GENDER DIFFERENCES IN DIETARY HABITS, LIFESTYLE PRACTICES AND NUTRITIONAL STATUS OF UNIVERSITY STUDENTS

By

NURUL SHAFIZA BINTI AZLILI

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Dissertation submitted in partial fulfillment of the requirement for the degree of Bachelor of Health Sciences (Honour) (Dietetics)

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Declaration

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated and duly acknowledged. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at Universiti Sains Malaysia or other institutions. I grant Universiti Sains Malaysia the right to use the dissertation for teaching, research and promotional purposes.

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NURUL SHAFIZA BINTI AZLILI

Date: 27/1/2025

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List of Symbols and Abbreviation

BMI	Body Mass Index
USM	Universiti Sains Malaysia
WHO	World Health Organization
UK	United Kingdom

GENDER DIFFERENCES IN DIETARY HABITS, LIFESTYLE PRACTICES AND NUTRITIONAL STATUS OF UNIVERSITY STUDENTS

ABSTRACT

Gender differences in dietary habits, lifestyle practices, and nutritional status among university students remain inconsistent across populations, yet understanding these differences is important for effective health promotion. This cross-sectional study examined associations between gender and fruit intake, physical activity, and body mass index (BMI) among university students. The results indicated no significant association between gender and fruit intake ($p = 0.509$), with a slightly higher proportion of males (66.7%) reporting fruit consumption compared to females (59.5%), suggesting that fruit intake was relatively similar across genders, consistent with previous findings in Turkey (Çapar et al., 2024). In contrast, lifestyle practices differed significantly by gender ($p = 0.009$), with a larger proportion of females (81.0%) classified as sedentary compared to males (55.6%), and more males reporting moderate physical activity (44.4%) than females (19.0%), aligning with prior research indicating higher physical activity levels among male university students (Schmidt et al., 2022; Espada et al., 2023). Nutritional status, assessed via BMI, showed no significant gender differences ($p = 0.706$), although males had a slightly higher prevalence of obesity and females a higher prevalence of underweight, reflecting patterns observed in multinational university populations (Pengpid & Peltzer, 2014). These findings suggest that while gender may not strongly influence fruit intake or BMI among university students, it is associated with lifestyle behaviors, particularly physical activity.

Interventions to promote physical activity may need to target female students specifically, whereas dietary and nutritional strategies may benefit from a universal approach. Overall, this study highlights the nuanced role of gender in shaping health behaviors and nutritional outcomes within the university context.

PERBEZAAN JANTINA DALAM TABIAT DIET, AMALAN GAYA HIDUP DAN STATUS PEMAKANAN PELAJAR UNIVERSITI

ABSTRAK

Perbezaan jantina dalam tabiat pemakanan, amalan gaya hidup, dan status pemakanan dalam kalangan pelajar universiti masih tidak konsisten merentas populasi, namun pemahaman mengenai perbezaan ini adalah penting untuk mempromosikan kesihatan dengan berkesan. Kajian keratan rentas ini meneliti hubungan antara jantina dengan pengambilan buah, aktiviti fizikal, dan indeks jisim badan (BMI) dalam kalangan pelajar universiti. Keputusan kajian menunjukkan tiada hubungan yang signifikan antara jantina dan pengambilan buah ($p = 0.509$), dengan peratusan lelaki yang sedikit lebih tinggi (66.7%) melaporkan pengambilan buah berbanding wanita (59.5%), menunjukkan bahawa pengambilan buah adalah agak serupa antara jantina, sejajar dengan penemuan terdahulu di Turki (Çapar et al., 2024). Sebaliknya, amalan gaya hidup berbeza dengan signifikan mengikut jantina ($p = 0.009$), dengan peratusan wanita yang lebih besar (81.0%) tergolong dalam kategori sedentari berbanding lelaki (55.6%), manakala lebih ramai lelaki melaporkan aktiviti fizikal sederhana (44.4%) berbanding wanita (19.0%), sejajar dengan kajian terdahulu yang menunjukkan tahap aktiviti fizikal lebih tinggi dalam kalangan pelajar lelaki (Schmidt et al., 2022; Espada et al., 2023). Status pemakanan, dinilai melalui BMI, menunjukkan tiada perbezaan signifikan mengikut jantina ($p = 0.706$), walaupun lelaki mempunyai prevalens obesiti yang sedikit lebih tinggi manakala wanita mempunyai

prevalens berat badan rendah yang lebih tinggi, mencerminkan corak yang diperhatikan dalam populasi pelajar universiti pelbagai negara (Pengpid & Peltzer, 2014). Penemuan ini mencadangkan bahawa walaupun jantina mungkin tidak mempengaruhi pengambilan buah atau BMI dengan kuat dalam kalangan pelajar universiti, ia dikaitkan dengan tingkah laku gaya hidup, terutamanya aktiviti fizikal. Intervensi untuk mempromosikan aktiviti fizikal mungkin perlu memberi tumpuan khusus kepada pelajar wanita, manakala strategi pemakanan dan nutrisi boleh dilaksanakan secara universal. Secara keseluruhan, kajian ini menekankan peranan halus jantina dalam membentuk tingkah laku kesihatan dan hasil pemakanan dalam konteks universiti.

Chapter 1: Introduction

1.1 Background of Study

According to Alkazemi (2018), university year consisted of the ages of 18 to 25 represent a critical stage of increasing adulthood in which individuals established long-term lifestyle patterns. Therefore, students gained greater independence in making dietary and lifestyle choices, which can extremely influence their nutritional status and future health outcomes. A healthy lifestyle included balance nutrition, adequate physical activity, and the absence of harmful habits are essential for maintaining optimal health. However, gender play an important role in shaping these behaviors, with visible differences in dietary preferences, activity levels, and health-related attitudes (Dmickevicience et al., 2019).

Recent studies also help to explain these gendered patterns, particularly in lifestyle attitudes and behaviors. Du et al. (2022), reported that female university students experienced higher levels of stress and dietary risks compared to male students. Females also showed more restrained and emotional eating patterns, along with poor sleep quality, which related to psychological and emotional factors that may influence their health behaviors more strongly than male students. Furthermore, in Malaysia it was found that male students consumed higher amounts of energy and macronutrients than females, which precisely shown lower fiber intake that was linked to higher BMI among males (Chong et al., 2024). A cross-national study involved university students from seven countries,

including Malaysia, further highlighted gender differences in lifestyle, while poor sleep quality strengthened this relationship in females (Du et al., 2022).

A study conducted in Kuwait showed that males consumed more animal protein and sugary drinks, while females reported higher snack consumption and greater concern regarding body weight (Alkazemi et al., 2019). Similarly, research on physical activity patterns reported that male students were generally more engaged in moderate and vigorous activities, whereas females showed relatively higher levels of external motivation and demotivation toward physical activity (Espada et al., 2023). Thus, these findings emphasize that dietary and lifestyle patterns are influence not only based on cultural and biological differences, but also by psychological factors such as stress, emotional eating, and sleep quality, as well motivational factors such as attitudes and engagement toward physical activity.

1.2 Problem Statement & Study Rationale

Current evidence showed that university students around the age of 18 to 25 highlighted key differences towards their dietary and lifestyle habits. It showed that female students often preferred plant-based foods and exhibit more emotional eating, while male students typically consumed higher energy and macronutrients and demonstrate more vigorous physical activity patterns (Feraco et al., 2024). In addition, the contrast in body image perception and attitudes toward foods based on psychological and motivational factors was clearly noticeable, with sex-specific trends shaping eating choices and nutritional status (Ruiz-Bravo et al., 2025). However, further studies that immediately compare dietary habits, lifestyle practices and nutritional status between genders in university populations remain limited. These gaps highlight the need for evidence-based insight to guide effective intervention strategies.

To addressed this, the study explained gender-specific differences in dietary habits, lifestyle practices, and nutritional status among university students by combining multiple aspects into a singular investigation. A cross-sectional study conducted in Syria highlighted that poor dietary differences and insufficient nutritional knowledge contributed to higher overweight and obesity rates among university students, regardless gender (Younes, 2024). To address the gaps in current knowledge, this study will include variables such as dietary differences, physical activity levels, stress, sleep quality, with comparison between male and female students. Thus, this approach is important to inform gender sensitive intervention strategies, tailored nutrition education, and supportive university environments that can reflects actual behaviour changes in each gender.

1.3 Objective

1.3.1 General Objective

To investigate the gender differences in dietary habits, lifestyle practices and nutritional status of university students.

1.3.2 Specific Objective

i. To determine association between dietary habits and gender
ii. To determine association between lifestyle practices and gender
iii. To determine association between nutritional status and gender.

1.4 Research Questions

i. Is there any significant differences in dietary habits between gender in university students?
ii. Is there any significant differences in lifestyle practices (e.g., physical activity, sleep, stress management, smoking, alcohol use) between gender in university students?
iii. Is there any significant differences in nutritional status (e.g., BMI, weight categories, body composition indicators) between gender in university students?

1.5 Research Hypotheses

Hypotheses 1:

H_0 : There is no significant difference in dietary habits between gender university students.

H_1 : There is a significant difference in dietary habits between gender in university students.

Hypotheses 2:

H_0 : There is no significant difference in lifestyle practices between gender in university students.

H_1 : There is a significant difference in lifestyle practices between gender in university students.

Hypotheses 3:

H_0 : There is no significant difference in nutritional status between gender in university students.

H_1 : There is a significant difference in nutritional status between gender in university students.

1.6 Significance of Study

Understanding gender differences in dietary habits, lifestyle choices, and nutritional status among university students is key to creating effective health promotion strategies. Recent evidence showed that male are more likely to eat processed meats and have delayed hunger patterns. In contrast, female prefer cooked vegetables and feel hungry earlier. They also engaged in behaviours like skipping meals and snacking at night, which differ by gender and body composition (Lombardo et al., 2024).

A study in the UK found that men generally have healthier movement patterns, while women adopt better dietary practices. This highlighted the need to consider both gender and ethnicity in student health programs (Hennis et al., 2024). Additionally, an analysis using principal component analysis (PCA) revealed that men tend to participate more in strength and endurance sports and follow meat-heavy diets. Meanwhile, women maintain structured eating routines rich in vegetables, showing distinct lifestyle and dietary profiles (Feraco et al., 2024).

Thus, these findings point to the importance of recognizing gender differences among university students. Insights from this research can help shape wellness programs that better fit actual student behaviors.

Chapter 2: Literature Review

2.1 Gender Differences in Dietary Habits among University Students

Many studies have showed that male and female university students have different eating habits. This is especially true for meal patterns and nutrient intake. In Malaysia, Gan et al. (2011) found that both genders often skipped meals and relied on snacks. Men consumed more sodium, while women had lower intakes of iron and calcium. Similar study conducted in Nepal also showed that female students tended to choose vegetables and lighter meals, while male preferred energy-dense foods like meat (Dahal et al., 2022). However, despited these differences, both groups faced nutritional problems, as calcium inadequacy that was very common among both men and women (Gan et al., 2011). Therefore, this suggested that while food choices differ by gender, poor dietary habits are widespread among university students.

Other than that, gender differences are also evident in the types of food and drinks people consume. Research in Kuwait showed that female students were more likely to eat fruits and vegetables and drink fewer sugary beverages. In contrast, male students preferred fast food and had a higher chance of being overweight or obese (Alkazemi et al., 2019). Similar results were found in Malaysia, where female students reported healthier eating habits, although their nutrient intake often fell below recommended levels (Gan et al., 2011). Additionally, a study in Saudi Arabia indicated that women possessed better

knowledge of nutrition and calorie labels than men. However, both genders struggled to apply that knowledge to their eating habits (Alotaibi et al., 2023). These findings show that men typically consume larger quantities of less healthy food, while women are more health conscious but still experience nutrient gaps.

Apart from food choice, attitudes toward health and eating vary by gender. Studies show that female students often have stronger health attitudes and care more about diet quality. Male students, on the other hand, are less likely to think about the long-term health effects of their meals (Alotaibi et al., 2023). For example, in Nepal, women were more likely to limit their food intake to manage body weight. However, this also put them at risk of missing crucial nutrients like iron and calcium (Dahal et al., 2022). In contrast, men tended to eat based on convenience and taste, resulting in higher fast-food consumption (Gan et al., 2011). These differences indicate that interventions should not just promote healthier choices. They should also tackle gender-specific behaviors. For instance, programs could encourage men to cut back on fast food and help women avoid nutrient deficiencies while dieting.

Another important factor, students knowledge to nutrition policies and education. The Saudi study found that even though women had better knowledge about nutrition, there was little actual behavior change after calorie labels were introduced (Alotaibi et al., 2023). This is similar to findings from Malaysia and Kuwait, where knowledge and attitudes often did not lead to better diet quality (Gan et al., 2011; Alkazemi et al., 2019). Together, these studies indicate that while gender influences food habits, the overall university environment also promotes poor practices like skipping meals, eating fast food, and not getting enough

key nutrients. Tackling these habits needs a mix of policy, education, and nutrition programs that consider gender differences.

2.2 Gender Differences in Lifestyle Practices Among University Students

University students went through many lifestyle changes that can impact their health, and these changes often differ between male and female students. One significant difference is in physical activity. Several studies show that male students are usually more physically active than their female peers. For example, Espada et al. (2023) found that male university students not only exercised more but were also more motivated by personal enjoyment and health benefits. In contrast, female students were influenced more by social pressures or concerns about body image, which could discourage them from being active or make it less enjoyable. Another recent study by Amole et al. (2024) from the UK looked at health-related behaviors among university students and found that males were more likely to engage in active and movement-rich routines, while females often focused more on healthy eating but were less active. These findings suggest that gender impacts not just how often students participate in healthy practices but also their motivations and attitudes toward these practices. Recognizing these differences is vital for universities since it can assist in creating health programs or fitness campaigns that target each gender. For instance, female students may benefit more from group fitness sessions with social support, while male students might prefer goal-oriented or competitive activities.

Besides exercise, gender differences appear in sleep habits, stress levels, and overall time management. University life often brings academic pressure, irregular schedules, and

new responsibilities, which can harm sleep and mental health. Zhou et al. (2021) studied over 5,000 students in China and found that sleep problems were common in both genders, but the causes differed. Male students were more likely to have sleep issues due to extended screen time or gaming, while female students often faced stress and emotional concerns that interrupted their sleep. Similarly, Lemola et al. (2019) discovered with U.S. college students that while males generally reported sleeping fewer hours, they had lower levels of stress. On the other hand, females experienced higher stress levels, often related to academic and social pressures, which affected their sleep quality. These gender-based differences indicate that student wellness programs should consider various causes and coping strategies. For example, stress management workshops might be especially helpful for female students, while encouraging digital wellness and reducing screen time could improve sleep for male students. Overall, these studies emphasize the need to consider lifestyle practices through a gender perspective to develop more supportive and inclusive health strategies on campus.

2.3 Gender Differences in Nutritional Status among University Students

Recent studies showed that male and female university students often differ in nutritional status, including body composition and dietary intake. In Malaysia, Chong et al. (2024) found that male students had higher total energy and macronutrient intakes than female students. Male students with lower fiber intake were also more likely to have higher BMI. In Ghana, Obirikorang et al. (2024) reported that male undergraduates had higher rates of obesity and worse body composition compared to females when considered factors like diet, physical activity, and waist circumference. These findings suggested that men

tend to consume more energy and have more body fat, while women may eat less energy but still face risks related to diet quality and body composition.

Both undernutrition and overweight/obesity exist, but their distribution by gender is uneven. Chong et al. (2024) also found that many female students were underweight or had lower energy sufficiency compared to males. Obirikorang et al. (2024) noted that although males had higher rates of obesity, females still faced challenges with overweight, particularly regarding body fat distribution and waist size. This indicated that interventions need to address both underweight and overweight issues and consider gender differences.

Diet quality and micronutrient intake are often poorer in female students, even when BMI and weight seem normal. In the Malaysian study, Chong et al. (2024) showed that many students, especially females, did not meet recommended nutrient intakes despite having normal or nearly normal BMI. While the Ghanaian research focuses more on obesity, it also emphasizes that diet and lifestyle habits, not just weight, are significant risk factors for poor nutritional status in both genders (Obirikorang et al., 2024). This suggests that focusing solely on BMI or obesity may overlook hidden nutritional issues, particularly in female students.

Behavioral patterns played a role in these gender differences. Chong et al. (2024) report that males are more likely to eat larger portions and more macronutrients, but they may also develop unhealthy habits if their diet lacks quality. In the Ghana study, factors linked to obesity included low physical activity, diets high in processed foods, and sedentary behavior, with these being more common or more impactful among male

students compared to female students (Obirikorang et al., 2024). Therefore, gender-sensitive strategies could promote nutrient-rich diets and balanced physical activity, especially among male students, while ensuring female students receive support to meet their micronutrient needs.

2.4 Conceptual Framework

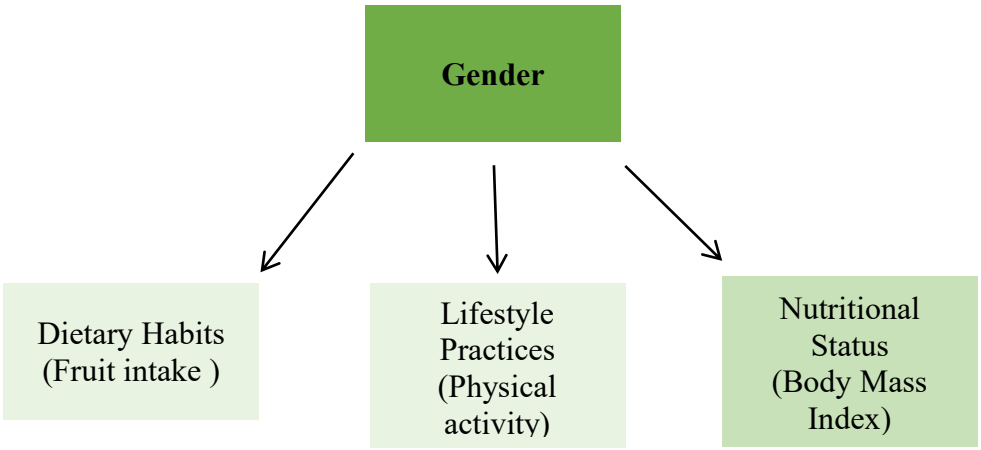

Figure 2.4 Conceptual Framework

Gender is an important factor that affects dietary habits, lifestyle choices, and nutritional status among university students. Fruit intake is an important indicator of overall dietary quality among university students. Previous research shows that dietary habits such as fruit consumption differ significantly between males and females, although the direction of the difference varies by context. For example, in a sample of Dutch university students, fruit intake was lower among male students than female students, suggesting that females may consume more fruit (van den Bogerd, Maas, Seidell, & Dijkstra, 2018)

Gender influenced lifestyle choices as well. Males usually reported higher levels of physical activity, but they also have a greater tendency to eat fast food and engage in sedentary behaviors compared to females (Chong et al., 2024; Pakistan Boarding Students Study, 2024). These differences in diet and lifestyle contribute to variations in nutritional status. Males tend to have higher average BMI and waist circumference, while females

have a higher rate of underweight issues (Gan et al., 2011). Thus, these findings highlighted that gender influences dietary habits and lifestyle choices, which ultimately affect the nutritional status of university students.

Chapter 3: Methodology

3.1 Study Design

This study employed a cross-sectional design to compare gender differences in dietary habits, lifestyle practices, and nutritional status among university students. A cross-sectional design allows the collection of the date at a single point in time, featuring a structured questionnaire to gather demographic information, dietary patterns, and lifestyle behaviours such as physical activity, sleep duration, and sedentary time. Anthropometric measurements including body mass index (BMI), waist circumference (WC), and skinfold thickness are used to assess students nutritional status. This design enabled efficient one-time data collection and provides a clear picture of how dietary and lifestyle practices vary by gender, as well as their association with nutritional status within student population.

3.2 Study Area

The research will be conducted at the Health Sciences Campus of Universiti Sains Malaysia (USM) in Kelantan. This location was chosen because health sciences students are an important group for studying lifestyle and nutrition, due to their academic background and potential awareness of healthy habits. The campus allows access to a diverse range of male and female students from various programs and academic years. This diversity offers valuable insights into gender differences in dietary and lifestyle practices within a university population.

3.3 Study Population

The study population consisted of undergraduate Health Sciences students of Universiti Sains Malaysia, Health Campus. The participants were selected from Year 1 to Year 4 from School of Health Sciences (PPSK). Informed consent was obtained from all participants prior to their involvement in the study. Participants were informed of their right to withdraw from the study at any time, as stated in the research information provided on the first page of the questionnaire.

3.4 Sampling Plan

3.3.1 Subject Criteria

Participants will be recruited after receiving approval from the Universiti Sains Malaysia Human Research Ethics Committee (USM/JEPeM/KK/25010149).

Inclusion Criteria:

i. Male and female undergraduate students aged 18–25 years.

ii. Enrolled in any Health Sciences program at Universiti Sains Malaysia.

iii. First year to final year of study.

iv. Students who provide written informed consent after being briefed on the objectives and procedures of the study.

v. Students in generally good health without serious medical conditions that may influence dietary intake or nutritional status.

Exclusion Criteria:

i. Students with diagnosed chronic illnesses (e.g., diabetes, cardiovascular disease, kidney disease).

ii. Female students who are pregnant or breastfeeding.

iii. Students currently participating in competitive sports teams or undergoing intensive physical training, as this may bias nutritional and lifestyle data.

iv. Students who decline to participate or fail to complete the required assessments.

3.4.2 Sample Size Estimation

The sample size required for research is calculated according to the objectives of the study based on the use of the population variance of the given outcome variable.

Sample-sized calculation for first objectives

For the first objective which to compared dietary habits between male and female university students. One proportion calculation used to estimate the sample size (Wan, 2013). The formula for one proportion calculation as shown below:

$$n = \left[\frac{Z}{\Delta}\right]^2 p\,(1 - p)$$

n = sample size

Z = value representing the desired confidence level.

Δ = absolute precision

p = anticipated population proportions

Using Δ value of 0.1 and confidence level of 95% for the study, the Z-score will be 1.96. According to the first objective, to compare dietary habits between male and female students is used as the anticipated population proportion. In comparing between dietary habits of male and female, according to Alkazemi (2018) stated that 23.4% of male and 28.1% of female students eat less than two servings of whole fruit a day. This is according to his research title Gender differences in weight status, dietary habits, and health attitudes among college students in Kuwait.

i) Differences in fruits intake between male and female students

$$n = \left[\frac{1.96}{0.1}\right]^2 0.234\ (1-0.234)$$

n = 69 male students

$$n = \left[\frac{1.96}{0.1}\right]^2 0.281\ (1-0.281)$$

n = 78 female students

Total sample size, n = 69 + 78

= 147 students

Extra respondents must be added to the research to account for any dropouts. Since the study sample is at high risk for health problems, a higher dropout rate was chosen. Consequently, the sample size is modified for a 10% dropout rate:

n = 147 + 10%

= 162 students

Sample-sized calculation for second objectives

Using Δ value of 0.1 and confidence level of 95% for the study, the Z-score will be 1.96. According to the second objective, comparing lifestyle practices between male and female students is used as the anticipated population proportion. In comparing between lifestyle practices of male and female, according to Verma et al (2022) stated that 72.9% of male and 67.2% of female students had high physical activity among postgraduate. This is according to his research title Patterns of Physical Activity Among University Students and Their Perceptions About the Curricular Content Concerned With Health.

ii) Differences in lifestyle practices between male and female students

$$n = \left[\frac{1.96}{0.1}\right]^2 0.718\ (1\text{-}0.718)$$

n = 56 male students

$$n = \left[\frac{1.96}{0.1}\right]^2 0.716\ (1\text{-}0.716)$$

n = 78 female students

Total sample size, n = 56 + 78

= 134 students

Extra respondents must be added to the research to account for any dropouts. Since the study sample is at high risk for health problems, a higher dropout rate was chosen. Consequently, the sample size is modified for a 10% dropout rate:

$$n = 134 + 10\%$$
$$= 148 \text{ students}$$

Sample-sized calculation for third objectives

Using Δ value of 0.1 and confidence level of 95% for the study, the Z-score will be 1.96. According to the third objective, comparing nutritional status between male and female students is used as the anticipated population proportion. In comparing between nutritional status of male and female, according to Alkazemi (2018) stated that 23.7 % of male and 12.1 % of female students are classified in obese category in BMI classfification. This is according to his research title Gender differences in weight status, dietary habits, and health attitudes among college students in Kuwait.

iii) Differences in nutritional status between male and female students

$$n = \left[\frac{1.96}{0.1}\right]^2 0.237\ (1\text{-}0.237)$$

$$n = 69 \text{ male students}$$

$$n = \left[\frac{1.96}{0.1}\right]^2 0.121\ (1\text{-}0.121)$$

$$n = 40 \text{ female students}$$

Total sample size, n = 69 + 40

= 109 students

Extra respondents must be added to the research to account for any dropouts. Since the study sample is at high risk for health problems, a higher dropout rate was chosen. Consequently, the sample size is modified for a 10% dropout rate:

n = 109 + 10%

= 120 students

3.5 Sampling Instruments

3.5.1: Data Collection Form

The data collection for this research study conducted using an interviewer-administered questionnaire to ensure accurate and comprehensive responses from participants. The data collection form is structured into one part only, where it was designed to gather specific types of information relevant to the research objectives.

Data collection content filled by the participants was socio-demographic form which included information such as gender, age, race, years of study, course of study and living arrangement of the participants.

3.5.2: Anthropometric Measurement

Anthropometric assessment mostly used for various purposes in research especially as indicators for risk identification, intervention, or impact assessment on nutritional status or health (Piqueras et al., 2021). Few components included in anthropometric measurements are body mass index (BMI), waist circumference (WC) and skinfold thickness (Casadei et al., 2022).

Firstly, anthropometry assessment such as BMI which assessed through taken body weight and height measurement of the participants. On the day of data collection, the participants height measured individually by using height measuring tools which SECA Stadiometer 213(Baharudin et al., 2017). The participants were asked to stand barefoot with their back should be touching the Stadiometer. Other than that, the participants face and head must faced forward front before the measurement taken. Then, the measuring rod of the Stadiometer then gently lowered until it touches the top of the participant's head. Besides that, the stadiometer properly calibrated and positioned perpendicularly to the floor to ensure accurate readings. The height measuremernt taken right after the height measurement results from the stadiometer displayed.

Next, another component assessed BMI which body weight measurement. Body weight measurement assessed by using weight scales (Tanita SC-240MA) that immediately displayed the body weight. The participants asked to take off their shoes, socks, watch or any heavy object that disrupted the measurement readings. Then, the participants were asked to stand still on the digital scales while their head and face facing front. Other than that, the weight scales placed on flat surface to avoid from error in the readings due to inappropriate surface located.

Once the weight displayed on the weight scales, the data for the BMI calculation. Both data for the height and weight measurement combined into BMI formula which weight in kilograms divided by the square of the height in meters. After the BMI calculation, the BMI of the participants categorised into four different category such as underweight, normal, overweight and obese. First, for underweight category BMI below than 18.5 kg/m2 (Lee et al., 2015). Normal category is classified when the BMI is within range 18.5 to 24.9 kg/m2 (Ardern et al., 2012). Current cut-off point for the BMI category recommended by the WHO is more than 25 kg/m2 for overweight and more than 30 kg/m2 for obese (Low et al., 2009).

Furthermore, a basic method to measure abdominal adiposity that is simple to defined and used in health care settings is waist circumference. Whether or not BMI is taken of consideration, waist circumference is highly correlated with cardiovascular and all-cause death (Ross et al., 2020). Other than that, waist circumference is measured by using measuring tape. Waist circumference is measured in the standing position, midway between the lowest rib and iliac crest, directly on the skin of the participants. All measurements were made by trained researcher according to standard techniques . The data of the waist circumference was collected for the next assessment process.

Other anthropometric measured such skinfold thickness measured by using Slim Guid Caliper that can Subscapular skinfold and Triceps skinfold of the participants. For the subscapular skinfold, located the area just below the shoulder blade (inferior angle of the scapula) and pinch the skinfold diagonally at a 45-degree angle to the participants. –The caliper was placed 1 cm away from the fingers, ensuring it was perpendicular to the fold, and the measurement was recorded after 2-3 seconds. Then, for the triceps skinfold, the midpoint between the acromion (shoulder) and olecranon (elbow) on the back of the upper arm was

located. The participant's skin was pinched vertically, and the caliper was placed 1 cm away from the fingers, and the reading was recorded after 2-3 seconds. The measurements were taken on the participant's dominant side and repeated each three times, with the average values used for analysis.

3.5.3: INTERHEART Questionnaire

The CVD stratification method was done using a Self-Assessment INTERHEART Questionnaire. This Self Assessment INTERHEART Questionnaire was basically taken from the INTERHEART study, which was a large international case-control study designed to identify risk factors for myocardial coronary heart disease worldwide (Yusuf et al., 2004). Furthermore, a few selected items from the INTERHEART Modifiable Risk Factor Questionnaire were adopted to assess dietary habits (e.g., fried food intake, fruit and vegetable consumption), lifestyle practices (e.g., physical activity, smoking), and nutritional status–related behaviours. On the other hand, the questionnaire items were used independently as behavioural variables to describe and compare health-related practices between male and female students, consistent with the study objectives. No CVD risk estimation or classification was performed.

3.6 Data Collection Method

The data collection for this study began with ethical approval from the Human Research Ethics Committee at Universiti Sains Malaysia (USM), ensuring that all research practices aligned with ethical standards. Data collected from students at Health Campus, Universiti Sains Malaysia.