THE ASSOCIATION OF FOOD INSECURITY WITH THE QUALITY OF LIFE, ACADEMIC PERFORMANCE AND BODY MASS INDEX AMONG UNIVERSITY STUDENTS

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ABSTRACT

Introduction: Food insecurity is a condition which occurs when people lack access to adequate amount of safe and nutritious food for healthy life. University students are vulnerable to food insecurity but not many studies emphasize on the relationship between food insecurity and the quality of life (QOL), academic performance as well as body mass index (BMI) level in Malaysia. Therefore, this study was designed to determine the association of food insecurity with the QOL, cumulative grade point average (CGPA) score and BMI level among the International Islamic University Malaysia Kuantan campus students. **Methods:** A total of 362 respondents were recruited and 310 completed a questionnaire that consisted of three parts which were the socio-demographic profile, Food Insecurity Experience Scale (FIES) and WHOQOL-BREF questionnaire. Weight and height were measured using standard anthropometry instruments and techniques. **Results:** It was found that 30.6% of respondents were food insecure with 24.8% were categorized as having moderate food insecurity and 5.8% severe food insecurity. However, food insecurity was not associated with either QOL, CGPA score or BMI level. **Conclusions:** Food insecurity among students is a serious issue. The prevalence was found to be quite high in this study for which interventions should be explored. Further research on the relationship between food insecurity and QOL, CGPA as well as BMI level among tertiary education institution students is also needed.

KEYWORDS: Food Insecurity, Quality of Life, CGPA score, BMI level

INTRODUCTION

Throughout the years, food insecurity has become a significant problem in the developing world as well as in developed countries. Food insecurity in developing countries, including Malaysia, is a prevalent issue and there have been many studies in different populations to measure this. The United Nations defines food security as a situation in which everyone has access to nutritionally safe and sufficient food for a healthy life (Food and Agriculture Organization (FAO), 2003). The definition also comprises of four dimensions which are food availability, food access, food utilization and stability (FAO, 2001). Food security is indeed hard to be measured as it includes comprehensive terms like food production, distribution and consumption but food insecurity is the other way around (Napoli, 2011). An increasing number of studies have been done to portray the food insecurity status among university students in the United States (US). The prevalence of food insecurity in the US for the tertiary education level was found to be 19% from eight US universities (Zein et al., 2019) and also 29% from seven universities in Georgia, US (Raskind, Haardorfer, & Berg, 2019). Food insecurity has many negative consequences on health and may affect the quality of life (QOL), especially the health-related quality of life (HRQOL). Assessing QOL is very crucial because most people experience the first exposure to stress during their university life. A study by Al-Naggar, Osman, and Musa (2014) showed that the QOL for the environment is the highest while the QOL for physical health is the lowest. This means that in terms of environment, most respondents among students have adequate economic resources, feel safe and free, and engage in leisure activities. They however, lack of physical activity and energy, suffered from pain and had problems with sleep. A study of QOL would be useful because the potential link with academic performances and body mass index (BMI) also can be determined. This study, therefore, was carried out with the primary objective to assess the prevalence of food insecurity at the tertiary education level. It also portrays the association of food insecurity with the QOL, academic performances and BMI level among students of IIUM Kuantan.

METHODS

A total of 362 students from International Islamic University Malaysia (IIUM) Kuantan campus aged between 18 and 25 years were recruited into this study. Informed consent was obtained from the participants. The protocol of the study was approved by the IIUM Research Ethics Committee (IREC). The data were collected using a set of questionnaires that was distributed to the subjects. Part A of the questionnaire contained the socio-demographic profile. It includes information such as age, gender, kulliyyah, year of study, living arrangement, parents' income, and scholarship status. The anthropometry measurements were taken using standard technique. The height was measured using a portable stadiometer (SECA 213) and weight using Tanita Digital Bathroom Scale. The BMI was calculated as weight (kg)/height^2 (m^2) and its classification is as presented in Table 1. For the CGPA score, the respondents needed to pick one from four ranges of score provided in the questionnaire which were less than 2.49, 2.5 to 2.99, 3.0 to 3.49 and 3.50 to 4.00. The Food Insecurity Experience Scale (FIES) questionnaire was used to measure food insecurity

which composes of 8 yes or no questions. It can assess the individual and household levels since both parts are available. For the scoring of FIES, the level of severity can be determined through its raw score. If all answer is no or less than four affirmative answers, it is categorized as food secure or mild food insecure, 4 to 6 yes answers is moderate while 7 to 8 yes answers is considered severe food insecurity. The WHOQOL-BREF questionnaire consists of 26 questions. For scoring, the level of QOL depends on the mean score of the domain where a high mean score indicates a higher QOL while a low mean score indicates a lower QOL. The data were analysed by using IBM SPSS Statistics (version 21). Descriptive statistics were used to assess the prevalence of food insecurity and the QOL. Independent Sample T-test, chi-square and Mann-Whitney U test were used to assess the association of food insecurity with the QOL, CGPA score and BMI level. The level of significance was set at 95% confidence interval ($P<0.05$).

Table 1 Classification of BMI (rask, 1998)

BMI	Weight Status
Below 18.5	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Overweight
30.0 – 34.9	Obese Class I
35.0 – 39.9	Obese Class II
40.0 and above	Obese Class III

RESULTS

From 362 questionnaires distributed, 310 completed the questionnaires with the response rate of 85.6 %. Out of the total respondents, 31.3% (n=97) were males while 68.7% (n=213) were females. The respondents of this study came from all kulliyyahs where 104 (33.5%) were from Science, 77 (24.8%) Allied Health Sciences, 48 (15.5%) Pharmacy, 39 (12.6%) Medicine, 34 (11.0%) Nursing and 8 (2.6%) were from Dentistry. Nearly all of them were living on campus. The highest number of students for parents' monthly income was 168 (54.2%) with income more than RM 4000 followed by 79 (25.5%) students with parents' income less than RM 2000.

Table 2 Demographic characteristics of respondents (N=310)

Characteristics	Frequency n (%)
Gender	
Male	97 (31.3)
Female	213 (68.7)
Kulliyyah*	
KOM	39 (12.6)
KOD	8 (2.6)
KOP	48 (15.5)
KAHS	77 (24.8)
KOS	104 (33.5)
KON	34 (11.0)
Living arrangements	
On-campus	307 (99.0)
Off-campus	2 (0.6)
With parents	1 (0.3)
Parents' monthly income	
< RM 2000	79 (25.5)
RM 2000 – RM 3000	38 (12.3)
RM 3000 – RM 4000	25 (8.1)
>RM 4000	168 (54.2)

*KOM= Kulliyyah of Medicine; KOD= Kulliyyah of Dentistry; KOP= Kulliyyah of Pharmacy; KAHS= Kulliyyah of Allied Health Sciences; KOS= Kulliyyah of Science; KON= Kulliyyah of Nursing

For ease of interpretation and data analysis purposes, moderate and severe food insecurity were referred to as 'food insecurity' (Smith, Kassa, & Winters, 2017). The prevalence of food insecurity among IIUM Kuantan students was 30.6% (n=95) with 24.8% (n=77) having moderate food insecurity and 5.8% (n=18) having severe food insecurity (Figure 1). Majority of the students were food secure which is 69.4% (n=215) from the total participants.

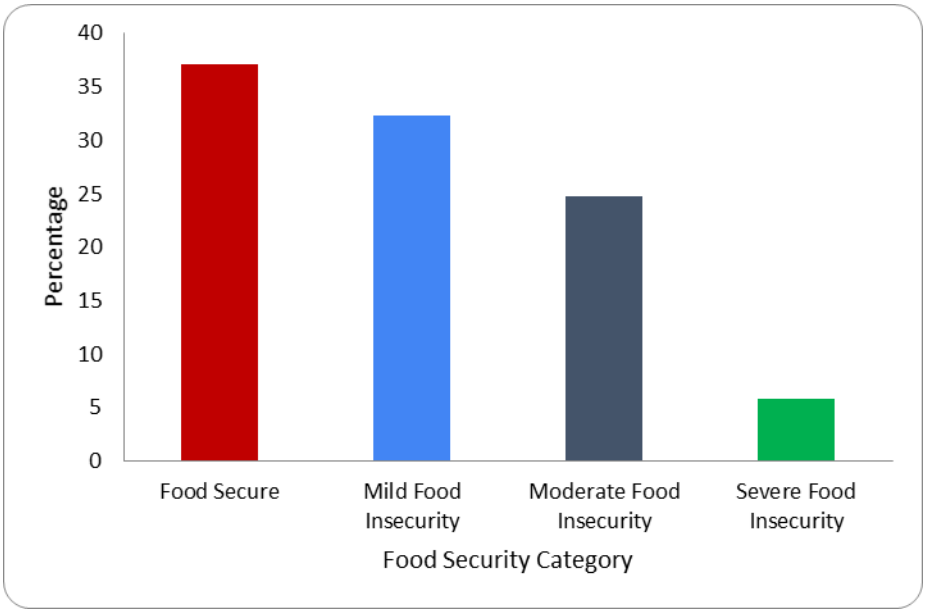

Figure 1 Food security status category among respondents using FIES

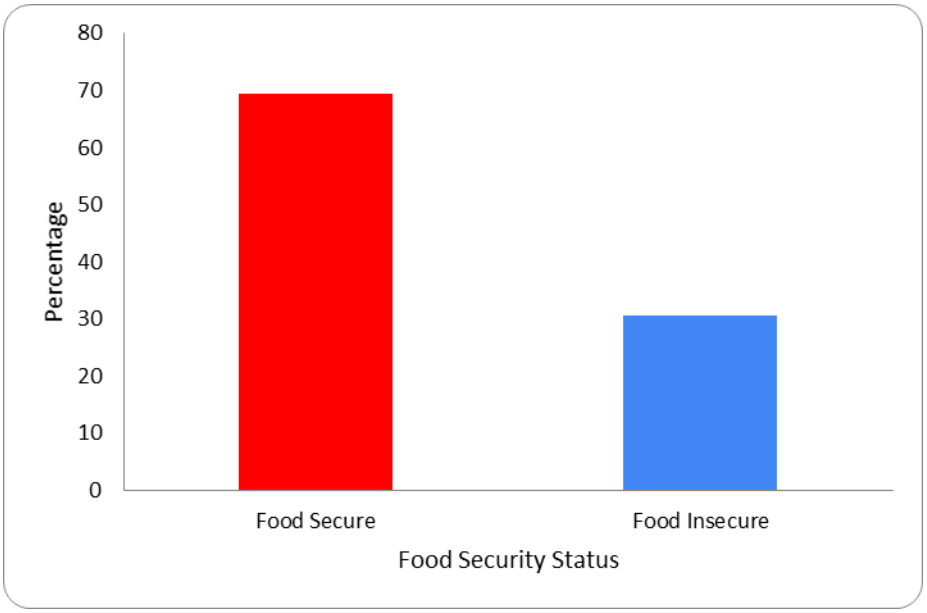

Figure 2 Food security status among respondents

The Table 3 shows the association between food insecurity and QOL. As can be seen, among all domains, the highest mean was found for Domain 1 which is physical health (Mean = 51.40). This indicates that the students practising suitable activities of daily living, less dependence on medicinal substances and medical aids, have adequate energy, less

fatigue, pain and discomfort, have enough sleep and rest and good work capacity. On the other hand, the lowest mean score is from Domain 4 which is environment (Mean = 45.36). Most of them would probably not have good financial resources, fewer opportunities for acquiring new information and skills, less conducive physical environment, and others. All domains of QOL showed that there was no significant difference between food secure and food insecure.

Table 3 Association between Food Insecurity and the QOL (N=310)

Variable (QOL)	Mean ± SD (n = 310)	Mean ± SD		*p*-value
		Food Secure (n = 215)	Food Insecure (n = 95)	
Physical	51.40 ± 18.83	52.23 ± 19.386	49.54 ± 17.452	0.246
Psychological	48.48 ± 17.95	48.88 ± 18.890	47.50 ± 15.691	0.533
Social Relationship	46.44 ± 22.56	46.03 ± 23.117	47.37 ± 21.342	0.631
Environment	45.36 ±20.34	45.667 ± 21.740	44.67 ± 16.834	0.662

*Independent Sample T-test

For CGPA score, from 310 of total respondents, 47 students which were from KOM and KOD were excluded in this test because they were using a different grading system. Overall, 110 (35.5%) achieved CGPA score between 3.50 – 4.00, 138 (44.5%) students achieved 3.00 – 3.49, and only 15 (4.8%) students achieve CGPA score less than 2.99. The results clearly showed that there was no significant association between food insecurity and CGPA score (p = 0.916) among students in all four kulliyyahs (Table 4).

Table 4 Association between Food Insecurity and CGPA score (N=263)

Cumulative Grade Point Average (CGPA)	Food Secure (n = 182) n (%)	Food Insecure (n = 81) n (%)	*p*-value
< 2.99	10 (3.8)	5 (1.9)	
3.00 – 3.49	97 (36.9	41 (15.6)	0.916
3.50 – 4.00	75 (28.5)	35 (13.3	

*Chi square test

The Mean BMI was 22.50 ± 4.05 (mean±SD). Majority of students were having normal BMI (n=207, 66.8%), whereas 34 (11.0%) underweight and 69 (22.2%) overweight and obese. As shown in Table 5, on average, the BMI of the food secure students (*Mean Rank* = 155.85, n = 215) was not significantly different to those of the food insecure students (*Mean Rank* = 154.70, n = 95), U = 10136.50, p = 0.917, two-tailed). Thus, there was no association between food insecurity and BMI level.

Table 5 Association between Food Insecurity and BMI (N=310)

Variable	Mean Rank		Mann-Whitney U	p-value
	Food Secure (n = 215)	Food Insecure (n = 95)		
Body Mass Index (BMI)	155.85	154.70	10136.50	0.917

*Independent-Sample Mann-Whitney U test

DISCUSSION

This current result was higher than the previous prevalence from Ramlee et al. (2019) who found that 22% out of 96 students were food insecure from two universities in Terengganu. However, this prevalence was lower than the study reported by Mohd Abu Bakar et al. (2019) and Sulaiman et al. (2013), with 54.4% (sample size=316) and 67.1% (sample size=484) students were food insecure, respectively. The differences in the prevalence might be due to several reasons, including different instruments used to measure and classify food insecurity and different sample size. For the current study, if mild, moderate and severe food insecurity were combined together, the percentage is 62.9% which is close to the prevalence reported by Mohd Abu Bakar et al. (2019) and Sulaiman et al. (2013). The QOL among students in IIUM Kuantan portrayed higher physical health followed by psychological, social relationship and the lowest domain of QOL was environment. The analysis nevertheless found that there was no significant association between food security status and QOL. Overall, many researchers have found an association between food insecurity and QOL but in a separate domain. There were not many researchers who assessed the association between food insecurity and QOL as a whole. The current result for social relationship domain is in accordance to a study by De Marco and Thorburn (2009). However, their study specifically focused on social support. They discovered that there were several reasons that might cause no association between food insecurity and social support. First, they assumed that the differences did not actually exist. Second, it might be because of bias from over-reported results due to social desirability, and

the last reason was probably because of the small effect of association where more subjects are needed. There is a variety of academic performance assessments that can be used. For example, it can be assessed by looking at students' concentration in the class, CGPA score, delayed in graduation time, and others. As can be seen in the current result, there was no association between food insecurity and CGPA score. This result was consistent with a study that was done by Payne-Sturges et al. (2018) and Davidson and Morrell (2020) which revealed that there was no relationship between both food insecurity and GPA score. As there was much evidence showing the association, Davidson and Morrell (2020) mentioned that one reason that they did not come out with the same result was because of the large percentage of respondents with high GPA score. This reason also can be applied to this study since the percentage of students with CGPA less than 2.99 was very small (4.8%). Not only that, this could also cause by the inadequate subjects as it did not reach the target and because of the reduction of the number of respondents cause by the exclusion of KOM and KOD students from the analysis. The finding of this study illustrated that there was no association between food insecurity and BMI. It was in line with what was reported by Gregório et al. (2018), Ukegbu, Nwofia, Ndudiri, Uwakwe, and Uwaegbute (2019) and El Zein et al. (2019). The rate of overweight and obese in this result was 22.2% of total respondents. Although some students were classified as underweight, overweight or obese, most of them were still in food secure group. Several studies found that food insecurity is associated with obesity. A food-insecure person is known to be more overweight and obese for several reasons, including the effect of feast-famine episodes and consumption of cheaper, high-energy and low-nutrient-density diets which may contribute to overweight and obesity. This will lead to high-energy intake and weight gain and raise the likelihood of getting non-communicable diseases (Jyoti, Frongillo, & Jones, 2005; Martin & Ferris, 2007; Wilde & Peterman, 2006).

CONCLUSION

As a conclusion, the prevalence of food insecurity showed that 30.6% of respondents were food insecure; with 24.8% were moderately food insecure and 5.8% were severely food insecure. The study findings showed that food insecurity among students at IIUM Kuantan was not significantly associated with any of the variables (QOL, CGPA score and BMI level). It means that there might be other variables that affect the students' food security status. Such results were opposite to a number of previous research which found positive correlations between those factors. Despite the different measuring tools used to assess the status of food security in different studies, university students in the current study appeared to be at a higher risk of food insecurity. It is alarming considering the increasing chances that university students would have insufficient food availability and accessibility, which may jeopardize their study.

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