THE PREVALENCE OF OBESITY AND ITS ASSOCIATED FACTORS AMONG NURSING STUDENTS IN UNIVERSITI SAINS MALAYSIA

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by

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LIST OF ABBREVIATIONS

IPAQ-SF	– International Physical Activity Questionnaire Short Form
PA	– Physical Activity
PSS-10	– Perceived Stress Scale-10
USM	– Universiti Sains Malaysia
WHO	– World Health Organization

PREVALENS OBESITI DAN FAKTOR - FAKTOR BERKAITANNYA ANTARA PELAJAR KEJURURAWATAN DI UNIVERSITI SAINS MALAYSIA

ABSTRAK

Obesiti menurut WHO (2021), merujuk kepada Indeks Jisim Tubuh (BMI) yang melebihi atau bersamaan dengan 30 kg/m². orang yang obes berisiko mendapat banyak kesan negatif berkaitan dengan kesihatan. Obesiti telah meningkat kepada kadar wabak, dengan lebih 4 juta orang mati setiap tahun akibat obes pada 2017, yang menyebabkan keadaan kesihatan kronik. Kajian ini bertujuan untuk menilai prevalens obesiti, perkaitannya dengan aktiviti fizikal, stres, tingkah laku pemakanan dan faktor sosio-demografi terpilih dalam kalangan pelajar kejururawatan di USM. Satu tinjauan keratan rentas telah dijalankan menggunakan satu set soal selidik yang ditadbir sendiri yang mengandungi soalan daripada IPAQ, PSS-10 dan '*Eating Behavior'*. Seramai 207 pelajar Kejururawatan daripada program Diploma dan Ijazah Sarjana Muda mengambil bahagian dalam kajian ini. Data telah dianalisis menggunakan SPSS versi 27.0. Penemuan menunjukkan seramai 24 (11.6%) pelajar Kejururawatan mengalami obesiti. Kebanyakan pelajar mempunyai aktiviti fizikal sederhana (45.4%), stres sederhana (82.6%) dan tingkah laku pemakanan yang baik (20.7%). Tiada perkaitan signifikan antara obesiti dan aktiviti fizikal (p=0.987), tekanan (p=0.970) dan tingkah laku pemakanan (p=0.665). Dari segi faktor sosio-demografik, hanya umur (p=0.048) dan jantina (p=0.048) menunjukkan perkaitan yang signifikan. Kesimpulannya, walaupun prevalens obesiti dianggap lebih rendah dalam kalangan pelajar Kejururawatan di USM, usaha berterusan dan bersesuaian perlu dilakukan oleh pihak yang berkenaan untuk meningkatkan kesedaran golongan muda tentang kesan buruk obesiti serta menggalakkan mereka untuk terus mengamalkan gaya hidup sihat.

THE PREVALENCE OF OBESITY AND ITS ASSOCIATED FACTORS AMONG NURSING STUDENTS IN UNIVERSITI SAINS MALAYSIA

ABSTRACT

Obesity according to WHO (2021) is refers to BodyMass Index (BMI) greater than or equal to 30 kg/m². Obese people are at risk for many negative effects relating to health. Obesity has grown to epidemic proportions, with over 4 million people dying each year as a result of being obese in 2017, that caused a chronic health condition. This study aims to assess the prevalence of obesity, its association with physical activity, stress, eating behavior and selected socio-demographic factors among nursing students in USM. A cross-sectional survey was done using a set of self-administered questionnaires that contained questions from the IPAQ, PSS-10 and Eating Behavior scales. A total of 207 nursing students from Diploma and Bachelor programmes participated in this study. Data were analyzed by using SPSS version 27.0. The findings indicated that a total 24 (11.6%) nursing students had obesity. Most of the participants had moderate physical activity (45.4%), moderate stress (82.6%) and good eating behavior (20.7%). There is no significant association between obesity with physical activity (p=0.987), stress (p=0.970) and eating behavior (p=0.665). In terms of socio-demographic factors, a significant association was only indicated in age (p=0.048) and gender (p=0.048). In conclusion, although the prevalence of obesity is considered lower among nursing students in USM, appropriate and continuous initiative need to be done by the authorities to raise young people's awareness on the bad impact of obesity and encourage them to keep practicing healthy life style.

CHAPTER 1
INTRODUCTION

1.1 Background of the Study

Obesity according to World Health Organization (WHO) (2021), is referring to BodyMass Index (BMI) which is greater than or equal to 30 kg/m². To be more precise, BMI that is less than 18.5 kg/m² is considered as underweight. Healthy weight of BMI is withinthe range of 18.5 kg/m² to <25 kg/m². Whereas BMI that is 25 kg/m² to <30 kg/m² is within overweight range. For BMI that is 30 kg/m² or higher is classified as obesity (Centre of Disease Control (CDC), 2022).

Furthermore, obesity is categorized into three classes, Class I, Class II and Class III with each BMI from 30 to < 35, 35 to < 40 and 40 or higher respectively (CDC, 2022). Obesity can also be categorized as mild, moderate to extreme obesity, where each category has several implications on the individual with weight management issues (Uzogara, 2017). Commonly, the popular method to determine obesity is BMI and waist circumference. The BMI is calculated in the metric system whereby weight in kilogram divide by height in meter squared. While waist circumference measurement is when it is greater than 35 inches in women or greater than 40 inches in men (Uzogara, 2017).

Obesity can adversely affect nearly all physiological functions of the body and comprises a significant public health threat (Chooi *et al*., 2019). Purnell (2018) defined obesity as a disease that occurred when excess fat accumulation increases risk to health problems. This due to fat covers the body weights and the distributions leads to co-morbid diseases that occur at different onsets depending on the population. This unwanted weight gain has become a main driver of the global rise and considered as one of non-communicable diseases that causing major health challenge leading to premature

disability and death by increasing the risk of cardio metabolic diseases, osteoarthritis, dementia, depression, and some types of cancers (Blüher, 2019)

In 2016, the WHO has identified obesity as a global health problem due to more than 650 million of the world population were thought to be obese (Syed *et al*., 2020). In western countries, the prevalence of obesity in United States has increased from 30.5% in 1999 to 42.4% in 2017 (CDC, 2020). A study in Brazil also shows that the prevalencehas increased from 12.5% in 2006 to 21.4% in 2020 *(*Dias *et al*., 2022). In Africa, the overall prevalence of obesity was 22.9% among 1559 out of 1960 participants (Agyemang*et al*, 2017). While in Middle-east countries, the WHO Global Health Observatory in 2014 estimated that the prevalence of obesity was 35% in Qatar. This is followed by Kuwait and United Arab Emirates with 32% and 29% respectively *(*Fan *et al*., 2017). According to a study by Behl & Misra (2017), the prevalence of obesity in India is increasing and ranges from 8% to 38% in rural and 13% to 50% in urban areas. In Malaysia, the prevalence of obesity in both gender is 13.5% (Chong & Lee, 2018)

Ironically, obesity that occur at the early age is a serious public health problem as it may lead to various chronic non-communicable diseases (NCDs) and causes death in bothdeveloped and developing countries (Ruano *et al.,* 2018). Based on Ahmad *et al.* (2018),an overweight child or teenager is at a high risk of being obese as an adult and later on gaining chronic diseases such as diabetes mellitus, hypertension, cardiovascular disease and stroke. Subsequently, the presence of chronic NCDs related to obesity would increasethe rate of morbidity and mortality among the young population (Ruano *et al*., 2018). In addition, it is important to improve the existing knowledge about the prevalence of obesityand their associated risk factors as the increasing trends of obesity especially in developing country (Shabu, 2019). A study in Brazil shows higher prevalence of obesity in children and adolescent due to poor sedentary habits. Most of them preferred spending

more time by watching TV, playing video games and using computer more than 5 hours per day (da Silva *et al*., 2018).

Besides younger population, obesity is also an issue that is often observed among university students. For example, in a study by Ahmed *et al.* (2019) in Bangladesh, the findings showed that obesity is 3.1%, which is more common among female students (3.3%) compared to male. Similar findings also indicated a Western country when they reported higher prevalence of obesity among undergraduate student (14.9%) and also more common among the female students *(*Syed *et al*., 2020).

According to a study by Britnell *et al.* (2017), there are approximately 51% of nursing students in University of New Zealand reported either overweight or obese. The same finding also reported in a study by Urbanetto *et al*. (2019) in Brazil that indicated weight gain was observed in 52.6% of nursing students. However, some studies in Malaysia reported a contrast finding, whereby overweight or obesity was found as less than 40% among university students (Soong *et al.,* 2021; Balu *et al.,* 2021; Aslani *et al.,* 2020). Even though the trends of obesity are rising among university students' population, such study however, is limited among nursing students in Malaysia and bachelor nursing students in particular. Nursing students are the future nurses and therefore, it is important to ensure that they have a high level of awareness of the importance of being healthy and fit as a model of health.

Furthermore, obesity can negatively affect the students' academic performance and causing lower self-esteem (Obesity Medicine Association, 2022). Suraya *et al*. (2017), indicated that female medical students with high BMI ≥30 kg/m² showed poor academic performance (9.31%). While a study by Alghawrien *et al.* (2020) reported that obesity has a significant negative relationship on academic performance and self-esteem

among students. Moreover, obesity caused negative impact among university students population on body image dissatisfaction (50.0%) (Ponte *et al.*, 2019).

There are many factors that can contribute to excess weight gain including eating patterns, physical activity levels, and sleep routines as well as social determinants of health, genetics, and taking certain medications (CDC, 2022). A study in Iraq found that low level of education, unemployment and not performing physical exercises as factors that associated with obesity (Shabu, 2019). Most of the participants practicing sedentary lifestyle and performing fewer physical exercises as the age increases. According to Jayawardana *et al.* (2017) increased age, ethnicity, high family income and low physical activity level are associated with overweight and obesity. In Malaysia, poor dietary intakes contribute to obesity among adults (Lee & Muda, 2019).

With this in mind, nursing students of Universiti Sains Malaysia (USM) are chosen as the study population of this propose study. Nursing students are related with hectic schedules because they are required to fulfils both theoretical and clinical parts in their study (Abraham *et al*, 2021). Those with lack of coping mechanisms of this burden could end up with lack of physical inactivity, stress and healthy eating habits disturbance that eventually, lead to obesity. This condition will later on affect their health condition as well as clinical and academic performances. Hence, this study is very important to be conducted.

1.2 Problem Statement

As mentioned earlier, there are several factors that contribute to excess weight gain and caused obesity. For instance, nursing students are exposed with heavy curriculum that comprised of both academic and clinical training. Due to hectic schedules, they have limited leisure time and caused them to be physically inactive and feel stress (Abraham *et al.*, 2021). Besides, the unrelieved stress can change their eating habit like binge eating and snacking. Although there are many methods available on weight control, most of them however, have poor outcomes to prevent and manage obesity (Astrup *et al.*, 2018).

As mentioned earlier, Malaysia has been identified as the highest prevalence of obesity among adult population in South East Asia (Universiti Malaya, 2021). Chai *et al.* (2021) found that the overall prevalence of obesity was higher among adults in Selangor (18.6%). A higher prevalence of obesity was also indicated among university students by Ahmad *et al.* (2018). Al-Abed *et al.* (2019) had conducted a study among nursing students. They revealed that inactive lifestyle and unhealthy led increasing rate of obesity (Al-Abed *et al.*, 2019).

From the researcher's own observation, weight gain is a common phenomenon among college students, especially those in their second year of study due to various factors such as lack of motivation to do physical activity and lack of time to maintain healthy eating (Choi, 2020). Besides, obese students were more likely to blame environmental factors such as 'the weather is too bad to exercise' or tiredness and exhaustion due to stressful life with hectic schedules and multiple assignment deadlines as some of the excuses not to do physical activity (Saleem *et al.*, 2018; Yan & Harrington, 2020). Thus, this proposed study will explore the factors that causing the students to become overweight or obese.

There are several published studies on obesity but most of the studies were conducted among elderly, adolescent and children (Carette *et al*., 2018; da Silva *et al.*, 2018; Ahmed *et al*., 2019; Chai *et al.*, 2021). In terms of specific populations, most of the studies been done among university students (Alyass *et al.,* 2017; Ahmad *et al.,* 2018; Syed *et al.,* 2020; Al-Banna *et al.,* 2021). However, this kind of study among bachelor nursing students in Malaysia is rather limited (Al-Abed *et al.,* 2019, Soong *et al*., 2021). Furthermore, obesity and its associated factors are not adequately studied regionally and globally despite of its serious complications. Thus, all of these issues have inspired the researcher to conduct a study on obesity and its associated factors in nursing students' population.

1.3 Research Question

1. What is the prevalence of obesity among nursing students in School of Health Sciences, Universiti Sains Malaysia (USM)?
2. Are there any association between obesity and physical activity,stress and eating behavior among nursing students in School of Health Sciences, USM?
3. Are there any association between obesity and socio- demographic factors (age, gender, ethnicity, educational status, programme of study and BMI) among the nursing students in School of Health Sciences, USM?

1.4 Research Objective

1.4.1 General Objective

To assess the prevalence of obesity and its associated factors (socio-demographics factors, physical activity, stress and eating behavior) among nursing students in School of Health Sciences, USM.

1.4.2 Specific Objective

1. To determine the prevalence of obesity among nursing students in School of Health Sciences, USM.

2. To identify the association between obesity and physical activity, stress and eating behavior among nursing students in School ofHealth Sciences, USM.

3. To identify the association between obesity and selected socio-demographic factors (age, gender, ethnicity, educational status, programme of study and BMI) among the nursing students in School of Health Sciences, USM.

1.5 Hypothesis

1. **Null hypothesis, H0:**

   There is no significant association between obesity and physical activity, stress and eating behavior among nursing students in School of Health Sciences, USM.

Alternative hypothesis, HA:

There is a significant association between obesity and physical activity, stress and eating behavior among nursing students in School of Health Sciences, USM.

2. **Null hypothesis, H0:**

   There is no significant association between obesity and socio-demographic factors (age, gender, ethnicity, educational status, programme of study and BMI) among the nursing students in School of Health Sciences, USM.

Alternative hypothesis, HA:

There is a significant association between obesity and socio-demographic factors (age, gender, ethnicity, educational status, programme of study and BMI) among the nursing students in School of Health Sciences, USM.

1.6 Conceptual and Operational Definitions

Term	Conceptual	Operational
Obesity	It is defined as a Body Mass Index (BMI) in adult, which are greater than or equal to 30 kg/m². BMI is commonly used for population-level measure of overweight and obesity as it is the same for both genders and ages in adults (WHO, 2021).	In this study, obesity refers to those with BMI ≥ 30 kg/m² among nursing students.
Prevalence	Prevalence is the percentage of a population that is affected with a particular disease at a given time (Merriam-Webster, 2022).	In this study, the prevalence of obesity will be assessed among nursing students
Associated factor	Associated factor is afactor that directly or indirectly influence the determinant of certain disease (Department of Health, 2022).	In this study, factors associated to obesity will be identified using the Perceived Stress Scale (PSS-10) and the International Physical Activity Questionnaire-Short Form (IPAQ-SF) and additional 10 items on eating behaviour.
Nursing student	Nursing student means an individual who is enrolled in a professional nursing or vocational nursing education program. (Law Insider Dictionary, 2022)	In this study, nursing student refers to those who are studying basic nursing from both Diploma and Bachelor Nursing programmes at School of Health Sciences, USM.

1.7 Significance of The Study

This study will provide findings on the prevalence of obesity among the nursing students in USM. The findings will act as a baseline data on obesity among university students in Malaysia. Besides, this study also will provide information on the factors associated to obesity. In other words, it is important for the population to increase their awareness of obesity and practicing healthy life styles.

With the increasing trends of obesity in Malaysia recently, this topic can be very important to determine either there is any significant association between the prevalence of obesity and its associated factors. Furthermore, the participants may gain some potential benefits and motivation after completing this study through acknowledgement on maintaining good physical activity, stress and eating habits. Thus, this will help to reduce the prevalence of obesity and help as early detection of obesity among the population in Malaysia.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

In this chapter, the findings of previous studies related to obesity and associated factors will be discussed and elaborated. This chapter also provide a description of the instruments that will be used in this study and ended with conceptual framework chosen for this study.

2.2 Prevalence of Obesity

The researcher managed to find many published studies on obesity. However, most of these studies were conducted among adults, children and university students in general (Alyass *et al.*, 2017; Ahmad *et al.*, 2018; Carette *et al*., 2018; Ahmed *et al*., 2019; Ariaratnam *et al*., 2020; Chai *et al*., 2021; Al-Banna *et al.*, 2021. However, such study among nursing students is scant (Britnell *et al*., 2017; Balu *et al*., 2021; Soong *et al*., 2021). Therefore, for this review, the researcher will also include studies among other populations.

In a study by Carette el at. (2018), the prevalence of obesity was indicated at 12% among adults, which amounts to 604 million obese adults in the world. Additionally, Ariaratnam *et al*. (2020) indicated that the prevalence of obesity worldwide has doubled since 1980 until 2008 from 6.4% to 12.0%. In another study that was carried out in younger population, the finding showed that the prevalence increased to 5% globally due to urbanization with increased consumption of high calorie foods and sedentary lifestyle (Ahmed *et al*., 2019). While in Malaysia, the overall prevalence of obesity (BMI $\geq$ 30 kg/m^2) among adults was 18.6% (Chai *et al*., 2021).

In terms of specific populations, a study by Ahmed *et al.* (2019) among university students found that the prevalence of obesity in this population was high in the developing countries such as Egypt (59.4%), Bangladesh (20.8%) and China (14.3%). This trend is kept on increasing to 14.7% among female students in Canada (Alyass *et al*., 2017). A higher prevalence rate of obesity was indicated in Al-Banna *et al.* (2021) among male students that also revealed the increased risk of disordered eating attitudes and behaviors. Whereas in Brunei, the prevalence of obesity among the university students was at 28.8%. There was a study conducted in Malaysia by Ahmad *et al*. (2018), and they found that 72 out of the 240 female medical students were obese. Another study by Soong *et al.* (2021) reported that 28 out of 100 Malaysian nursing students either overweight or obese.

2.3 Factors associated to obesity

There are several factors associated to the obesity as reported in the literature. However, for this study, the researcher will focus on socio-demographic factors include age, gender, ethnicity, educational status, programme of study, BMI and other potential factors such as physical activity, stress and eating behavior. All of these factors are explained in the following sections.

2.3.1 Socio-demographics factors

There were several articles reporting the association between socio-demographic factors and obesity. Most socio-demographic factors covered were age, gender and body mass index.

2.3.2 Age and Obesity

In terms of age, obesity can occur at any age (Chooi *et al.*, 2019). Previous studies assessing trends in obesity found that its prevalence has increased in both adults and children of all ages, indiscriminate of geographical locality, ethnicity or socioeconomic status (Chooi *et al.,* 2019). Globally, there are around 1.9 billion and 609 million adults

were estimated to be obese representing approximately 39% of the world's population in 2015 (Chooi *et al*., 2019). According to Balu *et al.* (2021), the prevalence of obesity was common among adult population (12.6%). The trend keeps rising in adult population as another study by Chong & Lee (2018) also reported that high prevalence rate of obesity was among adults (13.1%).

2.3.3 Gender and Obesity

According to Abdallah *et al.* (2017), female is found at higher risk group of obesity as they always take meals regularly (58.9%). This was measured using the Likert-scale. For the question "How many times do you eat meals except snacks?", male (18.8%) took meals 4 times than female (3.2%). Poor eating habits also occurred mostly in female (55.6%) than male (50%) for the question "How often do you take snacks apart from meal", daily consumption of fried food (17.7%) for question on "How often do you eat fried food?". They also rarely consumed fruits (24.2%), for question on "How often do you eat fruits?". Instead of poor eating habits, female participants showed higher intake of vegetables (31.5) for question "How often do you eat green, red or yellow colored vegetables?" and they also had knowledge on balanced nutrition (72.6%) as able to choose the right food consumption required in question on "What type of food do you think you should eat to have a balanced nutrition?".

2.3.4 Body Mass Index

The risk factors of overweight and obesity as indexed by high body mass index (BMI) include genetics, inactivity, unhealthy diet and eating habits (Purnell, 2018). Another study by Al-Abed *et al.* (2019) showed that mostly the female participants chose yes on "Eat so much until stomach hurts" (53.8%), "Feel completely out of control when it comes to food" 82 (62.1), "Eat because of feeling upset or nervous" (53.0%), "Eat because of feeling bored" (59.1%) and "Eat because of feeling happy" (80.3%).

2.3.5 Physical activity and Obesity

Physical activity can involve playing, working, active transportation, household tasks, and exercise training or all motions caused by energy intake caused by skeletal muscles (Søgaard & Sjøgaard, 2017). In China, the society perform 30–60 minutes of moderate-intensity physical activity to improve physical fitness, recreation, and disease prevention (Dai *et al.*, 2020). In relation to this, (Baad *et al.*, 2018) reported that 218 (22%) from 991 of the Swedish elderly were obese due to physical inactivity. While in Malaysia, 52 (43%) of non-academic staffs has poor level of physical activity and 68 (57%) had good level of physical activity due to regular active participants in zumba and aerobics (Sook *et al.*, 2019).

In United States (US), 35% of college students who said that they did not do hiking or cycling on weekends were obese (Demirci *et al.*, 2018). This is almost similar to a study conducted among 6532 adolescents. The findings showed that 27.3% said they have less physical activity and spent more time on gadgets and television. Of this, nearly half (13.8%) were obese (Gortmaker & Kenney, 2017). While in a study by Urbanetto *et al*. (2019), it was reported that 27.9% from 144 Brazilian nursing students did not practice physical activity and they were classified as presenting obesity. Apart from that, a study by Ahmad *et al.* (2018) indicated that tiredness and exhaustion (41.5%) as well as lack of motivation (54.0%) as the key reasons for physical inactivity among Malaysian undergraduate students.

2.3.6 Stress and Obesity

Moderate to severe work-related and life stress are some of the stressors among Canadian adults (Feng *et al.*,2022). According to Alyass *et al.* (2017), high levels of stress (60%) across multiple domains commonly associated with increased trends of obesity among adults. Besides, in a study Amiri *et al.* (2021), they found a significant relationship

among obesity phenotypes with anxiety and stress in both women (16.6%) and men (9.5%) as effects of obesity, cardiovascular risk factors and various cultural contexts. Furthermore, 68 (44.4%) of the obese adolescents in Saudi Arabia experienced stress than those with normal weights (34.8%) due to cultural determinants (Alsaleem *et al.*, 2021). In Malaysia, personal psychological distress (3.68%) and environmental factors (4.77%) were indicated as significant contributors to obesity among adults.

Weight gain was reported in 52.6% of Brazilian students attending 'Professional training' session, with stress level from high (29.5%) and very high (36.8%) (Urbanetto *et al.*, 2019). In Sri Lanka, perceived stress was indicated in 51.9% female students (Ekanayake & Mudiyanse, 2020). While in Korea, Choi (2020) reported that university students from high-stress groups (24.3%) tend to consume high frequency of foods to release stress than those in low-stress group (19.4%). Certainly, stress is one of the major factors on gaining body weight as reported in a study by Chen *et al.* (2019) conducted among the Malaysia students.

2.3.7 Eating habits and Obesity

Generally, older adults have been reported to adhere more to healthy eating patterns compared with younger age groups (Anastasiou *et al.*, 2018). This proven where almost 74.6% of the older adults were reported with good diet quality as adherence to the dietary guidelines in maintaining good health (Adznam *et al.*, 2020). However, a study by Chen *et al.* (2020) reported that ideal diet quality among the older people in US remained consistently low with only 0.4% from the 10 837 of the older populations.

As for the young populations, skipping breakfast is a widespread practice among university students as it could influence other eating behaviors such as repeated snacking. A study by Bede *et al.* (2020), reported that 184 out of 203 of the population (medical

students) experienced poor eating habits characterized by meal skipping (33.5%), snacking (40.8%), low fruit and vegetables (49.7%). They also found that the participants do not eat balanced meals and do not meet their daily nutrient requirements even though they knew the benefit of eating some fruit daily and vegetables regularly. Contrary to that, a study by Baad *et al.* (2018) reported that 83 (68%) out of 130 the medical students practice good dietary habits by consuming daily breakfast and fruits. In this study, only 11 (8%) students were either overweight or obese. Certainly, breakfast and adequate consumption of fruits and vegetables able to provide energy for the brain, improve learning.and decreases the risk of major chronic diseases (Baad *et al.*, 2018).

According to Ahmed *et al.* (2019), poor eating behavior among the students due to expansion in the fast-food market and lack of appropriate food courts influenced that influenced the students for having meal skipping, inadequate variety of foods and unhealthy snacking. Similarly in Brunei, around 303 of the students were reported to have poor eating habits even the majority of them had good nutrition knowledge. In this study, frequent snacking, fried food consumption at least three times per week (82.2%) and low intake of daily fruits and vegetables (60.7%) were common among students. While in Malaysia, a study by Lek *et al.* (2018) indicated that 48.6% of the students consumed fried food three to five times per week and did not consumed fruits per day. However, a study by Ismail *et al*. (2022) shows that around 43.9% of medical students in Malaysia had good eating habits as they did not skip their breakfast even though they had lack of time, did not have appetite and not feeling hungry.

2.4 Instruments to be used in this study

2.4.1 International Physical Activity Questionnaire

The International Physical Activity Questionnaire – Short Form (IPAQ-SF) is a globally-used self-report to measure physical activity (PA). It was developed in Geneva by an International Consensus Group in 1998 and had been undergone extensive reliability and validity testing across 12 countries in 2000. Since then, it has been used in many studies. There are two types of IPAQ, the long and short forms. However, according to Myers *et al.* (2020) the IPAQ – Long Form (IPAQ-LF) is not feasible for daily delivery compared to IPAQ-SF. Hence, IPAQ-SF is more likely be used by most researchers as part of their instrument of study. As for example, IPAQ-SF has been used in a study by Lewis *et al.* (2021) to assess level of physical activity among adults with progressive muscle disease in United Kingdom. It was also used in Balu *et al.* (2021) to assess the level of physical activity among the Malaysian nursing students. Thus, the proposed study will also utilize this instrument to assess the level of physical activity among nursing students in School of Health Sciences, USM.

2.4.2 Perceived Stress Scale (PSS-10)

The Perceived Stress Scale (PSS) is one of the most widely used instruments to measure stress perceptions that intended for adolescents or adult population (Chan & La Greca, 2020). It was developed by Cohen *et al.* in 1983 and had been undergone extensive reliability, validity testing and translated to 15 languages. Since then, it has been used in many studies. There are three types of PSS, PSS-4, PSS-10 and PSS-14. However, PSS-10 has been used mostly by the researchers in their study. As for example, a study by Choi (2020) used PSS-10 instead of PSS-4 and PSS-14 items measurements as it has themost satisfactory psychometric properties to study the impact of stress levels on eating behaviors among Korean college students. Besides, PSS-10 also been used in a study by

Gamonal-Limcaoco *et al*. (2022) to determine on people perceived stress and worry due to the COVID-19 among participants from 41 countries. Thus, the proposed study will also utilize this instrument to assess the level of stress among nursing students in School of Health Sciences, USM.

2.4.3 Eating behavior questionnaire

Eating behavior questionnaire has been used by the researchers to assess student's eating behavior related to dietary practices with special reference to eating habits, meal patterns, consumption of fruits and vegetables include the consumption of fried foods. This instrument has been developed in Japan based and been used by many studies which mostly among university students. As for example, a study by Genena & Salama (2017) has used this instrument to determine the level of eating habits associated to obesity among the Egyptians university students. Similar with a study by Ahmed *et al.* (2019) where this instrument has been used to determine the eating habits associated to obesity among the undergraduate students in Bangladesh. Thus, the proposed study will also utilize this instrument to assess the level of eating behavior among nursing students in School of Health Sciences, USM.

2.5 Theoretical and Conceptual Framework

The social determinant of health (SDOH) framework as shown in Figure 2.1 can be used to support and further explain on health issue of obesity with its factors associated among nursing students. According to WHO (2022), social determinants of health (SDOH) refer to the demonstration of some non-medical factors like a person social and environmental condition which can shape and slowly drive to the health outcomes. Social determinants of health can be further grouping into five domains, which are education access, economic stability, health care access, neighborhood, social and community context.

In order for a clear view on the social determinants of health on the impact on health equity and outcomes, WHO has further developed a social determinant of health framework to highlight different level of causation (Rural Health Information Hub, 2020). This WHO SDOH framework basically demonstrates how social factors could become a key role in maintaining health outcomes. In this framework, there are two broad types of determinants can work together to put an impact on health outcomes. The two broad types of determinants are the structural determinants and intermediary determinants.

In terms of structural determinants, the socioeconomic status, society and political context are the main components. Socioeconomic and political of a country like governance, macroeconomic policies, social policies, public policies, social and society values can influence the implications on how the people are born, grown, live, work as well as their socioeconomic position.

A person socioeconomic position can then determine their stage in intermediary determinants which includes material circumstances, psychosocial circumstances, behavioral and biological factors as well as health system (National Academy, 2022). A person with a lower socioeconomic position might cause him to have a poorer living condition, less ability in accessing health system as well as unstable mood due to stress. All these are the leading factors for the exposure of variety of health problems. Without a good health, the person may lose the job and income and thereby lowering the socioeconomic position. With this, the cycles will continue on endlessly.

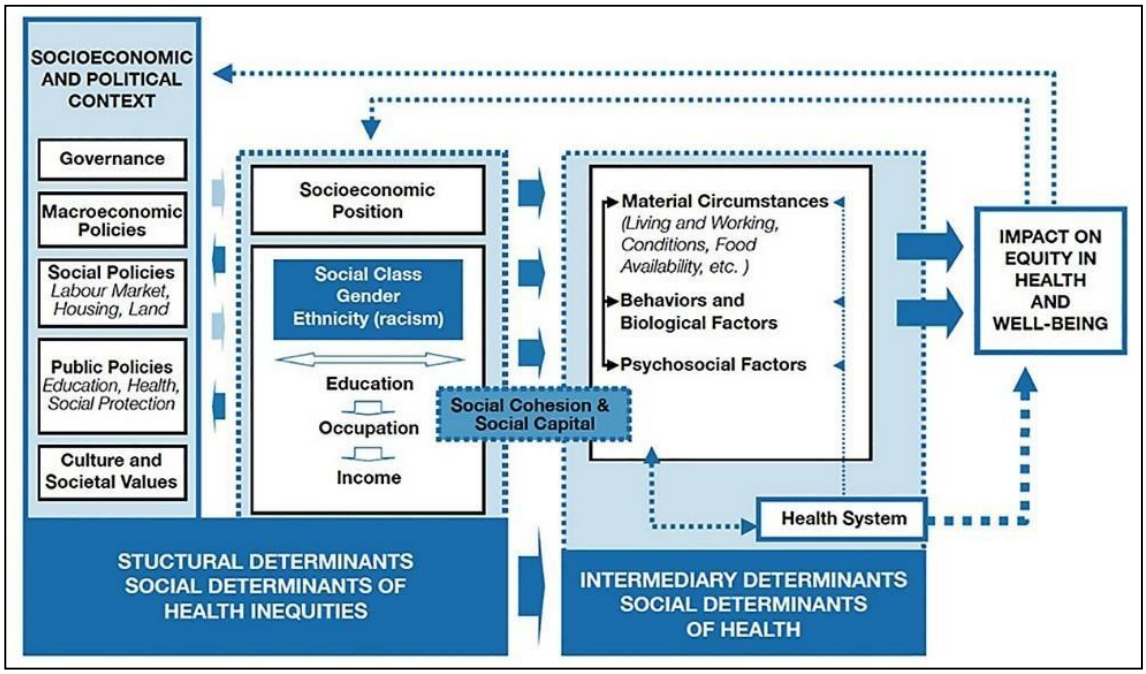

Figure 2.1 Social Determinants of Health (SDOH) framework. (Adopted from National Academy, 2022)

This social determinant of health framework has been widely used in the research related to health problem and its factors associated. Thus, this framework was adapted to this study to support and further review on the obesity and factors associated among nursing students in School of Health Sciences, USM. This study is intended to explore the nature of obesity among nursing students related with specific factors of physical activity, eating behaviors and stress with further lead to obesity health problem. Figure 2.2 shows the conceptual framework adapted from the Social Determinants of Health framework to this study.

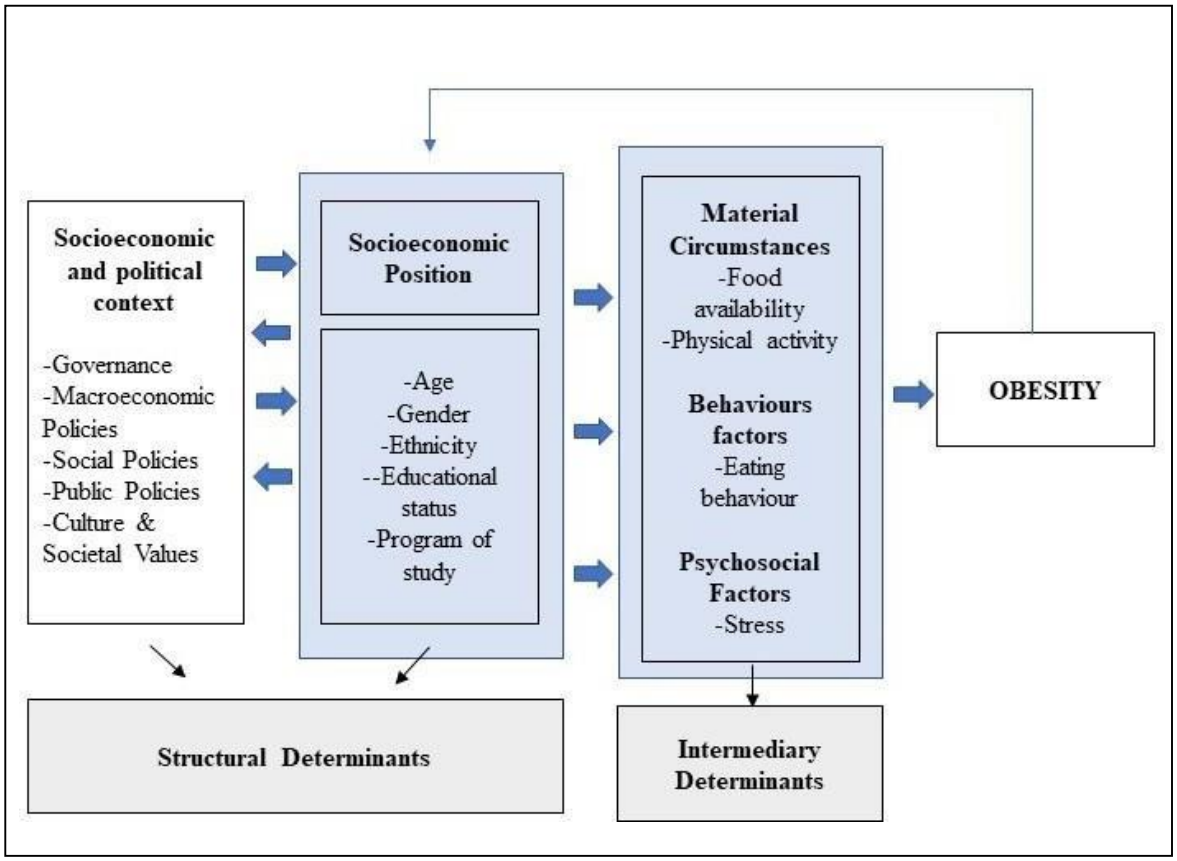

Figure 2.2 Conceptual Framework of Study.
Adapted from the Social Determinants of Health (SDOH) framework

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter introduced all the information about the study in terms of research design, the population and setting of the study, the sampling method, variables, instrumentations, ethical consideration, and data collection plan and finally the data analysis plan.

3.2 Research Design

This study is descriptive in nature and was conducted through a cross-sectional survey using a set of self-administered questionnaires.

3.3 Research Location

The location of this study is at School of Health Sciences, Universiti Sains Malaysia (USM).

3.4 Research Duration

This study was conducted from October 2022 until August 2023.

3.5 Research Population

The population for this study was among nursing students in School of Health Sciences, USM. Students from first year up to final year of both Diploma and Bachelor degree programmes were involved in this study. Currently, there are 285 nursing students in the programmes. Out of this number, 134 are Bachelor degree and 151 are Diploma students.

3.6 Subject Criteria

3.6.1 Inclusion Criteria

Male and female nursing students.

3.6.2 Exclusion Criteria

Nursing students who are away from academic activities due to medical leave, mobility, temporary course interruption, or for any other reason.

3.7 Sampling Plan

3.7.1 Sample Size Estimation

The sample size for a study needs to be estimated at the time the study is proposed because too large a sample is unnecessary and unethical while too small a sample is unscientific and also unethical (Andrade, 2019). Sampling size for this study was initially calculated for each research objective and then the largest sampling size was chosen as the final sample size estimation for this study.

3.7.1.1 Objective 1

Sample Size for Objective 1

The sample size was determined by using Calculator Version 2.0 (Arifin, 2017). The one single proportion formula with two-tailed was used to calculate the sample size.

The proportion (p), the percentage prevalence of obesity among nursing students was 14.7% (Balu *et al.*, 2021).

The Precision: 5.0%, Significant Level: 0.05

After adding drop-out 10%, the total sample size for objective 1 was 215 of nursing students.

C2	1 proportion – Estimation	
Proportion (p)	14.70%	
Precision	5.00%	
Significance level (α)	0.050	Two-tailed
Drop-out	10%	
Sample size	193	
Sample size (with drop-out)	215	

3.7.1.2 Objective 2

Sample Size for Objective 2

Sample size to calculate this objective is made by using Calculator Version 2.0 (Arifin, 2017). For this objective, two proportions formula with two tailed was used to determine the physical activity, stress and eating behavior.

I. Physical activity

The proportion in control (p0), 46.3%, is the percentage of nursing students with low physical activity (Balu *et al.*, 2021).

The proportion of case (p1): 70%, Significant level: 0.05, Power: 0.8

After adding 10% drop-out, the total sample size was 104 of nursing students.

C1	2 proportions – Hypothesis Testing	
Proportion in control (p0)	46.3%	
Proportion in case (p1)	70.00%	
Significance level (α)	0.050	Two-tailed
Power (1-β)	0.800	
Drop-out	10%	
Sample size	93	
Sample size (with drop-out)	104	

II. Stress

The proportion in control (p0), 36.8% is the percentage of nursing students with very high level of stress but not associated to obese (Urbanetto *et al*., 2019).

The proportion of case (p1): 70%, Significant level: 0.05, Power: 0.8

After adding 10% drop-out, the total sample size was 39 of nursing students.

C1	2 proportions – Hypothesis Testing		
	Proportion in control (p0)	36.80%	
	Proportion in case (p1)	70.00%	
	Significance level (α)	0.050	Two-tailed
	Power (1-β)	0.800	
	Drop-out	10%	
	Sample size	34	
	Sample size (with drop-out)	39	

III. Eating behavior

The proportion in control (p0), 21.5% is the percentage of nursing students who are not obese and not influenced by eating behavior (Mahmoud & Taha, 2017).

The proportion of case (p1): 70%, Significant level: 0.05, Power: 0.8

After adding 10% drop-out, the total sample size was 18 of nursing students.

C1	2 proportions – Hypothesis Testing		
	Proportion in control (p0)	21.50%	
	Proportion in case (p1)	70.00%	
	Significance level (α)	0.050	Two-tailed
	Power (1-β)	0.800	
	Drop-out	10%	
	Sample size	15	
	Sample size (with drop-out)	18	