

FOOD INSECURITY AMONG UNIVERSITY STUDENTS AT TWO SELECTED PUBLIC UNIVERSITIES IN MALAYSIA

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ABSTRACT

Most of food insecurity studies focus on the general households' level and less have been done for the university students. Therefore, this cross-sectional study focused on determining food insecurity, assessing factors contributing to the food insecurity and the association between socioeconomic status and food security status among students in two public universities in Terengganu. About 96 undergraduate students from two selected public universities in Terengganu participated and filled out a self-administered questionnaire consisting of three primary sections; Demographic profile, Food Security Index and Causes of Food Insecure and these were later analysed by SPSS. Results showed that 22% of respondents were classified as food insecure, with 14% of them were categorized in the low food security group and 8% were categorized as very low food security. High cost of living is among the main factors contributing to food insecurity among the university students in Terengganu. However, no significant association was found between socio-economic status and food insecurity status at $p < 0.05$. This may indicate that there are other factors besides socioeconomic status, which may influence food insecurity of the students in this study. In the future, similar studies should be extended to focus on assessing students' food insecurity and food coping strategies.

Key words: Food Insecurity, university students, Terengganu, Malaysia

INTRODUCTION

Food insecurity is the inability to get sufficient food and nutrition. It occurs when the accessibility of nutritious and safe food or the ability to get acceptable foods in socially acceptable ways is restricted or uncertain (Sulaiman *et al.*, 2013). Food insecurity basically covers issues related to the inadequacy of food and nutrition, and how it can affect people. Generally, it may affect health as it is interrelated in many aspects of life and currently this is an emerging threat to the university students for it can affect their academic performance (Patton-Lopez *et al.*, 2014; Silva *et al.*, 2015), behaviour, mental (Chaparro *et al.*, 2009), and health status (Cady, 2014; Morris *et al.*, 2016). Food insecurity affects the university students as most of them are young adults living away from home and some are

on first hands experiencing to manage themselves. Most studies regarding food insecurity paid attention only towards the household levels but few researches have been carried out among university students (Patton-Lopez *et al.*, 2014). At this time, food insecurity is an arising issue among university students due to the fact that they are affected by the increase in the cost of living (Zain, 2016), the rise in tuition and compulsory fees (Sulaiman *et al.*, 2013) which results that most of them are not always able to afford food and need to skip meals to pay for educational purposes (Martinez *et al.*, 2016; Sulaiman *et al.*, 2013). This is supported by evidence from a Malaysia newspaper's report in regards to starvation among university students in Malaysia as a result of not having enough living expenses (Salwani, 2016) which was reflected by 74% or 18,675 of them did not have sufficient money to buy food (Ghani, 2016). However, many of these students did not report of their starvation.

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This had been highlighted by Cady (2014) that most of the students who were in food insecurity states, want to keep it hidden, as they feel intimidated and shameful (Cady, 2014).

A study involving 1882 university students in Illinois, US found that 35% of them were food insecure and this was higher compared to the prevalence of US household food insecurity, which was about 14% (Morris *et al.*, 2016). Another study about 354 university students of a midsize rural university in Oregon, US shows that about 59% of them were experiencing food insecurity, which is considered as relatively high percentage of food insecurity occurrence among the university students (Patton-Lopez *et al.*, 2014). A study conducted in Malaysia involving 484 university students from selected Malaysian public universities found that almost 67.1% of the respondents had some kind of food insecurity with 44.4% consigned to low food insecurity and 22.7% were with very low food insecurity (Sulaiman *et al.*, 2013). Yet, there is scarcity of studies being carried out on food insecurity among university students specifically in Malaysia despite the high number of food insecure prevalence. Therefore, the aim of this study was to determine the percentage of food insecurity (via Radimer and US Adult Food Security Survey Module System Components) among public university students in Terengganu. This study also attempts to determine several factors that may contribute to food insecurity and the association between socio-economic status and food security status among public university students in Terengganu.

MATERIALS AND METHODS

This cross-sectional study involved 96 students aged 18 to 25 years from selected universities, among which all answered a self-administered questionnaire. Both universities were purposely chosen because of their high concentration of students which may have higher possibility to meet the required sample size. The minimum sample size for this study was calculated using the Cochran formula using the estimated prevalence of food insecurity among university students 67.1% (Sulaiman *et al.*, 2013), with 95% confidence level, and desired precision of 0.1. Thus, the minimum sample size derived was 74, but to increase the response rate to more than 30%, the sample size was increased to 96. Respondents were conveniently selected from registered undergraduate students for the academic session of 2017/2018 and age ranging between 18 and 25 years old. Data collection was conducted from July to October 2017. The ethical approval for this research was received

from the Human Ethic Board of Committees of Universiti Malaysia Terengganu with reference number: UMT/JKEPM/2017/8. The verified questionnaire was distributed to respondents together with an informed consent form. Informed consent was obtained from the respondents prior to data collection. The data was analysed using SPSS, and chi-square analysis was chosen to determine the association between socio-demographic and food security status. Meanwhile, the descriptive result was reported as frequency and percentage. The questionnaire used in this study consists of 3 main sections namely; Section 1- Demographic profile, Section 2- Food Security Index (Radimer Cornell Scale Item and US Adult Food Security Survey Module System Components) and, Section 3- Cause of food insecurity.

The first section was designed to obtain the demographic profile of the respondents. The second section involves food security consisting of two parts; Radimer- Cornell Scale and US Adult Food Security Survey Module System Components as shown in Table 1.

All of the Radimer-Cornell Scale questions were indicated as affirmative response if it was “often” or “always” except for question number 5, the affirmative response was “never”. For example, if the respondents chose “often” or “always” as an answer to the question ‘are you worried whether your food will run out before you get money to buy more’, then it is considered that the respondents chose the affirmative answer for that question (except for question 5). For US Adult Food Security Survey Module System Components, the affirmative response is “yes” for item number 1, 4 and 5 while for number 2, the affirmative response is “almost every month” and for number 3, the affirmative response is “0 to 3 days”. For example, in question 1: “In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn’t enough money for food?” if the respondents answer “yes”, it was said that the respondents had chosen affirmative response and will be noted. Later, the scores were classified according to a standard cut-off points; 0 to 3 points as ‘High & Marginal Food Security’, 4 to 6 points as ‘Low Food Security’, and 7 to 13 points as ‘Very Low Food Security’ (Berg *et al.*, 2015; Frongillo *et al.*, 1996). The method for food security index was simplified as shown in Figure 1.

RESULTS AND DISCUSSION

Socio-demographic profile of respondents

Table 2 shows the socio-demographic profile of the respondents. Most of the respondents were single, female, Malay, age ranging 22 to 23 years

Table 1. Food Security Index items

Items	Rating scales
Radimer Cornell Item	
1: Are you worried whether your food will run out before you get money to buy more?	<i>Never, Sometimes, Often, Always</i>
2: Is the food that you bought didn't last long and you didn't have money to get more?	<i>(Never & Sometimes coded as 0 = Food Secure, Often & Always coded as 1= Food Insecure for all item; except item 5 where for item 5, Never & Sometimes coded as 1 = Food Insecure, Often and Always coded as 0 = Food Secure)</i>
3: Have you ever experience the situation where you ran out of the foods that you needed to put together with a meal and didn't have money to get more food?	
4: Have you ever worried or think about where the next day's food is going to come from?	
5: Do you think that you eat in a proper manner in terms of meeting your daily food and energy requirement?	
6: Do you often hungry, but don't eat because can't afford enough food	
7: Do you think that you eat less than you think you should because don't have enough money for food?	
8: I couldn't afford to eat balanced meals in the last 12 months?	
US Adult Food Security Survey Module System Components	
1: In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?	Yes (coded as 1 = Food Insecure), No (coded as 0 = Food Secure)
2: If your answer to the question above is YES, how often does this happen? (Please Move To The Next Question If Your Answer To The Previous Question Is NO)	Almost every month (coded as 1= Food Insecure), Some months but not every month (Coded as 0= Food Secure), In only 1 or 2 months (Coded as 0= Food Secure)
3: In the last 30 days, how many days were you hungry but didn't eat because there wasn't enough money for food?	0 to 3 days (coded as 0=Food Secure), 3 days and above (Coded as 1= Food Insecure)
4: In the last 12 months, did you lose weight because there wasn't enough money for food?	Yes (Coded as 1= Food Insecure), No (Coded as 0= Food Secure)
5: In the last 12 months, did you ever not eat for a whole day because there wasn't enough money for food?	



Fig. 1. Steps for determination, calculation and classification of food security level.

Table 2. Socio-demographic profile of respondents (n=96)

Demographic Characteristics	Frequency	Percentage (%)
Gender		
Male	40	41.7
Female	56	58.3
Age		
18–19	22	22.9
20–21	30	31.2
22–23	41	42.7
24–25	3	3.1
Race		
Malay	80	83.3
Chinese	13	13.5
Indian	0	0
Pribumi	2	2.1
Others	1	1.0
Religion		
Islam	82	85.4
Buddha	13	13.5
Hindu	0	0
Christian	1	1.0
Marital Status		
Single	93	96.9
Married	3	3.1
Divorced	0	0
Monthly Household Income		
Below RM1000	17	17.7
RM1001–RM1500	12	12.5
RM1501–RM2000	8	8.3
RM2001–RM2500	12	12.5
RM2501–RM3000	12	12.5
RM3001 and above	35	36.5
Financial Status		
PTPTN Loans	65	67.7
JPA	11	11.5
Self-Finance	14	14.6
Other Sources	6	6.3
Education Background		
Currently Pursuing Diploma	23	24.0
Currently Pursuing Degree	73	76.0
Year of Study		
Year 1	15	15.6
Year 2	32	33.3
Year 3	30	31.3
Year 4	19	19.8
Mode of Study		
Full Time	92	95.8
Part Time	4	4.2
University		
University A	63	65.6
University B	33	34.4
Academic CGPA		
Below 1.50	0	0
1.51 to 2.50	5	5.2
2.51 to 3.00	21	21.9
3.01 to 3.50	42	43.8
3.51 to 4.00	28	29.2
Monthly Expenses		
RM0–RM 100	6	6.3
RM101–RM200	24	25.0
RM201–RM300	27	28.1
RM301 and above	39	40.6
Food Expenses		
Less than RM50	0	0.0
RM51–RM100	22	22.9
RM101–RM200	38	39.6
RM201–RM300	26	27.1
RM301 and above	10	10.4

old and had a household monthly income of RM3000 and above. Most of them do obtain financial aid, typically from PTPTN. About 40.6% of them spend RM 301 and above per month for their expenditure.

Food Insecurity among University Students in Terengganu

It was found that approximately 78% were food secure and 22% were food insecure among both university students in Terengganu based on 13-affirmative questions of Food Security Index items (a combination of Radimer Cornell and US Adult Food Security Survey Module System Components). Out of 22% of those food insecure, around 14% were having 'low food security', and 8% were having 'very low food security' as shown in Table 3. 'Low food security' is known as food insecure without hunger. People that experience this type of food insecurity are said to experience anxiety, reduced quality, variety and diet desirability, uncertainty of sufficient food access but still having regular food consumption (Micevski *et al.*, 2014; Berg & Raubenheimer, 2015). Meanwhile, people classified as having 'very low food security' also known as food insecure with hunger, will experience disrupted eating patterns, reduced food intake, inadequate meal, experience hunger often and having malnutrition effects (Micevski *et al.*, 2014; Berg & Raubenheimer, 2015).

According to this finding, we can infer that one in five of the respondents experienced food insecurity (22%, n = 21). So, out of five students, one will be affected by food insecurity. In a previous study done among 441 students from the University of Hawai'i at Manoa, Honolulu, Hawai'i reported that one in four students (24 %, n = 98) experienced one or two indicators of food insecurity, classifying them as marginally food-secure or at risk of food insecurity (Chaparro *et al.*, 2009). Another study carried out among 597 students enrolled in public California State University showed that about one in three of the students were food insecure (30.7%, n = 183) (Espinoza, 2013).

The percentage of food insecurity among samples of this study were much lower than the previous studies by Sulaiman *et al.* (2013) among Malaysian university students, which revealed that about 67.1% of them were food insecure. In contrast with the present result, Malaysia household food insecurity prevalence demonstrated a higher prevalence of food insecure ranging from approximately 27% to 85% in the past 16 years. This somehow might be influenced by differences of sample size, location, method and terminology used in each respective study. Therefore, it seems that food insecurity was said to be more severe

Table 3. Food Security Level based on Cut-Off Points (n=96)

Food Security Level	Score	Distribution (%)
High and Marginal Food Security (Food Secure)	0-3	75 (78.1)
Low Food Security (Food Insecure without Hunger)	4-6	13 (13.5)
Very Low Food Security (Food Insecure with Hunger)	≥ 7	8 (8.3)

Table 4. Distribution of students' ratings towards Radimer-Cornell scale (n=96)

Items	Frequency	Percentage (%)
Are you worried whether your food will run out before you get money to buy more?		
Never	15	15.6
Sometimes	49	51.0
Often	19	19.8
Always	13	13.5
Is the food that you bought didn't last long and you didn't have money to get more?		
Never	27	28.1
Sometimes	54	56.3
Often	14	14.6
Always	1	1.0
Have you ever experience the situation where you ran out of the foods that you needed to put together with a meal and didn't have money to get more food?		
Never	33	34.4
Sometimes	55	57.3
Often	5	5.2
Always	3	3.1
Have you ever worry or think about where the next day's food is going to come from?		
Never	27	28.1
Sometimes	49	51.0
Often	7	7.3
Always	13	13.5
Do you think that you eat in a proper manner in terms of meeting your daily food and energy requirement?		
Never	8	8.3
Sometimes	51	53.1
Often	21	21.9
Always	16	16.7
Do you often hungry, but don't eat because can't afford enough food?		
Never	36	37.5
Sometimes	46	47.9
Often	9	9.4
Always	5	5.2
Do you think that you eat less than you think you should because don't have enough money for food?		
Never	34	35.4
Sometimes	45	46.9
Often	10	10.4
Always	7	7.3
I couldn't afford to eat balanced meals in the last 12 months?		
Never	35	36.5
Sometimes	42	43.8
Often	11	11.5
Always	8	8.3

among Malaysian general population compared to the university students in Terengganu. However, it is important to bear in mind that for every five university students, one will experience food insecurity in this study. Since 22% of them appeared to be food insecure, it can be roughly estimated that about 4,298 of the university students in this

present study would be prone to food insecurity since both universities have a total of 19,646 students.

Students' ratings towards Radimer-Cornell scale

Table 4 shows the students' rating towards the 8-items of Radimer-Cornell Scale. Most of students

answered sometimes for each of the Radimer scale which indicates food secure.

In the statement “Have you ever experience the situation where you ran out of the foods that you needed to put together with a meal and didn’t have money to get more food”, affirmatively into single attribute, about 91.7% of respondents were individually food secure (never and sometimes represent food secure) while remaining were food insecure (often and always represent food insecure). Compared with 8.3% of food insecure for this individual item, Mansour (2014) found out that 19.6% of his respondents were food insecure, which was two-folds higher. Some university students do experience a situation where they don’t have money to cover their food running out, but the percentage was low. This could be because certain universities do provide assistance to students in need, either in terms of money or free food.

In the statement “Do you think that you eat in a proper manner in terms of meeting your daily food and energy requirement?”, only 8.3% of respondents were food insecure individually, and this is considered to be low. Most of the students eat in the proper manner in terms of meeting their daily food and energy requirements. In the statement “Do you often feel hungry, but don’t eat because can’t afford enough food?” about 85.4% of respondents were individually food secure. This was in contrast with Mansour (2014) findings where his study has 18.2% who were often hungry but did not eat as they can’t afford to buy food. Thus, there is quite a low percentage of students in this study who were hungry, and they did not eat because they could not afford to buy food. In the statement “I couldn’t afford to eat balanced meals in the last 12 months?” about 19.8% of respondents was classified as food insecure individually. Both study done by Silva *et al.* (2015) and Mansour (2014) showed higher percentages of food insecure for this statement at 27.3% and 41.6%, respectively.

In summary, the majority of the university students were classified as food secure individually based on Radimer-Cornell but individual food insecure still occurs ranging between 8.3% and 33.3%. A study conducted by Leyna *et al.* (2017) using Radimer-Cornell scale found that the percentage of food insecure for each item falls in the range of 43.2% and 68.3%. This indicates that severity of food insecurity among respondents in this study was not critical, but does exist in an observable manner. However, this section does not account for the overall scores of food insecurity as stated earlier.

Students’ response towards food running out and duration of occurrence based on US Adult Food Security Survey Module System Components

Table 5 shows the distribution results for food running out and duration of occurrence. It was found that 34.4% answered ‘Yes’ for the question “In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn’t enough money for food?” with 25% said state that it happen in some months but not every month. Previous studies showed a lower percentage for ‘Yes’ for this item (Dubick *et al.*, 2016; Mansour, 2014; Silva *et al.*, 2015). Therefore, the occurrence of students skipping meals or cutting the size of meals due to lack of money was considered quite high in contrast to previous studies. When students do not have enough money to buy food, the first factor that they will consider was the cost of food. Previous studies suggest that students will prioritize cost over other factors when they don’t have enough money, thus when they thought that they can’t afford it, they will either cut their meal size, or skip their meals (Hanbazaza, 2016; Lisnic, 2016; Martinez *et al.*, 2016). Eventually, not only their nutritional requirement will be disrupted and affected, but may extend to their quality of life and performance as students depending on their food insecurity severity. University students skipping or cutting their meal does happen but at a lower percentage.

Approximately 92.7% of respondents reported experiencing 0 to 3 days of hunger but didn’t eat because there wasn’t enough money for food for them to last 30 days, while another 7.3% choose “3 days and above”. Thus, the severity of hunger period due to lack of money among university students was considered low. About 69.8% of the respondents did not lose weight due to lack of money for food while another 30.2% of respondents reported losing weight due of money shortage. The affirmative response of this study was higher compared to previous studies by Dubick *et al.* (2016) and Mansour (2014) with 9.7% and 15%, respectively. This might be inter-related with item “whether they had cut or skipped their meal due to lack of money”. These two items were quite similar. Thus, a student that had experienced skipping or cut their meal size frequently, aided by other factors, they also might experience body weight loss due to body utilization providing sufficient energy. In the past 12 months, almost 16% of them had experienced of not eating the whole day due to lack of money to buy food. Studies by Dubick *et al.* (2016) and Mansour (2014) found 20% and 7.9% did experience hunger for one whole day, respectively.

Table 5. Distribution of students' ratings towards Food Run Out and Duration (n=96)

Items	Distribution n (%)
In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn't enough money for food?	
Yes	33 (34.4)
No	63 (65.6)
If your answer in question above is YES, how often did this happen?	
My answer for previous question is NO	63 (65.6)
Almost every month	7 (7.3)
Some months but not every month	24 (25.0)
In only 1 or 2 months	2 (2.1)
In the last 30 days, how many days were you hungry but didn't eat because there wasn't enough money for food?	
0 to 3 days	89 (92.7)
3 days and above	7 (7.3)
In the last 12 months, did you lose weight because there wasn't enough money for food?	
Yes	29 (30.2)
No	67 (69.8)
In the last 12 months, did you ever not eat for a whole day because there wasn't enough money for food?	
Yes	15 (15.6)
No	81 (84.4)

Factors contributing to food insecurity among university students in Terengganu

This study had several options such as food, buying books and academic materials, buying basic needs and others to observe respondent monthly expenditures. It was found that among these options, 77.1% of them would spend their money on food. This is because food is a basic necessity for life. Respondent's perceptions regarding food insecurity or factors that they think contribute to food insecurity to occur among university students were also investigated. Out of the three options provided, namely educational fees and expenses, high cost of food, and high living cost, it was found that 51.0% of respondents choose high living cost as the main factor contributing to food insecurity. High living costs were the main reason for food insecurity among university students in these selected public universities, in line with previous studies (McIntyre *et al.*, 2002; Chaparro *et al.*, 2009; Freudenberg *et al.*, 2011; Mansour, 2014; Gaines *et al.*, 2014; Hanbazaza, 2016; Lisnic, 2016).

Association between several socioeconomic status and food security level

One unanticipated finding was that there was no significant association found between socio-economic status and food security status at $p < 0.05$ as shown in Table 6. These findings contradicted with findings from previous studies by Bruening *et al.* (2015), Chaparro *et al.* (2009), Freudenberg *et al.* (2011) and Sulaiman *et al.* (2013) which show significant associations between socio-economic and food security status.

It has been suggested that socio-economic factors such as gender (Zhou *et al.*, 2017; Maziya *et al.*, 2017; Moffitt & Ribar, 2018), age (Zhou *et al.*, 2017; Moffitt & Ribar, 2018), race (Myers & Painter, 2017), marital status (Hanson *et al.*, 2007; Maziya *et al.*, 2017), income (Chaparro, 2007; Freudenberg *et al.*, 2011; Sulaiman *et al.*, 2013; Gaines *et al.*, 2014; Mansour, 2014; Micevski *et al.*, 2014; Berg *et al.*, 2015; Silva *et al.*, 2015; Hanbazaza, 2016; Lisnic, 2016; Martinez *et al.*, 2017) and academic CGPA (Patton-Lopez *et al.*, 2014; Silva *et al.*, 2015) do have an association with food insecurity but this does not appear to be the case. This might be due to the different measurement methods used, different sample sizes, and different demographic profiles.

CONCLUSION

Approximately 22% of them were food insecure and this indicates that food insecurity among public university students in Terengganu does exist. Taken together, this result suggests that for every five university students, one will experience food insecurity. The second major finding was that 'high cost of living' was the main contributor for food insecurity among the university students in Terengganu. Interestingly, there was no association found between socio-economic status and food security status in this study at $p < 0.05$.

The findings will be of interest to university-related authorities in re-designing policies to reduce the percentage of food insecurity among the

Table 6. Association between socioeconomic status and food security level (n=96)

Demographic Characteristics	Food Secure	Food Insecure	χ^2	p-value	Fischer exact test value (if any)
	n (%)	n (%)			
Respondents	75 (78.1)	21 (21.9)			
Gender			0.016	0.900 ^a	
Male	31 (32.3)	9 (9.4)			
Female	44 (45.8)	12 (12.5)			
Age			0.089	0.765 ^a	
Below 20	19 (19.8)	6 (6.2)			
Above 20	56 (58.3)	15 (15.6)			
Race			0.110	0.740 ^b	0.746
Malay	63 (65.6)	17 (17.7)			
Non-Malay	12 (12.5)	4 (4.2)			
Financial Status			0.052	0.820 ^b	1.000
Receive financial aids	59 (61.5)	17 (17.7)			
Do not receive financial aids	16 (16.7)	4 (4.2)			
Academic CGPA			1.651	0.199 ^a	
Below 3.00	18 (18.8)	8 (8.3)			
Above 3.00	57 (59.4)	13 (13.5)			
Monthly Expenses			0.090	0.764 ^a	
Below RM200	24 (25.0)	6 (6.2)			
Above RM200	51 (53.1)	15 (15.6)			

*chi-square test or fisher exact test significant at $p < .05$.

^a0 cells (.0%) have expected count less than 5.

^b1 cells (25.0%) have expected count less than 5 (use Fischer exact test value).

university students. This is vital as they are the assets of this country, where each respective university need to generate more quality and productive human capital (Morris *et al.*, 2016). The insights gained from this study may be of assistance to the Ministry of Health in Malaysia as it devotes to one of the goals of the national nutrition policy, National Plan of Action for Nutrition of Malaysia (NPANM), in manifesting Malaysian food security level plan of action (Ministry of Health, 2006).

The finding of this study may not represent all the university students in Malaysia, but it may somehow slightly reflect the current situation of food insecurity among university students in Malaysia. Considerable work will need to be done in future to determine food insecurity status among university students suggesting to attain their coping strategies as well.

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REFERENCES

- Berg, L.V.D. & Raubenheimer, J. 2015. Food insecurity among students at the University of the Free State, South Africa. *South African Journal of Clinical Nutrition*, **28(4)**: 160-169.
- Bruening, M., Brennhofers, S., Woerden, I.V. & Todd, M. 2016. Factors related to the high rates of food insecurity among diverse, urban college freshmen. *Academy of Nutrition and Dietetics*, **116(9)**: 1450-1457.
- Cady, C. 2014. Food insecurity as a student issue. *Journal of College & Character*, **15(4)**: 265-271.
- Chaparro, M.P., Zaghoul, S., Holck, P. & Dobbs, J. 2009. Food insecurity among college students at the University of Hawai'i at Manoa. *Public Health Nutrition*, **12(11)**: 2097-2103.
- Dubick, J., Mathews, B. & Cady, C. 2016. Hunger on campus: The challenge of food insecurity for college students. Report for College and University Food Bank Alliance, National Student Campaign Against Hunger and Homelessness, Student Government Resource Center and Student Public Interest Research Groups.pg 1-47.
- Espinoza, A. 2013. Assessing Differences in Food Security Status among College Students Enrolled at a Public California State University. California State University.

- Frongillo, E.A. Jr., Rauschenbach, B.S., Olson, C.M., Kendall, A. & Colmenares, A.G. 1996. Estimating the prevalence of hunger and food insecurity: The validity of questionnaire-based measures for the identification of households. Cornell University.
- Freudenberg, N., Manzo, L., Jones, H., Kwan, A., Tsui, E. & Gagnon, M. 2011. Food insecurity at CUNY: Results from a survey of CUNY undergraduate students. City University of New York.
- Gaines, A., Robb, C.A., Knol, L.L. & Sickler, S. 2014. Examining the role of financial factors, resources and skills in predicting food security status among college students. *International Journal of Consumer Studies*, **38(4)**: 374-384.
- Ghani, A.S.M. 2016. 18,675 mahasiswa tidak berduit untuk makan. Sinar Harian [online]. Available from <http://www.sinarharian.com.my/nasional/18-675-mahasiswa-tidak-berduit-untuk-makan-1.472073> [Accessed on 13 March 2017].
- Hanbazaza, M.A. 2016. Hunger on campus: A multi-method study of food insecurity among post-secondary students at the University of Alberta. University of Alberta.
- Hanna. 2014. Evaluation of food insecurity among college students. *American International Journal of Contemporary Research*, **4(4)**: 46-49.
- Hanson, K.L., Sobal, J. & Frongillo, E.A. 2007. Gender and marital status clarify associations between food insecurity and body weight. *The Journal of Nutrition*, **137(6)**: 1460-1465.
- Hashim, N., Khairil, K.A., Dahlan, A. & Ismail, N.H. (2014). Exploring the understanding of hunger experience among Malay undergraduate students in Malaysia. *Recent Trends in Social and Behaviour Sciences – Proceedings of the 2nd International Congress on Interdisciplinary Behavior and Social Sciences*, 2013: 549-552.
- Nur Atiqah, A., Norazmir, M.N., Khairil Anuar, M.I., Mohd Fahmi, M. & Norazlanshah, H. 2015. Food security status: Its association with inflammatory marker and lipid profile among young adult. *International Food Research Journal*, **22(5)**: 1855-1863.
- Lindsley, K. & King, C. 2014. Food insecurity of campus-residing Alaskan College students. *Journal of the Academy of Nutrition and Dietetics*, **114**: 44.
- Lisnic, R. 2016. Student food insecurity survey report student food insecurity survey: assessment, predictors, consequences and potential solutions. Student Affairs Centre for Community Engagement. Arkansas.
- Leyna, G.H., Mmbaga, E.J., Mnyika, M.S. & Klepp, K.I. 2017. Validation of the Radimer/Cornell food insecurity measure in rural Kilimanjaro, Tanzania. *Public Health Nutrition*, **11(7)**: 684-689.
- Ministry of Health (MOH). 2006. National Plan of Action for Nutrition of Malaysia II (2006 – 2015). National Coordinating Committee on Food and Nutrition, Ministry of Health [online]. Available from <http://nutrition.moh.gov.my/en/pelan-tindakan-pemakanan-kebangsaan-malaysia-npanm/> [Accessed on 8 December 2017].
- Mansour, R. 2014. Food security among students at University of Wollongong. University of Wollongong.
- Martinez, S.M., Maynard, K. & Ritchie, L.D. 2016. Student food access and security study. University of California Global Food Initiative Report. pg 1-29.
- Maziya, M., Mudhara, M. & Chitja, J. 2017. What factors determine household food security among smallholder farmers? Insights from Msinga, KwaZulu-Natal, South Africa. *Agrekon*, **56(1)**: 40-52.
- McIntyre, L., Glanville, N.T., Officer, S., Anderson, B., Raine, K.D. & Dayle, J.B. 2002. Food insecurity of low-income lone mothers and their children in Atlantic Canada. *Canadian Journal of Public Health*, **93(6)**: 411-415.
- Micevski, D.A., Thornton, L.E. & Brockington, S. 2014. Food insecurity among university students in Victoria: A pilot study. *Nutrition and Dietetics*, **71(4)**: 258-264.
- Moffitt, R.A. & Ribar, D.C. 2018. Child age and gender differences in food security in a low-income US inner-city population. *European Economic Review*.
- Morris, L.M., Smith, S., Davis, J. & Null, B.D. 2016. The prevalence of food security and insecurity among Illinois university students. *Journal of Nutrition Education and Behavior*, **48(6)**: 376-382.
- Myers, A.M. & Painter, M.A. 2017. Food insecurity in the United States of America: an examination of race/ethnicity and nativity. *Food Security*, **9(6)**: 1419-1432.
- Patton-Lopez, M.M., Lopez-Cevallos, D.F., Cancel-Tirado, D.I. & Vazquez, L. 2014. Prevalence and correlates of food insecurity among students attending a midsize rural university in Oregon. *Journal of Nutrition Education and Behavior*, **46(3)**: 209-214.

- Silva, R.M., Kleinert, W.L., Sheppard, A.V., Cantrell, K.A., Freeman-Coppadge, D.J., Tsoy, E., Roberts, T. & Pearrow, M. 2015. The relationship between food security, housing stability, and school performance among college students in an urban university. *Journal of College Student Retention: Research, Theory and Practice*, (1996): 208-221.
- Sulaiman, N., Jusoh, M.Z. & Razak, M.A. 2013. Food insecurity among public university students receiving financial assistance in peninsular Malaysia. *Malaysian Journal of Consumer and Family Economics*, **16(12)**: 78-90.
- Salwani. 2016. Cabaran baharu mahasiswa. Sinar Harian [online]. Available from <http://www.sinarharian.com.my/kampus/cabaran-baharu-mahasiswa-1.481178> [Accessed on 13 March 2017].
- USDA. 2012. U.S. Adult food security survey module: Three- stage design with screeners. ERS [online]. Available from <https://www.ers.usda.gov/media/8279/ad2012.pdf> [Accessed on 17 March 2017].
- Zain, M.D.S. 2016. Tambang naik, mahasiswa tertekan, jejas kos sara hidup. Sinar Harian [online]. Available from <http://www.sinarharian.com.my/kampus/tambang-naik-mahasiswa-tertekan-jejas-kos-sara-hidup-1.464960> [Accessed on 13 March 2017].
- Zhou, D., Shah, T., Ali, S., Ahmad, W., Din, I.U. & Ilyas, A. 2017. Factors affecting household food security in rural northern hinterland of Pakistan. *Journal of the Saudi Society of Agricultural Sciences*. <https://doi.org/10.1016/j.jssas.2017.05.003>.