

**ASSOCIATION BETWEEN FOOD SECURITY STATUS, NEGATIVE  
EMOTIONAL STATES AND ACADEMIC PERFORMANCE AMONG  
UNDERGRADUATE STUDENTS AT SCHOOL OF HEALTH SCIENCES IN  
UNIVERSITI SAINS MALAYSIA**

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**SCHOOL OF HEALTH SCIENCES  
UNIVERSITI SAINS MALAYSIA**

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UNIVERSITI SAINS MALAYSIA**

**by**

**ONG JING SHUN**

**Dissertation submitted in partial fulfillment of the requirements for the degree of  
Bachelor in Nutrition with Honours**

**Jan 2025**

## CERTIFICATE

This is to certify that the dissertation entitled “Association between Food Security Status, Negative Emotional States and Academic Performance among Undergraduate Students at School of Health Sciences in Universiti Sains Malaysia” is the bona fide of research work done by Ms Ong Jing Shun during the period from March 2024 to Jan 2025 under my supervision. I have read this dissertation and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation to be submitted in partial fulfillment for the degree of Bachelor in Nutrition with Honours.

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## DECLARATION

I hereby to 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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## TABLE OF CONTENTS

LIST OF TABLES .....	v
LIST OF FIGURES .....	vii
LIST OF ABBREVIATIONS .....	viii
ABSTRAK.....	1
ABSTRACT .....	3
CHAPTER 1: INTRODUCTION .....	5
1.1 Background of study .....	5
1.2 Problem Statement .....	10
1.3 Study rationale .....	14
1.4 Research Questions .....	16
1.5 Objectives .....	17
1.5.1 General objective .....	17
1.5.2 Specific objectives .....	17
1.6 Hypothesis .....	18
1.7 Conceptual framework.....	18
CHAPTER 2: LITERATURE REVIEW .....	20
2.1 Factors that influence students' food security status .....	20
2.2 Food security status and negative emotional states .....	23
2.3 Food security status and academic performance.....	25
2.4 Negative emotional states and academic performance .....	27
CHAPTER 3: METHODOLOGY .....	29
3.1 Research design.....	29
3.2 Study area .....	29
3.3 Study population.....	30
3.4 Subject criteria .....	30
3.4.1 Inclusion criteria .....	30
3.4.2 Exclusion criteria .....	31
3.5 Sample size estimation .....	31
3.6 Sampling method and subject recruitment .....	35
3.7 Research tools .....	36
3.8 Operational definition .....	39

3.9 Data collection method .....	41
3.10 Study flowchart .....	43
3.11 Data analysis .....	44
3.12 Ethical considerations .....	44
CHAPTER 4: RESULTS .....	47
4.1 Sociodemographic characteristics.....	47
4.2 Food security status .....	49
4.3 Negative emotional states.....	50
4.4 Academic performance .....	52
4.5 Association between food security status and negative emotional states.....	52
4.6 Association between food security status and academic performance .....	56
4.7 Association between negative emotional states and academic performance .....	57
CHAPTER 5: DISCUSSION .....	60
5.1 Prevalence of food insecurity .....	60
5.2 Negative emotional states.....	65
5.3 Academic performance.....	69
5.4 Association between food security status and negative emotional states.....	73
5.5 Association between food security status and academic performance .....	78
5.6 Association between negative emotional states and academic performance .....	80
5.7 Strengths and limitations of study.....	88
CHAPTER 6: CONCLUSION .....	90
6.1 Recommendations .....	91
REFERENCES .....	92
APPENDIX .....	124
Appendix A: Online Questionnaire (Google Form) .....	124
Appendix B: Poster advertisement .....	135
Appendix C: Participant Information Sheet and Consent Form.....	136
Appendix D: JEPeM Approval Letter.....	143

## LIST OF TABLES

	Page
Table 1.7: Independent and dependent variables	19
Table 4.1: Descriptive statistics of sociodemographic characteristics among undergraduate students at School of Health Sciences in USM (n=136)	48 – 49
Table 4.2: Descriptive statistics of food security status among undergraduate students at School of Health Sciences in USM (n=136)	50
Table 4.3: Descriptive statistics of negative emotional states among undergraduate students at School of Health Sciences in USM (n=136)	51
Table 4.4: Descriptive statistics of academic performance among undergraduate students at School of Health Sciences in USM (n=136)	52
Table 4.5.1: Association between food security status and depression among undergraduate students at School of Health Sciences in USM (n=136)	54
Table 4.5.2: Association between food security status and anxiety among undergraduate students at School of Health Sciences in USM (n=136)	55

Table 4.5.3:	Association between food security status and stress among undergraduate students at School of Health Sciences in USM (n=136)	55
Table 4.6:	Association between food security status and academic performance among undergraduate students at School of Health Sciences in USM (n=136)	56
Table 4.7.1:	Association between depression and anxiety with academic performance among undergraduate students at School of Health Sciences in USM (n=136)	58-59
Table 4.7.2:	Association between stress and academic performance among undergraduate students at School of Health Sciences in USM (n=136)	59

## LIST OF FIGURES

	Page
Figure 1.7: Independent and dependent variables	18
Figure 3.5.1: Photo of G*Power	34
Figure 3.10.1: Study flowchart	43

## **LIST OF ABBREVIATIONS**

USM: Universiti Sains Malaysia

AFSSM: Adult Food Security Survey Module

DASS-21: Depression, Anxiety and Stress Scale-21 Items

CGPA: Cumulative Grade Point Average

JPA: Jabatan Perkhidmatan Awam

PTPTN: Perbadanan Tabung Pendidikan Tinggi Nasional

MARA: Majlis Amanah Rakyat

IIUM: International Islamic University Malaysia

**HUBUNGKAIT ANTARA STATUS SEKURITI MAKANAN, KEADAAN  
EMOSI NEGATIF DAN PRESTASI AKADEMIK DALAM KALANGAN  
PELAJAR SARJANA MUDAH DI PUSAT PENGAJIAN SAINS KESIHATAN  
UNIVERSITI SAINS MALAYSIA**

**ABSTRAK**

Status sekuriti makanan perlu dititikberatkan dalam kalangan pelajar universiti. Status sekuriti makanan boleh mempengaruhi kesejahteraan emosi dan kejayaan akademik pelajar. Oleh itu, kajian ini bertujuan untuk menentukan hubungan antara status sekuriti makanan, keadaan emosi negatif dan prestasi akademik. Seramai 136 pelajar sarjana muda sains kesihatan USM telah dikumpul dengan menggunakan kaedah persampelan mudah. Soal selidik dalam talian dan ditadbir sendiri telah diedarkan untuk mendapatkan ciri sosiodemografi, status sekuriti makanan (US AFSSM), keadaan emosi negatif (DASS-21) dan prestasi akademik (PNGK). SPSS versi 29 digunakan untuk menganalisis data. Hasil kajian menunjukkan hampir separuh daripada responden mengalami ketidakjaminan makanan dengan 27.9% mempunyai sekuriti makanan yang rendah dan 20.6% sebagai sekuriti makanan yang sangat rendah. Antara responden yang mempunyai sekuriti makanan, terdapat 16.2% sekuriti makanan tinggi dan 35.3% sekuriti makanan marginal iaitu yang tertinggi dalam empat darjah sekuriti makanan. Sementara itu, kemurungan normal, keresahan normal dan stres normal adalah peratusan tertinggi dalam kategori masing-masing iaitu 63.2%, 36.1%, dan 58.9%. Dari segi prestasi akademik, 61.8% responden memperoleh Purata Nilai Gred Kumulatif (PNGK) cemerlang diikuti dengan 38.2% PNGK baik. Kajian ini mendedahkan terdapat hubungan yang signifikan antara status sekuriti makanan dan keadaan emosi negatif termasuk

kemurungan ( $\chi^2 = 9.582$ ; nilai  $p = 0.048$ ), kerasahan ( $\chi^2 = 14.266$ ; nilai  $p = 0.006$ ) dan stres ( $\chi^2 = 13.784$ ; nilai  $p = 0.005$ ). Selain itu, pelajar yang mengalami ketidakjaminan makanan kurang berkemungkinan melaporkan PNGK cemerlang berbanding pelajar dengan sekuriti makanan ( $\chi^2 = 4.275$ ; nilai  $p = 0.039$ ). Manakala kemurungan ( $\chi^2 = 18.579$ ; nilai  $p < 0.001$ ), kerasahan ( $\chi^2 = 14.825$ ; nilai  $p = 0.005$ ), dan stres ( $\chi^2 = 12.188$ ; nilai  $p = 0.009$ ) juga menunjukkan hubungan negatif dengan prestasi akademik. Penemuan ini menekankan keperluan untuk menangani status sekuriti makanan. Program intervensi yang disasarkan sepatutnya perlu dijalankan untuk meningkatkan status sekuriti makanan pelajar, menyokong kesihatan emosi dan kecemerlangan akademik mereka.

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**ABSTRACT**

Food security status needed to get more concerned by university students. Food security status could influence students' emotional well-being and academic performance. Thus, this study aimed to determine the association between food security status, negative emotional states and academic performance. A total of 136 undergraduate health sciences students from USM were recruited in this study using the convenience sampling method. An online and self-administered questionnaire was distributed to obtain sociodemographic characteristics, food security status (US AFSSM), negative emotional states (DASS-21) and academic performance (CGPA). SPSS version 29 was used to perform data analysis. The results indicated that nearly half of the respondents experienced food insecurity with 27.9% of low food security and 20.6% were identified as very low food security. Among food secure respondents, there were 16.2% of high food security and 35.3% of marginal food security which was the highest among four of the food security degrees. Meanwhile, normal depression, anxiety and stress were the highest percentages within their categories at 63.2%, 36.1%, and 58.9% respectively. In terms of academic performance, 61.8% of respondents obtained excellent CGPA followed by 38.2% with good CGPA. It revealed a significant association between food security status and negative emotional states including depression ( $\chi^2 = 9.582$ ; p-value = 0.048), anxiety ( $\chi^2 = 14.266$ ; p-value = 0.006) and stress ( $\chi^2 = 13.784$ ; p-value = 0.005).

Additionally, food-insecure students were less likely to report excellent CGPA than food-secure students ( $\chi^2 = 4.275$ ; p-value= 0.039). While depression ( $\chi^2 = 18.579$ ; p-value < 0.001), anxiety ( $\chi^2 = 14.825$ ; p-value = 0.005), and stress ( $\chi^2 = 12.188$ ; p-value = 0.009) were negatively associated with academic performance. These findings highlighted the need to address food security status. Targeted intervention programs should have been carried out to improve students' food security status which further supported their emotional health and excel in academics.

## CHAPTER 1: INTRODUCTION

### 1.1 Background of study

According to the Food And Agriculture Organization of United Nation, food security is defined as when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life (Goodness Ogeyi Odey *et al.*, 2022). On the other hand, food insecurity was defined as the lack of physical or economic access to safe, nutritious, and sufficient food (Foini *et al.*, 2023). Given its high prevalence and detrimental effects on nutrition, health and well-being, food insecurity was a serious public health concern. This continued to be one of the major challenges included in the 2030 Agenda for Sustainable Development (United Nations, 2023). The Sustainable Development Goals (SDGs) were a group of internationally recognized goals that aimed to eradicate poverty, protect everything that made the earth habitable and ensure every individual achieved peace and prosperity (Morton *et al.*, 2019). The United Nations set "end hunger, achieve food security and improve nutrition and promote sustainable agriculture" as its second Sustainable Development Goal. However, projection currently indicated that even with considerable developments, the world would not be able to meet the second SDG until 2030 (Marques *et al.*, 2022).

Generally, food insecurity was a multifaceted issue that arose from the interaction of several political, sociodemographic, and environmental factors. While food security consisted four main dimensions which included availability, accessibility, utilization and stability. The first dimension of food security was food availability which related to ensure adequate amount and variety of food accessible for consumption, whether it came from the farm, the market, or somewhere else. Next, having the financial and physical

resources to acquire proper foods for a healthy diet is referred to as food access. The household's income, how income is distributed within the household, the cost of food, and the distance to markets all affect access. Third, the ability and resources required to utilise food in a way that supports healthy diets such as adequate calories along with essential nutrients, drinkable water, and proper sanitation are implied by food utilisation. Depending on a person's health, utilisation frequently refers to their capacity to absorb nutrients. The fourth dimension was stability, which mostly referred to the availability and quality of food but also applied to the stability of the food supply and access (Fanzo, 2023). An individual who fulfilled the four main dimensions was considered food secure. Moreover, agency and sustainability have also been suggested as essential components of food security (Clapp *et al.*, 2021). Agency was defined as the ability of individuals or groups to choose what foods to eat, produce and the methods used to grow, prepare, and transport food. Meanwhile, sustainability was indicated as the capacity of food systems across time to deliver nutrition and food security without compromising the next generations.

Individuals who were food insecure frequently ate a diet low in nutrients but high in added sugar, salt, and saturated fat, which promoted the onset of chronic illnesses such as diabetes, heart disease, stroke, obesity, and hypertension (Carvajal-Aldaz *et al.*, 2022; Centers for Disease Control and Prevention, 2022; Chang *et al.*, 2022). Chronic diseases related to diet were also more challenging for those living in food-insecure households to manage. For instance, individuals with type 2 diabetes who were food insecure were only be able to buy cheap, high-calorie, but nutritionally deficient foods such as those heavy in refined carbohydrates rather than more beneficial options like vegetables, lean meats, and whole grains. Furthermore, low-income households tended to underuse medication due to financial restrictions or put off necessary medical care to buy food (Men *et al.*,

2019). These actions indirectly led to costly yet preventable hospitalizations (Rohatgi *et al.*, 2021).

Food and Agriculture Organization (FAO), International Fund for Agriculture Development (IFAD), United Nations International Children's Emergency Fund (UNICEF), World Food Programme (WFP) and World Health Organization (WHO) (World Health Organization, 2023) estimated that 2.4 billion people worldwide which is roughly 29.6 percent of the total population were moderately or severely food insecure in 2022. Out of 2.4 billion of the food insecure population, 900 million people approximately 11.3 percent of people in the world experienced severe food insecurity. More than 3.1 billion people in the world or 42 percent of them unable to afford a healthy diet in 2021. In Malaysia's context, it was shown that there had been improvement in the Global Food Security Index (GFSI) 2022 with the score rising from 43rd place with 67.9 points in 2020 to 39th place in 2021 and 41st place in 2022 with a score of 69.9% (Economist Intelligence Unit, 2022). This indicated that Malaysia was not exempt from the rising threat of increasing food insecurity.

Studies indicated that compared to the general population, university students developed food insecurity at higher rates (Zayadi, 2021; Goh *et al.*, 2020). Although the major cause of university students being more vulnerable to food insecurity remained unknown, it was hypothesized that this vulnerability was due to their limited financial resources, diminished purchasing power, and rising housing with food expenses (Men *et al.*, 2020). Food insecurity may have also resulted from an increase in the younger generation of low-income students attending universities. As a result, food insecurity concerns were likely to increase along with the expense of higher education (Azdie *et al.*, 2019).

Furthermore, food security status was associated with negative emotional states. A person might have experienced extreme depression, anxiety and stress whenever they went to purchase food since they did not have the sufficient money to purchase it. In this context, stress was recognized to be a trigger for anxiety and depression, and it was created when there was uncertainty about whether food supplies would be regularly available in the present or the future (Feng *et al.*, 2023). Food insecurity could have had a detrimental effect on academic performance as well (Sabi *et al.*, 2019). Research showed that long-term food insecurity exposure has been linked to a few issues, including bad academic performance (Mohd Abu Bakar *et al.*, 2019) and the risk of malnutrition (El Zein *et al.*, 2019). It was believed that meeting the daily recommended intake of fruit was also strongly linked to higher perceived academic achievement among university students, where meeting the daily recommended intake of both fruit and vegetables was linked to a higher cumulative grade average (Whatnall *et al.*, 2019). Despite that, students experiencing food insecurity ate fruits, vegetables, fish, meat, dairy products, and legumes less frequently and in lower amounts than students who were food secure (Fram *et al.*, 2022; Shi *et al.*, 2021). It was understood that students who struggle with food insecurity might have placed greater emphasis on getting food than on meeting academic performance standards (Brescia and Cuite, 2019).

Furthermore, negative emotional states were believed to have impacts on the student's academic performance. Low academic performance or high failure rates could have resulted in unacceptably high attrition, a decrease in student productivity, and increased educational expenses. The foundation of a future-educated society was the student population. They viewed academic success as a major life objective, which might have been negatively impacted if students became depressed (Abbas *et al.*, 2021). Furthermore, because they saw themselves as failures, believed that the world was unfair,

and were uncertain about the future, depressed students were more likely to score lower on examinations in attainable-focused environments such as higher education institutions and had lower self-confidence (Deng, 2022).

Numerous research demonstrated the increased risk of anxiety disorders among college students (Soh *et al.*, 2023; Li *et al.*, 2022; Wang *et al.*, 2020). According to past studies, anxiety among undergraduates was brought on by a lack of flexibility in new circumstances, concern about the future, trouble addressing difficulties, and traumatic events (Arbona *et al.*, 2021; Sustarsic and Zhang, 2021). Numerous distinct factors, including learning (Islam *et al.*, 2020), tests (Hamzah *et al.*, 2018), and inappropriate use of the internet (Lozano Blasco *et al.*, 2020), were known to contribute to anxiety among university students. Despite that, due to their intense coursework, academic stress was identified as the primary cause of anxiety in university students (Zhang *et al.*, 2022). Previous research indicated that learning outcomes were harmed by university students' academic and non-academic anxiety (Liu and Xu, 2021; Zhang *et al.*, 2019).

According to a systematic analysis of 13 research, self-reported stress levels were linked to lower quality of life and well-being among individuals pursuing higher education (Ribeiro *et al.*, 2018). It was undeniable that most students found their time in university to be stressful with exposure to different types of stressors being the cause. These included trying to complete school goals despite financial constraints, having high expectations for oneself, time constraints, academic overload, exams, competitions, and a lack of leisure activities (Sharp and Theiler, 2018). Nevertheless, compared to students at other universities, healthcare college students were more susceptible to stress. One possible explanation for this might have been a greater degree of academic, social, and economic pressures (Alwhaibi *et al.*, 2023).

## **1.2 Problem Statement**

Despite being a middle-income nation with the capacity to generate its food, Malaysia struggled to meet its domestic food demands. Our nation continued to import some food items such as rice, which is a staple food in Malaysia to meet the requirements for food. Food security in Malaysia was at risk due to the expected continuation of the widening gap between local output and domestic demand. Since 1994, the Malaysian government implemented intervention programs including the National Plan of Action for Nutrition of Malaysia (NPANM) to decrease household food insecurity, nutritional deficiencies, and malnutrition while enhancing the nutritional well-being of Malaysians. To encourage healthy eating, the current NPANM III (2016–2025) concentrated on food and nutrition security. This was achieved by increasing the amount and quality of food, improving food purchasing power, and decreasing unhealthy eating habits such as skipping meals and consuming smaller portions. To guarantee that every family had access to safe and high-quality food at reasonable costs, strategies and initiatives were determined for execution. However, adhering to healthy diet guidelines required significant eating pattern changes, which impacted the cost of food purchasing.

According to the most current State of Food Security and Nutrition in the World (SOFI) report, 733 million people experienced hunger in 2023, which was equal to one in eleven people worldwide and one in five in Africa. Around 2.33 billion people worldwide had moderate to severe food insecurity in 2023 and this figure has not moved much since the sharp increase in 2020 during the COVID-19 pandemic (World Health Organisation, 2024). More than 864 millions of them suffered from extreme food insecurity, often going for a whole day or more without eating. According to Nava-

Amante *et al.* (2021), the percentage of Mexican college students experiencing food insecurity was 30.8%, with mild food insecurity at 16.3%, moderate food insecurity having 8.8%, and severe food insecurity being 5.7%. While in Giessen, Germany, 27.5% of students at Justus Liebig University experienced food insecurity. According to Maïke Kötzsche *et al.* (2023), 10.4% of college students were moderately or severely food insecure.

The prevalence rates of food insecurity among undergraduate students in Malaysia were somewhat similar to those found in earlier global research, which varied from 22% to 67.7% (Azmi *et al.*, 2022; Sulaiman *et al.*, 2021). Additionally, according to the most recent National Health and Morbidity Survey (NHMS) in 2019, up to 95% of adults did not eat enough fruits and vegetables in their diets. The scarcity and high cost of adequate, nutrient-dense food may have contributed to unhealthy eating patterns as ultra-processed, highly marketed, and less expensive goods became more widely available.

Food insecurity was more common among students studying at universities away from their hometown, regardless of where they studied. This was attributed to issues like high food expenses, culturally acceptable food options, and a lack of parental support (Shi *et al.*, 2020). Additionally, the majority of Kelantan meals were sweet and creamy due to the high sugar and coconut milk content in the region's cuisine. Students from other states and international students might be less likely to eat the meals in sweet flavours offered in campus cafeterias since they were unfamiliar with the flavour of foods. On the other hand, they preferred fast food restaurants close to the campus or placed more frequent meal delivery orders. Nevertheless, long-term chronic disorders were frequently linked

to sweet and creamy foods (Putri *et al.*, 2018). However, it remained unclear how evidence-based Malaysian cuisine affected chronic long-term illnesses.

Furthermore, students who experienced food insecurity were more likely to experience depression, anxiety, and stress compared to the general population (Liyuwork Mitiku Dana *et al.*, 2023). This was due to a shortage of reasonably priced, culturally appropriate food and their inability to support themselves. According to research, college students who struggle to satisfy their fundamental needs for food have a two-fold increased risk of suffering stress (Bruening *et al.*, 2018). Meanwhile, a study conducted in the United States revealed that an increased likelihood of depression was linked to a higher severity of food insecurity (Luke *et al.*, 2023).

It was stated that students who are food insecure were more likely to perform poorly in academics. A previous study indicated that students who had a GPA higher than 3.1 were 60% less likely to be food insecure (Hagedorn and Olfert, 2018). In contrast to students who had safe access to food, those who experienced food insecurity were found to have a lower likelihood of receiving a grade more than or equal to 3.7 for their academic achievement (Ahmad *et al.*, 2021). Due to a range of nutrient-dense but pricey meals are out of reach for food-insecure students, meals of food insecure individuals lack of essential nutrients, especially iron, folate, and omega-3 fatty acids which were critical for brain functioning (Ahmad *et al.*, 2022). In a study, students with marginal food security reported feeling less motivated, having a poor self-perception, and having trouble participating fully in their studies because of their eating habits such as skipping meals or eating an unbalanced diet and experiencing physical symptoms like headaches, fatigue, bloating, sluggishness, and hunger pains (Gamba *et al.*, 2021). Likewise, university

students who suffered from food insecurity, hunger, or inadequate food supplies often or consciously chose not to attend classes because their hunger caused them to feel ill, lethargic, and lightheaded (Kim *et al.*, 2022).

In terms of the association between negative emotional states and academic performance, university students were found to have a high prevalence of depression, anxiety, and stress, which subsequently led to poor academic performance. Various forms of depression, anxiety, and stress could affect university students. They dealt with a wide range of issues, including shifting away from home or family, academic pressure to achieve, an unclear future, health issues, financial difficulties, and so forth (Hassan, 2019). All of these issues interfere with their performance, which lowers their academic grades. Plus, it was demonstrated that university students' academic performance was impacted by symptoms of stress, anxiety, and worry about their financial and food conditions (Meza *et al.*, 2019).

In Malaysia, most studies have identified the factors or coping strategies related to food insecurity, yet little was known about the effect of food security status on academic performance and negative emotional states which mainly focused on depression, anxiety, and stress. Therefore, this study examined the role of food security status on negative emotional states and academic performance among undergraduate health sciences students in USM as well as the impact of negative emotional states on academic performance.

### 1.3 Study rationale

Students were a unique group of individuals who emerged from one of the most important life stages, in which they encountered numerous stressful situations. One of the stressful events was that students at universities were more susceptible to food insecurity. Due to the growing expense of education, struggling university students frequently spend more on tuition, housing, and other utilities than they did on food (Henry, 2017). As a result, students experiencing food insecurity frequently had to pick less nutritious and inexpensive options (Brescia and Cuite, 2019). College students perceived that unhealthy food was more reasonably priced, particularly fast food, sweets, and chocolate (Al-Hamad *et al.*, 2022). When students' income was equal to or less than their expenses, they were frequently given the option to choose less nutritious foods, compromising the quality of what they eat to save money (Shi *et al.*, 2021). These students bought less nutrient-dense food or consumed fewer servings because they valued affordability and employed these techniques as coping strategies (Gahan *et al.*, 2022).

Additionally, students who experienced food insecurity reported higher levels of depression, anxiety, and stress, which could exacerbate the negative impacts of food insecurity on their lives. Stress from food insecurity may have worsened when students learned to manage their relationships and education while also becoming independent from their families. Despite that, students' social and academic lives were impacted by the guilt, anxiety, and loneliness that were associated with food insecurity (Gahan *et al.*, 2022). Most significantly, food insecurity could negatively impact university students' lifestyles and health that might have long-term effects including elevated chances of chronic illnesses (Loofbourrow and Scherr, 2023; Rizk *et al.*, 2023) and negative emotional states (Lemp *et al.*, 2023; Wolfson *et al.*, 2021).

Nevertheless, compared to their food-secure peers, students experiencing food insecurity demonstrated a diminished capacity for focus and worse grade point averages (GPA) (El Zein *et al.*, 2019). To sustain bodily processes and carry out daily tasks, humans were required to eat a healthy diet. Human body used nutrients from food for optimal development, function, and immunity. Individuals who were food insecure particularly students found it difficult to go about their everyday lives. It may also have an impact on students' general well-being as well as their academic achievement. A nutritious diet was essential for students to succeed academically, and food insecurity jeopardized this (Kahtan and Hanbazaza, 2024). According to a study in Iceland, food insecurity could harm the academic performance of university students (Repella *et al.*, 2024). This added to the increasing amount of evidence pointing to a relationship between food insecurity and worse academic achievement, even though it did not prove that it always did (Martinez *et al.*, 2018).

Yet, a high prevalence rate of negative emotional states, in this context where depression, anxiety, and stress could affect academic performance. Researchers discovered that the signs of depression and anxiety had an impact on student's performance in college and university. These symptoms could cause a lack of concentration, a reduction of interest and motivation, absence, and physical health issues like fatigue and headaches (Shokrgozar *et al.*, 2019). Another study further added the evidence of university students were more likely to experience negative emotional states (Auerbach *et al.*, 2018). Additionally, it has been noted that university students in several nations, including the United States, Malaysia, and the United Kingdom, experience

negative emotional states, such as greater rates of anxiety, depression, and excessive stress (Brown, 2018).

Therefore, by providing an understanding of the association between food security status, students' negative emotional states and academic performance among undergraduate students at the School of Health Sciences in USM, the study's findings benefited students immensely. University played an important role in boosting students' academic achievement by offering financial help, reasonable meal plans, food pantries, and other services as food insecurity was a barrier to education for university students. Besides, relevant authorities could support the development of strategies and interventions that address food insecurity and negative emotional states. The government and the Malaysian Ministry of Higher Education should have reviewed their policies and programs to help students who were facing food insecurity. Healthcare interventions could have been applied to improve students' emotional states in terms of psychological discomfort because food insecurity was strongly linked to depression, anxiety, and stress. To address the importance of students' emotional states and academic performance, all universities should have offered counselling services, mental health resources, or access to community support programs.

#### **1.4 Research Questions**

1. What was the prevalence of food insecurity among undergraduate students at School of Health Sciences in USM?
2. Was there any association between food security and negative emotional states among undergraduate students at School of Health Sciences in USM?

3. Was there any association between food security status and academic performance among undergraduate students at School of Health Sciences in USM?
4. Was there any association between negative emotional states and academic performance among undergraduate students at School of Health Sciences in USM?

## **1.5 Objectives**

### **1.5.1 General objective**

To determine the association between food security status, negative emotional states and academic performance among undergraduate students at School of Health Sciences in USM.

### **1.5.2 Specific objectives**

1. To identify the prevalence of food insecurity among undergraduate students at School of Health Sciences in USM.
2. To determine the association between food security status and negative emotional states among undergraduate students at School of Health Sciences in USM.
3. To investigate the association between food security status and academic performance among undergraduate students at School of Health Sciences in USM.
4. To determine the association between negative emotional states and academic performance among undergraduate students at School of Health Sciences in USM.

## 1.6 Hypothesis

**Null:** There was no association between food security status, negative emotional states, academic performance among undergraduate students at School of Health Sciences in USM.

**Alternative:** There was association between food security status, negative emotional states, academic performance among undergraduate students at School of Health Sciences in USM.

## 1.7 Conceptual framework

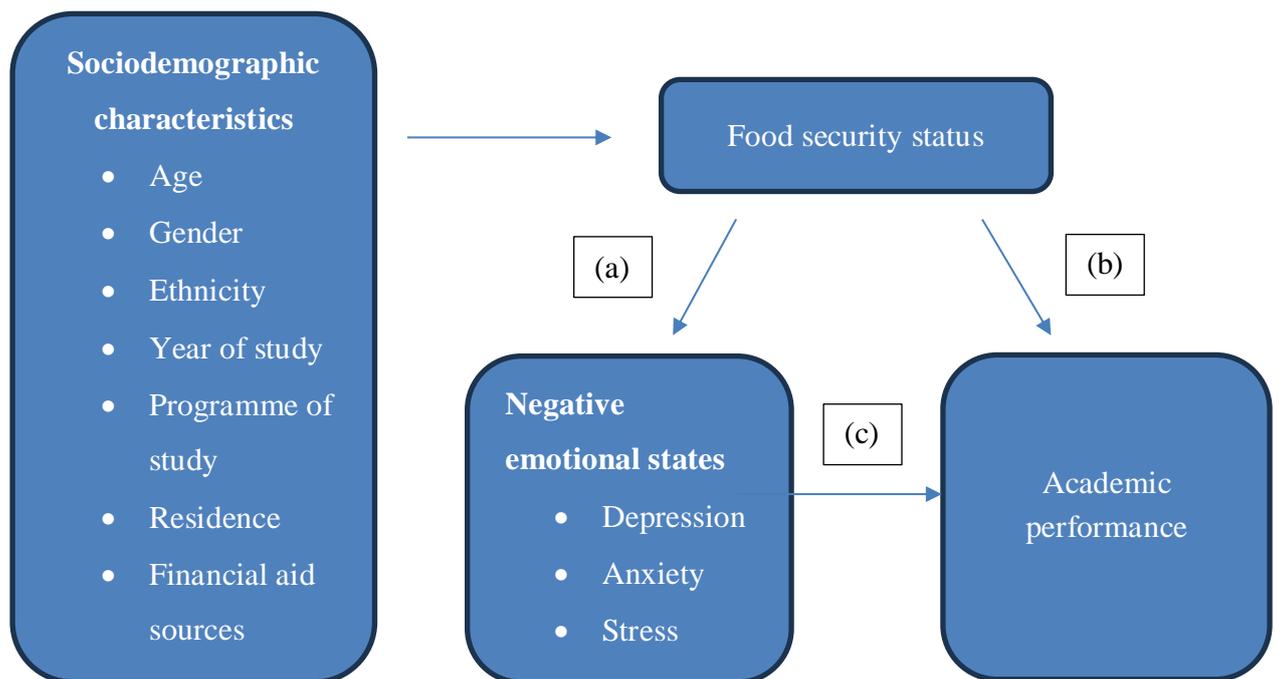


Figure 1.7 Independent and dependent variables

Table 1.7.1 Independent and dependent variables

	Independent variables	Dependent variables
(a)	Food security status	Negative emotional states
(b)	Food security status	Academic performance
(c)	Negative emotional states	Academic performance

The figure above demonstrated the conceptual framework of the possible association between independent and dependent variables in this study including food security status, negative emotional states which included depression, anxiety, and stress as well as cumulative grade point average (CGPA). Data on sociodemographic characteristics were collected to describe the respondents' characteristics. Food security status was also gathered to study its association with negative emotional states and academic performance respectively. By choosing and conducting the appropriate statistical tests, the association between food security status, academic performance and negative emotional states was used to determine whether the association was significant or not.

## CHAPTER 2: LITERATURE REVIEW

### 2.1 Factors that influence students' food security status

Global food insecurity was primarily caused by poverty, war, a population boom, changes in the climate, environmental issues, higher food costs, unstable agriculture, and unbalanced social and economic policies (FAO, 2021). Food insecurity was found to be more likely to impact certain populations, including children, adolescents, the elderly, and people with chronic illnesses (Owens *et al.*, 2020). Another significant population susceptible to food insecurity was undergraduate students (Mohd Abu Bakar *et al.*, 2019). Students at universities and other post-secondary institutions encountered challenges in their academic and personal lives, rendering them vulnerable to food insecurity.

Several factors that affected students' food security status were reported in previous research. One of the main factors was students facing financial difficulties (Maynard *et al.*, 2019) due to increasing tuition fees, expenses on educational materials, rising living expenses, insufficient financial loans and so forth (Freudenberg *et al.*, 2019; Mayasari *et al.*, 2020; Daniels *et al.*, 2021; Sulaiman *et al.*, 2021). For instance, 65% of University of North Carolina students who participated in a survey study stated they were food insecure, and 40.8% of them claimed they skipped meals because they did not have the money to buy food (Waity *et al.*, 2020). This put students in a challenging position where they had to decide how to divide their inadequate financial resources, and food was not usually the first option (Weaver *et al.*, 2021). In terms of dietary behaviours, food-insecure students ate more processed but affordable meals than their food-secure peers (McArthur *et al.*, 2018). Moreover, breakfasts and homemade meals were more infrequent to consume by students who experienced food insecurity (Shi *et al.*, 2021). A prior study showed that eating a nutritious breakfast was linked to improved learning and performance (Jackson

and Vaughn, 2019). However, individuals experiencing food insecurity may have reduced normal brain function due to insufficient nutrition (Royer *et al.*, 2021). A study conducted in four randomly selected universities in Peninsular Malaysia revealed that respondents with more financial issues were 3.5 times more likely to experience food insecurity than those with lower financial problems (Mohd Jamil *et al.*, 2020). The prevalence of food insecurity among students rose as a result of poor food literacy and nutritional awareness.

University students particularly those from lower-income families, bore a far heavier burden than one might have thought because a majority of them did not have a formal source of income. According to Ukegbu *et al.* (2019), food insecurity among college students was associated with income status which was in line with findings from other research conducted in household settings (Arina Bakeri *et al.*, 2023; Kh'ng *et al.*, 2022; Shinwell and Defeyter, 2021; Penne and Goedemé, 2020; Tarasuk *et al.*, 2019). As low income left it more difficult to meet the family members' fundamental necessities like food. A descriptive-analytical study carried out in Turkey found that individuals were less likely to experience food insecurity if their income exceeded their expenses (Celik *et al.*, 2023). Nevertheless, despite income status being the primary predictor of food insecurity, two Malaysian studies found no correlation between income and food insecurity (Ramlee *et al.*, 2019; Rajikan *et al.*, 2019).

Older students, had dependents, or belonged to minority groups were examples of "non-traditional" students that had become more prevalent in college enrolment in recent years. Students who had full-time jobs to support themselves while attending lectures were also included in this category of "non-traditional" students (Nazmi *et al.*, 2022). According to a student health services survey of 1,359 students, finding a job or working

more hours was the second most prevalent method for students to deal with food insecurity, behind receiving food from friends and family (Olauson *et al.*, 2017). Another study conducted among undergraduate students at a public university discovered that students with employed status had a 1.44-fold higher chance of experiencing food insecurity than those without jobs (Robbins *et al.*, 2022). Food insecurity and employment had a significant association, particularly for female students in a different study that included 338 undergraduate survey data from the University of Mississippi (Halfacre *et al.*, 2021). Nonetheless, a large number of college students who also faced food insecurity could not have an obvious source of income or obtained their money from a variety of sources, such as jobs, parental assistance, scholarships, and other loans (Zigmont *et al.*, 2022).

On the other hand, it was also shown that the status of food security was related to those who received financial aid (Ahmad *et al.*, 2021). Comparably, several studies have reported similar findings (Amin *et al.*, 2022; Angotti and Zangirolani, 2022; Whatnall *et al.*, 2019; Davidson and Morrell, 2018). Also, younger and financially unstable college students who did not have government financial aid, housing, or dorm amenities were said to be more vulnerable to food insecurity (Whatnall *et al.*, 2019; Davidson and Morrell, 2018). Regarding the type of financial aid available in Malaysia, Mohd Abu Bakar and colleagues (2019) found that those who had a Perbadanan Tabung Pendidikan Tinggi Nasional (PTPTN) loan experienced higher levels of food insecurity than those who had a Jabatan Perkhidmatan Awam Malaysia (JPA) scholarship. This was because PTPTN loan recipients received less funding than JPA scholarship recipients. Additional factors that were linked to food security status included time constraints (Mohd Abu Bakar *et al.*,

2019), lack of money management skills (Ahmad *et al.*, 2022), book expenditures (Mohd Nasir *et al.*, 2021), and other expenses.

## **2.2 Food security status and negative emotional states**

According to previous studies, negative emotional states mainly focus on depression, anxiety, and stress (Zhang *et al.*, 2022; Tian *et al.*, 2021; Geng *et al.*, 2020). World Health Organization (2022) reported that the COVID-19 pandemic caused a 25% global rise in the incidence of depression and anxiety. On the other hand, a prior study in July 2020 of international students studying in China discovered that 43.6%, 24.6%, and 38.8% of them experienced symptoms of depression, anxiety, and stress (Antwi *et al.*, 2022). Another survey conducted in December 2020 reported 49% and 39.6% of foreign students studying in South Korea having depression and anxiety respectively (Kim and Kim, 2021). However, these rates were lower than those found in some studies in Malaysia. During the COVID-19 pandemic, university students in Selangor had corresponding prevalence rates of 53.9%, 66.2%, and 44.6% for moderate to severe depression, anxiety, and stress (Wong *et al.*, 2023). According to research conducted among Universiti Putra Malaysia (UPM) students, 72.7% of respondents reported having moderate to high levels of anxiety, while 60.6% reported experiencing depression with moderate to high levels (Suhaili Arifin *et al.*, 2023).

Generally, students who experienced food insecurity typically suffered from higher levels of depression (Bruening *et al.*, 2018; Payne-Sturges *et al.*, 2018), anxiety (Pourmotabbed *et al.*, 2020; Raskind *et al.*, 2019), and stress (Ibiyemi *et al.*, 2022; El Zein *et al.*, 2019). Food insecurity in university students was also related to various aspects of emotional health (Becerra and Becerra, 2020; Raskind *et al.*, 2019; Martinez *et al.*, 2018)

such as higher rates of depression, anxiety, and stress and/or psychological well-being (Coffino *et al.*, 2020; Bruening *et al.*, 2018). According to a research, people who were food insecure were more likely to perceive stress, which might have acted as a mediator in the negative association between food insecurity and health (Cedillo *et al.*, 2023). It was also believed that food insecurity played a "toxic" stressor, worsening the negative emotional states that students experienced (Ovinuchi Ejiohuo *et al.*, 2024). Consequently, students who were food insecure might have often faced additional challenges to their physical and emotional well-being.

In NHMS (2019), 2.3% of adults claimed to have depression, and a study done at the International Islamic University Malaysia (IIUM) discovered that more than one-third of health sciences students contributed to the prevalence of depression (Fata Nahas *et al.*, 2019). Previous studies found that food security status and depression had a significant association (Liyuwork Mitiku Dana *et al.*, 2023; Bayat *et al.*, 2021). Reeder *et al.* (2022) revealed a strong association between food insecurity and a higher likelihood of depression in a nationally representative sample of adult US citizens. Additionally, the lowest perceived stress score was observed among students who never reported food insecurity (El Zein *et al.*, 2022). According to Diamond *et al.* (2019), 1,229 undergraduate students at a large public university who experienced short- and long-term food insecurity had considerably higher levels of depression and perceived stress. This could have been because food insecurity indirectly causes stress, which exacerbates students' present emotional health. On top of that, anxiety typically lasted longer compared to stress. Anxiety disorders could develop from excessive anxiety, and people who experienced anxiety for a long time frequently have depressive symptoms, such as low mood and hopelessness (World Health Organization, 2023). Furthermore, research has indicated an