy diet habits, whereby those who used to prepare the meal for themselves tend to have higher nutritional knowledge, self-efficacy, and healthy diet habits compared to others (Hartmann et al., 2013; Huisken et al., 2016; Jarpe-Ratner et al., 2016). In accordance with these findings, some schools in Malaysia were actively in cooking skills training as a part of the skills training programme (Fuller et al., 2017). As a result of self-efficacy can influence decision making in order to maintain health promotion behaviours; therefore, those who had a lower sense of self-efficacy and not confidence to prepare healthy food for themselves were associated with unhealthy snacking behaviour (Buckworth, 2017). Consistent with this finding, several studies showed that the lack of nutritional knowledge and low self-efficacy would affect the late-adolescents and young adults for consuming unhealthy snacks, although they were intended to be healthy (Matthews et al., 2016; Prinsen et al., 2013).

Evidence-based studies found that skill-building-activities for adolescents (Bandura, 1994; Chowdhury, 2019) and healthy parenting practices helped to shape self-efficacy in children (Breiner et al., 2016; CDC, 2020b; WHO, 2009). Nevertheless, some studies provided evidence that perceived self-efficacy was not associated with unhealthy snacking behaviour among the respondents (Demirci et al., 2018; Shekari et al., 2019). Several studies provided evidence that the change in diet self-efficacy (between pre- and post-test) was a more significant predictor of eating behaviours in

weight-loss intervention programme than the baseline diet self-efficacy (Bas & Donmez, 2009; Warziski et al., 2008).

2.2.5 Cost or price sensitivity

Cost/price sensitivity for food is the degree to which pricing determines the consumer's inclination to purchase the food. It can be measured by the price elasticity of the demand (Kagan, 2019). In general, those with high cost/price sensitivity only purchase if the prices and qualities that they deem reasonable (Andreyeva et al., 2010; Okrent & Sweitzer, 2016). Additionally, the quality of the product also one of the purchase criteria during shopping for those with higher cost sensitivity (Ceylana et al., 2014; Kagan, 2019; Lichtenstein et al., 1993). A study revealed that those who used to check the food prices and ingredients before purchase were found consume lesser unhealthy snacks than others (Zagorsky & Smith, 2017).

Hence, to draw the customer's attention, those unhealthy snacks companies commonly focus on two major promotion strategies: i) New product promotions and ii) Price-based promotions (Mathe-Soulek et al., 2016). Studies showed when markets promoting some products with discount prices, it can significantly boost the sale of those products (Steenkamp et al., 2005). In Malaysia, those fast-food giants and SSBs companies were using similar marketing strategies to keep engaging with their customers (Hype Newsdesk, 2019; Justin, 2019). A study found that when these unhealthy snacks were selling everywhere in the market with low prices and easy to access, then cost/price sensitivity was no longer the decisive factor in purchase these unhealthy snacks (Saleh et al., 2018). As a result, a study found the cost/price sensitivity of certain unhealthy snacks, such as biscuits, cakes, confectionery, and chocolate, were similar in communities regardless of their socioeconomic status,

because of the price elasticity for biscuits was on average −0.69 (a 10% increase in price yields a 6.9% reduction in quantity purchased), while for cakes −0.66, chocolate and confectionery −0.74. These elasticities that less than 1 indicated the low responsiveness to price changes among the consumers (Smith et al., 2018). In like manner, some studies showed no significant association between cost/price sensitivity and unhealthy snacking behaviour. (Saleh et al., 2018; Yazdi Feyzabadi et al., 2017).

In order to overcome these unhealthy marketing strategies, the evidence-based studies recommend the nation policymakers to implement 'Health Taxes' on SSBs (WHO, 2016a; Wright et al., 2017). Evidence showed that imposed health taxes on SSBs by increased the prices 20% could reduce the SSBs consumption effectively around 20% (WHO, 2016a). Hence, Malaysia imposed sugar taxes on certain SSBs at 40 sen per litre since 1 July 2019 (Kaur, 2019). Sugar taxes could influence food choices, especially those who had higher cost/price sensitivity. This was one of the desired policy outcomes for imposed the sugar taxes on unhealthy snacks (ASM, 2014).

A study found that cost/price sensitivity was negatively associated with unhealthy snacking behaviour among school-going adolescents ($B = -0.10$, $SE = 0.04$, $p < 0.05$) (Larson et al., 2017). In addition, there were several studies provided evidence that cost/prices sensitivity and unhealthy snacks purchase intention had a significant negative association among young people (Ashoka & Rakesh, 2016; Block et al., 2010; Guerrero-López et al., 2017; Moore & Carpenter, 2006; Prakash & Pathak, 2014).

Moreover, studies showed that subsidies for healthy food or healthy food menu could promote positive nutrition behaviours in multiple settings (Alagiyawanna et al.,

2015; Hendren & Logomarsino, 2017; Patsch et al., 2016; Roy et al., 2015; Tam et al., 2017). Furthermore, a systematic review showed that increased the taxes of SSBs and implemented healthy food subsidies range from 2% to 50% could increase the sales of healthy snacks/foods, include fruits and vegetables (Thow et al., 2014).

2.3 Environmental factors associated with unhealthy snacking behaviour

2.3.1 Perceived parental control

Parental control is that how parents engage with their child every day through communication and disciplinary strategies; also, parents played a crucial role in shaping the child's eating behaviour (Sanne et al., 2014). In a broad sense, there are four types of parenting styles on food control, which including pressure their child to eat healthy food, make easily accessible to food, reward their child using food, and restrict on certain food (Hughes et al., 2013; van der Horst & Sleddens, 2017). Studies showed that parents who used food as a reward had a positive association with food responsiveness among their children. Children with higher food responsiveness were associated with a stronger desire for food (Allen et al., 2016; Jansen et al., 2020). Several studies showed that the coercive parenting style through rewards and restricts their child with unhealthy snacks, were positively associated with eating more unhealthy snacks (Blaine et al., 2015, 2017; Davison et al., 2015; Gibson et al., 2020; Shloim et al., 2015; Rhee et al., 2015; Larson et al., 2017). Researchers explained, when unhealthy snacks were excessively restricted by parents, it could be counterproductive once the parental control removed; therefore, this parenting style was positively associated with unhealthy snacking behaviour (Blaine

et al., 2017; Loth et al., 2016; Reina et al., 2013). Nevertheless, the association between parental control and unhealthy snacking behaviour was inconsistent in all studies. Some studies showed evidence that perceived parental control on unhealthy snacks had a negative association with unhealthy snacking behaviour, (Boots et al., 2015; Tsin et al., 2017; Yazdi Feyzabadi et al., 2017). Moreover, some studies demonstrated that parenting practice was not associated with unhealthy snacking behaviour (Gan et al., 2019; Harris et al., 2014; Liang et al., 2016).

2.3.2 Easy accessibility

Scholars found that people were more difficult to resist unhealthy snacks, which were easily accessed (Maas et al., 2012; Wansink et al., 2006), particularly the small pieces of unhealthy snacks, which may unintentionally lead to excessive energy intake (Poelman et al., 2014). Due to the less expensive and the easy availability of unhealthy snacks, unhealthy snacking behaviour among adolescents can easily be triggered (Mithra et al., 2018). In line with these findings, some local studies found that those school canteens where the unhealthy snack was available their students were positively associated with unhealthy snacking behaviour (Mohd Fahmi Teng et al., 2019; Nurliyana et al., 2015; Poudel, 2018). Similarly, a local study also found evidence that the presence of unhealthy snacks at home had a positive association with unhealthy snacking behaviour among young people ($\beta = 0.118, p < 0.05$) (Gan et al., 2019). Some similar studies in the United States and Iran revealed the same finding (Larson et al., 2017; Yazdi Feyzabadi et al., 2017). In addition, vending machines were another source for providing unhealthy snacks (Grech & Allman-Farinelli, 2015), and the frequency of vending machine usage on campus had a positive association with body mass index among the college students (Sowers et al., 2018), while, some researchers stated greater availability and easier accessibility to

healthy food could break the unhealthy snacking behaviour (Martin et al., 2012; Gustafson et al., 2013; Jilcott Pitts et al., 2017).

Nevertheless, several studies stated no significant association between easy accessibility to unhealthy snacks and unhealthy snacking behaviour (Leung et al., 2011; Thornton et al., 2011; Griffiths et al., 2014). A study found that, even if the unhealthy snack was readily available in convenience stores and fast-food restaurants, some consumers did not purchase when the unhealthy snack was costly and low quality (Griffiths et al., 2014). Additionally, a study found that those with transportation, the distance between the housing and the food outlet no longer a decisive factor that affects their food choices (Bernsdorf et al., 2017). Furthermore, the food delivery service had revolved by food-related industries over the past decade from restaurant-customer services, become customer-apps-restaurant services (Salleh et al., 2020). The food delivery giants make the process for ordering food become easier, more conveniently, and accessible by using their mobile apps. The majority of food delivery website/app users were adolescents and young adults (Alagoz & Hekimoglu, 2012; Zion et al., 2019). More than half of these users order food delivery service more than one time per week (Iyer, 2019). Meanwhile, the majority of items for sale were unhealthy food and unhealthy snack (Dye, 2020).

2.3.3 Media advertisements

Scholars stated that media advertisements were powerful and able to convince consumers to purchase after watching the ads; however, in a more general situation was that media advertisements gradually change the consumer's behaviour in a subtle way (Herhold, 2017; Haider & Shakib, 2018; Wroblewski, 2019). In general, all types of media fall into two broad categories: traditional media and digital media. Traditional media includes newspaper, posters, magazine, television and radio

broadcast advertising; whereas digital media encompasses that of the food-related websites, such as HungryGoWhere.my, vkeong.com; the social media/video channels, such as Facebook ads, Youtube ads; and the mobile apps, such as GrabFood, Food panda (Marwah, 2014). When using these media for promoting products or services, traditional marketing is primarily advertising; whereas, digital marketing offers a higher level of interaction and engagement with customers (Hausman, 2017). Digital marketing creates brand awareness, which mediated a positive relation between brand interactivity, content quality, and purchase intention (Dabbous & Barakat, 2020). Moreover, Jeff French (2017) stated that there were several key benefits to using digital marketing, for instance, i) Easier to access (also better timeliness for computer and mobile phone users); ii) With better targeting (more personalisation and segmentation); iii) More cost-effective (greater reach with smaller budgets) and iv) With better monitoring, engagement, and feedback (French, 2017). These were the major differences between traditional and digital marketing.

Research showed that 70% of young people followed the social media of various food brands, which 93% of the food products can be classified as unhealthy foods, and most of them frequently interacted with social media related to unhealthy snacks (Fleming-Milici & Harris, 2020; Katy Askew, 2019). These unhealthy snacks advertisements consistently encouraging customers to engage their digital marketing strategies, for instance, to participate the 'prize-winning activities'; 'redeem birthday voucher'; click 'Like' and 'Share' the posts at social media platform, to get the promotion codes (Promo Codes, 2020). Commonly, children and adolescents have been identifying as the primary intended audiences of those fast-food industries and unhealthy snack companies for promoting their products (Harris et al., 2010; Harris & Frazier III, 2018). Nonetheless, although college-going age populations are

usually sceptical; they are still vulnerable under the influence of these media advertisements (Folkvord, 2019). In Malaysia, a local study showed evidence after the authors analysed more than 32,000 advertisements on Malaysian TV channels. They found 17.1% were food-related advertisements, which potentially associated with unhealthy snacking behaviour among children and adolescents (Ng et al., 2014); moreover, the internet users survey in 2018 revealed that there were 87.4% of Malaysian online. These internet users were mainly young adults (30%) and adults (25.9%), with spending nearly eight hours online (digital media) per day (Malaysian Communications and Multimedia Commission [MCMC], 2019). NHMS (2014) states that media advertisements were the primary sources that influenced those adolescents and young adult's eating pattern (IPH, 2014). Nowadays, various of trendy unhealthy snacks can be found in local social media sites, such as 'Dirty, dirty buns,' 'Rojak burger,' 'Mozza cheesy crunch' and 'Krep Lumpur Pisang' (Chua, 2019; Khairain, 2019; Lim, 2018), which indicated that Malaysian was gaining influence by these unhealthy snacks (Ganesan, 2019).

There were a number of studies that provided evidence that media advertisements influence had a positive association with unhealthy snacking behaviour among adolescents (Lee et al., 2014; Lwin et al., 2017; Gan et al., 2019; Halford et al., 2008; Andreyeva et al., 2011; Giese et al., 2015; Hennessy et al., 2015; Norman et al., 2018b). Hence, the WHO called on member states to enact legislation to protect children and adolescents from media advertisements related to unhealthy snacks to protect their privacy and health (WHO, 2016b). In accordance with the recommendations, the Ministry of Health has had the idea of banning fast-food advertising; however, it had caused backlashes from the fast-food giants. Because these fast-food companies were annually spending around RM 200 million on

advertising their product in Malaysia (ASM, 2014), therefore, it was not feasible to ban fast-food advertisements. However, some food-related policies had refined by the Malaysia government, such as imposed the health taxes on the SSBs industry; required these companies to give commitments to reduce the sugar, fat, and salt content in their products, and strengthen the Food Regulation enforcement on food labelling (ASM, 2014).

Nonetheless, although nearly 90% of Malaysian were mobile phone users nowadays (MCMC, 2018), more than half of the users used to skip online media advertisements (Handley, 2017). Moreover, some studies found that media advertisements influence was not associated with unhealthy snacking behaviour (Anschutz et al., 2010; Gregori et al., 2017; Lorenzoni et al., 2017; Yazdi Feyzabadi et al., 2017).

In this chapter, the studies above demonstrated that the inconsistent relationship between the individual, environmental factors, and unhealthy behaviour. Therefore, the evidence provided from similar studies might not be applicable to the college students in Kuching, Sarawak. Hence, this study aimed to determine the prevalence of unhealthy snacking behaviour and its association with individual and environmental factors among college students in Kuching in order to get a better insight and provide advantages of focusing the significant determinants in the intervention programme on similar study populations in future.

CHARTER 3: METHODOLOGY

3.1 Study area

Sarawak is the largest state in Malaysia, with nearly three million population and an area of 124,450 km^2 (Department of Statistics Malaysia, 2019). The total area of Kuching division is 4,560 km^2, which consists of three districts: Kuching, Bau, and Lundu; and one sub-district: Padawan. The Kuching division has approximately 700 thousand of population, and more than 80% of them were living in the urban area, the Kuching city, the most urbanised city in Sarawak (Sarawak Government, 2010). It is a city covering an area of approximately 431 km^2; also, it is the capital of Sarawak, also (Takano, 2003).

There are 12 colleges located in Kuching (Malaysian Qualifications Agency [MQA], 2019). The government colleges include Kuching Community College, Kuching Vocational College, Santubong Community College, and College of Allied Health Sciences Kuching. The private colleges include Asia Metropolitan College Kuching, International College of Advanced Technology Sarawak, Limkokwing Institute of Creative Technology, SEGi College Sarawak, FAME International College, Sunway College Kuching, I-Systems College Kuching, and Executive College.

The majority of colleges are located in Kuching city; only a few colleges which are located in suburban areas. In spite of that, the farthest college is just about 15 km away from Kuching city. On average, each college has around 250 college students. Some colleges provided accommodations in Kuching city, particularly for those

international students. Additionally, food and beverages are provided in the college canteen and/or cafeteria for the college students. (Limkokwing facilities, 2020; International College of Advanced Technology Sarawak, 2020; Asia Metropolitan College Kuching, 2018; Kuching Vocational College, 2020; Santubong Community College, 2020; Kuching Community College, 2020).

3.2 Study design

This research was a cross-sectional study design. The data were collected on socio-demographic characteristics, taste-and-sensory perception, nutritional knowledge, cost/price sensitivity, perceived self-efficacy, media advertisements influence, perceived parental control, easy accessibility, and unhealthy snacking behaviour among college students in Kuching.

3.3 Study population and sample

The study population was all college students in Kuching. Three private colleges and three government colleges were selected as study samples through a stratified random sampling method.

3.4 Study duration

This study was conducted from October 2019 till August 2020 in a total of ten months. A Gantt chart was designed to depict the tentative progression of the study (Refer to Appendix A).

3.5 Inclusion and exclusion criteria

3.5.1 Inclusion criteria

i. Those registered students with active status in the selected three private colleges and three government colleges in Kuching.

ii. Malaysian and non-Malaysian.

3.5.2 Exclusion criteria

i. Those students were below 18 years old.

ii. Those do not agree with participating in the study.

iii. Those have no access to the internet.

3.6 Sample size and sampling method

3.6.1 Sample size

Most of the similar local studies provided results that showed the frequency of consuming unhealthy snacks among school-age adolescents; nonetheless, the definition of unhealthy snacking behaviour had not been widely used in Malaysia (Gan et al., 2019; IPH, 2017; Mohd Fahmi Teng et al., 2019; Nizar Abdul Majeed et al., 2015).

Mithra et al. (2018) defined that any individual consuming unhealthy snacks more than three times per week will be considered as unhealthy snacking behaviour; hence, the sample size calculation for this research report was based on 54.3% of college students practised unhealthy snacking behaviour (Mithra et al., 2018), using single

proportion formula to calculate the sample size. The Sample size estimation was calculated using the formula as below:

$n = z^2 p (1 - p) / d^2$ (Single proportion single prevalence)

Whereby,

n = sample size

z = critical standard value for two-tail test = 1.96

p = anticipated population proportion for unhealthy snacking behaviour = 0.54

d = absolute precision required, 5% or 0.05

Then, $n = 1.96^2 (0.54) (1 - 0.54) / (0.05)^2$

$n = 382$

The minimum sample size = 382

Those respondents who refused to participate in this study will be considered as non-response. The pilot test in this study showed the response rate = 51 / 54 = 94.4%. Therefore, the non-response rate was expected no more than 10%. With a 95% confidence interval and 5% precision level, anticipated population proportion for unhealthy snacking behaviour of 0.54 among college students, and expected no more than 10% non-response, the sample size of 424 was needed to obtain significant results.

3.6.2 Sampling Method

A total of 12 colleges in Kuching were stratified into eight private colleges and four government colleges, then, a stratified random sampling method was used to select three colleges within each stratum. The random numbers were generated by using software Microsoft Excel (Microsoft Corporation, 2010). First, used the RAND function in Microsoft Excel, the eight private colleges were assigned a set of random numbers; next, three private colleges with the highest random numbers were selected

as study samples in this research project. For government colleges, the same method was used to select three colleges as study samples (See Fig: 3.1).

The self-administered questionnaire was used as a data collection instrument. After coordinated with the Head of colleges, the link of the Google form was separately sent to the liaison officer of each college. Next, the liaison officers disseminated the link to the college students via e-mail or WhatsApp. Each student was given an option of whether they agree to participate in this questionnaire survey.

As a result of the COVID-19 (also known as Coronavirus disease 2019) outbreak became a Public Health Emergency of International Concern on 30 January 2020 (WHO, 2020b), the enhanced movement control order (Enhanced MCO) was implemented by the Federal Government of Malaysia on 18 March 2020 as a preventive measure to control the COVID-19 outbreak (Prime Minister's Office, 2020). The mass shut down (including all schools) that enforced in the whole country had delayed the data collection process. The majority of college students were returned to their hometowns. However, not every college students have easy access to the internet, particularly those who stay in rural districts. Hence, those who have internet access and agreed to participate in this online survey were then considered as respondents.

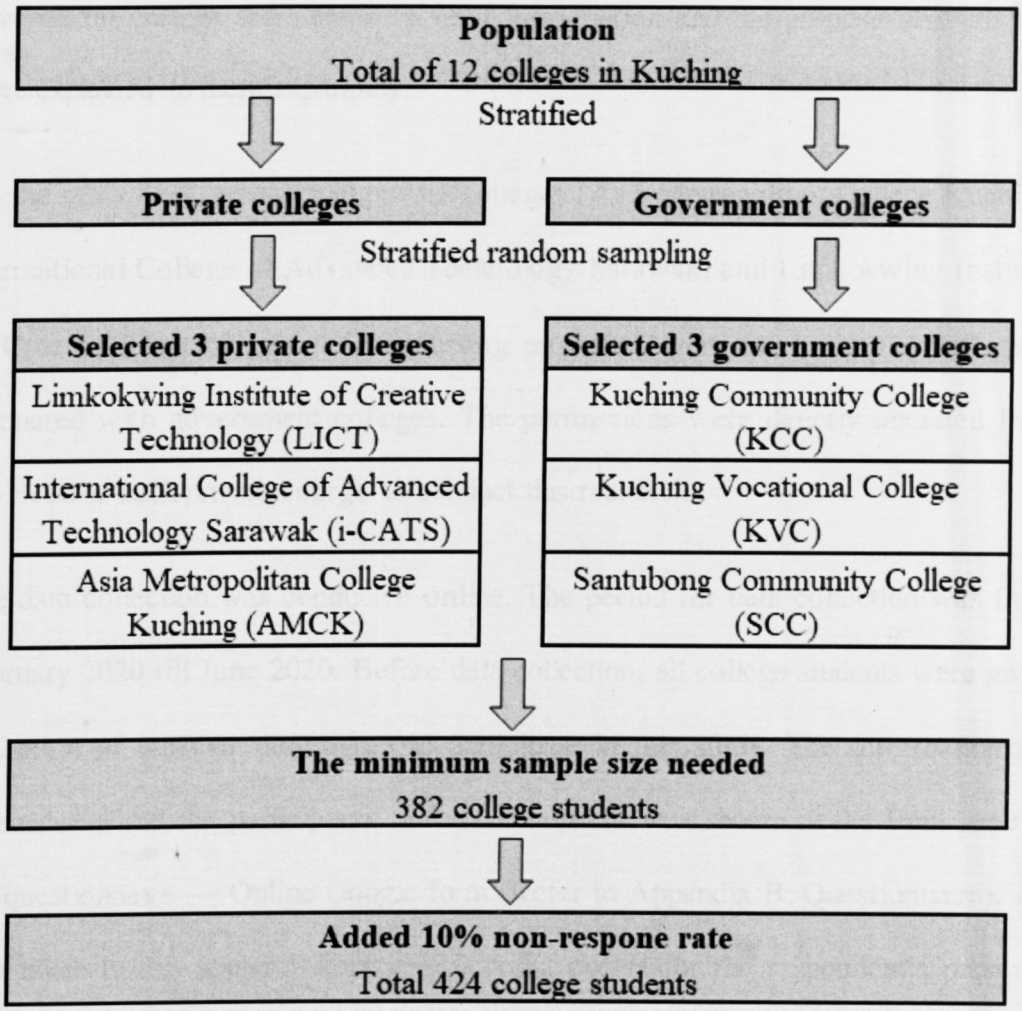


Fig 3.1: The flow chart of the sampling method.

3.7 Data collection procedure

To conduct research at government colleges (Kuching Vocational College, Kuching Community College, and Santubong Vocational College), first, the permission was obtained from the Chairman of Technical and Vocational Education Division, and the Director-General of the Department of Polytechnic and Community College Education Department, Ministry of Higher Education in Putrajaya. Next, the approval was given by the Sarawak State Education Department for data collection in these government colleges. Then, the appointments with the Head of each selected

government college were made. A brief introduction and the purpose of this study were explained to them separately.

On the other hand, research at private colleges (Asia Metropolitan College Kuching, International College of Advanced Technology Sarawak, and Limkokwing Institute of Creative Technology), the conducting processes were much simple and easier compared with government colleges. The permissions were directly obtained from the Head of each private college to conduct this research.

The data collection was conducted online. The period for data collection was from February 2020 till June 2020. Before data collection, all college students were given an option of whether they agree to participate in this study. The information for respondents and the participants' informed consent was shown at the front page of the questionnaire — Online Google form (Refer to Appendix B: Questionnaire). All data taken in this research kept in soft copy, except for the respondent's personal data, which was kept confidential. Only the researchers allow accessing this data.

3.8 Data collection instrument

The data collection instrument for this study was a self-administered questionnaire. The types of snacks were referred from the Food Frequency Questionnaire (FFQ) (Cheong et al., 2020). This questionnaire consisted of 22 questions divided into three-part (Part A, B, and C). It was available in the English and Malay language versions (Refer to Appendix B: Questionnaire)

Part A: Socio-demographic characteristics. This part consisted of five questions, which included gender and age of the respondents, the course (sciences or non-

sciences area), the food preference (vegetarian or non-vegetarian), the type of colleges (government or private), and the name of the college that they were studying.

Part B: Factors associated with unhealthy snacking behaviour. This part consisted of 16 questions which required to answer in the five-point Likert scale questionnaire. The factors associated with unhealthy snacking behaviour were categorised into two major domains, which were the individual factors and environmental factors. The individual factors were as follows: taste-and-sensory perception, nutritional knowledge, cost/price sensitivity, and perceived self-efficacy. Environmental factors were included social-environmental (perceived parental control over unhealthy snacks), physical-environmental (easy accessibility to unhealthy snacks), and macro-system (media advertisements influence) factors. The respondents gave their level of agreement to the statements in the five-point Likert scale questionnaire, which were ranged from strongly disagree = 1 to strongly agree = 5; whereas, the mid-point, neutral = 3 was the option for those who neither agreed nor disagreed the statements. The sequences of the questions and the variables in Part B, as below:-

i. **Cost/price sensitivity:** Question No.1, 2 were items for measure cost/price sensitivity among respondents, for example, "Because snack foods are less expensive, I eat them." Those get the higher the score in this question, which means the prices played a higher role in determining unhealthy snacking behaviour.

ii. **Taste-and-sensory perception:** Question No.3, 4, 5 were items to measure the role of taste perception influence them to purchase an unhealthy snack.

For example, "Because unhealthy snacks are tasty and delicious, I eat them." Those get the higher the score in this question, which means the tastes played a higher role in determining unhealthy snacking behaviour.

iii. **Media advertisements:** Question No.6, 7 were items to measure the role of media ads in influencing them to consume unhealthy snacks. For example, "Advertisement on TV or social media (Facebook, YouTube...) stimulates me to eat snack foods". Those get the higher the score in this question, which means the media ads played a higher role in determining unhealthy snacking behaviour.

iv. **Easy accessibility:** Question No.8, 9, 10 were items to measure if easy accessibility to unhealthy snacks influences them to consume unhealthy snacks. For example, "If I have access to snack food at home, most probably I will eat these food items." the higher the score the respondents get in these questions, the easier access to unhealthy snacks among respondents.

v. **Nutritional knowledge:** Question No.11 and 12 were items to measure the nutritional knowledge among respondents. For example, "Bubble tea is an unhealthy drink." The higher the score the respondents get in this question, the higher the nutritional knowledge among respondents.

vi. **Perceived self-efficacy**: Question No.13, 14 were items to measure the self-efficacy among respondents. For example, "I am confident that, if I wanted to, I could reduce consumption of certain snack foods." the higher the score the respondents get in this question, the higher the self-efficacy among respondents.

vii. **Perceived parental control:** Question No.15, 16 were items to measure the perceived parental control on unhealthy snacks. For example, "My parents

tell me how much snack foods I may consume." the higher the score the respondents get in this question, the higher the control for unhealthy snacks consumption by their parent.

Part C: The unhealthy snacking behaviour. All respondents answered the frequency of intake of unhealthy snacks per week for the past month. Any individual that repeatedly consumes unhealthy snack more than three times per week for one month considered unhealthy snacking behaviour in this part.

3.9 Pilot-test

A pilot test was conducted in the Faculty of Medicine & Health Sciences, UNIMAS. A total of 51 respondents (students aged 18-19) participated in the pilot test. The primary purpose was assessed if the questions in this study instrument were sequenced logically and whether the contents were accessible for respondents to understand and answer appropriately. The five-point Likert scale questionnaire used to gather data regarding unhealthy snacking behaviour and its determinants (gender, food preferences, type of school and courses, taste-and-sensory perception, nutritional knowledge, perceived self-efficacy, and cost/price sensitivity, perceived parental control, easy accessibility, and media advertisements influence) demonstrated acceptable internal consistency, overall Cronbach $\alpha = 0.697$ (Ursachi et al., 2015).

3.10 Operational definition

i. **Late adolescence / Young Adults:** any individual age around 18–24 years old (Lewis Gilbert et al., 2018; McDonagh et al., 2018).

ii. **Sciences class (course in college):** Any course that is related to natural sciences (chemistry, microbiology, biology, physics, environmental studies, ecology, botany, geology, zoology, and astronomy) will be considered as sciences class (College Factual, 2020).

iii. **Vegetarian:** diet does not include meat, meat products, poultry, seafood, and flesh from any other animal (IPH, 2017).

iv. **Healthy diet (adult):** Refer to the recommended nutrient intake every day (NCCFN, 2017). Generally should include at least 400 grams of vegetables and fruit, less than 25 grams of sugar, less than 5 grams of salt, and not exceed 30% of total energy intake from fat every day (WHO, 2020c).

v. **Breakfast:** the first meal that took after awake from sleep. Food intake in the early morning between 6:00 am to 8:00 am. Food intake after 8:00 am is not considered as breakfast (IPH, 2017).

vi. **Lunch:** defined as a meal between 11:00 am to 3:00 pm. Food intake after 3:00 pm not considered as lunch (IPH, 2017).

vii. **Dinner:** defined as a meal between 6:00 pm to 10:00 pm. Food intake after 10:00 pm not considered as dinner (IPH, 2017).

viii. **Online food ordering services:** these systems set up a food menu online, and clients are given options to place the order as per they like. For example, food delivery apps (such as GrabFood, GetFood, Foodpanda), restaurants own website (such as McDelivery, KFC Delivery), or through personal social media (such as Facebook, Instagram) (Adithya et al., 2017).

ix. **Snacks:** any caloric beverage or food that is consumed between the main meals (breakfast, lunch, and dinner) (Hess et al., 2017).

x. **Snacking:** defined as consumption of energy outside of breakfast, lunch, and dinner (IPH, 2017).

xi. **Healthy snacks:** a healthy snack must be a grain product (as the first ingredient) that at least contains one-half of whole grains by weight; or have as the first ingredient a vegetable/fruit, a dairy product or protein food; or a combination food which contains at least a quarter cup of vegetable/fruit. Additionally, a healthy snack must also meet the nutrient guidelines for calories, sugar, sodium, and fats (WADOH, 2017).

xii. **Unhealthy snacks:** refer to high in calories, fat, sodium, or sugar, but nutrient-poor food or beverages, such as bubble tea, popcorns, chips, crackers, pickles, cakes, ice cream, chocolate, candy, SSBs, nuggets, sausages, and french fries (Bellisle, 2014; IPH, 2017; O'Connor et al., 2015).

xiii. **Unhealthy snacking behaviour:** Any individual that consuming unhealthy snacks between breakfast, lunch, and dinner more than three times per week is considered as unhealthy snacking behaviour (Mithra et al., 2018).

3.11 Statistical analysis

The collected data were checked and coded. The respondents were classified into three groups based on the frequency of intake of unhealthy snacks, which were: unhealthy snacking behaviour (those who repeatedly consume unhealthy snacks more than three times per week), occasionally (those who consume unhealthy snacks 1-3 times per week), and none (those who consume unhealthy snacks 0 times per

week). IBM Statistical Package for the Social Sciences (SPSS) software, Version 22 was used for data analysis, as below:

i. Descriptive analysis of all variables.

ii. Used the simple binary logistic regression analysis to test hypotheses about the relationship between unhealthy snacking behaviour and its association with individual factors and environmental factors among respondents. The association between each factor and outcome was analysed separately to identify which were the potential factors associated with unhealthy snacking behaviour.

iii. Those independent factors that showed the $p < 0.20$ in the simple binary logistic regression analysis were shortlisted into the multiple binary logistic regression analysis (Cheah et al., 2018).

iv. Used the multiple binary logistic regression analysis to determine the factors associated with unhealthy snacking behaviour among college students.

v. The multicollinearity (MC) were checked the degree of correlation between independent variables. Variance inflation factor (VIF) was used to measure the amount of multicollinearity in the final model.

vi. Used the Hosmer-Lemeshow goodness-of-fit statistic to evaluate the goodness-of-fit of the overall model.

vii. The sensitivity, specificity of the final model's prediction were checked with a classification table.

viii. The discriminatory capacity of the model had checked with the Area under ROC curve (AUC) analysis.

ix. Cook's influential statistics was used to find influential outliers in the dataset.

3.12 Ethical consideration

Ethical approval for this research report was obtained by the Ethical Committee of University Malaysia Sarawak (UNIMAS), reference number: UNIMAS/NC-21.02/03-02 Jld.4(48); and the Education Planning and Research Department (Ministry of Education, 2020) through the educational research application system (ERAS), reference number: KPM.600-3/2/3-eras(6690). Additionally, the permission was obtained from the Chairman of Technical and Vocational Education Division, reference number: KPM.600-3/2/3(68), and the Director-General of the Department of Polytechnic and Community College Education Department, Ministry of Higher Education in Putrajaya, reference number: KPT.JPP.PPPP.700-1/1 Jld.12(4) (Refer to Appendix C). Next, the approval was given by the Sarawak State Education Department for data collection in these colleges.

The information for respondents and the participants' informed consent was shown at the front page of the questionnaire — Online Google form. Students were given an option of whether they agree to participate in this questionnaire survey (Refer to Appendix B: Questionnaire). All the respondents were briefed regarding the below details:

i. The objectives and steps of the study;
ii. Benefits of the study, in term of benefits to the subject and benefits to others;
iii. Absolute confidentiality of information obtained; and
iv. The respondents have the right to withdraw from the study at any time without any way affecting his or her current situation.

CHARTER 4: RESULT

Stratified random sampling was used to select three private colleges and three government colleges. A total of 427 college students from these colleges given their feedback through this online survey, whereas there were five students who declined to answer the questionnaire. Hence, 422 college students in Kuching participated in this study (response rate = 422 / 427 = 98.8%).

4.1 Socio-demographic characteristics of the respondents

Table 4.1 shows the socio-demographic characteristics of the respondents — a total of 422 college students who participated in this study. The mean (SD) age among these students was 19.69 (±1.47) years old, while the youngest was 18 years old, and the eldest was 29 years old. Most of them (89.6%) were 18-21 years old. Half of the respondents were females (50.5%), and half were males (49.5%). Nearly half of them (53.3%) were studying in private colleges (included 99 students in science areas, 126 students in non-sciences areas), and half of them (46.7%) were studying in government colleges (77 students in science areas, 120 students in non-sciences areas). There was a slightly more than half of the college students were enrolled in non-science courses (58.3%), while the rest of them were enrolled in science courses (41.7%). However, the majority of the college students were non-vegetarians (80.8%), while the rest were vegetarians (19.2%).

Table 4.1: Sociodemographic characteristics of the respondents (n = 422)

	frequency	(%)	mean	(SD)	
Age (year)			19.69	(1.47)	min = 18 max = 29
Gender					
Female	213	(50.5)			
Male	209	(49.5)			
School type					
Government	197	(46.7)			
Private	225	(53.3)			
Course					
Sciences	176	(41.7)			
Non-sciences	246	(58.3)			
Food preference					
Vegetarians	81	(19.2)			
Non-vegetarians	341	(80.8)			

Footnote: n = sample size, SD = Standard deviation

4.2 The prevalence of unhealthy snacking behaviour among the respondents

Table 4.2 revealed the prevalence of unhealthy snacking behaviour among the 422 college students in Kuching. There was nearly 1 in 5 of the college students (17.1%) claimed that they did not consume any unhealthy snacks (0 times per week) for the past one month. Whereas, more than half of college students (58.3%) consumed unhealthy snacks occasionally (1 – 3 times per week). Moreover, there were a quarter of the college students (24.6%) who consumed unhealthy snacks repeatedly more than three times per week.

Table 4.2: The prevalence of unhealthy snacking behaviour among respondents (n = 422)

		frequency	(%)
None			
	0 times per week	72	(17.1)
Occasionally			
	1 – 3 times per week	246	(58.3)
Unhealthy snacking behaviour			
	more than three times per week	104	(24.6)

4.3 Individual factors related to unhealthy snacking behaviour.

Table 4.3 shows that mean scores on four individual factors related to unhealthy snacking behaviour among respondents. The taste-and-sensory perception (mean = 3.08, SD = 0.86) got the highest mean score, followed with perceived self-efficacy (mean = 3.07, SD = 1.06), cost/price sensitivity (mean = 3.01, SD = 0.99), and nutritional knowledge (mean = 2.65, SD = 0.89).

Table 4.3: Mean scores on the domain of individual factors related to unhealthy snacking behaviour among the respondents. (n = 422)

Individual factors	mean	(SD)
Taste and sensory perception	3.08	(0.86)
Perceived self-efficacy	3.07	(1.06)
Cost/price sensitivity	3.01	(0.99)
Nutritional knowledge	2.65	(0.89)

4.4 Environmental factors related to unhealthy snacking behaviour.

Table 4.4 reveals that mean scores on three environmental factors related to unhealthy snacking behaviour among respondents. Media advertisements influence (mean = 3.17, SD = 1.03) obtained the highest mean score, followed with easy accessibility (mean = 3.04, SD = 0.92), and perceived parental control (mean = 3.03, SD = 0.86).

Table 4.4: Mean scores on the domain of environmental factors related to unhealthy snacking behaviour among the respondents. (n = 422)

Environmental factors	mean	(SD)
Social-environmental:		
Perceived parental control	3.03	(0.86)
Physical-environmental:		
Easy accessibility	3.04	(0.92)
Macro-system:		
Media advertisements influence	3.17	(1.03)

4.5 The association between individual factors and environmental factors with unhealthy snacking behaviour among respondents.

Based on the consuming pattern, all respondents (n = 422) were categorised into two groups, which were: unhealthy snacking behaviour (24.6%) and occasionally-and-none (75.4%). Those with unhealthy snacking behaviour had a low proportion of vegetarians (18.7%). with unhealthy snacking behaviour obtained the highest mean score on item media advertisements (mean = 3.56, SD = 1.10), taste-and-sensory perception (mean = 3.51, SD = 0.79), followed with perceived parental control over

unhealthy snacks (mean = 3.17, SD = 1.10), and easy accessibility to unhealthy snacks (mean = 3.16, SD = 0.86); whereas, they got the lowest mean score on item nutritional knowledge (mean = 2.79, SD = 0.88).

Table 4.5 shows the simple binary logistic regression analysis for the association between each independent variables with unhealthy snacking behaviour among the respondents. Two predictors of unhealthy snacking behaviour were found significant ($p < 0.05$) in the simple binary logistic regression. The association between media advertisements influence and unhealthy snacking behaviour was significant [χ^2 (1, n = 422) = 19.429, $p < 0.001$, OR = 1.663, 95% CI = 1.314 – 2.106]. Additionally, the association between taste-and-sensory perception and unhealthy snacking behaviour was significant [χ^2 (1, n = 422) = 35.544, $p < 0.001$, OR = 2.338, 95% CI = 1.732 – 3.156]. Nevertheless, those predictors of unhealthy snacking behaviour with $p <$ 0.20 in simple binary logistic regression were selected for subsequent multiple binary logistic regression analyses.

The association between food preference and unhealthy snacking behaviour was not significant [χ^2 (1, n = 422) = 2.127, $p = 0.157$, OR = 1.554, 95% CI = 0.844 – 2.861]. Additionally, the association between nutritional knowledge and unhealthy snacking behaviour was not significant [χ^2 (1, n = 422) = 3.386, $p = 0.067$, OR = 1.264, 95% CI = 0.984 – 1.623]. Moreover, the association between perceived parental control and unhealthy snacking behaviour was not significant [χ^2 (1, n = 422) = 3.698, $p = 0.056$, OR = 1.291, 95% CI = 0.994 – 1.676]. Furthermore, the association between easy accessibility and unhealthy snacking behaviour was not significant [χ^2 (1, n = 422) = 2.289, $p = 0.132$, OR = 1.205, 95% CI = 0.945 – 1.536].

Therefore, a total of six predictors of unhealthy snacking behaviour with $p < 0.20$ were found in the simple binary logistic regression analysis, which included three individual factors (food preference, taste-and-sensory perception, nutritional knowledge) and three environmental factors (media advertisements influence, perceived parental control, and easy accessibility). All these six predictors of unhealthy snacking behaviour were then included for further multiple binary logistic regression analysis.

Table 4.5: Simple binary logistic regression analysis for the association between each independent variable with unhealthy snacking behaviour. (n = 422)

Factors	Unhealthy snacking behaviour freq. (%)	mean (SD)	None and Occasionally freq. (%)	mean (SD)	Crude OR (95% CI)	χ^2 stat. (df)[a]	*p* value
Individual factors							
Socio-demographic characteristics							
Age		19.58 (1.53)		19.73 (1.45)	0.930 (0.795 ; 1.088)	0.837 (1)	0.360
Gender							
Female	48 (22.5)		165 (77.5)		Reference		
Male	56 (26.8)		153 (73.2)		1.258 (0.807 ; 1.961)	1.031 (1)	0.311
School type							
Government	46 (23.4)		151 (76.6)		Reference		
Private	58 (25.8)		167 (74.2)		1.140 (0.730 ; 1.779)	0.334 (1)	0.564
Course							
Sciences	39 (22.2)		137 (77.8)		Reference		
Non-sciences	65 (26.4)		181 (73.6)		1.262 (0.801 ; 1.988)	1.012 (1)	0.317
Food preference							
Vegetarians	15 (18.5)		66 (81.5)		Reference		
Non- vegetarians	89 (26.1)		252 (73.9)		1.554 (0.844 ; 2.861)	2.127 (1)	**0.157**

Table 4.5: Continued (1)

Factors	Unhealthy snacking behaviour freq. (%)	mean (SD)	None and Occasionally freq. (%)	mean (SD)	Crude OR (95% CI)	χ^2 stat. (df)[a]	*p* value
Taste and sensory perception		3.51 (0.79)		2.94 (0.84)	2.338 (1.732 ; 3.156)	35.544 (1)	**< 0.001**
Perceived self-efficacy		3.12 (1.07)		3.06 (1.06)	1.055 (0.856 ; 1.299)	0.253 (1)	0.615
Cost/price sensitivity		3.06 (1.05)		2.99 (0.97)	1.080 (0.863 ; 1.352)	0.453 (1)	0.501
Nutritional knowledge		2.79 (0.88)		2.60 (0.89)	1.264 (0.984 ; 1.623)	3.386 (1)	**0.067**

Table 4.5: Continued (2)

Factors	Unhealthy snacking behaviour freq. (%)	mean (SD)	None and Occasionally freq. (%)	mean (SD)	Crude OR (95% CI)	χ^2 stat. (df)[a]	p value
Environmental factors							
Media advertisements influence		3.56 (1.10)		3.06 (0.98)	1.663 (1.314 ; 2.106)	19.429 (1)	**< 0.001**
Perceived parental control		3.17 (0.87)		2.98 (0.85)	1.291 (0.994 ; 1.676)	3.698 (1)	**0.056**
Easy accessibility		3.16 (0.86)		3.00 (0.94)	1.205 (0.945 ; 1.536)	2.289 (1)	**0.132**

Footnote: n = sample size, freq. = frequency, SD = Standard deviation, OR = Odds ratio, CI = Confidence Interval, χ^2 stat. = Chi-square stat., df = degrees of freedom.

[a] Likelihood Ratio (LR) test

Those variables with $p < 0.2$ in simple binary logistic regression were shortlisted into the final model.

4.6 The factors associated with unhealthy snacking behaviour among respondents.

Results indicated that the six-predictor model of unhealthy snacking behaviour, which consisted of food preference, taste-and-sensory perception, nutritional knowledge, media advertisements influence, perceived parental control, and easy accessibility, was statistically significant $\chi^2(6, n= 422) = 47.20$, $p < 0.001$ and explained 15.7% (Nagelkerke R Square = 0.157) of the total variance of unhealthy snacking behaviour.

In addition, all possible two-way interactions had checked. Wald test for all interaction terms, $p > 0.05$, indicated that no interaction was found. Moreover, multicollinearity. (MC) had checked under linear regression, and all variance-inflation Factor (VIF) less than 10, indicated that no MC found. Furthermore, the goodness-of-fit of the overall model was evaluated by the Hosmer-Lemeshow goodness-of-fit statistic with $p = 0.297$ (not significant), meaning the dataset fits well with the logistic regression model. The sensitivity, specificity of the logistic regression model's prediction had checked with a classification table. The logistic regression model correctly predicted 76.8% of the respondents, whether they practised unhealthy snacking behaviour, which implied the logistic regression model was a good model. Additionally, the discriminatory capacity of the model had checked with the Area under ROC curve (AUC) analysis, and the result was 71.9%. AUC between 70% to 80% indicated the logistic regression model was fair to distinguish between those with unhealthy snacking behaviour and those who were not. Cook's influential statistics shown none of the data was more than 1.0 (the highest was 0.26), which indicated that no influential outliers in the dataset.

Table 4.6 shows factors associated with unhealthy snacking behaviour. The result demonstrated that taste-and-sensory perception (Adjusted OR = 2.202, 95% CI = 1.548 – 3.133, $p < 0.001$) and nutritional knowledge (Adjusted OR = 1.484, 95% CI = 1.120 – 1.966, $p < 0.05$) had a positive association with unhealthy snacking behaviour.

Table 4.6: Factors associated with unhealthy snacking behaviour. (n = 422)

Factors	B	SE	Wald	df	Sig.	Exp (B)	95% CI	
							Lower	Upper
Individual factors								
Taste and sensory perception	0.789	0.180	19.259	1	< 0.001	2.202	1.548	3.133
Nutritional knowledge	0.395	0.143	7.578	1	0.006	1.484	1.120	1.966

Footnote: B = the estimated logit coefficient; SE = the standard error of the coefficient; Wald = $[B/SE]^2$; Sig = the significance level of the coefficient; Exp(B) = the "odds ratio" of the individual coefficient; CI = Confidence interval

Results indicated that the six-predictor model was statistically significant $\chi^2(6, n= 422) = 47.20, p$ value < 0.001

Pseudo R-squared statistics:

- Cox & Snell R Square = 0.106
- Nagelkerke R Square = 0.157

Interaction: Wald test for interaction term, p-value > 0.05

Multicollinearity, VIF < 10

Model assumptions and outliers.

- Measures of goodness-of-fit:
  - Hosmer and Lemeshow Test, p-value > 0.05
  - Classification tables, 76.8% of the respondents are correctly classified.
  - AUC = 71.9%
- Measures of outliers:
  - Cook's influential statistic = 0.26 (the highest point)

CHAPTER 5: DISCUSSION

This chapter presented the discussion of research findings, identified the limitation, and recommendations for future similar research. The conceptual framework of this research project was conceptualised based on social cognitive theory and ecological theory and referred to previous similar studies (Larson et al., 2017; Story et al., 2002; Yazdi Feyzabadi et al., 2017). The purpose of this study was to determine the potential individual and environmental factors associated with unhealthy snacking behaviour among college students in Kuching.

5.1 The prevalence of unhealthy snacking behaviour

Table 4.2 demonstrates that nearly a quarter of respondents (24.6%) with unhealthy snacking behaviour. Similar local studies found that 20.3% of university students consumed SSBs on a daily basis (Mohd Fahmi Teng et al., 2019), while 26.9% of school-age adolescents consumed snacks three times and above at fast-food outlets in the past week (Gan et al., 2019). In addition, 25.6% of university students reported they "often" and "always" consumed unhealthy snacks (Nizar Abdul Majeed et al., 2015). The NHMS (2017) showed a quarter of (23.8%) Malaysian adolescents consumed four to six times unhealthy snacks per week, and 7.6% were daily consumers (IPH, 2017).

The systematic review found the prevalence of unhealthy snacking behaviour and associated factors among these young people might vary across regions and

populations (Blaine et al., 2017). By comparing the prevalence of unhealthy snacking behaviour with other countries, a study in the United Arab Emirates showed that 25% of adolescents consumed unhealthy snacks three or more times per week, and 19% of the respondents consumed the unhealthy snacks daily at fast food outlets (Al-Yateem & Rossiter, 2017); whereas, a study in India demonstrated evidence that 54.3% of college-going adolescents practised unhealthy snacking behaviour (Mithra et al., 2018). Additionally, a study in Sri Lanka found 73% of school-going adolescents had unhealthy snacking behaviour (Talagala & Arambepola, 2016). Furthermore, Larson et al. (2017) reported that most of the United States school-going age adolescents consumed an average of two servings of unhealthy snacks every day (female: 2.2 servings per day; male 2.1 servings per day).

5.2 Factors associated with unhealthy snacking behaviour

Multiple binary logistic regression in this study (see Table 4.6) revealed that taste-and-sensory perception and nutritional knowledge were positively associated with unhealthy snacking behaviour among the respondents, while other predictors of unhealthy snacking behaviour were not significant in this study.

Nevertheless, research in Iran showed that taste-and-sensory perception, easy accessibility were positively associated with unhealthy snacking behaviour; while nutritional knowledge, parental control, and self-efficacy were negatively associated with unhealthy snacking behaviour among the school-going age adolescents (Yazdi Feyzabadi et al., 2017). Nevertheless, another study in the United States demonstrated that on-screen time and easy accessibility had a positive association with unhealthy snacking behaviour; while nutritional knowledge and taste-and-

sensory perception both were not significant in determining unhealthy snacking behaviour among the school-age adolescents (Larson et al., 2017). These above findings demonstrated that the association between the independent factors and unhealthy snacking behaviour was not consistent in all studies. The following paragraphs further discussed the unhealthy snacking behaviour and its association with individual and environmental factors among respondents in this research project.

First, this research project demonstrated a significant finding that taste-and-sensory perception had a positive association with unhealthy snacking behaviour among college students. Similar studies also found taste-and sensory perception was positively associated with unhealthy snacking behaviour among Norwegian and Persian adolescents (Wang et al., 2016; Yazdi Feyzabadi et al., 2017). This result can be explained by a number of taste-and-sensory studies, showed that taste-and-sensory perception as one of the essential factors influencing the consumers to purchase the food (Connors et al., 2001; A. Drewnowski & Rock, 1995; Glanz et al., 1998; Kearney et al., 2000; Kourouniotis et al., 2016; Mok, 2009). Additionally, unhealthy snacks were often associated with high food pleasure (Adam Drewnowski, 1998). Therefore, school-going adolescents tended to eat unhealthy snacks because most of these snacks were tasty and met their food pleasure immediately, instead of spent longer time to think of the health consequences (Teo & Sedek, 2012; Wang et al., 2016). Furthermore, a study demonstrated evidence that most of the consumers chose claimed difficulty to compromise the taste of food for healthier reasons (Ballco et al., 2020). This matter might need to be addressed in further policy planning by food industries (ASM, 2014; Yazdi Feyzabadi et al., 2017).

sensory perception both were not significant in determining unhealthy snacking behaviour among the school-age adolescents (Larson et al., 2017). These above findings demonstrated that the association between the independent factors and unhealthy snacking behaviour was not consistent in all studies. The following paragraphs further discussed the unhealthy snacking behaviour and its association with individual and environmental factors among respondents in this research project.

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Nonetheless, the association between taste-and-sensory perception and unhealthy snacking behaviour was not consistent in all studies. There were studies that found no significant association between unhealthy snacking behaviour and taste-and-sensory perception among the students; however, they attributed to other associated factors. Those students chose to eat unhealthy food, mostly due to lack of time to cook healthier food and the easy accessibility of unhealthy snacks (Poobalan et al., 2014; Mithra et al., 2018).

Second, this study confirmed a significant finding that nutritional knowledge had a positive association with unhealthy snacking behaviour among college students. In line with this finding, a study in Malaysia revealed that, although the students understood the definition of unhealthy snacks and had a certain level of nutritional knowledge, half of them still consumed unhealthy snacks occasionally; moreover, nearly a quarter of them practised unhealthy snacking behaviour (Hoque et al., 2016). Additionally, a study in Mauritius reported that almost 80% of adolescents had good nutritional knowledge, 1 in 5 of them used to consumed SSBs between meals, and 1 in 10 of them practised unhealthy snacking behaviour (Ranjana et al., 2013). Similarly, another study in the United States showed that the majority of school-going adolescents had a significant amount of nutritional knowledge; some of them still consumed unhealthy snacks frequently (Croll et al., 2001). The findings above indicated that nutritional knowledge among these adolescents had not been translated into healthy eating behaviour.

However, contrary to the findings, some other countries such as the United Arab Emirates, Italy, and Iran, provided significant evidence that nutritional knowledge had a negative association with unhealthy snacking behaviour among young people

(Al-Yateem & Rossiter, 2017; Grosso et al., 2013; Yazdi Feyzabadi et al., 2017). In accordance with this finding, some studies demonstrated evidence that nutritional knowledge had a positive association with healthy diet habits among young people (Asakura et al., 2017; Dissen et al., 2011; Krešić et al., 2009). These studies proved the fact that nutritional knowledge among adolescents played crucial roles in determining healthy diet habits and prevent unhealthy snacking behaviour (Grosso et al., 2013; Sogari et al., 2018).

The rest of the independent factors were found no significant association with unhealthy snacking behaviour in the multiple binary logistic regression analysis. First, interestingly, this research project provided evidence that perceived self-efficacy was not associated with unhealthy snacking behaviour among the respondents. And the same way, a few studies showed the same finding (Demirci et al., 2018; Shekari et al., 2019). Some studies provided evidence that the change in diet self-efficacy (between pre- and post-test) was a more significant predictor of eating behaviours than the baseline diet self-efficacy in a weight-loss intervention programme (Bas & Donmez, 2009; Warziski et al., 2008). Hence, the above studies had explained why perceived self-efficacy (as baseline characteristics) could be a not significant independent factor that predicting unhealthy snacking behaviour among college students in Kuching.

Nonetheless, the negative association between self-efficacy and unhealthy snacking behaviour among adolescents had demonstrated in many studies (Churchill et al., 2019; Luesse et al., 2019; Rezali et al., 2015; Shieh et al., 2015; Stephens et al., 2017; Tavassoli et al., 2018; Vardanjani et al., 2015; Zeinab et al., 2017). As a result of self-efficacy can influence decision making in order to maintain health promotion

behaviours; therefore, those who had a lower sense of self-efficacy and not confidence to prepare healthy food for themselves were associated with unhealthy snacking behaviour (Buckworth, 2017).

Second, the analyses in this research project showed no significant association between cost/price sensitivity and unhealthy snacking behaviour. In like manner, some studies reported the same findings (Saleh et al., 2018; Yazdi Feyzabadi et al., 2017). This could happen because research found the cost/price sensitivity of certain unhealthy snacks, such as biscuits, cakes, confectionery, and chocolate, were similar in communities regardless of their socioeconomic status, because of the price elasticity for biscuits was on average −0.69 (a 10% increase in price yields a 6.9% reduction in quantity purchased), while for cakes −0.66, chocolate and confectionery −0.74. These elasticities that less than 1 indicated the low responsiveness to price changes among the consumers (Smith et al., 2018). Therefore, when these unhealthy snacks were selling everywhere in the market with low prices and easy to access, then cost/price sensitivity was no longer the decisive factor in purchase these unhealthy snacks (Saleh et al., 2018). This case explained the reason why Malaysia imposed sugar taxes on certain SSBs (Kaur, 2019). Sugar taxes can lead the communities to reduce to consume unhealthy snacks, especially those who had higher cost/price sensitivity.

On the other hand, a study showed that cost/price sensitivity was negatively associated with unhealthy snacking behaviour ($B = -0.10$, $SE = 0.04$, $p < 0.05$) among school-going adolescents (Larson et al., 2017). In line with this finding, there were several studies provided evidence that cost/prices sensitivity and unhealthy snacks purchase intention had a significant negative association (Ashoka & Rakesh,

2016; Block et al., 2010; Guerrero-López et al., 2017; Moore & Carpenter, 2006; Prakash & Pathak, 2014).

Third, there was no significant association found between gender with unhealthy snacking behaviour in this research. Similar local studies demonstrated the same result (Fadzly et al., 2018; Gan et al., 2019; Hamirudin et al., 2018; Isa & Masuri, 2011). Likewise, researches from other countries such as the United States and India observed the same findings (Caine-Bish & Scheule, 2009; Larson et al., 2017; Mithra et al., 2018). The possible reason was the easy accessibility of unhealthy snacks (especially SSBs) within the canteen; therefore, no gender differences were observed in consuming unhealthy snacks (Mohd Fahmi Teng et al., 2019; Nurliyana et al., 2015).

In contradiction to these findings, several studies revealed a significant finding that male students were positively associated with unhealthy snacking behaviour (Borgogna et al., 2015; Genena & Salama, 2017; Yazdi-Feyzabadi et al., 2019); vice versa, another research demonstrated that females had a positive association with unhealthy snacking behaviour (El Ansari & Berg-Beckhoff, 2017). In general, male college students required more energy than females based on the recommended nutrient intake every day (NCCFN, 2017). Moreover, studies observed a shred of interesting gender differences in eating occasions, which is, menstrual cycle and fluctuating sex hormone in females, might make them change the total energy intake accordingly (Asarian & Geary, 2006, 2013; Eckel, 2011). These periodic physiological changes lead to the sense of craving for sweets, carb, and fat, particularly during pre-menstrual (Frank et al., 2010; Hormes & Timko, 2011; Twogood, 2019). Additionally, another study provided evidence the females

consumed more unhealthy snacks than males, while the males consumed more unhealthy lunch than females (Fryar et al., 2018). Furthermore, as a novel finding, a study stated that the gender differences in the effects of superior temporal sulcus (STS) stimulation in the human brain might make female tends to choose more high calories food (Manippa et al., 2017).

Fourth, the type of college was not a significant factor associated with unhealthy snacking behaviour among college students in this study. Most of the similar researches, their study designs did not stratify the respondents into private college and public college. Hence, there were limited studies that can be referred for discussion in terms of the type of college. Consistent with this research, a study confirmed that was no significant association found between the type of college and unhealthy snacking behaviour (Mithra et al., 2018). Studies showed that although college students were relatively independent, the easy accessibility of unhealthy snacks could influence their food choices, regardless of the type of college (Mohd Fahmi Teng et al., 2019; Nurliyana et al., 2015). In contrast, a study provided evidence that private school students were positively associated with unhealthy snacking behaviour, because most of these students received pocket money and tended to spend on unhealthy snacks (Yazdi Feyzabadi et al., 2017)

Fifth, this research project suggested that science courses and non-science courses were not associated with unhealthy snacking behaviour among college students in Kuching. Similarly, a local study revealed the same findings (Nizar Abdul Majeed et al., 2015). In contradiction to these findings, a study found that those enrolled in science courses had a positive association with unhealthy snacking behaviour (Ahmad et al., 2019), vice versa, another study showed evidence that those enrolled

in non-science courses were positively associated with unhealthy snacking behaviour, because non-science courses students got a lower knowledge of food nutrition (Mithra et al., 2018).

Sixth, this study revealed no significant association between food preferences (vegetarians and non-vegetarians) and unhealthy snacking behaviour. In accordance with this finding, a study found that some of the vegetarians were frequently consumed unhealthy snacks, such as potatoes, sweets, refined grains, and SSBs frequently (ACC, 2020). Additionally, studies also provided evidence that no significant differences in terms of daily energy intake between vegetarians and non-vegetarians (Gan et al., 2018; Nebl et al., 2019). Hence, the above viewpoints and findings demonstrated that, regardless of the food preferences, the outcome can be no different. Vegetarians do not necessarily mean that their eating habits were healthier because vegetarian foods can consume unhealthy snacks as well. Therefore, the association between food preferences and unhealthy snacking behaviour might not be significant.

In contrast to these findings, a study confirmed a significant finding that non-vegetarian college students were positively associated with unhealthy snacking behaviour (Adjusted OR = 1.74, 95% CI = 1.29 – 2.35, $p < 0.05$) (Mithra et al., 2018). This finding in accordance with the evidence in several studies when compared to the diet habits between vegetarian and non-vegetarian adolescents; the former usually had a healthier food list (Movassagh et al., 2018; Perry et al., 2002; Segovia-Siapco et al., 2019). These can be explained by vegetarians always put whole wheat, high-fibre foods, beans, nuts, seeds, and legume in their daily menu and serve as staple foods or even serve as snacks. And these foods can easily make

people feel full and satisfied (Leiva, 2019). Therefore, lesser of vegetarian adolescents practised unhealthy snacking behaviour.

Seventh, from the analyses in this research project, it was cleared that media advertisements influence was not associated with unhealthy snacking behaviour among college students in Kuching. In like manner, some other countries found the same result (Anschutz et al., 2010; Gregori et al., 2017; Lorenzoni et al., 2017; Yazdi Feyzabadi et al., 2017). A possible reason is, although nearly 90% of Malaysian were mobile phone users nowadays (MCMC, 2018); however, more than half of the users used to skip online advertising (Handley, 2017). Thus, media advertisements may not the attribute factor to unhealthy snacking behaviour among these users.

On the other hand, a local study found that media advertisements influence had a positive association with unhealthy snacking behaviour among adolescents (Gan et al., 2019). In fact, another local study showed evidence after the authors analysed more than 32,000 advertisements on Malaysian TV channels. They found 17.1% were food-related advertisements, which potentially associated with unhealthy snacking behaviour among the children and adolescents (Ng et al., 2014). In line with this finding, some other Asian countries such as South Korea and Indonesia revealed a positive association between media advertisements influence and unhealthy snacking behaviour among children and adolescents (Lee et al., 2014; Lwin et al., 2017). Similarly, the same finding in other Western countries such as the United States, Finland, Germany, Romania, England, and Australia (Andreyeva et al., 2011; Giese et al., 2015; Halford et al., 2008; Hennessy et al., 2015; Norman et al., 2018a, 2018b). Some scholars believe that media advertisements were powerful and able to convince consumers to purchase after watching the ads; however, in a

more general situation was that media advertisements gradually change the consumer's behaviour in a subtle way (Herhold, 2017; Haider & Shakib, 2018; Wroblewski, 2019). Hence, the WHO called on member states to enact legislation to protect children and adolescents from media advertisements related to unhealthy snacks to protect their privacy and health (WHO, 2016b).

Eighth, this study revealed that perceived parental control on unhealthy snacks was not associated with unhealthy snacking behaviour among the respondents. In accordance with this result, another similar study demonstrated the same finding among school-age adolescents in Malaysia (Gan et al., 2019). Likewise, some other Western countries such as Australia and the United States were found no association between perceived parental control and unhealthy snacking behaviour among the school-age children (Harris et al., 2014; Liang et al., 2016). In general, the measure that parents used to protect their children from exposure to unhealthy snack advertisements was to monitor and control TV advertisements. Nowadays, with the development of technology, it is easier for young people to obtain unhealthy snack information from mobile phones and the Internet. It seems that it is difficult for parents to fully restrict this aspect (Pettigrew et al., 2014). Hence, this makes parental control of unhealthy snacks and unhealthy snacking behaviour not necessarily have a significant relationship.

On the other hands, some studies showed evidence that perceived parental control on unhealthy snacks was negatively associated with unhealthy snacking behaviour (Boots et al., 2015; Yazdi Feyzabadi et al., 2017), vice versa, and some studies demonstrated that those family with parents who restricted their children on unhealthy snacks had a positive association with unhealthy snacking behaviour

among the children (Blaine et al., 2015, 2017; Davison et al., 2015; Gibson et al., 2020; Shloim et al., 2015; Rhee et al., 2015; Larson et al., 2017). The interesting fact was some studies showed that parental control on unhealthy snacks had a positive association with unhealthy snacking behaviour among the children because when unhealthy snacks were excessively restricted by parents, it could be counterproductive once the parental control removed (Blaine et al., 2017; Loth et al., 2016; Reina et al., 2013). Evidence-based studies found healthy parenting practices help to shape self-efficacy in children (Breiner et al., 2016; CDC, 2020b; WHO, 2009). In addition, scholars stated that parental control played an important role in their child's healthy growth process. The way of interaction between the parents and children and the way for cultivating self-discipline could influence their child's eating behaviour (Savage et al., 2007; Scaglioni et al., 2018; Morin, 2019).

Ninth, this research project found a not significant association between easy accessibility to unhealthy snacks and unhealthy snacking behaviour. In line with the finding, some researchers found a similar association in their studies (Griffiths et al., 2014; Leung et al., 2011; Thornton et al., 2011). The possible reasons are, first, even if the unhealthy snack is readily available in convenience stores and fast-food restaurants, some consumers may not purchase if the unhealthy snack is costly and low quality (Griffiths et al., 2014). Second, research showed that those had access to transportation, the distance between the housing and the shop no longer a decisive factor that affects their food choices (Bernsdorf et al., 2017). Furthermore, the food delivery service made the process for ordering food become easier, more convenient, and accessible by using their mobile apps. Hence, the geographic accessibility of SSBs shop and fast-food restaurant were gradually become less important due to the rapid development of these food delivery services (Dye, 2020; Iyer, 2019). Hence,

easy accessibility is not merely determined by the availability factor, but also the mobility factor.

In contrast, some studies in Malaysia stated that those school canteens where the unhealthy snack was available, the students were positively associated with unhealthy snacking behaviour (Nurliyana et al., 2015; Mohd Fahmi Teng et al., 2019). A similar local study also found evidence of the presence of unhealthy snacks at home had a positive association with unhealthy snacking behaviour (Gan et al., 2019). Some other studies in Iran and the United States were revealed their finding in line with these results (Yazdi Feyzabadi et al., 2017; Larson et al., 2017). Scholars stated that people were more difficult to resist unhealthy snacks, which were easily accessed (Wansink et al., 2006; Maas et al., 2012), particularly the small pieces of unhealthy snacks, may unintentionally lead to excessive energy intake (Poelman et al., 2014). Due to the less expensive and the easy availability of unhealthy snacks, unhealthy snacking behaviour among adolescents can be triggered (Mithra et al., 2018).

5.3 Limitation of study

The aim of this research was to determine the extent of unhealthy snacking behaviour and the associated factors among college students in Kuching. Nevertheless, this research was subject to several limitations, which may provide advisements and directions for future studies with similar research objectives.

First, it was a cross-sectional study. Therefore, the temporal sequence between the factors and unhealthy snacking behaviour was difficult to determine, whereby the

results in this study unable to infer the causality. Indeed, the temporality between the factors and the outcome can be clearly defined by using a cohort study; however, more time and cost were needed. Aside from that, other prominent disadvantages in cohort study were those participants probably switch between a factor category to another; additionally, knowledge of the factors associated with unhealthy snacking behaviour probably biases the classification of the outcome (Roever, 2015). A cross-sectional study is particularly applicable to determine the prevalence of unhealthy snacking behaviour in the population and determine the association between the factors and the outcome. Importantly, it is less time-consuming and relatively cheap (Buka et al., 2018; Sedgwick, 2014). Therefore, it remains an appropriate type of study for the objectives of this research topic.

Second, although stratified random sampling was used to select three private colleges and three government colleges in Kuching, the survey was conducted online. Those college students who have access to the internet were recruited to participate in this study. Therefore, the sampling biased was the major concerned in this study. Particularly, during the enforcement of the movement control order (MCO), the majority of college students were returned to their hometowns. However, not every college students have easy access to the internet, particularly those who stay in rural districts. Self-selection biased occurred among the college students who have access to the internet and actively answered this online survey. Additionally, non-response biased occurred among the respondents who have no access to the internet because these college students may be inherently different from other respondents. As a result, this sampling method was not represented the unhealthy snacking behaviour of the whole college-age population but merely represented the students from the selected colleges (6 out of 12 colleges in Kuching). Moreover, these results cannot

be generalised to the whole Sarawak state as well as the country. However, since the data were separately collected from 6 out of 12 colleges; therefore, the sampling method in this study was more accurate than cluster sampling for the same sample size in the one college. Nevertheless, in order to reduce sampling biased in the future study, a multistage systematic sampling method was a greater way to obtain a better representative sample by selecting respondents in the different major courses from each college based on their matric number.

Third, while the self-administered questionnaire was used as a data collection instrument, the response biased cannot be avoided completely (Adida et al., 2019; Bowling, 2005; Latkin et al., 2017), and this research project was no exception. The social desirability bias in the self-administered online survey was not uncommon, particularly in the behaviour patterns. When the respondents knew they were being observed, they might not answer the question truthfully. They may tend to present their snacking behaviour in a socially acceptable manner when answering this self-administered online survey (Demetriou et al., 2015). In addition, a month recall period was used to determine the unhealthy snacking behaviour, which might be influenced by recall biased (Naska et al., 2017). Although response biased cannot be avoided completely, the self-administered online survey remains one of the fastest and easiest ways for data collection (Khatri, 2015); therefore, it was applicable to be used extensively for online survey in this research project (Jarvis, 2010; Lavrakas, 2008), particularly when all schools were shut down during the enforcement of MCO,

CHAPTER 6: CONCLUSION AND IMPLICATIONS

6.1 Conclusion

Adolescence is a period associated with critical changes in physical, mental, emotional, social lifestyle, as well as eating behaviour. Although college-going age populations are usually sceptical; they are still vulnerable under the influence of individual and environmental factors for choosing the food. Therefore, these people are often targeted by unhealthy food advertisements and marketing strategies in the environment, which may lead them favourable to adopt unhealthy snacks.

Unhealthy snacking behaviour among young people is one of the growing public health concern because it is one of the risk factors associated with diet-related NCDs, especially obesity, cardiovascular diseases, diabetes, and hyperlipidemia. Hence, this cross-sectional study aimed to determine the prevalence of unhealthy snacking behaviour and its association with individual and environmental factors among college students in Kuching in order to get a better insight and provide advantages of concentrating the significant determinants in the intervention programme on similar study populations in future.

Results showed the prevalence in nearly a quarter of college students in Kuching practised unhealthy snacking behaviour, which similar to the prevalence of unhealthy snacking behaviour among school-age adolescents in some studies in Malaysia. College students are still at the ages to improve their unhealthy eating behaviours, as these will impact the health status later in their life. Therefore, the

stakeholders and food-related policy decision-makers shall strengthen the intervention programmes among this age group as well. Additionally, the multiple binary logistic regression analysis highlighted the taste-and-sensory perception and nutritional knowledge had a positive association with unhealthy snacking behaviour. In order to address these issues, the college administrators shall strengthen the implementation of the Integrated School Health Programme (ISHP) on the college campus with the efforts towards healthy dietary habits meanwhile prohibiting the unhealthy food and SSBs in school areas. Furthermore, KAFE@TEEN should encourage and promote healthy eating among adolescents. In addition, policymakers shall intervene the fast-food companies and unhealthy snack companies by refining certain food policies. Moreover, the authorised officer shall strengthen the enforcement to ensure the food labelling of these unhealthy foods is comply with Food Regulation.

Meanwhile, the gender, type of college, type of courses, food preferences, perceived self-efficacy, cost/price sensitivity, perceived parental control, easy accessibility, and media advertisements influence were not associated with unhealthy snacking behaviour in this study. Thus, further studies are required in order to ascertain these associations through wider and representative sampling. In conclusion, the objectives of this research project had achieved in which significant associations were found between the taste-and-sensory perception and nutritional knowledge with unhealthy snacking behaviour among the respondents.

6.2 Implication

This research project showed significant evidence that taste-and-sensory perception and nutritional knowledge were positively associated with unhealthy snacking behaviour. Although conducting further researches is needed in order to expand and clarify these findings, the current evidence might provide stakeholders with a few directions for future intervention development and policy targeting.

First, studies had proven that higher nutritional knowledge influenced the decision-making for choosing healthier foods and snacks (Buckworth, 2017; Yazdi Feyzabadi et al., 2017). The college administrators shall consider systematically combines the college environment and curriculum through multi-component approaches, to collaborate with students, parents, and school staffs, in order to create a sustainable environment toward healthy diet habits on the campus (Croll et al., 2001; Hoque et al., 2016; Sogari et al., 2018; Woodruff & Hanning, 2009). For instance, college administrators can strengthen the implementation of the Integrated School Health Programme (ISHP) to promote and practice healthy diet habits while prohibiting the sale of unhealthy snacks within the campus (Khairuddin, 2014).

Second, KAFE@TEEN should be strengthened, particularly the availability, accessibility, and affordability (National Population and Family Development Board, 2020). Strategically, KAFE@TEEN can be used to educate nutritional knowledge and promote healthy diets for young people. It provides an environment and perfect opportunities for young people to taste healthy, delicious foods, and teach them how to prepare simple, low-cost, low-calorie healthy snacks at home. KAFE@TEEN should encourage young people to practice their nutrition knowledge in their daily diet and to make a healthier snack choice.

Third, the policy intervention in the food industries (particularly fast-food companies) is undoubtedly the most critical part and also the most sensitive part. The Ministry of Health has had the idea of banning fast-food advertising since the past decades, but this idea had caused backlashes from the fast-food giants. The reason was that fast-food companies spend RM 200 million each year on advertising. (ASM, 2014). Therefore, it was not feasible to ban fast-food advertisements.

One of the solutions had adopted by the government was imposed the sugar taxes on the SSBs industry. Sugar taxes could influence food choices among young people (Unicef, 2019). Those consumers with high cost/price sensitivity only purchase if the prices and qualities that they deem reasonable (Andreyeva et al., 2010; Okrent & Sweitzer, 2016). Additionally, the quality of the product also one of the purchasing criteria during shopping for those with higher cost sensitivity (Ceylana et al., 2014; Kagan, 2019; Lichtenstein et al., 1993). A study revealed that those who used to check the food prices and ingredients before purchase were found consume lesser unhealthy snacks than others (Zagorsky & Smith, 2017). This was one of the desired policy outcomes for imposed taxes on unhealthy snacks. In addition, food-related policies decision-maker can intervening fast food companies and unhealthy snack companies through food policies, requiring them to give commitments to reduce the sugar, fat, and salt content in their products. Moreover, the authorised officer shall strengthen the enforcement to ensure all these food labellings should comply with Food Regulation (ASM, 2014). Additionally, the Ministry of Health can instil public health awareness through health advertisements and promote the importance of a healthy diet (Clark, 2020).

Lastly, one observational study was very unlikely to provide strong evidence and recommendations to change the health-related policy. Likewise, this study provided a small amount of evidence. Therefore, more similar studies were needed in the future because the findings in this study need to be supported by other evidence in order to generate stronger recommendations (Roever, 2015).

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APPENDIX A: Gantt chart

Gantt Chart for research project management

Title: The prevalence of unhealthy snacking behaviour and its association with individual and environmental factors among college students in Kuching, Sarawak.

Activities	2019			2020								
	Oct	Nov	Dec	Jan	Feb	Mac	Apr	May	Jun	Jul	Aug	Sep
Proposal preparation												
Proposal presentation and approval												
Pilot-test												
Data collection												
Data entry												
Data analysis												
Report writing and submission												

APPENDIX B: Questionnaire

[V1e] The prevalence of unhealthy snacking behaviour and its association with individual and environmental factors among college students in Kuching, Sarawak

Respondent information

Title of study:
The prevalence of unhealthy snacking behaviour and its association with individual and environmental factors among college students in Kuching, Sarawak.

Name of the investigator:
Cheah Yong Xiang (Matric number: 19030140)

Name of supervisor:
Associate Professor Dr Cheah Whye Lian

Institution:
Faculty of Medicine and Health Sciences, UNIMAS

Name of sponsor:
Self-sponsored

Introduction:
It is important that you understand why the research is being done and what it will involve. Please take your time to read through and consider this information carefully before you decide if you are willing to participate. Ask the study researcher if anything is unclear or if you would like more information. After you are properly satisfied that you understand this study and that you wish to participate, you must click the 'Agree' button below.

Your participation in this study is voluntary. You do not have to be in this study if you do not want to. You may withdraw from the study at any time. If you withdraw, any data collected from you up to your withdrawal will still be used for the study. Your refusal to participate or withdrawal will not affect any medical or health benefits or your learning in this university to which you are otherwise entitled.

This study has been approved by the Faculty of Medicine and Health Sciences, UNIMAS.

1. What is the purpose of the study?
The purpose of this study is to estimate the prevalence of unhealthy snacking behaviour and its association with individual and environmental factors among college students in Kuching, Sarawak.

This research will be conducted for a duration of two months (30/1/2020 till 30/3/2020). The expected number of participants will be 440.

2. What are my responsibilities when taking part in this study?
It is important that you answer all of the questions asked by the study researcher honestly and completely, which will take about 15 minutes. The study team will also ask your personal information like socio-demographic characteristics. For studies involving a questionnaire/survey, that is, you will be given a survey form to be answered. This form contains three (3) parts which will inquire some questions regarding individual factors and environmental factors that may cause the college students to consume unhealthy snack foods. And the last part is the frequency of snack foods that you consumed for the past one (1) week of duration.

3. What are the potential risks and side effects of being in this study?
Participating in this study will not affect your learning in this college, and there will be no physical and mental risk. You are free to decline to participate in this study if you feel uncomfortable with the questions.

4. What are the benefits of being in this study?
There may not be any benefits to you. However, that information obtained from this study may provide us as a reference for planning the nutrition education intervention programme regarding healthy eating habit among college students in the future.

5. Who is funding the research?
This study is self-sponsored by the researcher. You will not be paid for participating in this study.

6. Will my information be kept private?
All your information obtained in this study will be kept and handled in a confidential manner, in accordance with applicable laws and/or regulations. When publishing or presenting the study results, your identity will not be revealed. Individuals involved in this study, qualified monitors and auditors, and governmental or regulatory authorities may inspect the study data, where appropriate and necessary.

7. Who should I contact if I have questions?
If you have any questions about the study, you want further information about this study, please contact the supervisor of this research, Associate Professor Dr Cheah Whye Lian, who can reach through e-mail address:
wlcheah@unimas.my
*Required

Participants informed consent

Title of study: The prevalence of unhealthy snacking behaviour and its association with individual and environmental factors among college students in Kuching, Sarawak.

By clicking the 'Agree' button below, I confirm the following:

1. I have been given oral and written information for the above study and have read and understood the information given.

2. I have sufficient time to consider participation in the study and have had the opportunity to ask questions and all my questions have been answered satisfactorily.

3. I understand that my participation is voluntary and I can freely withdraw my participation from the study without giving a reason and this will in no way affect my learning in this college. I am not taking part in any other research study at this time. I understand the risks and benefits, and I freely give my informed consent to participate in the conditions stated. I understand that I must follow the investigator's instructions related to my participation in the study.

4. While information gained in this study, it may be used in a conference presentation, and may also be published in a journal article, I will not be identified. Information concerning me will remain STRICTLY CONFIDENTIAL.

5. I understand those study investigators, qualified monitors, and auditors, the sponsor or its affiliates, and governmental or regulatory authorities have direct access to my record in order to make sure that the study is conducted correctly and the data are recorded correctly. All personal details will be treated as STRICTLY CONFIDENTIAL.

1. Do you agree to participate in this study? *

Mark only one oval.

Yes, I agree to participate.

No, I do not agree to participate.

Part A: Socio-demographic data

2. What is your gender? *

Mark only one oval.

Male

Female

3. What is your age? *

_____

4. What is the name of the college that you are currently studying? *

_____

5. What is the course that you are currently studying? *

_____

6. What is your food preference? *

Vegetarian: diet does not include meat, meat products, poultry, seafood, and flesh from any other animal (Leitzmann, 2014).

Mark only one oval.

- ◯ Vegetarian diet
- ◯ Non-vegetarian diet

Part B: Measure the determinants

To measure the determinants associated with snack foods consumption.

Pic1: Example of 'snack foods' (please see below)



Definition of snack foods

Snack foods (refer Pic1): refer to HIGH in fat, sodium or sugar, but nutrient-poor food or beverages. For example Bubble tea, soda or soft drinks, energy drinks, any sugar-sweetened beverages (for example: Teh tarik, Ice-blended beverage, Syrup, etc), popcorns, potatoes chips, 'keropok' (crackers), fried banana, nuggets, sausages, french fries, churros, 'Jeruk' (pickles), raisin, waffle, kuih-muih (local confessionary), doughnuts, cakes, ice cream, chocolate, candy, 'cendol' & ABC (local sweet dessert) etc. (Bellisle, 2014, O'Connor et al., 2015, Cheong et al., 2017).

because they are 'Quick & Easy'.					
10. If I had access to snack foods at home, most probably I will eat these food items.	○	○	○	○	○
11. Bubble tea is an unhealthy drink.	○	○	○	○	○
12. It is very important to eat fruits and vegetables.	○	○	○	○	○
13. I am confident that, if I wanted to, I could reduce consumption of the certain snack foods.	○	○	○	○	○
14. I am confident that I would refuse a snack foods offer by someone, even though it looks VERY tasty and delicious.	○	○	○	○	○
15. My parents tell me how much snack foods I may consume	○	○	○	○	○
16. Potato chips or other snack foods are not available in my home.	○	○	○	○	○

Part C: Measure the outcome

Frequency of snack foods consumption

because they are 'Quick & Easy'.					
10. If I had access to snack foods at home, most probably I will eat these food items.	○	○	○	○	○
11. Bubble tea is an unhealthy drink.	○	○	○	○	○
12. It is very important to eat fruits and vegetables.	○	○	○	○	○
13. I am confident that, if I wanted to, I could reduce consumption of the certain snack foods.	○	○	○	○	○
14. I am confident that I would refuse a snack foods offer by someone, even though it looks VERY tasty and delicious.	○	○	○	○	○
15. My parents tell me how much snack foods I may consume	○	○	○	○	○
16. Potato chips or other snack foods are not available in my home.	○	○	○	○	○

Part C: Measure the outcome

Frequency of snack foods consumption

8. On average, how often do you eat snack foods per week? (*either eat in between main meal; or eat during meal times) *

Main meal: defined as the traditional meal; breakfast, lunch, dinner. (Hasnan Ahmad et al., 2017)

Mark only one oval.

- ◯ 0 time per week
- ◯ 1 - 3 times per week
- ◯ > 3 times per week

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Google Forms

[V1m] Prevalan tingkah laku pemakanan snek yang tidak sihat dan hubungan antara faktor individu dan persekitaran di kalangan pelajar kolej di Kuching, Sarawak

Maklumat peserta

Tajuk kajian :
Prevalan tingkah laku pemakanan snek yang tidak sihat dan hubungan antara faktor individu dan persekitaran di kalangan pelajar kolej di Kuching, Sarawak

Nama penyelidik:
Cheah Yong Xiang (Matric number: 19030140)

Nama penyelia:
Associate Professor Dr Cheah Whye Lian

Institusi:
Fakuliti Perubatan Dan Sains Kesihatan, UNIMAS

Nama penaja:
Penajaan sendiri

Pengenalan:
Borang ini menjelaskan hal-hal berkenaan penyelidikan tersebut dengan lebih mendalam dan terperinci. Amat penting anda memahami mengapa penyelidikan ini dilakukan dan apa yang dilakukan dalam penyelidikan ini. Sila ambil masa yang secukupnya untuk membaca dan mempertimbangkan dengan teliti penerangan yang diberikan sebelum anda bersetuju untuk menyertai penyelidikan ini. Jika ada sebarang kemusykilan ataupun maklumat lanjut yang anda ingin tahu, anda boleh bertanya mana-mana kakitangan yang terlibat dalam penyelidikan ini. Setelah anda berpuas hati bahawa anda memahami penyelidikan ini, dan anda berminat untuk turut serta, anda boleh mengklik butang 'SETUJU' di bawah.

Penyertaan anda dalam penyelidikan ini adalah secara sukarela. Anda tidak perlu menyertai penyelidikan ini jika anda tidak mahu. Anda juga boleh menarik diri daripada penyelidikan ini pada bila-bila masa sahaja. Jika anda menarik diri, segala maklumat yang telah diperolehi sebelum anda menarik diri tetap akan digunakan dalam penyelidikan ini. Jika anda tidak mahu menyertai ataupun menarik diri dari penyelidikan ini, tindakan anda tidak akan menjejaskan segala hak dan keistimewaan perubatan kesihatan atau pembelajaran yang selayaknya anda terima.

Penyelidikan ini telah mendapat kelulusan daripada Fakulti Perubatan dan Sains Kesihatan, UNIMAS

1. Apakah tujuan penyelidikan ini dilakukan?
Tujuan penyelidikan ini dilakukan adalah untuk menilai prevalan tingkah laku pemakanan snek yang tidak sihat dan hubungan antara faktor individu dan persekitaran di kalangan pelajar kolej di Kuching, Sarawak.
Penyelidikan ini akan berlangsung selama Dua (2) bulan (30/1/2020 sehingga 30/3/2020). Dijangka bahawa 440 peserta akan mengambil bahagian.

2. Apakah tanggungjawab saya sewaktu menyertai penyelidikan ini?
Amat penting untuk anda menjawab kesemua soalan yang dikemukakan oleh kakitangan penyelidikan dengan jujur dan lengkap yang akan mengambil masa selama 15 minit. Pasukan kajian juga akan meminta maklumat peribadi anda seperti ciri-ciri sosio-demografi. Borang ini mengandungi tiga (3) bahagian yang akan menanyakan tentang soalan berkaitan faktor individu dan faktor persekitaran yang berkemungkinan adalah penyebab pemakanan snek yang tidak sihat di kalangan pelajar kolej. Bahagian terakhir adalah berapa kekerapan anda makan snek tersebut dalam tempoh satu (1) minggu yang lepas.

3. Apakah risiko dan kesan-kesan sampingan menyertai penyelidikan ini?
Penyertaan penyelidikan ini tidak akan menjejaskan pembelajaran anda di kolej ini dan tiada risiko fizikal dan mental kepada anda. Anda berhak untuk tidak turut serta kajian ini jika rasa tidak selesa dengan soalan kajian tersebut.

4. Apakah manfaatnya saya menyertai kajian ini?
Penyelidikan ini mungkin tidak memberi apa-apa manfaat kepada diri anda sendiri. Walaubagaimanapun, segala maklumat yang diperolehi daripada penyelidikan ini mungkin akan diguna sebagai rujukan untuk kita merancangkan program intervensi pendidikan pemakanan berkaitan tingkah laku makan secara sihat di kalangan pelajar kolej pada masa depan.

5. Siapakah yang membiayai penyelidikan ini?
Kajian ini adalah dibawah tajaan sendiri oleh penyelidik. Anda tidak akan dibayar untuk menyertai kajian ini.

6. Adakah maklumat saya akan dirahsiakan?
Segala maklumat anda yang diperolehi dalam penyelidikan ini akan disimpan dan dikendalikan secara sulit, bersesuaian dengan peraturan-peraturan dan/ atau undang-undang yang berkenaan. Sekiranya hasil penyelidikan ini diterbitkan atau dibentangkan kepada orang ramai, identiti anda tidak akan didedahkan tanpa kebenaran anda terlebih dahulu. Individu yang terlibat dalam kajian ini, pemantau yang berkelayakan dan juruaudit, dan pihak berkuasa kerajaan atau pengawal selia boleh memeriksa data kajian, jika sesuai dan perlu.

7. Siapakah yang perlu saya hubungi sekiranya saya mempunyai sebarang pertanyaan?
Sekiranya anda mempunyai sebarang pertanyaan atau memerlukan maklumat lebih lanjut mengenai penyelidikan ini, anda boleh menghubungi penyelia kajian ini, Associate Professor Dr Cheah Whye Lian, di mana boleh dihubungi melalui alamat e-mel: wlcheah@unimas.my
*Required

Persetujuan peserta

Tajuk kajian : Prevalan tingkah laku pemakanan snek yang tidak sihat dan hubungan antara faktor individu dan persekitaran di kalangan pelajar kolej di Kuching, Sarawak

Dengan mengklik butang 'Setuju' di bawah, saya mengesahkan yang berikut:

1. Saya telah diberi maklumat tentang penyelidikan di atas secara lisan dan bertulis dan saya telah membaca dan memahami segala maklumat yang diberi.

2. Saya telah diberikan masa yang secukupnya untuk mempertimbangkan penyertaan saya dalam penyelidikan ini dan telah diberi peluang untuk bertanyakan soalan dan semua persoalan saya telah dijawab dengan sempurna dan memuaskan.

3. Saya juga faham bahawa penyertaan saya adalah secara sukarela dan pada bila-bila masa saya bebas menarik diri daripada penyelidikan ini tanpa harus memberi sebarang alasan dan ia sama sekali tidak akan menjejaskan pembelajaran saya di kolej ini. Saya tidak mengambil bahagian dalam mana-mana penyelidikan lain pada masa ini. Saya juga memahami tentang risiko dan manfaat penyelidikan ini dan saya secara sukarela memberi persetujuan untuk menyertai penyelidikan ini di bawah syarat-syarat yang telah dinyatakan di atas.

4. Kajian ini boleh dibentangkan di persidangan dan kajian ini juga boleh diterbitkan di dalam jurnal, dengan syarat diri saya tidak akan dikenal pasti. Maklumat mengenai diri saya akan disimpan secara SULIT.

5. Saya faham bahawa penyelidik, pemantau dan juruaudit terlatih, pihak penaja atau gabungannya, dan pihak berkuasa kerajaan atau undang-undang, mempunyai akses langsung dan boleh menyemak laporan saya bagi memastikan penyelidikan ini dijalankan dengan betul dan data direkodkan dengan betul. Segala maklumat dan data peribadi akan dianggap sebagai SULIT.

1. Adakah anda bersetuju untuk menyertai penyelidikan ini? *

Mark only one oval.

Ya, saya setuju untuk menyertai.

Tidak, saya tidak setuju untuk menyertai.

Bahagian A: Data sosio-demografi

2. Apakah jantina anda? *

Mark only one oval.

Lelaki

Perempuan

3. Berapakah umur anda? *

_____

4. Apakan nama kolej yang anda sedang belajar? *

_____

5. Apakah nama kursus yang anda sedang belajar? *

_____

6. Apakah makanan kegemaran anda? *

Vegetarian: adalah amalan pemakanan yang mengecualikan segala daging, produk daging, ayam, makanan laut, dan makanan yang berasal dari binatang. (Leitzmann, 2014).

Mark only one oval.

- ◯ Makanan vegetarian
- ◯ Makanan bukan vegetarian

Bahagian B: Menilai faktor penentu

Menilai faktor penentu yang berkaitan pengambilan 'makanan snek'

Gambar 1: Contoh makanan snek (sila lihat gambar di bawah)



Takrifan 'Makanan snek'

'Makanan snek' (sila rujuk gambar 1): ditakrifkan sebagai makanan atau minuman yang mengandungi gula, garam, lemak yang TINGGI tapi tidak berkhasiat. Contoh: Teh boba, air soda or air berkarbonat, minuman bertenaga, segala air minuman manis (contoh: Teh tarik, Minuman ice-blended, Sirap, dll.), popcorns, kerepek kentang, 'keropok' (crackers), pisang goreng, nugget, sosej, kentang goreng, churros, jeruk, kismis, wafel, kuih-muih, donat, kek, ais krim, coklat, gula-gula, 'cendol' & ABC (pencuci mulut manis tempatan) dll. (Bellisle, 2014, O'Connor et al., 2015, Cheong et al., 2017).

7. Adakah anda bersetuju dengan kenyataan berikut? *

Mark only one oval per row.

	Sangat tidak setuju	Tidak setuju	Neutral	Setuju	Sangat setuju
1. Kos untuk makan secara sihat terlalu mahal $$$.					
2. Saya makan makanan snek kerana ia kurang mahal.					
3. Saya makan makanan snek kerana ia sedap dan lazat.					
4. Kebanyakan sayur tidak sedap.					
5. Saya rasa perisa makanan LEBIH penting daripada nilai khasiat.					
6. Iklan dalam Aplikasi (mis. GrabFood, Foodpanda, dll.) membuat saya makan makanan snek.					
7. Iklan di TV atau media sosial (Facebook, YouTube ...) merangsang saya untuk makan makanan snek.					
8. Kedai runcit (cth: 7-Eleven, KK Supermart, etc.) selalu di dekat untuk saya beli makanan snek.					
9. Sebab saya kunjung restoran makanan segera (e.g. McD, SugarBun, etc.) dekat adalah kerana mereka 'Cepat & Mudah'.					

10. Sekiranya saya mempunyai akses kepada makanan snek di rumah, kemungkinan besar saya akan makan ia.

11. Teh Boba adalah minuman yang tidak sihat

12. Makan buah-buahan dan sayur-sayuran adalah sangat penting.

13. Saya yakin bahawa saya mampu mengurangkan pengambilan makanan snek tertentu.

14. Saya yakin bahawa saya akan menolak makanan snek yang ditawarkan oleh seseorang, walaupun ia kelihatan sangat sedap dan enak.

15. Ibu bapa saya memberitahu saya bahawa berapa banyak makanan snek yang saya boleh makan.

16. Potato chip (Kerepek kentang) atau makanan snek lain tidak tersedia di rumah saya.

Kekerapan makan makanan snek

Bahagian C: Menilai keberhasilan

8. Secara purata, berapa kerap anda makan makanan snek setiap minggu? (* sama ada makan semasa, ataupun di antara waktu hidangan utama) *

Hidangan utama: ditakrifkan sebagai sarapan, tengah hari dan malam (Hasnan Ahmad et al., 2017)

Mark only one oval.

- 0 kali seminggu
- 1 - 3 kali seminggu
- > 3 kali seminggu

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APPENDIX C: Ethical approval

Fakulti Perubatan dan Sains Kesihatan
Faculty of Medicine and Health Sciences

UNIMAS/NC-21.02/03-02 Jld.4 (48)

22 Januari 2020

Dr. Cheah Yong Xiang
Fakulti Perubatan Dan Sains Kesihatan
Universiti Malaysia Sarawak
94300 Kota Samarahan,
Sarawak.

Dr,

Kelulusan Mesyuarat Etika Perubatan Untuk Kajian:
- The Prevalence Of Unhealthy Snacking Behaviour And Its Association With Individual And Environmental Factors Among College Students In Kuching, Sarawak.

Dengan segala hormatnya perkara di atas dirujuk.

Sukacita dimaklumkan bahawa kertas kerja penyelidikan seperti di atas yang dijalankan oleh Dr. Cheah Yong Xiang dan diselia oleh Prof Madya Dr. Cheah Whye Lian telah diluluskan dalam Mesyuarat Jawatankuasa Etika Perubatan Fakulti bil 01/2020 pada 7 Januari 2020.

Sehubungan itu, penyelidikan tersebut boleh dimulakan dan diharap ia dapat dijalankan seperti yang dirancang.

Yang benar,

Professor Dr Lela Hj Su'ut
Pengerusi
Jawatankuasa Etika Perubatan
Fakulti Perubatan dan Sains Kesihatan

KEMENTERIAN PENDIDIKAN MALAYSIA
BAHAGIAN PERANCANGAN DAN PENYELIDIKAN DASAR PENDIDIKAN
ARAS 1-4, BLOK E8
KOMPLEKS KERAJAAN PARCEL E
PUSAT PENTADBIRAN KERAJAAN PERSEKUTUAN
62604 PUTRAJAYA

TEL : 0388846591
FAKS : 0388846579

Ruj. Kami : KPM.600-3/2/3-eras(6690)
Tarikh : 14 Februari 2020

DR CHEAH YONG XIANG
NO. KP : 850111146151

DEPARTMENT OF COMMUNITY MEDICINE AND PUBLIC HEALTH, FACULTY OF MEDICINE AND HEALTH SCIENCES,
UNIVERSITI MALAYSIA SARAWAK,
JALAN DATUK MOHAMMAD MUSA, 94300 KOTA SAMARAHAN, SARAWAK 94300 KOTA SAMARAHAN
SARAWAK

Tuan,

KELULUSAN BERSYARAT UNTUK MENJALANKAN KAJIAN :
THE PREVALENCE OF UNHEALTHY SNACKING BEHAVIOUR AND ITS ASSOCIATION WITH INDIVIDUAL AND ENVIRONMENTAL FACTORS AMONG COLLEGE STUDENTS IN KUCHING, SARAWAK.

Perkara di atas adalah dirujuk.

2. Sukacita dimaklumkan bahawa permohonan tuan untuk menjalankan kajian seperti di bawah telah diluluskan dengan syarat :

" 1. KAJIAN MELIBATKAN KOLEJ VOKASIONAL BERGANTUNG KEPADA PERTIMBANGAN PENGARAH BAHAGIAN PENDIDIKAN DAN LATIHAN TEKNIKAL VOKASIONAL. 2. KAJIAN MELIBATKAN POLITEKNIK DAN KOLEJ KOMUNITI HENDAKLAH DITUJUKAN KEPADA JABATAN PENGAJIAN POLITEKNIK DAN KOLEJ KOMUNITI, SEKTOR PENGAJIAN TINGGI, KPM. "

3. Kelulusan adalah berdasarkan kepada kertas cadangan penyelidikan dan instrumen kajian yang dikemukakan oleh tuan kepada bahagian ini. Walau bagaimanapun kelulusan ini bergantung kepada kebenaran Jabatan Pendidikan Negeri dan Pengetua / Guru Besar yang berkenaan.

4. Surat kelulusan ini sah digunakan bermula dari **31 Januari 2020** hingga **20 April 2020**

5. Tuan dikehendaki menyerahkan senaskhah laporan akhir kajian dalam bentuk *hardcopy* bersama salinan *softcopy* berformat pdf dalam CD kepada Bahagian ini.Tuan juga diingatkan supaya mendapat kebenaran terlebih dahulu daripada Bahagian ini sekiranya sebahagian atau sepenuhnya dapatan kajian tersebut hendak diterbitkan di mana-mana forum, seminar atau diumumkan kepada media massa.

Sekian untuk makluman dan tindakan tuan selanjutnya. Terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

Ketua Sektor
Sektor Penyelidikan dan Penilaian
b.p. Pengarah
Bahagian Perancangan dan Penyelidikan Dasar Pendidikan
Kementerian Pendidikan Malaysia

salinan kepada:-

JABATAN PENDIDIKAN SARAWAK

* SURAT INI DIJANA OLEH KOMPUTER DAN TIADA TANDATANGAN DIPERLUKAN *

PUSAT PENYELIDIKAN DAN INOVASI
JABATAN PENDIDIKAN POLITEKNIK DAN KOLEJ KOMUNITI
KEMENTERIAN PENDIDIKAN MALAYSIA
Galeria PjH, Aras 7, Jalan P4W
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Ruj. Kami : KPT.JPP.PPPP.700-1/1 Jld.12 (4)
Tarikh : 16 Mac 2020

DR CHEAH YONG XIANG
Pelajar Pascasiswazah (Sarjana Kesihatan Awam)
Fakulti Perubatan Dan Sains Kesihatan
Universiti Malaysia Sarawak
94300 Kota Samarahan
Sarawak

YBrs. Dr.,

KEBENARAN MENJALANKAN PENYELIDIKAN BERTAJUK "PREVALAN TINGKAH LAKU PEMAKANAN SNEK YANG TIDAK SIHAT DAN HUBUNGAN ANTARA FAKTOR INDIVIDU DAN PERSEKITARAN DI KALANGAN PELAJAR KOLEJ DI KUCHING SARAWAK"

Saya dengan hormatnya merujuk perkara di atas.

2. Sukacita dimaklumkan bahawa pihak kami tiada halangan untuk memberi kebenaran kepada YBrs. Dr. untuk menjalankan penyelidikan bertajuk **"Prevalan Tingkah Laku Pemakanan Snek Yang Tidak Sihat Dan Hubungan Antara Faktor Individu Dan Persekitaran Di Kalangan Pelajar Kolej Di Kuching Sarawak"** seperti yang dijelaskan dalam cadangan penyelidikan yang disertakan.

3. Kebenaran pengumpulan data hanya diberikan kepada penama dalam surat ini sahaja. Pihak ketiga dan Pusat Penyelidikan dan Inovasi (PPI), Jabatan Pendidikan Politeknik dan Kolej Komuniti tidak terlibat dalam penyebaran dan pengumpulan data bagi pihak penama. Sekiranya terdapat ketidakpatuhan, kebenaran ini terbatal dengan sendirinya.

4. Sebarang pertanyaan lanjut berkenaan kajian penyelidikan yang akan dijalankan, sila hubungi Ketua Unit Penyelidikan Kolej Komuniti yang berkenaan untuk melancarkan lagi pelaksanaan kajian.

5. Untuk peringatan, YBrs. Dr. hendaklah mengemukakan senaskah laporan akhir kajian tersebut ke PPI. Dimaklumkan juga bahawa YBrs. Dr. adalah diminta mendapatkan kebenaran terlebih dahulu daripada PPI sekiranya sebahagian atau sepenuhnya dapatan penyelidikan tersebut hendak dibentangkan di mana-mana persidangan atau seminar, atau untuk pengumuman di media massa.

Sekian untuk makluman dan tindakan seterusnya, terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah,

(DR. ISHAK BIN MOHAMAD)
Pengarah

s.k : 1. Pengarah Kolej Komuniti Kuching
2. Pengarah Kolej Komuniti Santubong

BAHAGIAN PENDIDIKAN TEKNIK DAN VOKASIONAL
(TECHNICAL AND VOCATIONAL EDUCATION DIVISION)
KEMENTERIAN PENDIDIKAN MALAYSIA
(Ministry of Education Malaysia)
ARAS 5 & 6, BLOK E14, KOMPLEKS E,
(Level 5 & 6, Block E14, Parcel E,)
PUSAT PENTADBIRAN KERAJAAN PERSEKUTUAN
(Federal Government Administrative Centre)
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: http://www.bptv.edu.my

Ruj. Kami : KPM.600-3/2/3(~~84~~)68
Tarikh : 25 Februari 2020

Dr. Cheah Yong Xiang
Department of Community Medicine and Public Health,
Faculty of Medicine and Health Sciences,
Jalan Datuk Mhammad Musa
94300 Kota Samarahan
Sarawak

Tuan,

KEBENARAN UNTUK MENJALANKAN KAJIAN PENYELIDIKAN IJAZAH SARJANA BERTAJUK *THE PREVALENCE OF UNHEALTHY SNACKING BEHAVIOUR AND ITS ASSOCIATION WITH INDIVIDUAL AND ENVIRONMENTAL FACTORS AMONG COLLEGE STUDENTS IN KUCHING, SARAWAK*

Dengan hormatnya perkara di atas adalah dirujuk dan salinan surat kebenaran bersyarat dari Bahagian Perancangan dan Penyelidikan Dasar Pendidikan dengan rujukan KPM.600-3/2/3-eras (6690) bertarikh 14 februari 2019 adalah berkaitan.

2. Bahagian ini telah meneliti proposal dan instrumen soal-selidik yang dikemukakan oleh pihak tuan. Sehubungan itu, pihak kami **memberikan kelulusan** untuk tuan menjalankan penyelidikan dan menggunakan sampel pelajar Kolej Vokasional untuk kajian **terhad** di **Negeri Sarawak**. Dapatan kajian juga terhad dan **bukan untuk dibentangkan di mana-mana forum, seminar atau diumumkan kepada media massa.**

3. Tuan adalah dipohon untuk mendapatkan kebenaran daripada Pengarah Kolej Vokasional yang terlibat dengan kajian terlebih dahulu dan memastikan perancangan telah dibuat dengan teliti mengikut prosedur yang telah ditetapkan agar ia tidak menganggu proses PdP di kolej vokasional berkenaan.

4. Surat kelulusan ini sah digunakan sehingga **20 April 2020**. Pihak tuan juga adalah diminta mengemukakan **satu naskah laporan akhir kajian ke Sektor Perancangan, Penyelidikan dan Pembangunan BPLTV setelah penyelidikan ini selesai dalam tempoh 3 bulan**. Kami berharap pihak tuan dapat memenuhi keperluan yang kami tetapkan dan berjaya dalam pengajian tuan.

..2/-

KEBENARAN UNTUK MENJALANKAN KAJIAN PENYELIDIKAN IJAZAH SARJANA BERTAJUK *THE PREVALENCE OF UNHEALTHY SNACKING BEHAVIOUR AND ITS ASSOCIATION WITH INDIVIDUAL AND ENVIRONMENTAL FACTORS AMONG COLLEGE STUDENTS IN KUCHING, SARAWAK*

Rujukan : KPM.6003/2/3(68) Tarikh : 25 Februari 2020

---

5. Sebarang pertanyaan berhubung perkara ini boleh dikemukakan kepada **En. Mohammad Hafiz Bin Salleh** di talian **03-88845225**.Kerjasama daripada pihak puan amatlah dihargai dan didahului dengan ucapan terima kasih.

"BERKHIDMAT UNTUK NEGARA"

Saya yang menjalankan amanah

(SARINAH BINTI MHD SARI)
Ketua Penolong Pengarah Kanan
b.p.: Pengarah
Bahagian Pendidikan dan Latihan Teknikal Vokasional
Kementerian Pendidikan Malaysia