

Nutritional Status Intake on Fruits and Vegetables Among UiTM Perlis Student's

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ABSTRACT

This study aimed to investigate the nutritional intake status of fruits and vegetables among students at Universiti Teknologi MARA (UiTM) Perlis. A total of 95 students from the Diploma in, consisting of male and female participants from semesters 2 and 4, were recruited for this study. Dietary intake data were collected using a 7-day food diary, consisting of two weekdays and one weekend day, to determine the quantity and nutritional contribution of fruit and vegetable consumption. The collected food diary data were analysed using MyFitnessPal nutrition software to assess the intake of selected nutrients. The findings revealed that the overall consumption of fruits and vegetables among UiTM Perlis students was insufficient. The average daily intake of key nutrients, including potassium, vitamin A, vitamin C, iron, and dietary fiber, was below the recommended dietary requirements. Gender comparison showed that female students had a higher intake of these nutrients compared with male students, with statistically significant differences observed between genders ($p < 0.05$). In conclusion, UiTM Perlis students demonstrated inadequate fruit and vegetable consumption, resulting in insufficient intake of essential nutrients. These findings highlight the need for increased awareness and nutritional interventions to encourage healthier dietary practices among university students.

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1. INTRODUCTION

Nutrition is about eating a healthy and balanced diet. A healthy diet throughout life promotes healthy pregnancy outcomes, supports normal growth, development and ageing, helps to maintain a healthy body weight, and reduces the risk of chronic disease leading to overall health and well-being. Fruits and vegetables are one of the main components in nutrition. According to National Health Service (NHS), fruit and vegetables are a good source of vitamins and minerals, including folate, vitamin C and potassium. They're an excellent source of dietary fibre, which can help to maintain a healthy gut and prevent constipation and other digestion problems (Bailey Houghtaling, 2022).

Fruits and vegetables should be an important part of your daily diet. Current findings further reveal that only 16.8% of those who reported being aware of the recommended intake of fruits and vegetables were aware of the adequate number of servings of fruits and vegetables as recommended by the World Health Organization (WHO) of at least (400 g) five servings of fruits and/or vegetables per day (Nyanchoka *et al.*, 2022).

Adequate fruit and vegetable intake is important for achieving a healthy diet and preventing chronic diseases. Depending on age and gender, a minimum of 1.5–2 cups/day of fruits and 2.5–3 cups/day of vegetables are recommended to maintain a healthy diet. Data from the Centers for Disease Control and Prevention estimate that less than 12% and 9% of adults meet the fruit and vegetable recommendations, respectively. National survey data show that women often have higher fruit and vegetable consumption and better overall diet quality than men (Bailey Houghtaling, 2022).

In Malaysia, insufficient consumption of fruits and vegetables is a growing issue that contributes to the overall burden of non-communicable diseases (NCDs). Findings from the National Health and Morbidity Survey (NHMS, 2019) revealed that approximately 95% of Malaysian adults do not meet the recommended daily intake for fruits and vegetables. This pattern of low consumption persists among younger populations, particularly university students, who are in a critical life stage for establishing long-term dietary behaviours. As young adults transition into higher education, they often experience lifestyle and environmental changes—such as living independently, managing financial constraints, and facing time pressures—that influence their eating patterns and lead to increased reliance on convenience foods high in sugar, salt, and fat (Moriassi, 2022). Consequently, fruit and vegetable intake among university students tends to fall short of nutritional recommendations.

This study investigates the nutritional status intake of fruits and vegetables among UiTM Perlis students, focusing on both the quantity and quality of their daily intake. The research also examines gender differences in consumption patterns to determine whether male or female students are more likely to meet recommended dietary requirements. By identifying the level of fruit and vegetable consumption and comparing it with established nutritional standards, the study seeks to highlight potential dietary inadequacies and inform future health promotion strategies at the university level. Through this approach, the research contributes to the broader understanding of young adults' dietary habits in Malaysia and supports the development of targeted interventions aimed at improving nutritional status and overall well-being among university students.

2. LITERATURE REVIEW

2.1 Nutritional Status

Nutritional status refers to the overall state of an individual's health in relation to their nutrient intake and nutrient requirements. It assesses the adequacy of nutrient intake, nutrient stores, and the body's ability to utilize those nutrients for growth, development, and maintenance of bodily functions (Aditi Kesari, 2023). Nutritional status is influenced by various factors, including dietary intake, nutrient absorption, metabolism, and physiological needs. It is a multidimensional concept that takes into account different aspects of nutrition, including macronutrients (carbohydrates, proteins, and fats), micronutrients (vitamins and minerals), and other bioactive compounds (Christos Triantos, 2021).

2.2 Related Literature

Fruits and vegetables are essential components of a healthy diet and are known for their abundant nutritional content. This literature review aims to summarize the current research on the nutritional composition and health benefits of fruits and vegetables. Fruit and vegetables are part of a healthy, balanced diet and can help the respondent to stay healthy. It's important that adults eat enough of them. According to World Health Organization, evidence shows there are significant health benefits to getting at least 5 portions of a variety of fruit and vegetables every day. That's 5 portions of fruits and vegetables in total, not 5 portions of each. A portion of fruits or vegetables is 80g (Dhandevi, 2018).

2.3 Male nutritional Status Intake of Fruits and Vegetables

Men are much less likely to eat their fruits and vegetables than women, and now researchers say they know part of the reason why. In a new study, men reported less favourable attitudes than women about the value of eating fruits and vegetables, and men also said they had less control over their fruit and vegetable intake than women did. The study showed that men do not believe as strongly as women that fruit and vegetable consumption is an important part of maintaining health (John A. Updegraff, 2013) associate professor of social and health psychology at Kent State University in Ohio. It also showed that men feel less confident in their ability to eat healthy foods like fruits and vegetables, especially when they are at work or in front of the television (Karen Rowa, 2021).

2.4 Female Nutritional Status Intake of Fruits and Vegetables

Research suggests that females generally consume higher amounts of fruits and vegetables compared to males. Studies have reported that females tend to have higher intake levels and are more likely to meet recommended intake guidelines for fruits and vegetables (AS Emanuel, 2012). Several factors influence fruit and vegetable intake among females. These factors include taste preferences, health consciousness, dietary patterns, cultural and social norms, awareness of the health benefits, and motivations related to weight management and body image (Carvalho Moraes, 2021). Females are more likely to eat fruits and vegetables and females began their healthy lifestyle programmes eating well below the recommended weekly average of fruits and vegetables (Erin M Caldwell, 2009). Overall, fewer than the minimum recommended five daily servings of fruits and vegetables were eaten by 77.6% of men and 78.4% of women from the 52 mostly low- and middle-income nations (Justin N. HallBSch, 2009).

2.5 Students Nutritional Status Intake of Fruits and Vegetables

Almost all of the students of universities knew very well about balanced diet. Similar trends have also been observed by Angeliki *et al.* (2007) and Bazzano *et al.* (2003) that university students were used to aware of the balanced diet over all bases, but Biro *et al.* (2005) argued that at least there should be a balance diet along with some specifications under specific conditions. Universities students were taking fruits and vegetables in the form of 1 cup only in a day and 3-4 times in a week which is not balanced diet as per recommended dietary intake of youth (M. Asif Raza, 2012). Fruit and vegetable consumption among university students discussed the significant gender differences related to the consumption of fruits and vegetables (Unusan, 2004). According to the findings, female students were more likely to eat vegetables during lunch and dinner and they prefer eating a fruit instead of a dessert at lunch or dinner and during breakfast. Compared to the female students, male students were less likely to eat fruits (T. Perera, 2022).

3. METHODOLOGY

The research of this study was quantitative study, aimed to know the nutritional status of fruits and vegetables intake among UiTM Perlis students. Quantitative descriptive using food diary research was defined by (Pritha Bhandari, 2020) was the process of collected and analysed numerical data. It could be used to find pattern and averages, make prediction, test causal, relationship and generalize result to wider population.

Among the quantitative research methods, food diary was used in this study to investigated nutritional status intake among UiTM Perlis students by used an appropriate data-gathering tool. The major purpose of the food diary is to understand the eating habits in their daily life. Keeping a record of the daily food intake will help the student to find out their daily nutritional intake. A food diary was given to find out the amounts of intake on fruits and vegetables in their daily life. A food diary is a daily track of the meals and drinks that the participants consume. The respondent uses the diary to understand better the respondents' eating patterns and daily intake of fruits and vegetables. It could make the respondent more aware of their daily diet. When the respondent is aware of this, they can improve their diet.

4. RESULTS

Based on the findings, Figure 4 illustrates the mean daily nutritional intake obtained from fruit and vegetable consumption among UiTM Perlis students. The nutritional components assessed include potassium, vitamin A, vitamin C, iron, and dietary fiber intake. Data are presented as mean $\pm$ standard deviation (SD).

Figure 4(A) presents the average potassium intake among UiTM Perlis students. The mean potassium intake was 126.9 ± 242.4 mg/day, indicating that the students' potassium consumption was below the recommended level according to the Recommended Dietary Allowance (2019).

Figure 4(B) demonstrates the average vitamin A intake among UiTM Perlis students. The mean vitamin A intake was 5.4 ± 14.4 IU, suggesting that the students' vitamin A consumption was insufficient compared with the recommended intake based on the Recommended Dietary Allowance (2022).

Figure 4(C) shows the average vitamin C intake among UiTM Perlis students. The mean vitamin C intake was 8.3 ± 20.8 mg/day, indicating an inadequate intake compared with the recommended level stated in the Recommended Dietary Allowance (2016).

Figure 4(D) illustrates the average iron intake among UiTM Perlis students. The mean iron intake was 7.5 ± 12.7 mg/day, demonstrating that the students' iron consumption was below the recommended dietary requirement according to the Recommended Dietary Allowance (2001).

Figure 4(E) presents the average dietary fiber intake among UiTM Perlis students. The mean dietary fiber intake was 3.3 ± 3.9 g/day, indicating insufficient fiber consumption compared with the recommended intake based on the USDA National Nutrient Database for Standard Reference (2020).

Based on the findings, Figure 5 illustrates the comparison of mean daily nutritional intake from fruit and vegetable consumption between male and female UiTM Perlis students. The nutritional components assessed include potassium, vitamin A, vitamin C, dietary fiber, and iron intake. Data are presented as mean $\pm$ standard deviation (SD), and statistical analysis was conducted to determine differences between genders.

Figure 5(A) presents the comparison of potassium intake between male and female students. The mean potassium intake was 6.8 ± 24.3 mg/day among male students and 292.1 ± 302.7 mg/day among female students. The results indicate that female students had a higher potassium intake compared with male students. A statistically significant difference was observed between male and female students' potassium intake ($p < 0.05$).

Figure 5(B) demonstrates the comparison of vitamin A intake between male and female students. The mean vitamin A intake was 1.9 ± 5.1 IU among male students and 10.3 ± 20.3 IU among female students. Female students showed a higher vitamin A intake compared with male students, with a statistically significant difference observed between genders ($p < 0.05$).

Figure 5(C) illustrates the comparison of vitamin C intake between male and female students. The mean vitamin C intake was 3.4 ± 7.3 mg/day among male students and 15.1 ± 29.5 mg/day among female students. The findings indicate that female students had a higher vitamin C intake compared with male students, and the difference between genders was statistically significant ($p < 0.05$).

Figure 5(D) presents the comparison of dietary fiber intake between male and female students. The mean dietary fiber intake was 2.2 ± 2.7 g/day among male students and 4.9 ± 4.7 g/day among female students. Female students demonstrated a higher fiber intake compared with male students, with a statistically significant difference observed between genders ($p < 0.05$).

Figure 5(E) shows the comparison of iron intake between male and female students. The mean iron intake was 3.9 ± 7.8 mg/day among male students and 12.5 ± 16.0 mg/day among female students. The results

indicate that female students had a higher iron intake compared with male students, with a statistically significant difference observed between genders ($p < 0.05$).

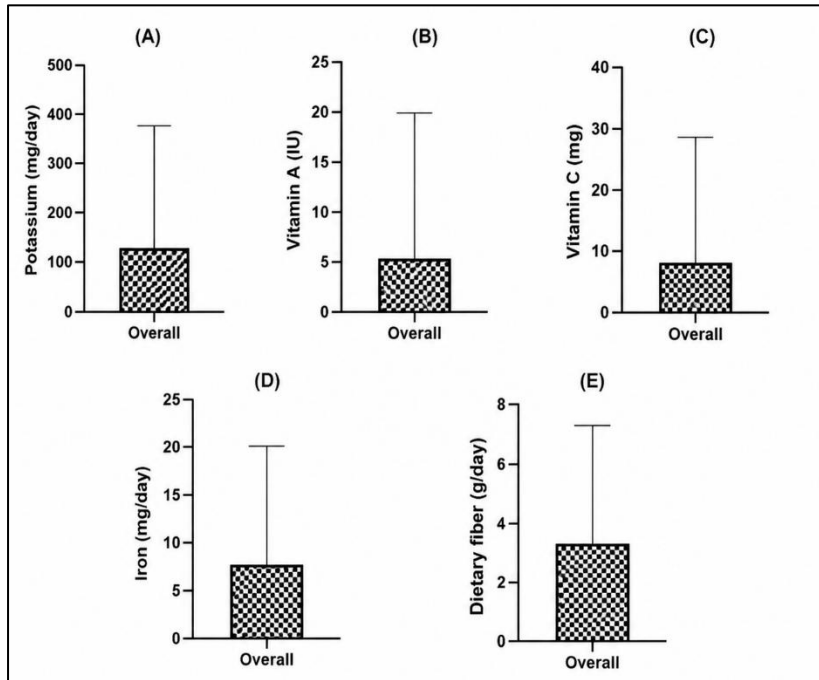


Figure 4. Mean daily intake of selected nutrients from fruit and vegetable consumption among UiTM Perlis students (A) Potassium (mg/day), (B) Vitamin (IU), (C) Vitamin C (mg), (D) Iron (mg/day) and (E) Dietary fiber (g/day). Data are presented as mean $\pm$ standard deviation (SD).

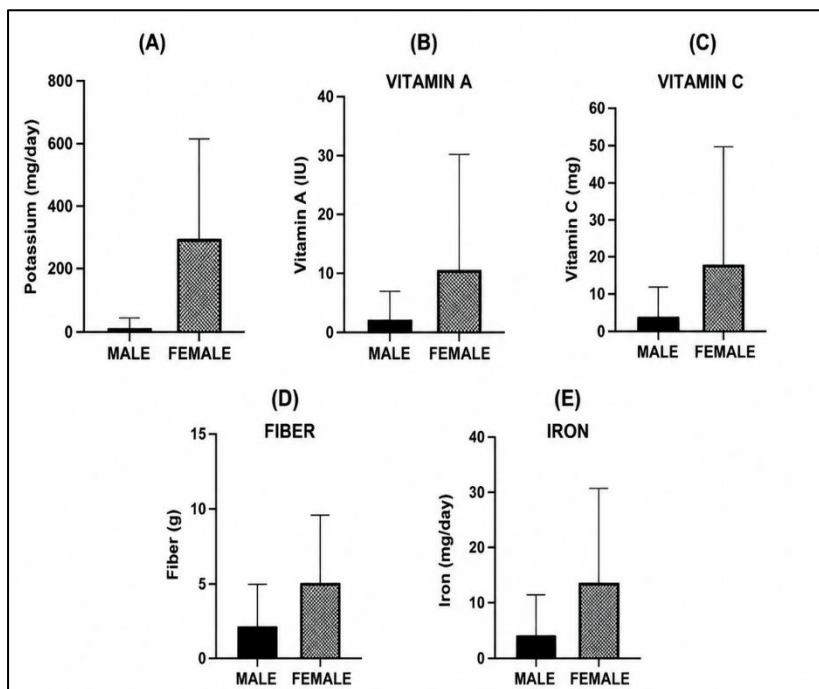


Figure 5. Gender comparison of mean daily nutrient intake derived from fruit and vegetable consumption among UiTM Perlis students. (A) Potassium, (B) Vitamin A, (C) Vitamin C, (D) Dietary fiber, and (E) Iron intake. Data are expressed as mean $\pm$ standard deviation (SD), with statistical significance set at $p < 0.05$.

5. DISCUSSION

The present study has shown that the nutritional intake of fruits and vegetables among UiTM Perlis students is not sufficient. The data collected has shown that students in UiTM Perlis, regardless male or female, do not consume enough potassium, vitamin A, vitamin C, Iron, and Fiber to meet Recommended Dietary Allowances recommendations in 2023. Those vitamins is a substance found in fruits and vegetables. Based on the previous study by American Dietetic Association in 2010, majority of the college students did not meet the recommended daily intake of fruits and vegetables. The study reported that students consumed an average of less than one serving of fruits and vegetables per day, falling far short of the recommended 5 to 9 servings (Christiane Schroete, 2012). Another study conducted in 2012 and published in the *Journal of Nutrition Education and Behavior* examined the eating habits of university students. The findings indicated that a significant number of students did not consume the recommended amounts of fruits and vegetables. The study suggested that factors such as limited availability, cost, and lack of knowledge about healthy eating may contribute to these low consumption levels (Tom Deliens, 2014).

The National Academy of Medicine has established an Adequate Intake (AI) for potassium. For women 19 and above, 2600 mg in a day and for men 19 and above, 3400 mg in a day. The data that has been taken shows that the average of overall potassium intake of students in UiTM Perlis was only 126.9 mg which is not sufficient. Previous study shows that most people consume too much sodium and not enough potassium (Dr Francesco, 2013). Potassium was identified as a shortfall nutrient by the Dietary Guidelines for Americans 2010 Advisory Committee. In modern societies, Western diets have led to a decrease in potassium intake with reduced consumption of fruits and vegetables (Connie M. Weave, 2013). Other than that, dietary surveys consistently show that people in the United States consume less potassium than recommended, which is why the 2015–2020 Dietary Guidelines for Americans identifies potassium as a “nutrient of public health concern” (J Nutr Sci, 2022).

According to Recommended Dietary Allowance, the nutritional intake of Vitamin A among UiTM Perlis students is not fulfilled the recommendation. The Recommended Dietary Allowance for adults 19 years and older is 90 mg daily for men and 75 mg for women. The results shows that the average of Vitamin A intake among students in UiTM Perlis only 5.4mg. Several studies have examined the dietary habits and vitamin A intake among students. These studies often highlight that students may have inadequate vitamin A intake due to various factors, including a preference for processed and low-nutrient foods, limited access to fresh fruits and vegetables, and poor dietary habits overall (Lubna Mahmood, 2021). Other than that, inadequate vitamin A intake was common, especially among populations with limited access to nutrient-rich foods. The researchers noted that improving dietary diversity and promoting consumption of vitamin A-rich foods, such as fruits and vegetables, could help address this issue (Sucheta Mehra, 2019). *European Journal of Nutrition* in 2016 assessed vitamin A intake in college students in England and the study reported that the majority of the students had inadequate vitamin A intake, emphasizing the need for nutritional education and interventions to improve dietary habits (Rita Polito, 2023).

Vitamin C is an essential nutrient that must be obtained through the diet in adequate amounts to protect us from cardiovascular disease, eye disease, stroke and cancer (Kathleen M, 2022). The Recommended Dietary Allowance for vitamin C in adults 19 years and older is 90 mg daily for men and 75 mg for women. The average intake of vitamin C for students in UiTM Perlis that consist of male and female were

8.3mg. This shows that the intake of vitamin C is not sufficient. Another study published in the Journal of the American College of Nutrition in 2011 assessed the dietary intake of vitamin C in college students in United States and the study reported that a significant portion of the students did not meet the recommended daily intake of vitamin C. This could be attributed to limited dietary diversity, reliance on processed foods, and insufficient knowledge about nutrition (AC Carr, 2020). This statement shows the impartiality of the recent study in among UiTM Perlis's student.

Next, according to USDA National Nutrient Database for Standard Reference, women should try to eat at least 21 to 25 grams of fiber a day, while men should aim for 30 to 38 grams a day (Alberto Ascherio, 2012). The result shows that the average intake of male and female in UiTM Perlis is not sufficient because the average intake of fiber is only 3.3 grams. Previous study from National Institute of Health suggest that many individuals, including students, often fall short of meeting the recommended daily fiber intake and the study reveals that the fiber intake among students tends to be lower than the recommended levels. This study also mentioned, students may frequently consume fast food, snacks, and processed meals, which are typically low in fiber and high in added sugars and unhealthy fats (Am J Lifestyle, 2017). In a study assessing fiber intake among college students in the USA, Spain, and Tunisia, researchers found a notable proportion of students who failed to meet the recommended daily fiber intake. The reasons attributed to this low fiber consumption included restricted access to high-fiber foods, insufficient awareness of fiber-rich sources, and a preference for processed food options (Ramón Serrano, 2017). The study carries even more significance when students at UiTM Perlis are also in line with the previous study.

Other than that, students in UiTM Perlis do not take enough Iron in their daily basis. The average intake of Iron among students in UiTM Perlis is 7.5 mg which is not fulfilled the recommendation intake based on Recommended Dietary Allowance (RDA). Men that age between 19 to 50 years old need to consume 8 mg daily, while women should consume 18mg daily. A study published in the Journal of the Academy of Nutrition and Dietetics in 2014 assessed iron intake among college students living in Saudi Arabia. The study found that a considerable proportion of the students had inadequate iron intake and did not meet the recommended daily intake. Factors contributing to low iron consumption included poor dietary choices, limited intake of iron-rich foods, and inadequate awareness of iron sources and requirements (Riyadh Alzaheb, 2017). Another study published in the British Journal of Nutrition in 2013 examined iron intake in adults. The study reported that a significant portion of the adult population had inadequate iron intake, particularly among women of childbearing age. This can be attributed to factors such as low consumption of iron-rich foods, dietary patterns that inhibit iron absorption, and inadequate iron supplementation in certain populations (MD Cappellini, 2020). Next, a previous study has explored iron intake among students, particularly in school-aged children and adolescents. These studies often reveal that many students do not meet the recommended daily intake of iron (Int J Food Sci, 2023).

Lastly, according to our findings, female students in UiTM Perlis consume more fruits and vegetables than male students. National dietary surveys stated that study conducted in different countries have consistently reported that males have lower fruits and vegetables intake compared to females. The survey collect data on food consumption patterns, including fruits and vegetables, and often reveal disparities between genders (Nihat Küçük, 2023). Other than that, based on National Institute of Health, study has

assessed fruit and vegetable intake among males and females using food frequency questionnaires or dietary recalls and the study often observe that females have higher consumption of fruits and vegetables, while males tend to fall short of recommended intake levels (D Alkazemi, 2021). Study from Amber S. Emanuel from Nutri Science also stated that females tend to prioritize health and weight management more often than males, which can lead to higher fruit and vegetable consumption. Males may focus more on macronutrients like protein and associate fruits and vegetables with feminine or less satisfying food options (Amber S. Emanuel, 2012). The findings prove that the significant of males and females consumption of fruits and vegetables with the previous study is parallel.

6. CONCLUSION

In conclusion, the present study shows that the overall nutritional status intake on fruits and vegetables among UiTM Perlis student is insufficient. Additionally, the second finding of fruits and vegetables intake among male and female is also insufficient. This finding of this study supports the previous study of the nutritional intake status of fruits and vegetables among adults especially students and also between gender. All the results were significant therefore rejected all the null hypothesis.

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8. CONFLICT OF INTEREST STATEMENT

The authors agree that this research was conducted in the absence of any self-benefits, commercial or financial conflicts and declare the absence of conflicting interests with the funders.

9. AUTHORS' CONTRIBUTIONS

Nur Fatini Izzati Azhar: Conceptualisation, methodology, investigation, formal analysis, data curation, and writing—original draft preparation; **Nurizzati Hatta Yarif:** Conceptualisation, methodology, investigation, and formal analysis; **Siti Nur Aini Jamil Ahmad:** Methodology, validation, investigation, and writing—review and editing; **Dr Ahmad Dzulkarnain Hj Ismail:** Supervision, validation,

methodology, and writing—review and editing; **Siti Syahirah Aqilah Shafee**: Data curation, investigation, formal analysis, and writing—review and editing.

All authors have read and agreed to the published version of the manuscript.

10. ETHICS STATEMENT

This study was reviewed and approved by the Institutional Ethics Committee of [Universiti Teknologi MARA] (Approval No: REC/484/2023). All procedures involving human participants/animal subjects were in fulfilment of the ethical standards of the 1964 Helsinki Declaration. Informed consent was obtained from all participants, and data anonymity was strictly maintained throughout the study.

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