THE ASSOCIATION BETWEEN INCOME STATUS AND DIET DIVERSITY AMONG IIUM KUANTAN STUDENTS

NURUL SHAHIDA MOHD SAFIEE, Bsc (Hons.)

DEPARTMENT OF NUTRITION SCIENCES, KULLIYYAH OF ALLIED HEALTH SCIENCES, INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA, JALAN SULTAN AHMAD SHAH, 25200 KUANTAN, PAHANG, MALAYSIA

NORAISHAH MOHAMED NOR, PhD (CORRESPONDING AUTHOR)

ishah@iium.edu.my

DEPARTMENT OF NUTRITION SCIENCES, KULLIYYAH OF ALLIED HEALTH SCIENCES, INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA, JALAN SULTAN AHMAD SHAH, 25200 KUANTAN, PAHANG, MALAYSIA

ABSTRACT

Introduction: Unhealthy eating patterns are one of the contributing factors that may cause malnutrition or nutrition-related disease in an individual. However, the ability to start a healthy, nutritious, and low energy-dense food is influenced by the individual's income, especially the budget allocated to food expenditures besides other commitments. Therefore, this study aimed to determine the relationship between income level and diet diversity among students in IIUM Kuantan. **Methods:** A total of 107 respondents were chosen through proportionate stratified sampling from each Kulliyyah available in IIUM Kuantan: Kulliyyah of Allied Health Sciences (KAHS), Kulliyyah of Medicine (KOM), Kulliyyah of Pharmacy (KOP), Kulliyyah of Dentistry (KOD), Kulliyyah of Sciences (KOS) and Kulliyyah of Nursing (KON). Participants were interviewed using a structured questionnaire to obtain information on their socio-demographic characteristics, nutrient intake, and dietary diversity. A questionnaire with three sections included: section 1: socio-demographic data, section 2: the 24-hour diet recall questions, and section 3: the dietary diversity questionnaires (DDQ) were used for data collection. The data obtained were assessed with descriptive analysis, a One-Way Analysis of Variance (ANOVA) test, and a One-Sample T-Test. **Results:** There was no significant association ($p>0.05$) between income status and diet diversity among IIUM Kuantan students. The total calorie intake for female and male students did not meet the energy requirement according to Recommended Nutrient Intakes (RNI) 2017, with $p<0.001$ for both genders. **Conclusions:** It can be concluded that students' income status is not associated with their diet diversity. The female and male university students in the IIUM Kuantan campus consumed less energy than recommended by guidelines. Therefore, high or low-income students can have a limited or very diverse diet. Future studies should examine the elements that affect the variety of their diets.

KEYWORDS: Income status, Diet diversity, food intake, DDQ

INTRODUCTION

While having an adequate grasp of nutrition knowledge, most university students continue unhealthy eating habits such as skipping breakfast, frequent snacking, high consumption of fried and fatty foods, and eating less fiber daily (Yun et al., 2018). Besides, young adults are susceptible to problems in their nutritional status, especially when they adjust to university life and take on more responsibility for their daily food intake and activities (Hicks, 2018; Sogari et al., 2018 & Yun et al., 2018). Based on the study conducted among students at University Brunei Darussalam by Yun et al. (2018), the body mass index (BMI) category according to WHO, 13.2% of university students were underweight, while 28.8% were overweight/obese.

Each macronutrient, including carbohydrates, protein, and fat, has a different calorie count, influencing an individual total energy intake. As a result, consuming a variety of macro- and micronutrients could help achieve an adequate energy requirement to maintain well-being. However, not all university students lead a healthy lifestyle to maintain a normal BMI. Moreover, essential nutrients can be obtained from various foods because different foods have different nutrient content (FAO, 2016). Dietary diversity is the number of different food groups or foods consumed in a given period (FAO,2011). Diverse diet scores have been positively correlated with sufficient nutrients or energy intake for all populations, including adults (Fao, 2010). Low diet diversity can affect health due to a lack of essential nutrient intake or an excess of one single nutrient intake. Based on a study conducted by Onyeji et al. (2021), undergraduate students with obesity have low dietary diversity; thus, it shows an association between nutritional status and dietary diversity. A diversified diet contains all the essential nutrients the body requires and reflects the diet quality for individuals' health (Goh et al., 2020; Sogari et al., 2018 & Stewart & Maisonville, 2018).

Moreover, the Department of Statistics Malaysia (2022) stated that Malaysia's inflation rate in August 2022 increased to 4.7% year-on-year from 4.4% year-on-year in July 2022. The increase is attributed to food and non-alcoholic beverages, which increased by 7.2%. Most of the time, the healthy and nutritious foods available are costly compared to unhealthy and high-energy-dense foods because food purchases are influenced by perceived cost in several ways by students (Daniel, 2020). Therefore, students choose cheaper foods to save money rather than look at their nutritional value (Sogari et al., 2018). According to Yun et al. (2018), 58.7% of students chose food that costs less over healthy or nutritious food. Regardless of ignorance about the nutritional benefits of various food groups, maintaining a balanced and varied healthy diet for university students may be difficult due to a lack of money (Omage & Omuemu, 2018 & Onyeji & Sanusi, 2022).

Additionally, the socio-demographic background of each student is varied. The financial situation can be one of the risk factors affecting the diversity of dietary intake by the students. There is a contradictory finding on the relationship between income and nutritional intake. Hicks (2018) found an insignificant relationship between income and nutrition intake due to the university's unique environment and circumstances. Despite that, several other authors stated otherwise by mentioning that income is likely related to nutrient consumption based on a few studies conducted as low-income people consumed low nutrients and foods (Daniel, 2020; French et al., 2019; Mohd Abu Bakar et al., 2019; Rajikan et al., 2019 & Shabnam et al., 2021). Moreover, poor nutrition quality was also consistently linked to lower household income (French et al., 2019 & Shabnam et al., 2021).

Hence, this study will determine if there are any differences in dietary diversity scores for IIUM Kuantan students from different incomes or allowances obtained per semester that may affect their nutritional status.

MATERIALS AND METHODS

Study Design and Population

A cross-sectional study design was used among the students from all six sciences-based kulliyyah in the IIUM Kuantan campus, involving 107 male and female participants from year one to year five.

The proportionate stratified sampling method with convenient selection was used for this study. The subjects were selected according to their gender and kulliyyah to meet the proportion of each kulliyyahs and gender. Yet only those who registered at IIUM Kuantan campus, aged between 18 – 29 years old, live on campus, and were free from chronic diseases or medical problems were eligible to be the participants.

The student's distribution was 24.9% from Kulliyyah of Sciences (KOS), 24.3% from Kulliyyah of Medicines (KOM), 18.5% from Kulliyyah of Allied Health Sciences (KAHS), 12.1% from Kulliyyah of Nursing (KON), 12.1% from Kulliyyah of Pharmacy (KOP) and 8.1% from Kulliyyah of Dentistry (KOD). The proportion for genders for female and male students was 61.2% and 38.8%, respectively.

Ethical approval had been obtained from Kulliyyah Postgraduate and Research Committee (Reference No: IIUM/310/14/11/2/KAHS6/23). The participant completed the informed consent form attached with a set of questions. All information was strictly confidential.

Questionnaire

For this study, participants were interviewed in-person by the researcher with a set of questionnaires consisting of three parts: i) Socio-demographics data (participants' age and gender, level of study, Kulliyyah and income status, and anthropometry measurements such as body mass index), ii) Three days of 24-hour diet recall form – consists of two days of weekdays and a weekend day of detailed information on dietary intake and iii) Diet Diversity Questionnaire (DDQ) – consists of nine food groups to categorize students into low (≤ 3 food groups), medium (4 – 5 food groups) and highly diverse diet (≥ 6 food groups), were used to collect the relevant information from the selected participants.

Statistical Analyses

The data obtained were statistically analyzed using Statistical Package for the Social Sciences version 26.0 (SPSS 26.0). The significance level for 95% confidence interval (CI) was set at 0.05 for the variables. A descriptive analysis was used to identify the percentage, mean, median and standard deviation of the socio-demographic data, the income status among the participants, the dietary diversity scores (DDS), and anthropometric measurements. The association between income status and students' diet diversity was analyzed using the One–way ANOVA test. One Sample T-Test analysis was used to compare the mean of total energy intake among female and male students with Recommended Nutrient Intakes (RNI, 2017).

RESULTS

Socio-Demographics Data

Table 1 shows the socio-demographic characteristics data collected from 107 male and female students from year one to year five from each Kulliyyah available at the IIUM Kuantan campus. Of 107 students, 39.3% (42) were from Kulliyyah of Allied Health Sciences (KAHS), 9.3% (10) from Kulliyyah of Dentistry (KOD), 6.5% (7) from Kulliyyah of Medicine (KOM), 14% (15) from Kulliyyah of Nursing (KON), 14% (15) from Kulliyyah of Pharmacy (KOP) and 16.8% (18) from Kulliyyah of Sciences (KOS). Female responses were higher than male respondents, at 60.7% (65) and 39.3% (42), respectively. All students who participated in this study were aged 19 to 25 and single.

Table 1 Socio-demographic Characteristics of the Participants (N=107)

Variables	Frequency (n)	Percentage (%)
Gender		
Female	65	60.7
Male	42	39.3
Age		
19	4	3.7
20	16	15.0
21	16	15.0
22	60	56.1
23	9	8.4
24	1	0.9
25	1	0.9
Kulliyyah		
KAHS	42	39.3
KOD	10	9.3
KOM	7	6.5
KON	15	14.0
KOP	15	14.0
KOS	18	16.8
Year of Study		
1	23	21.5
2	18	16.8
3	58	54.2
4	7	6.5
5	1	0.9

Table 2 shows the average body mass index (BMI) among the students, was 22.6 kg/m^2, which falls in the normal range of BMI.

Table 2 Body Mass Index (BMI) Among IIUM Kuantan Students (N=107)

Variable	Minimum	Maximum	Mean
Body weight (kg)	38.0	100.0	59.2
Height (cm)	148.0	180.0	161.2
Body mass index (BMI) (kg/m^2)	15.7	33.1	22.6

Income Status Among IIUM Kuantan Students

Table 3 indicates the income status of the participants. There were 38.3% (41) participants from the B40 category, 42.1% (45) from the M40 category, and 19.6% (21) from the T20 category. The participants received financial support from parental allowance, sponsorship, study loans, and/or working while studying. Not to mention, 49.5% (53) of most students depended solely on sponsorships and study loans.

Additionally, students received allowances per semester from less than RM 3,000 to more than RM 5,001. Nevertheless, the least participants received allowances of more than RM 5,001, while most received allowances of RM 3,001 to RM 5,000 per semester, with 14.0% (15) and 61.7% (66), respectively. Besides, each participant spent variably from less than RM 150 to RM 750 for food every month.

Table 3 Descriptive Analysis of Income Status of IIUM Kuantan Students (N=107)

Variables	Frequency (n)	Percentage (%)
Parent's estimated household income		
B40	41	38.3
M40	45	42.1
T20	21	19.6
Types of allowance received		
Parental allowance	21	19.6
Parental allowance, sponsorship & study loans	28	26.2
Parental allowance, study loans & working while studying	3	2.8
Sponsorship & study loans	53	49.5
Study loans & working while studying	2	1.9
Total allowance obtained per semester		
< RM 3,000	26	24.3
RM 3,001 – RM 5,000	66	61.7
> RM 5,001	15	14.0
Spending solely on food per month		
< RM 150	9	8.4

RM 151 – RM 300	44	41.1
RM 301 – RM 450	35	32.7
RM 451 – RM 600	17	15.9
RM 601 – RM 750	2	1.9

Dietary Diversity Scores (DDS) Among IIUM Kuantan Students

Table 4 displays the diet diversity scores of the students. It shows many participants fall in the medium category for diet diversity, with a total of 54 students (50.5%), followed by the high category for diet diversity, with a total of 32 students (29.9%), and the fewest participants fall in the low category for diet diversity, with a total of 21 students (19.6%).

Table 4 Dietary diversity scores of IIUM Kuantan students (N=107)

Diet Diversity (scores)	Frequency (n)	Percentage (%)
Low (0 – 3)	21	19.6
Medium (4 – 5)	54	50.5
High (6 – 9)	32	29.9

Association Between Income Status and Diet Diversity Among IIUM Kuantan Students

Table 5 indicates the between-groups analysis was conducted to explore the impact of total incomes obtained per semester by IIUM Kuantan students on their diet diversity, as measured by the nine food groups in the Dietary Diversity Questionnaire (DDQ). Participants were divided into three groups according to their total incomes obtained per semester (Group 1: RM 3,000 or less; Group 2: RM 3,001 – RM 5,000; Group 3: RM5,001 and more). The result found no statistically significant difference between the income level and diet diversity with a p-value of 0.680 which is more than 0.05.

Table 5 Dietary Diversity Scores and the Students' Total Incomes Obtained Per Semester (N=107)

Dietary Diversity Scores (DDS)	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.515	2	0.757	0.386	0.680*
Within Groups	199.914	104	1.960		

*Not Significant; value at $p > 0.05$

Total Energy Intakes Among Female and Male Students in IIUM Kuantan Compared to RNI

The test value used in conducting One Sample T-Test for female and male students was 1840 kcal per day and 2240 kcal per day, respectively, according to the total energy requirement for adults aged 19 to 29 years old from Recommended Nutrient Intakes (RNI) 2017. Table 6 shows a significant difference between the total energy intake among female students in the IIUM Kuantan campus and RNI. ($M = 1604.3960$, $SD = 360.9698$) and 1840, $t(64) = -5.262$, $p < 0.001$, $\alpha = 0.05$. In tandem with that, total energy intakes among male students in the IIUM Kuantan campus also showed a significant difference compared with RNI. ($M = 1964.0397$, $SD = 470.2679$) and 2240, $t(41) = -3.803$, $p < 0.001$, $\alpha = 0.05$. Hence, the mean total energy intakes for female and male students in the IIUM Kuantan campus were lower than the total energy requirement in RNI.

Table 6 Total Energy Intakes Among Female & Male Students in IIUM Kuantan According to RNI (2017) (N=107)

Variable		**Total Energy Intake (kcal)**					
Gender	**n**	**Test Value**	**Mean (M)**	**Std. Deviation (SD)**	**Mean difference (95% CI)**	**t-statistics (df)**	**p-value**
Female	65	1840.00	1604.3960	360.9698	-235.6040 (-325.0479, -146.1601)	-5.262 (64)	< 0.001
Male	42	2240.00	1964.0397	470.2679	-275.9603 (-422.5061, -129.4145)	-3.803 (41)	< 0.001

*Significance value, $p < 0.05$.

DISCUSSION

The total income or allowances students receive every semester varies depending on the sources of allowances received. Most students rely on sponsorships and study loans only, to receive the allowances for every semester from financial institutions that offer to assist university students financially in tertiary education. The matters considered were the cost of living among students in university, including the economic challenges faced nowadays including the expenses for basics such as food and drinks, hostel, and transport to faculty (Nizad et al., 2018). According to a few previous studies regarding incomes and nutrition, the incomes or allowances obtained are associated with the diet of individuals (French et al., 2019; Rajikan et al., 2019 & Shabnam et al., 2021).

People's psychology also shapes their perceptions about diet intake or food choices instead of income status. According to the research done among university students, they found that the students did not abide by the advice on healthy dietary practices such as consuming a diverse and balanced diet, limiting fried foods, unhealthy snacking and more. However, they are conscious of the adverse consequences of excess energy intake, sugar, salt and oily foods (Sogari et al., 2018 & Yun et al., 2018). The probable factors

such as the significant life-changing adjustments in university as compared to high school, university students establish the food habits they will maintain over four to five years in college and beyond (Hicks, 2018 & Sogari et al., 2018). Their diet diversity may have developed since their early entrance into university by their preferences; they consumed highly diverse foods or limited their diet to minimal food groups. According to a study by Goh et al., (2020), the food group choices among individuals were influenced by cultural, religious, and philosophical variations. Thus, food choices are very dependent on individual preferences and habits; this can be seen from the results where the participants have a wide range of food diversity from low, medium and high diverse food groups.

This study also implies that students with higher income per semester may have a low-diverse diet, whereas students with lower income per semester may have a high diverse diet. The probable key drivers that affect students' choices of various food groups instead of their allowances include the individual and social levels, university environment and student lifestyle. At the intrapersonal level, the key components include the university students' attitude, behavior, self-belief and skills. Even though some students have similar sources of allowances they received, for instance, the same types of financial support for study loans or sponsorships, every one of the students has different food preferences. Sogari et al. (2018) also continued that a student highlighted the importance of the pleasure of eating by consuming the same foods frequently, almost every day, while claiming that healthy foods are unpleasant and do not taste as good as unhealthy foods with lots of seasoning, deep fried, sweet drinks and so forth. University students tend to spend money on foods that give them pleasure, although they eat similar foods frequently.

Besides eating the same foods frequently, university students found it challenging to eat various foods because it was troublesome to prepare foods (Sogari et al., 2018). Moreover, in early adulthood, interpersonal relationships are influenced by the feeling of social pressure (Sogari et al., 2018). Psychologically, when going out or eating out, many university students consume similar foods as their peers or family members. In general, diet intake can be significantly influenced by the surroundings in which individuals live and their lifestyle (Sogari et al., 2018). In IIUM Kuantan campus, students who lived on the campus, as the included criteria in this study, will have limited access to food variability because the students depend on on-campus dining halls that may provide similar meals daily. This circumstance prevents them from having a very diverse diet as they become choosy when entering college. The students also claimed that they eat vegetables and fruits the most at home compared to at university (Sogari et al., 2018). This is because they found most vegetables and fruits are expensive (Daniel, 2020).

In the Recommended Nutrient Intakes (RNI) 2017, the total energy requirements were taken under the guideline for adults aged more than 18 years old with a physical activity level (PAL) of 1.6, which is moderate active PAL that commonly used or selected for the comparison purposes and the general population. Hence, for males, the total energy requirement is 2240.00 kcal per day, while for females, the total energy requirement is 1840 kcal per day.

Nevertheless, based on the results, the total energy intake of the participant was lower than the recommendation regardless of their gender. The primary factors of the variability in energy requirements of adult populations, including between females and males with various lifestyles, are physical activity level and body weight. Energy needs are influenced by other variables that impact basal metabolic rate (BMR) and physical activity level (PAL), which are the two main contributors to the energy expenditure of individuals. As in RNI (2017), the other variables that impact BMR are body size, health conditions, environments, climate, temperature, altitude, food compositions, hormone balances, medicines, stimulants, and many more. The finding was similar to a previous study conducted in Pakistan, where they found

lower energy intake among male students, however, the female students met the requirement (Khattak, et al, 2002)

CONCLUSIONS

This study revealed no association between income status and diet diversity of the students in the IIUM Kuantan campus. The diversity of the diet among university students might not be driven by the students' incomes or allowances per semester but by other factors, including personal preferences, university environment, and student lifestyle. Hence, high or low-income students can have a low or highly-diverse diet depending on their preferences. Thus, authorities should initiate effective strategies that educate students about healthier diets and better food choices to prevent non-communicable diseases among young adults.

ACKNOWLEDGEMENT

The authors would like to thank all the volunteered participants for their time and cooperation throughout conducting this study.

REFERENCES

Daniel, C. (2020). Is healthy eating too expensive?: How low-income parents evaluate the cost of food. *Social Science & Medicine (1982)*, *248*, 112823. https://doi.org/10.1016/j.socscimed.2020.112823

DOSM. (2022). *Consumer Price Index Malaysia August 2022*.

Food and Agriculture Organization (FAO). (2010). *Guidelines for measuring household and individual dietary diversity*. www.foodsec.org

Food and Agriculture Organization (FAO). (2016). *Minimum Dietary Diversity for Women: A Guide for Measurement.* Rome: FHI 360.

Food and Agriculture Organization (FAO). (2011). *Guidelines for Measuring Household and Individual Dietary Diversity.* Food and Agriculture Organization of the United Nations; Rome, Italy

French, S. A., Tangney, C. C., Crane, M. M., Wang, Y., & Appelhans, B. M. (2019). Nutrition quality of food purchases varies by household income: the SHoPPER study. *BMC Public Health*, *19*(1), 231. https://doi.org/10.1186/s12889-019-6546-2

Goh, E. Von, Azam-Ali, S., McCullough, F., & Roy Mitra, S. (2020). The nutrition transition in Malaysia; Key drivers and recommendations for improved health outcomes. *BMC Nutrition*, *6*(1). https://doi.org/10.1186/s40795-020-00348-5

Hicks, A. (2018). *A Study into a Relationship between Nutrition and Income in a College Setting*.

Khattak, M.M.A.K, Khan, A., & Khattak, M.U. (2002). Energy and Nutrients Intakes of Male and Female University Students. Pakistan Journal of Nutrition 1 (4): 174-178.

Mohd Abu Bakar, W. A., Ismail, S., Sidek, S., & Abdul Rahman, R. (2019). Prevalence and factors affecting food insecurity among university students in Pahang, Malaysia. *Malaysian Journal of Nutrition*, *25*(1), 59–67. https://doi.org/10.31246/mjn-2018-0139

Nizad, A. A. H., Yakob, R., Bangaan Abdullah, M. H. S., & Baharin, R. (2018). Students Living Index: A Case Study in International College (INTEC). *Jurnal Personalia Pelajar*, *21*(1), 11–18.

Omage, K., & Omuemu, V. O. (2018). Assessment of Dietary Pattern and Nutritional Status of Undergraduate Students in a Private University in Southern Nigeria. *Food Science & Nutrition, 6*(7), 1890–1897. https://doi.org/10.1002%2Ffsn3.759

Onyeji, G. N., & Sanusi, R. A. (2022). Nutrient Adequacy of Diets of Women of Childbearing Age in South East Nigeria. *Progress in Nutrition 2022, 24*(4), 1–11. https://doi.org/10.23751/pn.v24i4.12428

Rajikan, R., Shin, L. H., Hamid, N. I. A., & Elias, S. M. (2019). Food Insecurity, Quality of Life, and Diet Optimization of Low Income University Students in Selangor, Malaysia. *Jurnal Gizi Dan Pangan*, *14*(3), 107–116. https://doi.org/10.25182/jgp.2019.14.3.107-116

RNI. (2017). *Recommended Nutrient Intakes for Malaysia*. Minister of Health Malaysia.

Shabnam, N., Ashraf, M. A., Laar, R. A., & Ashraf, R. (2021). Increased Household Income Improves Nutrient Consumption in Pakistan: A Cross-Sectional Study. *Frontiers in Nutrition*, *8*. https://doi.org/10.3389/fnut.2021.672754

Sogari, G., Velez-Argumedo, C., Gómez, M. I., & Mora, C. (2018). College Students and Eating Habits: A Study Using An Ecological Model for Healthy Behavior. *Nutrients*, *10*(12). https://doi.org/10.3390/nu10121823

Stewart, I., & Maisonville, A. (2018). *A Guide for Successful Students* .

Yun, T. C., Ahmad, S. R., & Quee, D. K. S. (2018). Dietary Habits and Lifestyle Practices among University Students in Universiti Brunei Darussalam. *The Malaysian Journal of Medical Sciences : MJMS*, *25*(3), 56–66. https://doi.org/10.21315/mjms2018.25.3.6