

**ASSOCIATION OF DIET QUALITY AND MENTAL WELLBEING
AMONG UNIVERSITI SAINS MALAYSIA UNDERGRADUATE
MEDICAL STUDENTS**

SITI NAJIHAH BINTI ROZMI

**SCHOOL OF HEALTH SCIENCES
UNIVERSITI SAINS MALAYSIA**

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MEDICAL STUDENTS**

By

SITI NAJIHAH BINTI ROZMI

**Dissertation submitted in partial fulfillment of the requirements for the
degree of the Bachelor of Health Sciences (Honours) (Dietetics)**

July 2024

CERTIFICATE

This is to certify that the dissertation entitled “ASSOCIATION OF DIET QUALITY AND MENTAL WELLBEING AMONG UNIVERSITI SAINS MALAYSIA UNDERGRADUATE MEDICAL STUDENTS” is the bona fide record of research work done by Ms SITI NAJIHAH BINTI ROZMI during the period from under my supervision. I have read this dissertation and that in my opinion it confirms to acceptable standard scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfilment for the Bachelor of Health Sciences (Honours) (Dietetics).

Main Supervisor,



.....
Mrs. NurZetty Sofia Binti Zainuddin (Supervisor)
Lecturer of Dietetics Programme,
School of Health Science Universiti Sains Malaysia,
Health Campus 16150 Kubang Kerian,
Kelantan, Malaysia.

Date: 3/07/2024

DECLARATION

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

Student,



.....
Siti Najihah Binti Rozmi
Third Year Dietetics Student
School of Health Science
Universiti Sains Malaysia
Health Campus 16150 Kubang Kerian
Kelantan, Malaysia.

Date: 3/07/2024

ACKNOWLEDGEMENT

I would like to express deep gratitude to my thesis advisor, Mrs. NurZetty Sofia Binti Zainuddin, for her invaluable guidance, unwavering support, encouragement, and patience throughout this research journey. Her expertise and insightful feedback have been instrumental in shaping this thesis. I am also thankful to Dr. Wan Faizah, the course coordinator, for her assistance during the research proposal and project period.

My appreciation extends to the respondents of this study for their willingness to share experiences and insights, which were essential for this research. Without their participation, this study would not have been possible. I am grateful to my family for their unwavering support and understanding during the demanding process of thesis writing; their encouragement has been a continual source of strength for me.

Lastly, I acknowledge the indispensable role played by my classmates especially my fellow thesis peers under the same supervisor for their undoubtedly support in terms manpower and emotional aspects. Their support, camaraderie, and insightful discussions during this challenging thesis journey were invaluable, keeping me motivated and focused. I also appreciate the university study respondents who contributed to and inspired my research.

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LIST OF ABBREVIATION

WHO	World Health Organization
NHMS	National Health and Morbidity Survey
DASS	Depression, Anxiety and Stress Score
GHA	Interquatile Range
MOH	Ministry Of Health
UnisZa	Universiti Sultan Zainal Abidin
SAD	Stress, Anxiety and Depression
USM	Universiti Sains Malaysia
USMKK	Universiti Sains Malaysia Kubang Kerian
ASN	American Society for Nutrition
NCD	Non-Communicable Diseases
UiTM	Universiti Teknologi Mara
SAMH	Scottish Action for Mental Health
RNI	Recommended Nutrient Intake
MDG	Malaysia Dietary Guideline
MDGCA	Malaysia Dietary Guideline for Children and Adolescents
ANS	Adolescent Nutrition Survey
BMI	Body Mass Index
PUMA	<i>Pusat Mahasiswa</i>
SPSS	Statistical Package for the Social Sciences
PPSP	<i>Pusat Pengajian Sains Perubatan</i>

PERKAITAN ANTARA KUALITI DIET DAN KESEJAHTERAAN MENTAL DALAM KALANGAN PELAJAR SARJANA MUDA PERUBATAN UNIVERSITI SAINS MALAYSIA

ABSTRAK

Kajian terkini menunjukkan bahawa kualiti diet memberi kesan besar kepada kesihatan mental, dengan tabiat pemakanan yang buruk dikaitkan dengan peningkatan risiko kemurungan, kebimbangan, dan tekanan. Kajian ini meneroka hubungan antara kualiti diet dan kesejahteraan mental dalam kalangan pelajar perubatan sarjana muda di Universiti Sains Malaysia. Kajian keratan rentas telah dijalankan dengan 139 peserta, menggunakan Skala Kemurungan, Kebimbangan, dan Tekanan (DASS-21) untuk penilaian kesihatan mental dan Indeks Pemakanan Sihat Malaysia (M-HEI) untuk kualiti diet. Korelasi Spearman Rho digunakan untuk menguji hubungan antara pembolehubah. Hasil kajian menunjukkan bahawa kebanyakan pelajar mengalami tahap kemurungan, kebimbangan, dan tekanan yang normal hingga ringan. Tiada korelasi yang signifikan ditemui antara kualiti diet dan kesejahteraan mental ($p=0.780$, $r=0.322$). Secara khusus, 62.0% ($n=18$) lelaki melaporkan tahap kemurungan normal, 24.0% mengalami kemurungan sederhana hingga teruk, 58.6% ($n=17$) melaporkan tahap tekanan normal, dan 55.1% mengalami kebimbangan sederhana hingga teruk. Sebaliknya, dalam kalangan pelajar perempuan, 65.5% ($n=72$) melaporkan tahap kemurungan normal, 17.3% mengalami kemurungan sederhana hingga teruk, 45.5% mengalami kebimbangan sederhana hingga teruk, dan 78.2% ($n=86$) melaporkan tahap tekanan normal. Ini menunjukkan pelajar perempuan mempunyai kualiti diet yang lebih baik. Dalam hal kualiti diet, kajian mendapati tiada responden yang mempunyai diet berkualiti tinggi. Kebanyakan pelajar perempuan (60%, $n=72$) mempunyai diet berkualiti sederhana berbanding hanya 5% ($n=6$) pelajar lelaki, manakala 18.3% ($n=22$) pelajar perempuan dan 4.2% ($n=20$) pelajar lelaki mempunyai diet berkualiti rendah, menunjukkan bahawa pelajar perempuan mempunyai kualiti diet yang lebih baik. Dapatan kajian ini mencadangkan bahawa faktor-faktor lain selain kualiti diet menyumbang kepada kesejahteraan mental.

ASSOCIATION OF DIET QUALITY AND MENTAL WELLBEING AMONG UNIVERSITI SAINS MALAYSIA UNDERGRADUATE MEDICAL STUDENTS

ABSTRACT

Emerging evidence suggests that diet quality profoundly impacts mental health, linking poor dietary habits to increased risks of depression, anxiety, and stress. This study explored associations between diet quality and mental well-being among Universiti Sains Malaysia undergraduate medical students. A cross-sectional study was conducted with 139 participants, using the Depression, Anxiety, and Stress Scale (DASS-21) for mental health assessment and the Standardized Malaysian Healthy Eating Index (SM-HEI) for diet quality. Spearman Rho correlation tested relationships between variables. No significant correlations were found between diet quality and mental well-being ($p=0.780$, $r=0.322$). Findings indicated most students experienced normal to mild levels of depression, anxiety, and stress. Specifically, 62.0% ($n=18$) of males reported normal levels of depression, 24.0% experiencing moderate to severe depression, 58.6% ($n=17$) reported normal stress levels and 55.1% experiencing moderate to severe anxiety. In contrast, among females, 65.5% ($n=72$) reported normal levels of depression, 17.3% moderate to severe depression, 45.5% experiencing moderate to severe anxiety and 78.2% ($n=86$) reported normal stress level. This shows female student has better diet quality. In terms of diet quality, the study found that no participants had a high-quality diet. Most female students (60%, $n=72$) had a moderate-quality diet compared to only 5% ($n=6$) of males, while 18.3% ($n=22$) of females and 4.2% ($n=20$) of males had a low-quality diet, showing females had better diet quality. No significant correlations were found between diet quality and mental well-being ($p=0.780$, $r=0.322$). These results suggest that factors beyond diet quality contribute to mental well-being.

CHAPTER 1

INTRODUCTION

1.1 Background of the study

Mental wellbeing is an umbrella term used to explain general mental health that helps humans to function on a daily basis stress free and with the ability to do work harmoniously with their surroundings and it also enables people to cope with the stresses of life, realize their abilities, learn and work well and contribute to their community (WHO, 2022). Mental well-being encompasses how human functioning or reacts based on their cognitive, emotional and physiological processes of the brain. It is an integral component of health and well-being that underpins individual and collective abilities to make decisions, build relationships and shape the world we live in, and it is crucial to personal, community and socio-economic development (WHO, 2022).

Mental health is one of the factors contributing to mental wellbeing, thus it is often used to evaluate the state of mental wellbeing of the people living in the societies. These two intertwine and both can cause significant effects on the human system depending on the condition of mental state. Mental health can be defined as the absence of mental disease, or a state of being that also includes the biological, psychological, or social factors which contribute to an individual's mental state and ability to function within the environment (Li *et al.*, 2014). This issue exists on a complex continuum, which is experienced differently from one person to another, with varying degrees of difficulty and distress and potentially quite different social and clinical outcomes and these conditions include mental disorders and psychosocial disabilities as well as other mental states associated with significant distress, impairment in functioning, or risk of self-harm. People with mental health conditions are more likely to experience lower levels of mental well-being (WHO, 2022).

The quality of mental wellbeing has shown a significant decrease among people of the Malaysian societies. There has been a dramatic increase in the prevalence of mental disorders over the past decade in Malaysia with epidemiological data published in 2015 by the Ministry of Health identified that the prevalence of mental disorders among adults was 29% (95% CI 27.9–

30.5) which shows a threefold increase in comparison with the 10% prevalence rate identified in 1996 (Raaj *et al.*, 2021). Mental health condition also refer as mental disorders is a, psychosocial disabilities and other mental states associated with significant distress, impairment in functioning, or risk of self-harm (Stein *et al.*, 2021). According to National Health and Morbidity Survey (NHMS) conducted in 1996, the prevalence of mental disorders among adults in Malaysia was 10.7%. However, NHMS in 2015 showed the prevalence had increased to 29.2%. The commonest mental illness affecting adults was depression, which frequently co-exist with anxiety and stress (Abd Rahman *et al.*, 2020).

The emergence of mental health disorders can be triggered by numerous factors. The contributing factors can be varied based on stages of life. Among university students, factors such as a low socioeconomic background, difficulties in adapting to the new environment concomitant with unhealthy lifestyles such as smoking, unhealthy diet, lack of exercise and poor sleep habits contributes to mental health disorder (Shahira *et al.*, 2018). Diet qualities play a significant role in ensuring good mental health. Furthermore, common pathways to developing mental health disorders such depression and anxiety can be mediated by overall diet quality. Additionally, individuals are at risk when exposed to stress and those with prominent levels of neuroticism may be more prone to unhealthy dietary which in turn contribute to development of depression and anxiety (Schweren *et al.*, 2021). On the other hand, healthy eating practices such as diet consists of regular consumption of fruits, vegetables, low-fat dairy products, whole-grain products, nuts, legumes, fish, oils and soft margarines, and limited consumption of red/processed meat, butter and sugar-sweetened beverages is said to reduced effect of mental health issues (Vinke *et al.*, 2018).

Dietary eating habits or best referred as diet quality is said to be one of the crucial factors affecting mental wellbeing. Diet quality can be categorized by using Malaysia Healthy Eating Index (MHEI) which is derived through a thorough study conducted by using Malaysia Dietary guideline as the main reference source. Moreover, diet quality can be assessed by using dietary records or food diaries which can be highlighted among dietary assessment methods of the current diet for their interest and validity which is a prospective, open-ended survey method collecting data about the foods and beverages consumed over a previously specified period.

(Ortega *et al.*, 2015). Dietary records can be used to estimate the current diet of individuals and population groups and to identify groups at risk of inadequacy.

Furthermore, mental wellbeing can be assessed with Depression, Anxiety, Stress score (DASS-21) findings from studies support its validity as an approved instrument for measuring adverse mental states and depression, anxiety, and stress in adults (Marijanović *et al.*, 2021a). A study conducted in a Malaysian university reported that 41.9% of medical students had emotional disorders which is also a part of mental health disorders based on the General Health Questionnaire (GHQ) which shows quite a high prevalence of the said issue (Nair *et al.*, 2023). Medical culture breeds high-achieving and uncompromising personality types, both of which are unforgiving of mistakes and struggles, exacerbate impostor syndrome, and lead to a desire for perfectionism in trainees which associated with mental health burdens, as well as components of burnout such as cynicism and emotional exhaustion (Yusof *et al.*, 2009). Therefore, understanding the association of diet quality with mental wellbeing among medical students in Universiti Sains Malaysia is the prime focus of this study.

1.2 Problem Statement

Mental health disorders have been dramatically rising over the past years. Mental illness is one of the leading causes of disability and health loss in Malaysia, accounting for 8.6% of total disability-adjusted life-years (Raaj *et al.*, 2021). As a developing country, the prevalence of non-communicable disease has been acknowledged to be higher than infection disease which include mental health disorder. This is called as epidemiological transition throughout the years. The concept is applicable for mental health disorder in Malaysia. It is notable that by 2020, mental health conditions are expected to be the second biggest health problem affecting Malaysians after heart diseases (Chan, 2019). A national survey by the Ministry of Health found that one in three Malaysian adults aged 16 years and above (29.2%) have a mental health condition, nearly triple from 11.2% in 2006 and noted that the states of Sabah, Kelantan, Kuala Lumpur, and Sarawak have the highest prevalence of mental health conditions (MOH, 2017)

Students are said to be at elevated risk of developing mental health disorders such as depression and anxiety, especially students in tertiary educational level. Experts declared that anxiety and depression are the top causes of mental health disorders among Malaysian students (Kotera *et al.*, 2021). A study conducted among university students in Selangor found that the prevalence of moderate to severe depression, anxiety and stress among university students are 53.9%, 66.2% and 44.6%, respectively (Wong *et al.*, 2023). Meanwhile another study conducted in Universiti Sultan Zainal Abidin Terengganu (UniSZA) on 443 students, showed that 42.2% of respondents were detected to be in a depression, most respondents were diagnosed with anxiety with a percentage of 72.7% and the number of respondents that deals with stresses 34.8% (Shahira *et al.*, 2018). Furthermore, different psychological and psychiatric studies conducted in multiple developed and developing countries across the past decades have shown that prevalence of stress, anxiety, and depression (SAD) is higher among university students compared with the general population (Mofatteh, 2021).

Upon seeing the worrying trend of mental health problem among students and public, Ministry of Health Malaysia has come out with National Strategic Plan for mental health (2020-2025) to tackle the issue and reducing prevalence of mental health issue in Malaysia. Previous study conducted in form of meta-analyses pooling found that all “healthy dietary patterns” from 17 comparisons found that these patterns were associated with significantly reduced prospective risk of depression and similar effects were observed in a pooled analysis of healthy food group such as fish, vegetables and prospective risk of depression was also significantly higher for those with greater consumption of sugar-sweetened beverages (Firth *et al.*, 2020). Thus, determining the diet quality of medical students is important to understand how eating pattern the cause of emerging mental health issues among students could be. Hence, this study aims to assess the diet quality as well to determine the relationship of eating pattern and mental wellbeing among medical students of Universiti Sains Malaysia. Healthier eating patterns or good diet quality are expected to impact general mental well-being.

1.3 Research Question

1. What is the diet quality status among USM undergraduate medical students?
2. What is the depression, anxiety, stress level among USM undergraduate medical students?
3. Is there any association between diet quality and mental wellbeing (depression, anxiety and stress) among USM undergraduate medical students?

1.4 Research Objectives

1.1.1 General Objective

To determine the association of diet quality and mental wellbeing (depression, anxiety and stress) among USM undergraduate medical students.

1.1.2 Specific Objectives

1. To identify the diet quality status among USM undergraduate medical students.
2. To identify the depression, anxiety, stress level among USM undergraduate medical students.
3. To determine the association between diet quality and mental wellbeing (depression, anxiety and stress) among USM undergraduate medical students.

1.5 Research Hypothesis

1. (H₀): There is no significant association between diet quality and mental wellbeing (depression, anxiety and stress) among USM undergraduate medical students.
2. (H_A): There is a significant association between diet quality with mental wellbeing (depression, anxiety and stress) among USM undergraduate medical students.

1.6 Significance of study

Healthy eating is one of the ways of disease prevention especially related to non-communicable diseases (NCDs) such as ischemic heart disease, cerebrovascular disease, type II diabetes and certain types of cancer (Triches *et al.*, 2005). Mental health disorder can also be categorized as a non-communicable disease. Despite the health consequences of unhealthy eating habit or low diet quality, the practice of unhealthy eating habit is still prevalent among people living in Malaysia specifically university students. According to study conducted among multiethnic group found that the diet quality of adult urban Malaysians was found to need improvement (average M-HEI score: 61.3 ± 10.9). A similar finding was reported earlier in another intervention conducted among adult men. More than 55% of urban women were found to have diet quality that needs improvement (Ramadas *et al.*, 2021). The result of the study reflects to the inability of adult in Malaysia to remain motivated towards healthy eating habit or consumption of high-quality diet even though intervention has been conducted.

Therefore, maintaining a high-quality diet or healthy eating habits is important as a preventive strategy to deal with problems related to mental wellbeing. However, findings from previous studies have shown lack of awareness among adult specifically student in Malaysia about the impact of diet on mental wellbeing. Hence, the results of this study will be useful in developing intervention strategies such as establishing a more effective strategy to increase awareness of the importance of diet quality on mental wellbeing. American Society for Nutrition (ASN) notified that understanding the role of nutrition in health maintenance was one of Nutrition Research Needs focuses on high priority area (Ohlhorst *et al.*, 2013). Basic principles for designing, managing, and conducting clinical research studies are available in the literature, and it must be acknowledged that, as information accumulates, nutritional recommendations alter over time (Weaver & Miller, 2017). Thus, this study held a purpose to provide an overview of more recent issues related to clinical nutrition research. The finding result out of this study is hopefully to be useful to add to the previous study conducted and give a more in-depth understanding of said topic. The finding of this study will also provide information regarding association of diet quality and mental wellbeing among medical students in Universiti Sains Malaysia.

Figure 1 shows the conceptual framework depicting the association between diet quality and mental wellbeing. Both diet quality and mental wellbeing are said to be influenced by sociodemographic, health and environmental factors. Several factors that can be categorized as sociodemographic that impact diet quality and mental wellbeing which include age, gender, ethnicity, and household income (Jacka *et al.*, 2011). On the other hand, the health-related factor is body mass index, and the environmental factor is physical inactivity (Meegan *et al.*, 2017)

Numerous conducted studies have reported that diet quality was associated with sociodemographic and lifestyle factors, including age, sex, ethnicity, education, and energy intake (Kang *et al.*, 2019). Health factors such as Body Mass Index (BMI) also affect diet quality and mental wellbeing. Higher dietary quality is associated with lower BMI same goes to higher physical activity (Livingstone & McNaughton, 2016) Furthermore, environmental factor such as Physical activity could also affect diet quality and mental wellbeing. Evidence indicates that physically active individuals are less likely to develop major depression compared with those who are sedentary (Hamer *et al.*, 2009; Strawbridge *et al.*, 2002).

Diet quality affects mental wellbeing which is a general spectrum of mental health as well. Recently, some studies have reported that poor diet quality is associated with increased depression risk (Kuczmarski *et al.*, 2010). Improvements in diet quality were mirrored by improvements in mental health over the follow-up period, while deteriorating diet quality was associated with poorer psychological functioning (Jacka *et al.*, 2011)

1.7 Conceptual Framework

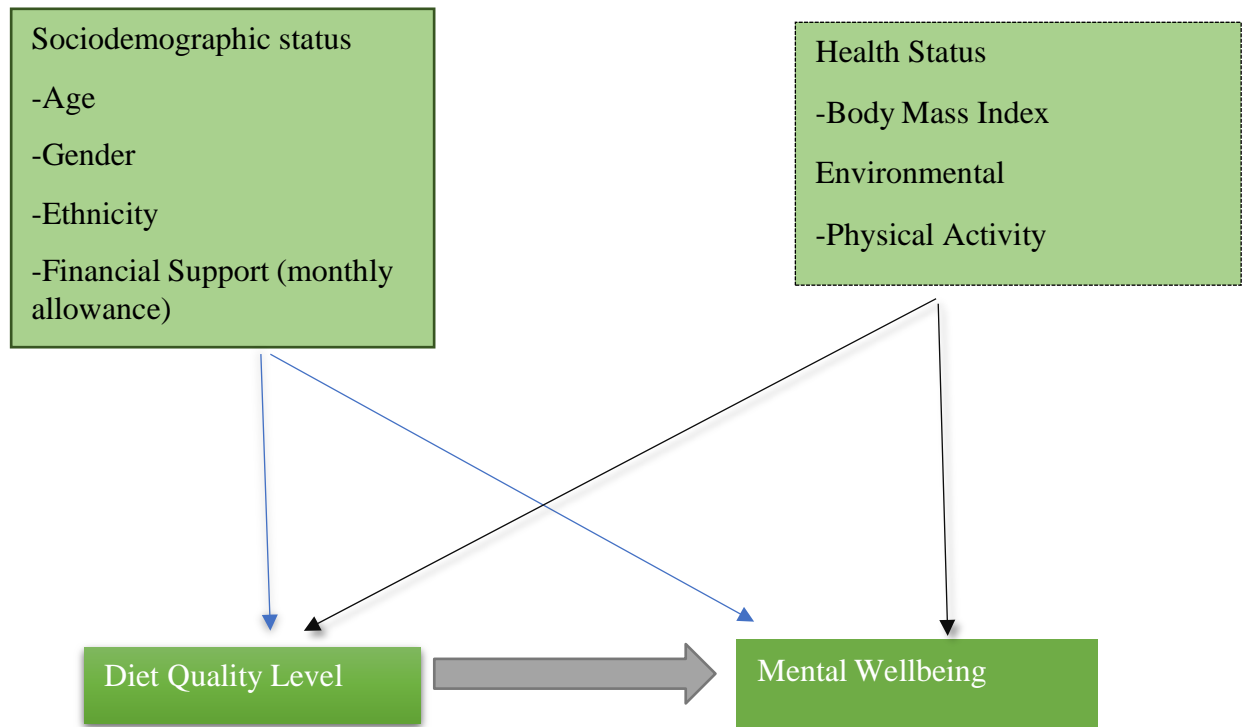


Figure 1: Conceptual Framework

CHAPTER 2

LITERATURE REVIEW

2.1 Factors Related to Mental Wellbeing

There is numerous data related to mental health and lifestyle. Mental health is one of the key components determining the state of mental wellbeing. Mental health and mental well-being can be seen to form two distinct, but correlated, continuous in populations of study (McAneney *et al.*, 2015). It can be concluded that factors causing declining of mental health are also related to impairment of mental wellbeing. Numerous factors can contribute to deterioration of mental health and most of it can be seen as a complex problem. Although it is hard to generalize the factors, it can be classified into several classifications such as biological factors, psychological factors, environmental factors, and socioeconomic factors. According to a study conducted by Universiti Teknologi MARA (UiTM) Arau, Perlis found that most undergraduate students experience declining of mental health through environmental factors such as dysfunctional family and social cultural expectation meanwhile biological factors such as lifestyle habit and eating pattern also contribute the most to the problem (Syaidatul.A *et al.*, 2023). Moreover, in another study conducted throughout universities across Selangor and Kuala Lumpur ascertained that lower socioeconomic status, poor academic performance and life satisfaction, smoking, social support, life stressors and unhealthy lifestyle such as physical inactivity and eating habits are factors associated with mental health problems which almost similar to the same study conducted on the same level (Hassan *et al.*, 2015).

2.2 Ways of Assessing Mental Wellbeing

Mental wellbeing can be assessed through numerous methods and screening tests. Some of the common test includes Warwick-Edinburgh mental wellbeing scale and depression, anxiety,

and stress (DASS) which is commonly use in clinical setting and other practices (Scottish Actionfor Mental Health (SAMH), 2010). Using screening tools like DASS is convenient to detect the absence of mental health disorders, hence DASS-21 will be used in this study to measure the state of mental wellbeing of undergraduate medical students in USMKK. This DASS-21 questionnaireis widely available and can be used for personal examination or clinical examination. Mentari Malaysia introduce DASS 21 as one of the screening tools under self-screening test service that isavailable online for the use of people living in Malaysia.

2.3 Consequences Related to Mental Wellbeing

Mental health illness has been a long-time issue that exists in the community. As day goes by more people are getting familiar with the words of mental health and mental wellbeing. Although, mental well-being literature can be confusing as many similar-sounding terms are used interchangeably such social or mental capital, positive mental health, psychological or subjective well-being and absence of mental health problems but the consequences of all related issue could also affect mental wellbeing (De Cates *et al.*, 2015). In other words, consequences of mental health issues could directly affect mental wellbeing. The brain is the most critical componentof the human system. However, mental health problems can be closely related to alteration in chemical products by the brain. Hundred thousand chemical reactions occur every second in the brain those reactions underlie the thoughts, actions, and behaviors with which we respond to environmental stimuli, the brain dictates the internal processes and behaviors that allow us to survive (National Institute of Health (US), 2007). Since the brain is the main processor of the human body, a single disruption could cause significant effect on the whole-body system. Mental illness shows prominent impact on health. Some of the consequences experiences by those with mental health disorder are deterioration of physical health such as cardiovascular disease, increasein mortality rate and decrease of sleep quality were reported (Clement-Carbonell *et al.*, 2021).

2.4 Diet Quality Status in Malaysia

Several studies including surveys have been carried out across the globe and nation to find the prevalence of diet quality among the community. For instance, a survey conducted by National Health and Nutrition Examination United States in 2003-2004 among 3,286 children (2 to 17 years), 3,690 young and middle-aged adults (18 to 64 years), and 1,296 older adults (65+ years) in ~~Amia~~ found that children and older adults had better-quality diets than younger and middle-aged adults and women had better-quality diets than men. Moreover, considering the heterogeneity of ethnicity in Malaysia, Malay subjects (33.0%) were found to have a greater proportion of having poor diet quality followed by Indian (10.0%) and Chinese (7.1%) (Faiz *et al.*, 2020). From the same study lower household income is said to have lower diet quality too. Meanwhile, mental wellbeing also relates to the same sociodemographic factors as diet quality. According to The National Health and Morbidity Survey (NHMS) (2015) discovered that 1 in 3 Malaysians have mental health issues, with highest prevalence among young adult aged 16-19 years as well as those from low-income families and women were also seen at higher risk of low mental wellbeing (Lee *et al.*, 2023).

2.5 Importance of Good Diet Quality

A good diet quality is defined as those with scores higher than 80. Food is a basic fuel that helps to sustain body function and provide energy, but not all food is beneficial to the body system. Healthy eating index is a helpful assessment to determine diet quality of an individual and help to understand eating behaviors to study which food are beneficial and not beneficial to human body. In addition, diet quality plays a vital role in ensuring the body meets nutritional requirements and sustains healthy body function. High diet quality thereby reflects achieving more optimal nutrient intake profiles and a lower risk of diet-related non-communicable disease (NCD) (Dalwood *et al.*, 2020). Generally, low quality diet includes highly processed snack foods, sugar-sweetened beverages, refined (white) grains, refined sugar, fried foods, foods high in saturated and trans fats, and high-glycemic foods such as potatoes are said to increase risk of non-communicable disease (Harvard, 2022). Besides that, adequate nutrition intake helps students to think smarter and increase concentration in class compared to students who lack certain nutrients in the diet for example, iron, iodine, protein tend to not have the same concentration for learning as compared to the students who have more balanced diets. This is because the content of food consumed would be able to affect

mental and physical health of the individual (Che Ibrahim *et al.*, 2015). A healthy dietary pattern which high score diet quality characterized by higher consumption of fish in men and fruits and vegetables in women was related to better cognitive performance and self-rated health in both sexes, and less depressive symptoms in women (Samier *et al.*, 2008). Others have also found that healthful dietary patterns rather than intake of isolated nutrients or foods may be responsible for good overall cognitive function and fewer depressive symptoms which indicate how important high diet quality is for overall mental wellbeing (Kuczmarski *et al.*, 2010)

2.6 Factors Influencing Diet Quality

Diet quality can be influenced by many factors be it internally or externally. It is said that the influence of socioeconomic status, physical and cultural factors contribute to the changes in dietary patterns such as families eating out, skipping meals, and consuming too much fast foods (Sidik & Rampal, 2009). Marquis (2019) stated that the cost of food is one of the factors influencing students' food preferences in which 42% of the respondents preferred foods that are easy to prepare which showed that they were concerned about time constraint. Students who lack cooking skills will consume food that can be quickly and easily prepared (Sprake *et al.*, 2018). Another study also revealed that students having problems, particularly time constraint due to university commitment, tend to eat quick-fixed meals, which led to unhealthy eating behavior (Hilger-Kolb & Diehl, 2019). According to study conducted, most of the respondents were not picky about foods and they usually ate something that was available and consumed a small portion of food to lose weight (Wy *et al.*, 2011). Accommodation status or students' residential environment has been observed to influence their dietary practices. University students, particularly those who live independently, away from parents and families have been reported to practice negative dietary habits which contribute to health implications as they grow older (Adelabu *et al.*, 2019). Additionally, a study conducted on Universiti Teknologi Mara found that many students did not *get all* the nutrients required for a healthy and balanced diet and it is quite worrisome to know that the students' fruits and vegetables intake was minimal when almost half of them chose fried foods and instant foods in addition to foods at cheaper prices over healthy and nutritious ones for their everyday meals (Wan. *et al.*, n.d.).

2.7 Assessment of Diet Quality

Several methods of assessment can be used to evaluate dietary quality. One of the assessments used to evaluate diet quality is Healthy Eating Index (HEI) which was first developed in 1995 in America to allow individuals to assess the overall quality of their diets, not simply isolated components (Kennedy *et al.*, 1995). Since then, it has been improvised and adapted by different countries based on their own dietary guidelines of the community. In Malaysia, the healthy index has been altered based on guideline provided by ministry of health and has been renamed to Malaysia Healthy Eating Index. The Malaysian Dietary Guidelines (MDG) 2010 and MDG for Children and Adolescents (MDGCA) 2013 were used as main references in developing the index components. In addition, the latest Malaysian Adults Nutrition Survey (MANS) and Adolescent Nutrition Survey (ANS) were also referred to ensure the relevance of the components selected and for adequacy components, the least restrictive method was used in setting the standard for the scoring system (Jailani *et al.*, 2021a). Meanwhile, the scoring system for moderation components was built based on the Recommended Nutrient Intake (RNI) 2017 and the new S-MHEI comprises of 11 components with a maximum total score of 100 (Jailani *et al.*, 2021b). The M-HEI consists of nine components of food groups which include seven food groups (grains and cereals, vegetables, fruits, meat, poultry and eggs, fish and seafood, legumes, and milk and dairy products) and two nutrients (fat and sodium) (Ayob.R *et al.*, 2020). The scores range from 0 to 100. An ideal overall HEI score of 100 reflects that the set of foods aligns with key dietary recommendations and dietary patterns published in the Dietary Guidelines (United States Dietary Association (USDA), 2023). A dietary intake score of more than 80% shows good diet quality while a score between 51 and 80% indicates the diet quality needs an improvement, while a total score below 51% is considered poor diet quality (Basiotis *et al.*, 2004)

2.8 Association of Diet Quality and Mental Wellbeing

The term diet quality has been gaining attention, especially in nutritional sciences and research. Diet quality is an umbrella term frequently used to describe how well an individual's diet conforms to dietary recommendations. A healthy, balanced, and nutritious diet means it is adapted to special individual needs to reach optimal health, that is, it supplies optimal levels of food and nutrients to maintain the body in a healthy state without excess, which may lead to increase in body weight or toxicity symptoms from some nutrients (Alkerwi, 2014). A high-quality diet can be defined as one which is hygienically safe, nutritious, balanced and adapted to individual requirements to prevent disease and ensure a good state of health as well as optimal development and growth (Guerrero & Rodriguez, 2016). Diet quality plays a major role in determining cognitive, and its impact on mental health. studies have been conducted to find the significant relationship between diet quality and mental wellbeing. A study conducted across universities in ASEAN country found that positive dietary behaviors which compose of vegetable, fruits high in fiber were associated with happiness meanwhile negative dietary behaviors (fast food consumption, having two or more soft drinks a day) were inversely associated with happiness, the study found some evidence that healthier dietary behaviors were associated with higher psychological well-being, lower mental distress and better mental health (Peltzer & Pengpid, 2017). Moreover, in another study conducted among higher educational institution in Malaysia found that diet quality have been reported to modulate inflammatory states which may either reduce or increase levels of anxiety, stress and depression and limited intake of fast food, moderate consumption of good fats and high intake of fruits, vegetables and fiber helps in reducing inflammation in the body which may lead to better mood, reduced stress and increased cognitive function (Tolkien *et al.*, 2019; Firth *et al.*, 2020).

CHAPTER 3

RESEARCH METHODOLOGY

3.1 Study Design

A quantitative method was carried out as the type of research in this study. Analysis of quantitative data research was conducted via the data collected through interview and self-administered for DASS-21 and sociodemographic data through google form and the questionnaire and consent of the participants of the topic association of diet quality and mental wellbeing.

Cross-sectional study was implemented in this study. This type of study enables investigation of the association of risk factors or predictor variable and the outcomes of the interest at the same time. It is a convenient study as only one time data collection needs to be conducted and no follow up. However, the major limitation of cross-sectional studies is that they do not allow for the conclusion of causality, as they are inherently nonrandomized and directionality between associated variables cannot always be determined.

3.2 Study Area

This research was carried out in Health Campus Universiti Sains Malaysia, Kubang Kerian 16150 Kota Bharu, Kelantan, Malaysia. The selected locations to conduct the research was held Health Campus particularly in *dewan Pusat Mahasiswa (PUMA)*. This place was chosen as it is convenient for students to attend and access the area and it is a leisure place where briefing session will be conducted at ease. Furthermore, the area is also furnished fully with air conditioning, which makes it the best location for research. The chosen place is also situated in between Desasiswa Murni and Nurani making it easy for students to take place in the research.

3.3 Study Population

The targeted population that involved in this study was year 1 until year 5 undergraduate student from School of Medical Science of Universiti Sains Malaysia. This population were chosen as it is believed that the prevalence of mental well-being and mental health are higher among medical students. Moreover, medical students have better understanding about mental health issue inform of it risk and consequences and there was little research conducted on the predictable variables and outcomes among medical students across universities in Malaysia. Hence, this population is the most suitable subject to be included in the research.

3.4 Subject Criteria

3.4.1 Inclusion Criteria

1. Year 1 until year 5 undergraduate Medical Student
2. Undergraduate students aged 19-30 years old
3. Female and male
4. Individually willing to participate in the study

3.4.2 Exclusion Criteria

1. Mentally and physically disabled individual
2. Refusal to give consent
3. Individual under serious medical condition (Cancer, heart related problems, hospice and bedridden)

3.5 Sample Size estimation

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

n = sample size

Z = value presenting the desired confidence level

Δ = absolute precision/percentage of true value

p = anticipated population proportion Using Δ value of 0.08 and confidence level of 95% for the study, Z-score will be 1.96. The prevalence of mental health problem among students of age 16 years old and above is 25% (Kotera *et al.*, 2021b). For p -value, it represents the prevalence of mental health issue at 35% which will be 0.25%.

$$n = \left[\frac{1.96}{0.08} \right]^2 0.25(1 - 0.25) = 112.5 \approx 113$$

To prepare for any possibilities, extra dropout participants must be enrolled in the research.

Therefore, 20% drop out rate was applied to the sample size:

Sample size, $n = 113$ subjects

Dropout rate = 20%

20% x 113 subjects = 23 subjects

Total subjects: $113 + 23 = 136$ subjects

Therefore, the final number of participants that was included in this research was about 136 participants.

3.6 Sampling Method

The subjects of study were chosen via simple random sampling. This is a type of probability sampling where the process was carried out by randomly selecting a group of subjects from the sample that was obtained from the list of undergraduate medical students from year 1 to year 5. The process of random sampling is non bias as all subjects have equal chance to be selected as the subjects. This process can be conducted via random number table, lottery method or computer program (SPSS) depending on what is the most convenient. The subject that was chosen based on inclusion and exclusion criteria listed based on availability among the undergraduate students from School of Medical Science (PPSP).

3.7 Research Tool

Three sections of the questionnaire were used as the research tool in the study. Part, one consists of a set questionnaire on sociodemographic factors such as age, gender, ethnicity, and financial support. The second part consists of a set of validated self-administered questionnaires which composed of 3 parts namely depression, anxiety and stress will be used which was adapted from previous studies by Lovibond & Lovibond (1995) which consists of 42 self-report items that was then modified to a shorter version of 21 self-report items. The questionnaire was validated through a pilot study among 240 Medical students in Lagos State University Nigeria (Coker *et al.*, 2018), Cronbach alpha is used to determine the reliability, discriminative, concurrent and convergent properties of the findings. A value of 0.81, 0.89 and 0.78 of depression, anxiety and stress Cronbach Alpha was obtained, proving this questionnaire is reliable (Coker *et al.*, 2018). Meanwhile the third part was asked on 3 days dietary record which is self-assessment by the subjects. The questionnaire will be provided in English. The participants were expected to complete the DASS 21 questionnaire in around 20 minutes meanwhile 3 days diet record will take approximately 3 days to be completed.

3.7.1 Part 1: Socio-demographic information

Socio-demographic data collected are age, gender, ethnicity, and financial support, such as monthly allowance, will be asked in questionnaire form.

Part 2: Mental wellbeing by DASS

The state of mental wellbeing among undergraduate medical students were measured and assessed using validated DASS questionnaire adapted from the research by Lovibond SH & Lovibond PF which is an open-ended questionnaire was included in questionnaire form. This screening tool as its name consists of 21 questionnaires related to 3 main domains of depression, anxiety, and stress. The DASS-21 is the short form and findings from studies support its validity as an approved instrument for measuring adverse mental states and depression, anxiety, and stress in adults (patients and non-patients). The 21 items on the questionnaire comprise a set of 3 self-reported scales designed to assess DASS and 7 elements on the scales are graded on a Likert scale from 0 to 3 (0: “Did not apply to me at all,” 1: “Applied to me to some degree or some of the time,” 2: “Applied to me to a considerable degree or a good part of the time,” and 3: “Applied to me very much or most of the time”) (Marijanović *et al.*, 2021). Depression, anxiety, and stress scores are measured by summarizing the scores of the related items. The DASS-21 is a shorter version of the 42-item original DASS, the score for each subscale must be multiplied by 2 to calculate the final score and according to the manual, the resulting ratings then are classified as normal, mild, moderate, severe, or extremely severe (Keating *et al.*, 2021).

The first domain is depression. This domain will evaluate the depression level of individual. Seven different items that will be assess based on the current mood and feelings such as dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest or involvement, anhedonia (displeasure of doing what one’s used to love). Meanwhile, anxiety will evaluate the feeling of anxiousness in different individuals. This compromise of items such as autonomal arousal, skeletal muscle effects, situation anxiety and subjective experience of anxious affect which also consists of 7 items. Lastly, stress, for the feeling of stress the same number of items as domain of depression and anxiety will be implemented in the questionnaire. The stress feeling is measure by the levels of chronic nonspecific arousal, difficulty relaxing, nervous arousal and being easily upset, agitated, irritable, over-reactive and impatient which are items number 1,6,8,11,12,14,18.

Table 1 scoring method

Part	Content	Number of Questions	Scoring
	Depression Anxiety Stress	7	0- Did not apply to me at all 1- Applies to me some degree, or some of the time 2- Applied to me to a considerable degree 3- Applied to me every time

Each answer includes selection of 0,1,2,3, and score depending on how the subject feels for the past week. The total mark for each domain needs to be multiple by two as the questionnaire is a short form questionnaire and the original consists of 42 number of questions or items (Lovibond 1995). The interpretation of scoring is as below

DASS Severity Ratings
(Multiply summed scores
by 2)

Severity	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely severe	28+	20+	34+

The range will be used to evaluate the current mental state of wellbeing of the subjects

3.7.3 Part 3: 24-hour diet recall

24-hour diet recall is a tool to record food 24 hour prior to the interview .It is a comprehensive tool that can be used to understand dietary pattern of and individual and give an insight to their dietary habits. The 24-hour dietary recall method is frequently employed in national nutrition surveys due to its several advantages, including its validity, high level of precision, and high response rate (Huang *et al.*, 2022). This approach provides a detailed snapshot of an individual's food and beverage consumption over the previous day, ensuring accurate dietary data. Moreover, the short recall period helps participants remember their intake better, contributing to higher participation rates. This subjective recall method involves either face-to-face or telephone interviews, and it can also be conducted through online self-reports. The process entails accurately remembering, detailing, and measuring all foods and beverages consumed in the 24 hours preceding the interview (Castell *et al.*, 2015). The quality of diet intake was evaluated based on Malaysia Healthy Eating score by the amount of serving based on food groups per day (Chong *et al.*, 2019). Malaysia Healthy eating Index is score based on the guideline provided by Malaysia dietary guideline (MDG), MDG for children and adolescent (MDGCA) and RNI 2017. The method of scoring is

dependent on the serving of food groups consume per day which consists of 10 food groups namely:

New standardized Malaysia Healthy Eating Index (S-MHEI)

o	Component	Type	Max Score	Criteria for Min Score (0)	Criteria for Max Score
1	Total grains	A	5	0 servings/1000 kcal	1.4 servings/1000 kcal
2	Whole grains	A	5	0 servings/1000 kcal	0.7 servings/1000 kcal
3	Fruits	A	10	0 servings/1000 kcal	0.9 servings/1000 kcal
4	Vegetables	A	10	0 servings/1000 kcal	1.2 servings/1000 kcal
5	Fish	A	10	0 servings/1000 kcal	0.4 servings/1000 kcal
6	Meat, poultry, and eggs	A	10	0 servings/1000 kcal	0.4 servings/1000 kcal
7	Legumes and nuts	A	10	0 servings/1000 kcal	0.4 servings/1000 kcal
8	Milk and milk products	A	10	0 servings/1000 kcal	0.9 servings/1000 kcal
9	Total Fat	O	10	0 or $\geq 55\%$ of TEI	25–30% of TEI
10	Added Sugar	M	10	$\geq 25\%$ of TEI	$\leq 5\%$ of TEI
11	Sodium	M	10	≥ 2300 mg	≤ 1925.0 mg

3.8 Operational Definition

DASS: Depression, Anxiety, Stress

Depression: Loss of interest and pleasure of activity related to self and surrounding

Anxiety: The feeling of restlessness of mind and body causing heart to pump

rapidly
Stress: A feeling that arise when facing life challenges from all sorts of factors

24-hour diet recall

Tool to record dietary intake to obtain the serving size of food groups per meal to be observed and evaluated.

NCD: Non-communicable Disease

Non-communicable disease is a type of disease that affect someone due to lifestyle and could be inherited through family history, but it is non spreadable from one person to another.

Mental Wellbeing

Mental well-being can be described as absence of any mental disorders and feeling of mental harmony in a person.

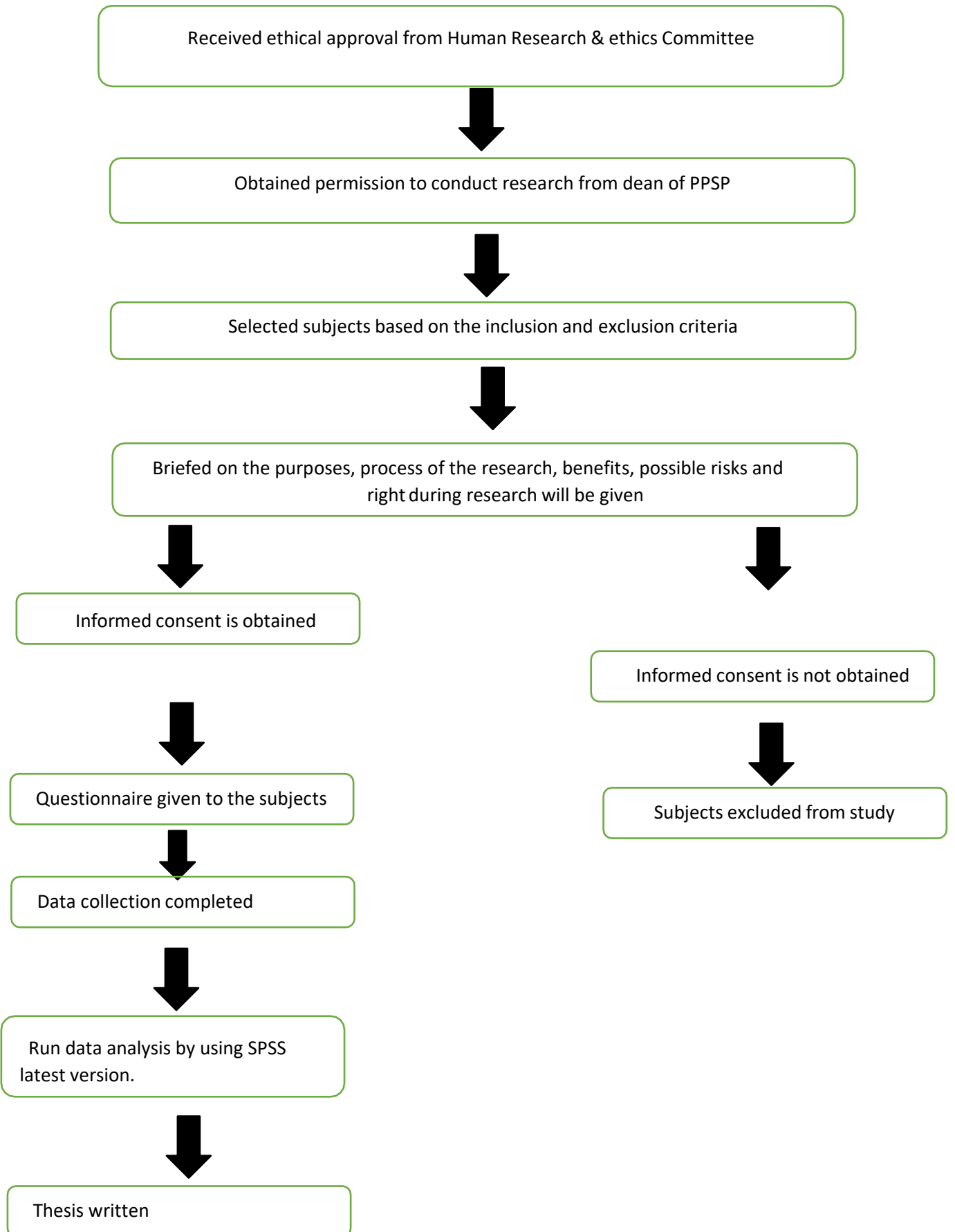
3.9 Data Collection Method

The data collection method was done once the approval from Human Research Ethics Committee of USM is obtained. Only 1 school in Health Campus of USM selected for the research namely School of Medical Science (PPSP). Permission to conduct the research was asked from the dean of chosen school, when the permission was obtained and agreed to participate in the study the data was collected. Subjects were recruited using simple random sampling that fulfills inclusion criteria.

Randomly selected subjects were contacted through social media such as WhatsApp through simple message information. The message includes calling for students to participate in the research by using attractive wordings and simple sentences so as not to confuse subjects. One WhatsApp or telegram group was created to include all the participants chosen via simple random sampling. A simple briefing in the social media group was given to highlight that the collected information will be used only for research purposes and kept confidential. Informed consent was distributed among the subjects and collected once they agreed to participate in the study. The subjects were once again thoroughly brief regarding the study purpose, objective, procedure, risks, benefits, privacy, confidentiality, and their right to refuse or withdraw from the study. Subjects were guided and informed on the measurements to be used in 24-hour diet recall, steps to fill in the questionnaire including DASS questionnaire. Subjects completed the 24-hour diet recall individually from the questionnaire given in the social media group which was created WhatsApp group created as medium of communication.

In the questionnaire forms, a 3-digit series number such as “001”, “002”, and “003” will be used as code for the subjects. The first part asked about the socio-demographic data such as age, gender ethnicity, household income or allowance per month, year of study (for student), history of mental health and medication consumption if related. In the second part, the questionnaire used for evaluating Depression, Anxiety, and stress (DASS) and the last part was the 24-hour diet recall questionnaire. All forms of information obtained were kept anonymous to ensure confidentiality. After all the data is collected analysis will be run by using the latest version of Statistical Package for Social Sciences (SPSS).

3.10 Study Flowchart



3.11 Research Variable

3.11.1 Independent Variable

Diet quality

3.11.2 Dependent Variable

Mental wellbeing

3.12 Data Analysis

The data analysis was run using IBM Statistical Package for the Social Sciences (SPSS), version 29.0. The social demographic data and mental health status was summarized using descriptive statistics of the subjects. Meanwhile for categorical data, presented using frequency (n) and percentage (%). Numerical represented using mean (\pm SD) or median(IQR) based on the normality distribution. The quality of dietary intake for each subject is represented in the form of Percentages which represents categorical data.

Diet quality (categorical variable) and its association with mental wellbeing (numerical variable) was tested using correlation test such as Pearson's Correlation and the Spearman's Correlation test if not normally distributed.

3.13 Ethical Issues

3.13.1 Subjects Vulnerability

Individuals with physical disabilities and those with severe medical conditions were not included in this study. No individual was forced and pressured to take part in this study and has absolute autonomy to make decisions without anyone interfering with the participants' decision. Before the study was carried out, participants were given with consent informed and only those who return the consent form and agree to be included in the study were eligible to take part. Once the consent information is collected the study was started. Beforehand, subjects were collectively briefed about the main purpose and objectives of the research. This is to ensure that all participants have clear knowledge and fully comprehend the process, purpose, and risks of the study, and that participants can cooperate fully with the research team. Subjects have the right to refuse to participate in the analysis or to avoid participating at any time, with no penalty or loss.

3.13.2 Declaration of the Absence of Conflict of Interest

The researcher involved declares there is no conflict of interest in this study

3.13.3 Privacy and Confidentiality

Privacy and Confidential have its harm and fully aware of it. All the identities of the participants were kept private and anonymous. The personal information of subjects was also used only for academic purposes and not leaked anywhere outside of the study. No information was leaked or posted on social media networks. Data entry in SPSS was done with a special code, and self-identifying statement without disclosing the subject's real identity. This is to protect the confidentiality of the data and subjects' information. The information was provided in groups rather than as separate subjects., Moreover, all the outcomes which were presented as

grouped data I strictly accessible to research team only. Personal information about participants, such as their ID card number, phone number, and address, were not disclosed or distributed. The socio-demographic, and consent forms were kept away from reaches of people except the researcher. When transferring data to a computer, strong passwords are created to ensure only the research team can log in. Subjects will be informed of beforehand if publications are to be made. After gaining permission from individuals, any publications related to this study are possible. However, subjects' identities will be kept private and anonymous only by using number and codeto protect subjects' privacy.

3.13.4 Community Sensitivities and Benefits

The findings obtained from this study will be useful to the policymakers and program managers to manage nutrition education and programmed to be implement among students related to the issue. The questionnaire and interview question may be sensitive to the subjects as it is closely related to personal problems and current health status. A conducive briefing session was conducted to ensure subjects were comfortable and confident to answer each question in the form given. Subjects will also be asked to think carefully before answering the questions. The time of briefing and to fill in the questionnaire will not be long to prevent subjects from getting boring and annoying while answering. To minimize sensitivity, the participants were informed about the study and offered the option to participate.

3.13.5 Honorarium and incentives

Respondents were not provided with an honorarium for participation in this study.

CHAPTER 4

RESULTS

4.1 Sociodemographic Characteristics of Respondents

The socio-demographic data presented in Table 4.1 offers a detailed overview of the characteristics of the 139 respondents involved in the study. The sample is predominantly female, with 78.4% (109 respondents) compared to 21.6% (30 respondents) male. Age-wise, the majority of respondents are young adults aged 19-24 years, accounting for 82.7% (115 respondents), followed by 12.2% (17 respondents) aged 25-30 years, and 5.0% (7 respondents) aged 31-34 years. Ethnically, the respondents are Malay (86.3%, 120 respondents), with smaller representations from Chinese and Indian ethnicities (each 5.8%, 8 respondents) and a small group classified as Others (2.2%, 3 respondents). Marital status data reveals that all respondents are single (99.3%, 138 respondents), with only one married individual (0.7%).

Regarding their academic standing, the respondents are evenly distributed across different years of study: Year 1 (23.7%, 33 respondents), Year 2 (23.0%, 32 respondents), Year 3 (18.0%, 25 respondents), Year 4 (18.0%, 25 respondents), and Year 5 (16.5%, 23 respondents). Financial support varies among respondents, with the majority (46.9%, 64 respondents) receiving a monthly allowance in the range of RM 800-1000. A notable portion receives RM 400-700 (33.1%, 46 respondents), while smaller groups manage with RM 300 (13.7%, 19 respondents) or more than RM 1000 (7.2%, 10 respondents). These socio-demographic characteristics provide a comprehensive context for understanding the background of the respondents and interpreting the study's findings considering these factors.

Table 4.1: Socio-demographic characteristics of the respondents (n=139)

Characteristics	Frequency (n)	Percentages (%)
Gender		
Male	30	21.6
Female	109	78.4
Age		
19-34	115	78.2
25-30	17	11.6
Ethnicity		
Malay	120	86.3
Chinese	8	5.8
Indian	8	5.8
Others	3	2.2
Marital status		
Single	138	99.3
Married	1	0.7
Year Of Study		
Year 1	33	23.7
Year 2	32	22.3
Year 3	25	18.0
Year 4	25	18.0
Year 5	23	16.5
Financial support/monthly allowance		
RM300	19	13.7
RM 400-700	46	33.1
RM 800-1000	64	46.9
>RM1000	10	7.2

4.2 Mental Wellbeing of USM undergraduate medical students (Depression, Anxiety & Stress)

The data in Table 4.1.2 and 4.1.2 presents the mental wellbeing of USM undergraduate medical students in terms of depression, anxiety, and stress among 139 students. The survey of 139 participants shows that most have normal levels of depression (64.7%, median score 6, IQR 10) and stress (74.1%, median score 10, IQR 12), while 46.8% have normal levels of anxiety (median score 8, IQR 10). Mild to moderate levels were less common, with 27.3% experiencing moderate anxiety. Severe and extremely severe levels are rare but more notable in anxiety (20.2%) compared to depression (8.7%) and stress (4.3%). The medians and interquartile ranges highlight central tendencies and variabilities in these mental health measures.

The study further broke down the prevalence of depression, anxiety and stress by gender. For depression, 64.7% of the total sample falls within the normal range, with a higher percentage of females (65.5%) compared to males (62.0%). Mild depression was observed in 16.5% of the total respondents, again with a higher prevalence among females (17.3%) than males (13.8%). Moderate depression affects 10.1% of the total respondents, with a nearly equal distribution between males (10.3%) and females (10.0%). Severe depression was reported by 6.5% of respondents, more commonly in males (10.3%) than females (5.5%). Extremely severe depression is the least common, affecting 2.2% of the total sample, with 3.4% of males and 1.8% of females.

In terms of anxiety, 46.8% of the total sample falls within the normal range, with a similar distribution among males (44.8%) and females (47.3%). Mild anxiety was presented in 5.8% of respondents, with females (7.3%) more affected than males (0.0%). Moderate anxiety was observed in 27.3% of respondents, more prevalent among females (30.0%) than males (17.2%). Severe anxiety affects 10.1% of the total sample, with males (17.2%) more affected than females (8.2%). Extremely severe anxiety was reported by 10.1% of respondents, with a higher prevalence in males (20.7%) compared to females (7.3%).

For stress, 74.1% of the total sample falls within the normal range, with females (78.2%) more frequently reporting normal stress levels than males (58.6%). Mild stress

experienced by 12.2% of respondents, with a slightly higher prevalence among males (13.8%) compared to females (11.8%). Moderate stress affects 9.4% of the total sample, with a higher prevalence among males (13.8%) than females (8.2%). Severe stress was reported by 3.6% of respondents, more common in males (10.3%) than females (1.8%). Extremely severe stress is the least common, affecting only 0.7% of the total sample, with 1.0% of males reporting it and none among females. Overall, the data indicated that females generally report lower levels of severe and extremely severe depression, anxiety, and stress compared to males

Table 4.2.1 Mental Health Problems of undergraduate USM medical student

Subscale	Total (n=139)		Median (IQR)
	Frequency (n)	Percentage (%)	
Depression			6 (10)
Normal	90	64.7	
Mild	23	16.5	
Moderate	14	10.1	
Severe	9	6.5	
Extremely severe	3	2.2	
Anxiety			8 (10)
Normal	65	46.8	
Mild	8	5.8	
Moderate	38	27.3	
Severe	14	10.1	
Extremely severe	14	10.1	
Stress			10 (12)
Normal	103	74.1	
Mild	17	12.2	
Moderate	13	9.4	
Severe	5	3.6	
Extremely severe	1	0.7	

Table 4.2.2: Prevalence of Depression, Anxiety and Stress among male and female students

Subscale	Male (n=30)		Female (n=109)	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Depression				
Normal	18	62.0	72	65.5
Mild	4	13.8	19	17.3
Moderate	3	10.3	11	10.0
Severe	3	10.3	6	5.5
Extremely severe	1	3.4	2	1.8
Anxiety				
Normal	13	44.8	52	47.3
Mild	0	0.0	8	7.3
Moderate	5	17.2	33	30.0
Severe	5	17.2	9	8.2
Extremely severe	6	20.7	8	7.3
Stress				
Normal	17	58.6	86	78.2
Mild	4	13.8	13	11.8
Moderate	4	13.8	9	8.2
Severe	3	10.3	2	1.8
Extremely severe	1	3.5	0	0.0