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NUTRITIONAL STATUS INTAKE ON FRUITS AND VEGETABLES AMONG *ASNAF* STUDENTS IN UiTM PERLIS

Siti Nur Ainie Jamil Ahmad[1], Nur Fatini Izzati Azhar[2], Masshera Jamaludin[3], Norfaezah Mohd Rosli[4], Zulkifli Ismail[5], Ahmad Dzulkarnain Hj Ismail[6*]

[1] Faculty of Sports Science and Recreation
Email: 2023393143@student.uitm.edu.my
[2] Faculty of Sports Science and Recreation
Email: fatiniazhar@gmail.com
[3] Faculty of Sports Science and Recreation
Email: masshera507@uitm.edu.my
[4] Faculty of Sports Science and Recreation
Email: faezah_rosli@uitm.edu.my
[5] Faculty of Sports Science and Recreation
Email: zulkifliismail@uitm.edu.my
[6] Faculty of Sports Science and Recreation
Email: ahmad409@uitm.edu.my
[*] Corresponding Author

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Abstract:

Insufficient consumption of fruits and vegetables has been associated with millions of deaths annually, contributing to conditions such as heart disease and cancer. In the context of Malaysia, this issue is particularly prevalent. The NHMS 2023 reports that 95.1% of adults do not consume the recommended daily servings of fruits and vegetables, averaging only two servings per day instead of the advised five. This problem extends across both rural and urban areas, with urban regions also exhibiting high rates of obesity and poor dietary habits. To better understand and address this concern, a study was conducted involving *asnaf* (economically disadvantaged) students at Universiti Teknologi MARA (UiTM) Perlis. Using a random sampling method, 217 students participated by maintaining daily food diaries in both English and Malay. These diaries were analyzed using MyFitnessPal to assess nutrient intake accurately. The findings were alarming. On average, students failed to meet the minimum recommended levels for essential nutrients such as vitamin A, C, iron, potassium, and fiber. For instance, the average daily intake included just 5.4 µg of vitamin A and 3.3 grams of fiber, significantly under the level required for good health. In conclusion, many *asnaf* students at UiTM Perlis do not consume adequate amounts of fruits and vegetables, placing them at increased risk for long-term health issues. This situation demonstrates the need for more

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awareness and support for healthy eating, particularly among vulnerable student populations.

Keywords:

Fruits, Vegetables, *Asnaf*, Perlis, Low Socio-Economy & Nutritional Status

Introduction

In Malaysia, nutritional status is a crucial determinant of overall well-being. It is defined as an individual's health condition as influenced by the intake and utilization of nutrients. Adequate consumption of fruits and vegetables plays a significant role in weight management and preventing chronic diseases. Increasing fruit and vegetable intake, especially fruit, is important for reducing the risk of cardiovascular diseases, premature mortality, as well as other diseases (Aune et al., 2017).

On a global scale, inadequate intake of fruits and vegetables among young adults has been widely reported. Despite growing awareness of the importance of sufficient fruit and vegetable consumption, the World Health Organization (WHO) reports that low intake increases the risk of non-communicable diseases (NCDs). In 2017, insufficient consumption of fruits and vegetables was linked to approximately 3.9 million deaths, ranking it among the top ten global mortality risk factors (Noncommunicable and Health Promotion (NHP) unit & World Health Organization, 2024).

The WHO continues to emphasize adding more fruits and vegetables to the daily diet to promote health and lower the risk of NCDs. In Malaysia, as of 2023, 95.1% of adults did not meet the recommended daily servings of fruits and vegetables (Ministry of Health Malaysia & Institute for Public Health, 2023). Moreover, the risk of malnutrition remains high among individuals with low socioeconomic status. Therefore, targeting rural populations may support the development of public health policies to foster health-promoting environments tailored to this demographic (Nazri et al., 2021). Recent surveys have revealed a high prevalence of overweight and obesity among women of reproductive age (WRA), particularly in urban settings (Amunga et al., 2024). Therefore, the main aim and objectives for this study is to assess the current nutritional intake of fruits and vegetables among asnaf students in UiTM Perlis, focusing on their daily consumption patterns.

Statement Of Problem

According to the National Health and Morbidity Survey, 95.1% of Malaysian adults did not meet the recommended daily intake of fruits and vegetables, reflecting a 0.01% increase since the previous report in 2019 (Ministry of Health Malaysia, Institute for Public Health, 2023; Ministry of Health Malaysia, 2023). Adequate consumption of fruits and vegetables is publicly recognized as vital for weight management and disease prevention. However, low intake among adults remains a global health challenge.

The risk of malnutrition is higher among individuals from low socioeconomic backgrounds. Focusing on rural populations may provide valuable insights for guiding public policies to develop health-supportive environments tailored to this demographic (Jamaludin et al., 2022a). A lack of awareness regarding daily dietary fibre requirements and recommended servings of

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fruits and vegetables is particularly evident among adults with lower socio-economic status (Hajar Mat Zin et al., 2023).

Jamaludin et al. (2022b) reported that 31.5% of adolescents achieved the recommended intake of fruits and vegetables, with a higher proportion from rural areas. Furthermore, the Noncommunicable and Health Promotion (NHP) & World Health Organization (2024) have estimated that approximately 1.7 million (2.8%) of global deaths are attributable to insufficient fruit and vegetable consumption. This deficiency contributes significantly to the burden of diseases such as cardiovascular disease, cancer, and other non-communicable conditions.

In Malaysia, many adults remain unconcerned about the health benefits of fruit and vegetable consumption. The prevalence of overweight and obesity among Malaysian adults has shown a steady increase from 2012 to 2022, a trend partly attributed to the proliferation of food stalls selling unhealthy foods, increased consumption of junk food and sugary beverages, and inadequate intake of fruits and vegetables. Despite rising rates of overweight and obesity among Malaysian adolescents, the coexistence of undernutrition and overnutrition indicates a double burden of malnutrition (Palaniveloo et al., 2022). This study aims to assess the current nutritional intake of fruits and vegetables among asnaf students in UiTM Perlis, focusing on their daily consumption patterns.

Literature Review

This literature review discusses six main areas related to the intake of fruits and vegetables and the nutritional status of asnaf adults in Perlis. These areas explore the dietary behaviours of the target group and assess how fruit and vegetable consumption is integrated into their daily lives.

According to the 2020 Malaysian Food Pyramid (Ministry of Health, 2020), food is categorized into four levels, each with specific recommended portions. Fruits and vegetables are prominently featured at the pyramid's base, indicating their fundamental importance in a balanced diet. Similarly, the Dietary Guidelines for Americans, supported by the Dietary Guidelines Advisory Committee since 1995, have consistently supported plant-based diets while discouraging the intake of cholesterol and saturated fats (Physicians Committee for Responsible Medicine, 2020). These recommendations are especially relevant in addressing the current trends of inadequate fruit and vegetable consumption in Malaysia and globally, where diets often prioritize carbohydrates and proteins over plant-based nutrition.

The target population in this study represents the lowest socio-economic tier in Malaysia. A potential relationship exists between nutritional status and socio-economic background, particularly regarding access to and awareness of fruits and vegetables. This highlights the need for research on how economic constraints influence dietary patterns and how interventions can be designed to support these communities.

Nutritional Status Of Fruits And Vegetables

Nutritional status is a critical factor in overall well-being and is defined as an individual's health condition as influenced by the intake and utilization of nutrients (Todhunter & Neige, 1970). Nutrition entails maintaining a healthy, balanced diet, which supports normal growth and development, contributes to healthy pregnancy outcomes, helps maintain appropriate body weight, and reduces the risk of chronic diseases.

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According to the Malaysian Food Pyramid (Ministry of Health, 2020), fruits, vegetables, and legumes form the foundational tier, emphasizing their role in a healthy diet. The Noncommunicable and Health Promotion (NHP) unit & World Health Organization (2024) recommend consuming more than three servings of vegetables and at least two servings of fruit daily. Fruits and vegetables are rich in essential vitamins and minerals, including vitamins C and A, magnesium, zinc, and phosphorus.

Scientific studies have shown that regular consumption of fruits and vegetables can significantly reduce the risk of non-communicable diseases such as type 2 diabetes, stroke, cardiovascular disease, and certain cancers. The colour of fruits and vegetables is often linked to their phytonutrient content. Coloured compounds, such as polyphenols, although not essential for plant growth, provide human health benefits by protecting against ultraviolet radiation and oxidative stress. Polyphenols have been found to counter the development of cancer cells and help prevent cardiovascular diseases, diabetes, osteoporosis, neurodegenerative conditions, and endothelial dysfunction.

For example, red and purple fruits and vegetables, such as cranberries, plums, watermelon, red cabbage, beets, and red or purple beans, are rich in minerals such as iron, phosphorus, calcium, magnesium, manganese, zinc, and vitamin K, all of which contribute to maintaining bone health (Deis et al., 2021). Additionally, blue and purple produce, including blueberries and eggplants, contain anthocyanins that are known to protect the body against cancer (Department of Health, 2022).

Adults Asnaf

There are eight categories of individuals who fall under the classification of asnaf in Islamic teachings. Central to understanding this classification is the concept of Had Al-Kifayah, which refers to the minimum standard of living required to maintain a decent life, as defined by Islamic economics. Individuals whose daily living conditions fall below this threshold are considered eligible for zakat and are classified under specific asnaf categories (Sugeng et al., 2022)

The first category is asnaf fakir, which refers to Muslims who are unable to meet even half of their Had Al-Kifayah and who do not possess any significant assets. The second category, asnaf miskin, includes Muslims who have a source of income and limited assets but are still unable to meet their basic needs, only managing to support themselves and their families at a minimal level.

The third category is amil, referring to appointed individuals or bodies responsible for managing zakat, including its collection and distribution, under authorized institutions. The fourth category is muallaf, which includes new converts to Islam, individuals whose hearts are inclined toward Islam, or those whose impact may protect or support the Muslim community.

The fifth category, asnaf riqab, comprises individuals trapped under restrictive conditions or circumstances that prevent them from leading a better life. This may include situations akin to modern forms of slavery or severe dependency. The sixth, asnaf fisabilillah, includes those engaged in activities that defend or promote Islam, such as scholars, preachers, or individuals involved in community service for Islamic causes.

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The seventh category is asnaf gharimin, referring to Muslims who are burdened with debt incurred for basic personal or communal needs and lack the means to repay it. Finally, asnaf Ibnu Sabil refers to travellers who meet specific criteria, such as:

- Being stranded or left without resources while traveling,
- losing access to their funds during travel,
- being unable to utilize their property to continue the journey, and
- requiring basic assistance to address travel-related hardships.

Among all the categories of asnaf, asnaf fakir and asnaf miskin are the most relevant to this study, as they directly relate to low socio-economic status. Therefore, for this research, the term low socio-economic status will be used instead of asnaf, as it provides a broader and more widely understood framework while retaining alignment with the underlying concepts.

University Students' Eating Habits

Eating habits are repetitive behaviors that influence individuals' food choices and consumption patterns based on social and cultural preferences (Medina et al., 2020). According to Sogari et al. (2018), university phases represent a high-risk period for young adults concerning food selection, often resulting in significant weight fluctuations. Supporting this, Mihalopoulos et al. (2008) reported that first-year university students gained an average of 2.7 pounds, approximately 5.5 times higher than typical weight gain.

Medina et al. (2020) revealed that many students follow nutritionally unbalanced eating routines, often lacking items from all five food groups. These students frequently consume fried foods and carbonated beverages while neglecting essential components such as fruits, vegetables, milk, and water. Many students fail to follow dietary guidelines regarding portion control and often snack two to three times per day.

Relationship Between Nutritional Status And The Intake Of Fruits And Vegetables

Adequate consumption of fruits and vegetables is essential for weight management and disease prevention. Increasing intake, particularly fruits, is vital in reducing the risk of cardiovascular diseases, premature mortality, and the overall disease burden. A healthy diet that includes sufficient fruits and vegetables plays a key role in preventing chronic diseases.

The general recommendation is a minimum of 1.5 to 2 cups of fruit and 2.5 to 3 cups of vegetables per day, depending on age and sex. However, data from Lee SH et al. (2022) indicate that fewer than 12% of adults meet fruit intake recommendations, and fewer than 9% meet vegetable intake recommendations. National survey data consistently show that women are more likely than men to consume adequate amounts of fruits and vegetables and to maintain higher overall dietary quality.

The Relation Between Fruits And Vegetables And Low Socio-Economic Family

According to food frequency and serving size data, most students prefer local fruits such as oranges, apples, and bananas due to their accessibility in rural areas. However, adolescents report several barriers to adequate fruit consumption, including high prices, limited availability, and low taste preference (Jamaludin et al., 2022).

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Due to budget constraints, research has shown that families in low socioeconomic groups often prioritize essential staple foods such as rice, meat, chicken, and fish over fruits and vegetables. As a result, the likelihood of purchasing fruits and vegetables during routine grocery shopping is significantly reduced. Additionally, ultra-processed foods high in fats and sugars—such as sausages, canned goods, and instant noodles—are often chosen because they are perceived to be more affordable (Cleveland Clinic, 2023; Noncommunicable and Health Promotion (NHP) unit & World Health Organization, 2024).

Comparison of the National Health Morbidity Survey

In 2011, 14.6% of Malaysian adults consumed adequate amounts of fruits. However, by 2015, this figure had dropped to only 9.9% (Ministry of Health Malaysia, 2015). A breakdown by gender shows that in 2011, 13.6% of men and 15.7% of females met fruit intake recommendations. In 2015, these figures declined to 8.5% for males and 11.5% for females.

Vegetable consumption followed a similar trend. In 2011, 13.3% of adults consumed adequate amounts of vegetables. By 2015, this decreased to 11.2%. For males, the proportion dropped slightly from 13.5% in 2011 to 13.0% in 2015, while for women, it declined from 13.0% to 12.0% during the same period. In 2019, the Ministry of Health reported that 95% of Malaysian adults did not meet recommended fruit and vegetable intake levels (Ministry of Health Malaysia, 2019). This number slightly increased in 2023, with 95.1% of adults still not consuming adequate amounts (Ministry of Health Malaysia, 2023).

Hypothesis Testing For This Study

Ho1: It is expected that the nutritional status intake of fruits and vegetables among asnaf students in UiTM Perlis are sufficient and acceptable.
Ho2: It is expected that there is a significant difference in nutritional intake between males and females among asnaf students in UiTM Perlis.

Method

Population And Sampling

This study employed a simple random sampling technique, where every individual in the target population had an equal probability of being selected. This method is recognized as the most straightforward probability sampling approach as it requires only a single random selection and minimal prior knowledge about the population. As noted by Lauren Thomas (2020), the use of randomization enhances the research's internal and external validity while minimizing potential biases, such as sampling and selection bias.

Inclusion and Exclusion Criteria:

- Asnaf students enrolled at UiTM Perlis
- Aged between 18 and 25 years
- Able to understand either English or Malay Exclusion Criteria:
- Currently undergoing medical treatment or taking any medication
- Involved in a structured dietary regime

Sample Size Calculation

The total population of asnaf students enrolled at UiTM Perlis is estimated to be 500. Referring to Krejcie and Morgan’s sample size determination table (1970), a minimum sample size of

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217 participants is required to obtain a representative and statistically valid sample. This calculation is based on a 95% confidence level and a 5% margin of error. The Krejcie and Morgan method is heavily adopted due to its practicality, as it offers an established table for determining appropriate sample sizes based on population estimates. It assumes a population proportion of 50% to maximize sample size and generalizability. Researchers should still consider the appropriateness of the chosen sample size by specific research objectives and statistical power (Bin Ahmad & Binti Halim, 2017).

Research Design

This research adopts a quantitative descriptive design to assess the nutritional status of fruit and vegetable intake among adult asnaf students in UiTM Perlis. According to Bishwajit (2020), quantitative descriptive research involves collecting and analyzing numerical data to identify patterns, establish averages, make predictions, test causal relationships, and generalize findings to a larger population.

Among various quantitative data collection methods, a food diary was selected for this study. This tool collects detailed information regarding daily eating habits and nutrient intake. Respondents are required to maintain a record of all food and beverages consumed over seven days. This method allows both researchers and participants to understand eating behaviours more thoroughly and provides insights into dietary awareness and habits, particularly the intake of fruits and vegetables.

Instrumentation And Procedure

The food diary was provided in English and Malay to ensure comprehension. It includes clear written instructions to help participants record relevant information, such as food and beverage names, preparation methods, brand names, portion sizes, and places of consumption. Portion sizes were estimated using food models, images, or standard measuring tools (National Cancer Institute, 2025). Participants completed the food diary over seven consecutive days. Upon completion, the data was obtained and entered into MyFitnessPal, a widely used dietary analysis tool for interpretation and nutrient analysis.

Food Diary Structure

The food diary is structured into three sections:

1. Consent Form: Ensures voluntary participation and mentions that the data collected is for educational and research purposes only.

2. Sociodemographic Information: Gathers participants' background data to assist in understanding the profile of the sample group.

3. Seven-Day Food Diary: Divided by days (Monday to Sunday), participants are required to log all meals and snacks consumed each day, up to seven eating occasions daily.

The food diary aims to identify the participants' intake patterns, consistency, and nutritional awareness, especially in relation to fruits and vegetables. A well-designed food diary helps improve dietary self-awareness and may encourage healthier eating behaviors.

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Nutritional Status: Intake Of Fruits And Vegetables

MyFitnessPal was used to analyse the dietary intake data. The application is linked to an extensive food composition database and eliminates the need for manual coding. According to Pendergast et al. (2014), MyFitnessPal facilitates nutrient tracking by enabling the input of food items and providing automatic nutrient calculations, including for potassium, vitamins A and C, fibre, and iron. This feature supports the evaluation of nutritional status based on fruit and vegetable intake.

Teixeira et al. (2018) found moderate positive correlations between paper-based food records and MyFitnessPal for various nutrients, with particularly strong validity in energy and fiber assessment, despite MyFitnessPal occasionally underestimating certain nutrients due to database limitations. Similarly, Griffiths et al. (2018) reported a reliability range of r = 0.71–0.93, affirming the app's suitability for dietary research. In this study, the premium version of MyFitnessPal was utilized for detailed analysis, including quantification of participants' fruit and vegetable consumption over the seven-day period.

Results

This study aims to identify the current nutritional status intake on fruits and vegetables of asnaf students in UiTM Perlis on a daily basis and to compare the intakes between male and female asnaf students in UiTM Perlis. This chapter presents the results, consisting of descriptive and inferential statistics.

Characteristics Of Participants

A total of 217 male and female asnaf students from the Faculty of Sports Sciences and Recreation were involved in this study. The mean age of the participants is (19 ±23). Table 1.1 presents the characteristics of the participants, including age, gender, and programme.

	N = 217
Gender Male Female	 108 109
Age	19±23
Program	FSR UiTM

Data are means ± SD

Table 1.1 Characteristics of Participants

Hypothesis Testing 1

Ho1: It is expected that the nutritional status intake of fruits and vegetables among asnaf students in UiTM Perlis is sufficient and acceptable.

Based on the result obtained, the graph shows the average nutritional status intake of fruits and vegetables among asnaf students in UiTM Perlis on a daily basis.

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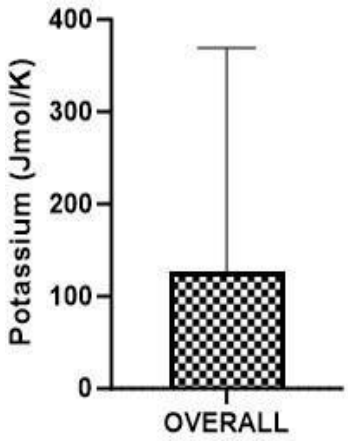

Figure 1.1 Result Of Nutritional Intake Of Potassium (Overall)

Figure 1.1 The nutritional intake of Potassium among asnaf students in UiTM Perlis on a daily basis. It is calculated using the unit of Jmol/k. The result shows that 126.9 ± 242.4 is the average potassium intake among ASNAF students in UiTM Perlis, which is insufficient based on the Recommended Dietary Allowance (2019).

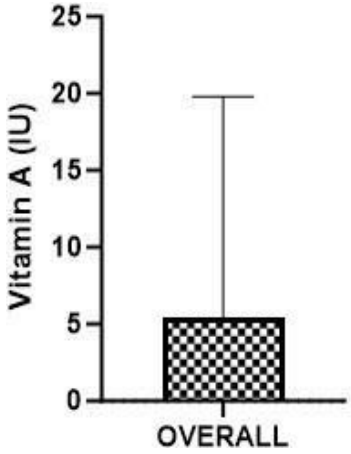

Figure 1.2 Result Of Nutritional Intake Of Vitamin A(Overall)

Figure 1.2 The nutritional intake of Vitamin A among asnaf students in UiTM Perlis on a daily basis. It is calculated using the international unit, which is IU. The result shows 5.4 ± 14.4 is the average of Vitamin A among asnaf students in UiTM Perlis, which is insufficient based on the Recommended Dietary Allowance (2022).

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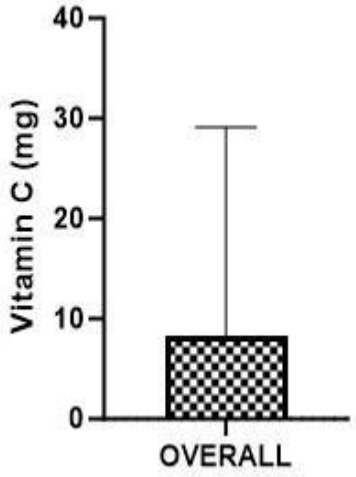

Figure 1.3 Result of nutritional intake of Vitamin C(overall)

Figure 1.3 The Vitamin C intake among *asnaf* students in UiTM Perlis on a daily basis. It is calculated in units of mg. The result shows that the 8.3 ± 20.8 is the average of Vitamin C intake among *asnaf* students in UiTM Perlis, which is insufficient based on the Recommended Dietary Allowance (2016).

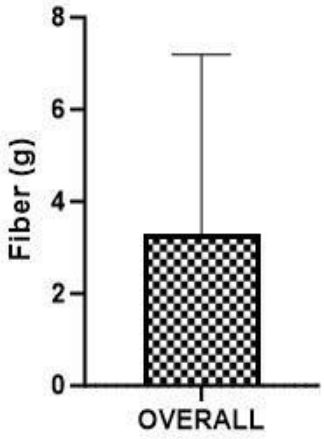

Figure 1.4 Result Of Nutritional Intake Of Fiber (Overall)

Figure 1.4 The Fiber intake among *asnaf* students in UiTM Perlis on a daily basis. It is calculated using the unit of g. The result shows that the 3.3 ± 3.9 is the average of Fiber intake among *asnaf* students in UiTM Perlis, which is insufficient based on the USDA National Nutrient Database for Standard Reference (2020).

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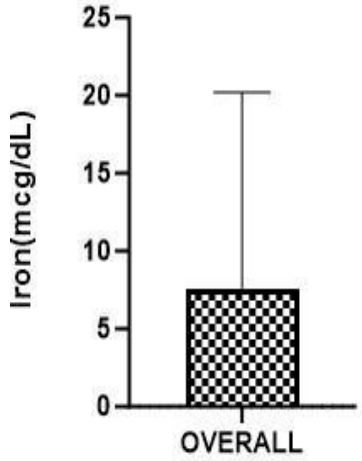

Figure 1.5 Result Of Nutritional Intake Of Iron (Overall)

Figure 1.5 The Iron intake among *asnaf* students in UiTM Perlis on a daily basis. It is calculated using the unit of mcg/dL. The result shows that the 7.5 ± 12.7 is the average Iron intake among *asnaf* students in UiTM Perlis, which is insufficient based on the Recommended Dietary Allowance (2001).

Hypothesis Testing 2

Ho2: It is expected that there is a significant difference in nutritional intake between males and females among *asnaf* students in UiTM Perlis.

Based on the result obtained, the graph shows the average of male and female nutritional status intake of fruits and vegetables among asnaf students in UiTM Perlis on a daily basis.

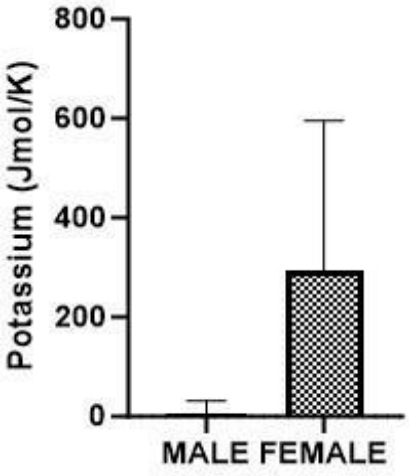

Figure 1.6 Comparison Result Of Nutritional Intake Of Potassium Between Male And Female

Figure 1.6 The Potassium intake between male and female students among asnaf students in UiTM Perlis on a daily basis. It is calculated using a unit of Jmol/k. The result shows that the 6.8 ± 24.3 is the average Potassium intake of males, and 292.1± 302.7 is the average of females. The result shows that the potassium intake of males is less than that of females. There is a significant difference in Potassium intake between males and females ($p = <0.05$).

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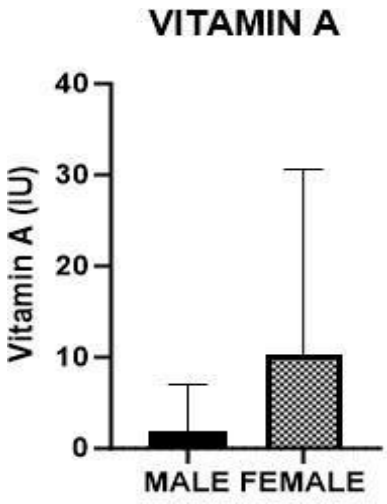

Figure 1.7 Comparison Result Of Nutritional Intake Of Vitamin A Between Male And Female

Figure 1.7 Vitamin A intake between male and female students among asnaf students in UiTM Perlis on a daily basis. It is calculated using the international unit. The results show that 1.9 ± 5.1 is the average Vitamin A intake of males and 10.3 ± 20.3 is the average of females. The result shows that the Vitamin A intake of males is less than that of females. There is a significant difference in Vitamin A intake between males and females (p = <0.05).

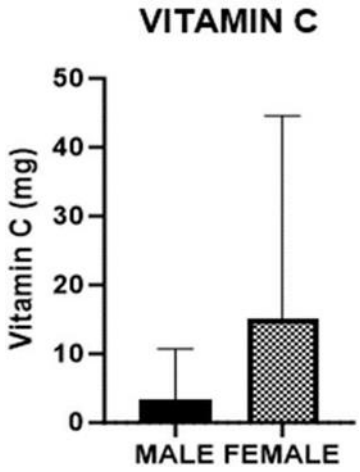

Figure 1.8 Comparison Result Of Nutritional Intake Of Vitamin C Between Male And Female

Figure 1.8 The Vitamin C intake between male and female students among asnaf students in UiTM Perlis daily. It is calculated using the mg unit. The results show that 3.4 ± 7.3 is the average Vitamin C intake of males and 15.1 ± 29.5 is the average of females. The result shows that the Vitamin C intake of males is less than that of females. There is a significant difference in Vitamin C intake between males and females (p = <0.05).

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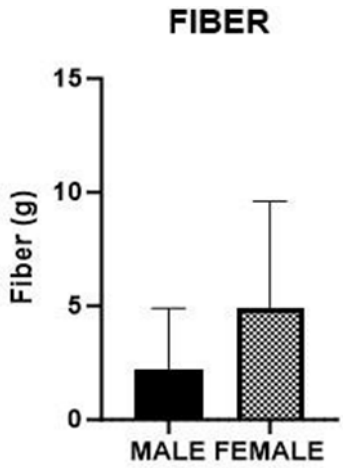

Figure 1.9 Comparison Result Of Nutritional Intake Of Fiber Between Male And Female

Figure 1.9 Fiber intake between male and female students among asnaf students in UiTM Perlis on a daily basis. It is calculated using the unit of grams. The result shows that the 2.2 ± 2.7 is the average Fiber intake of males, and 4.9 ± 4.7 is the average for females. The result shows that the Fiber intake of males is less than that of females. There is a significant difference in Fiber intake between males and females (p = <0.05).

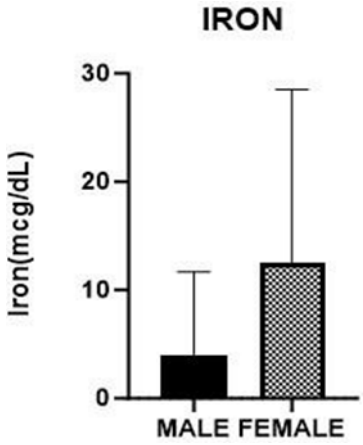

Figure 1.10 Comparison Result Of Nutritional Intake Of Iron Between Male And Female

Figure 1.10 Iron intake between male and female intake among asnaf students in UiTM Perlis on a daily basis. It is calculated using the unit of mcg/dl. The result shows that the 3.9 ± 7.8 is the average Iron intake of males, and 12.5 ± 16.0 is the average Iron intake for females. The result shows that the Iron intake of males is less than that of females. There is a significant difference in Iron intake between males and females (p = <0.05).

Discussion

This study revealed that the nutritional intake of fruits and vegetables among asnaf students in UiTM Perlis is insufficient. The findings showed that students, regardless of gender, did not consume adequate levels of potassium, vitamin A, vitamin C, iron, and fiber to meet the 2023

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Recommended Dietary Allowances (RDA). These essential micronutrients are primarily obtained through fruit and vegetable consumption.

Consistent with this study, the American Dietetic Association (2010) reported that the majority of college students did not meet the recommended daily intake of fruits and vegetables. Students consumed, on average, less than one serving per day—far below the recommended 5 to 9 servings (Schroeter, 2012). Similarly, another study identified limited availability, cost, and poor nutrition knowledge as contributing factors to low fruit and vegetable consumption among university students (Deliens et al., 2014).

According to the National Academy of Medicine, the Adequate Intake (AI) for potassium is 2,600 mg/day for women and 3,400 mg/day for men aged 19 years and above. The average potassium intake in this study was 126.9 mg, far below the recommended amount. Previous research has similarly noted inadequate potassium intake as a widespread issue, attributed to low consumption of fruits and vegetables and high intake of processed foods (Francesco, 2013; Weaver, 2013; J Nutr Sci, 2022).

Regarding vitamin A, the RDA for adults is 900 µg/day for men and 700 µg/day for women. The average intake among asnaf students was only 5.4 µg, which is significantly lower than the requirement. Several studies have emphasized poor vitamin A intake among students, attributing this to dietary preferences for processed, low-nutrient foods and limited access to fresh produce (Mahmood, 2021; Mehra, 2019; Polito, 2023).

Vitamin C intake was also inadequate. The RDA is 90 mg/day for men and 75 mg/day for women, yet the average intake in this study was only 8.3 mg. Previous studies have shown that insufficient dietary diversity and reliance on processed foods contribute to vitamin C deficiency in college populations (Carr, 2020).

In terms of fiber, the recommended intake is 21–25 g/day for women and 30–38 g/day for men (Ascherio, 2012). However, the students in this study consumed an average of only 3.3 g/day. This finding is consistent with reports from the National Institutes of Health, which indicate that many students fall short of fiber recommendations due to frequent consumption of low-fiber, processed foods (Am J Lifestyle Med, 2017; Serrano et al., 2017).

Iron intake among the students was also inadequate. The average intake was 7.5 mg/day, below the RDA of 8 mg for men and 18 mg for women. Previous studies have identified poor dietary choices and limited intake of iron-rich foods as common reasons for iron deficiency among university students (Alzaheb, 2017; Cappellini, 2020; Int J Food Sci, 2023).

This study found that female students consumed more fruits and vegetables compared to their male counterparts. This finding is supported by national dietary surveys and studies that consistently show higher fruit and vegetable intake among females (Küçük, 2023; Alkazemi, 2021; Emanuel, 2012). These differences are explained by greater health awareness and motivation for weight management among females compared to males.

Significance Of The Study

This study aims to raise awareness among asnaf students in Universiti Teknologi MARA (UiTM) Perlis regarding their nutritional intake, particularly fruits and vegetables. Adequate

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consumption of these food groups has been shown to positively influence health and behavioural outcomes, enhancing academic performance. Understanding the consumption patterns of fruits and vegetables among asnaf students will enable UiTM Perlis and relevant stakeholders to assess the current dietary landscape better. The findings may assist in developing targeted health policies and campus initiatives, such as increasing the availability of fruit and vegetable stalls or offering student discounts, thus reducing reliance on junk food.

This study can assist the Ministry of Health in designing appropriate interventions to promote healthy eating habits among asnaf students. Encouraging the adoption of a balanced diet rich in fruits and vegetables may contribute to long-term health benefits for this demographic. Ultimately, this research has the potential to contribute to healthier lifestyles and academic well-being among socioeconomically disadvantaged university students.

Conclusion

In conclusion, this study found that the overall intake of fruits and vegetables among asnaf students at UiTM Arau is insufficient. Additionally, both male and female students failed to meet recommended nutrient levels, although females generally had higher intake levels overall. These findings align with prior research on inadequate nutritional status among university students and highlight gender disparities in dietary behaviour. The results were statistically significant, and led to the rejection of all null hypotheses.

Recommendations

Based on the findings, the following recommendations are proposed for future research and practical intervention:

1. **Intervention Programs:** Future studies can implement and evaluate intervention strategies aimed at improving fruit and vegetable intake among students. These may include cooking demonstrations, meal planning workshops, or nutrition education sessions tailored to student needs.
2. **Gender-Specific Approaches:** With the gender-based differences in intake, future interventions should consider targeting male students through tailored messaging, the use of male role models, and strategies that address male dietary preferences and perceptions.
3. **Policy and Campus Initiatives:** Universities could improve access to affordable, nutritious food options on campus and integrate nutritional education into orientation or health promotion programs.

By addressing these areas, future research can contribute to the development of effective strategies to further enhance the dietary habits and nutritional status of asnaf students.

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