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Exploring Validity and Reliability of U.S. Adult Food Security Module (AFSSM) among Malay Young Adult

Khairil Anuar Md Isa ^{1*}, Ghazali Masuri ¹, Nazrul Hadi Ismail ¹, Norazlanshah Hazali ²

¹ Faculty of Health Sciences, Universiti Teknologi MARA, Malaysia

² Kulliyah of Allied Health, International Islamic University of Malaysia, Malaysia

Abstract

Food insecurity problem is growing public health concern worldwide. Thus, the estimation of the prevalence of food insecurity especially among the younger generation is important. Hence, reliable and valid instrument to access its prevalence is needed especially in Malaysia. A cross-sectional study consisted of n=149 participants were selected. The Cronbach's alpha and exploratory factor analysis were done to evaluate reliability and validity of the questionnaire. Cronbach's alpha coefficient indicated acceptable internal consistency for all scores. Exploratory factor analysis showed low-to-high loading. The U.S. food security module is reliable and valid to assess the prevalence of food insecurity among young Malay population.

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Keywords: Validity; reliability; food security; young adult

1. Introduction

Food insecurity is defined as limited or uncertain ability to acquire good nutritious food using socially acceptable means. It can happen with or without hunger. Despite food insecurity measuring food deprivation, it is also a marker of economic hardship because it assesses the adequacy and the stability of a household's food supply over the previous 12 months for active and healthy living of all household members (Bickel, Nord, Price, Hamilton, & Cook, 2000). Food security status exists on a continuum ranging from 'food security' to 'moderate form of food insecurity without hunger' and to a greater extent, 'food insecurity with hunger' (Frongillo, 1999; Bickel et al., 2000).

An individual is grouped as 'food insecurity' when the individual shows no evidence of food insecurity and dietary preferences are consistently satisfied. In the 'food insecurity without hunger form', the individual eventuated anxiety or uncertainty over access to food of sufficient quality or quantity. In the greater severity form of food insecurity, 'food insecurity with hunger' meals

* Corresponding author. Tel.: +60199805501; fax: +60332584599

E-mail address: khairil996@puncakalam.uitm.edu.my.

are neglected or in some condition inadequate, with hunger and possibly malnutrition being direct outcomes (Carlson et al., 1999; Bickel et al., 2000;).

Besides, food insecurity, as a whole, represents a significant public health concern and represents a contributor to many nutritional, health, and in the chronic condition to developmental problems (Seligman et al., 2010; Agboola, & Balcilar, 2012; Aigarinova, Akshatayeva, & Alimzhanova, 2014). Generally, moderate forms of food insecurity without hunger are known to be associated with some chronic diseases, including overweight and obesity, which can be associated with the consequence of a longer duration of reliance on cheap calorically dense foods that are usually easy to obtain (Shariff & Khor, 2005; Seligman et al., 2010). In an extended condition, food insecurity with hunger is associated with undernutrition (Tarasuk, 2001). Furthermore, experiencing food insecurity may also affect psychological, social, as well as economic well-being (Temple, 2008).

In Malaysia, a recent estimate of food insecurity among urban and rural low-income households of two major ethnic groups; Malay and Indian, indicated 78.4% of respondents reported having some form of food insecurity. Those women indicated experiencing household food insecurity, individual food insecurity, and child food insecurity at 26.7%, 25.3%, and 26.4%, respectively (Shariff et al., 2014). Besides, the extent of food insecurity is likely to vary across one's lifespan. In particular, the years spent during tertiary education seem to be one period of life when food insecurity becomes pronounced (Chaparro et al., 2009; Hughes et al., 2011; Micevski, Thornton & Brockington, 2013). This may be a result of those students having more independence since they are living out of home for the first time, and they need to manage the demand for both independent living and studying (Chaparro et al., 2009; Hughes et al., 2011; Micevski et al., 2013). To date, a few studies have assessed the prevalence of food insecurity among university students, as well as the potential determinant, especially in our population. However, valid measurement is important since food insecurity status is solely determined by questionnaire-based measure, in particular, the Adult Food Security Module (AFSSM), which provides valid measure for food insecurity and hunger for population and individual uses. Moreover, with a valid measurement instrument, a greater level of understanding is warranted, given these students represent a group that will contribute to future progression and prosperity of Malaysia. Besides, a previous study in the Hawaiian University suggested that the AFSSM has been validated and found reliable at least to Asians and Pacific Islander living in Hawai'i (Chaparro et al., 2009). Thus, this pilot study provided a ground to explore the validity and the reliability of AFSSM in young adults' population in the study location.

2. Methods

A pilot study was conducted for the questionnaire intended to be used in the subsequent study to measure the prevalence of food insecurity among young adults attending to local suburban university. The study protocol was approved by the Ethical Committee of Faculty of Health Sciences, Universiti Teknologi MARA (UiTM), Malaysia. For this study, a university in Selangor (UiTM Puncak Alam) was selected, and the participants were all students from one class that had been selected conveniently. One hundred and forty-nine students (n=149) aged 18-25 years old took part in this study.

The questionnaire of AFSSM is a subset of the U.S. Household Food Security Survey Module (HFSSM), which was used to measure the status of food security. The AFSSM consists of ten questions, whereby each question addressed conditions and behaviour that may have occurred in the previous 12 months and that effort characterizes persons with difficulty in meeting basic food needs. In general, the questions specified the lack of money and other resources to obtain food as a reason for food insecurity. Therefore, any voluntary fasting and dieting were excluded from the measure.

The study was conducted in April 2013 with permission obtained from the Faculty of Health Sciences. The questionnaire was administered once and was carried out in the lecture hall. A briefing session was done by the researcher to all participants to ensure that they understood what was required to be done. The participants needed to answer the questions by themselves. Any ambiguity or doubt by the respondents could always be asked to the researcher who was present at all times to clarify any item that they were unsure about. Besides, the quality check was done after all the questionnaires were collected while the participants were still present. The pilot study was completed without any reported complaints or adverse events.

Internal consistency of the questionnaire was assessed by using Cronbach's Alpha Coefficient. The alpha values of 0.60 to 0.90 are considered as satisfactory. Subsequently, item analysis was performed to generate information about the characteristics of the items and their association with one another. This information is vital in making decisions to retain or to delete individual items. On top of that, factor analysis was used to measure the construct validity of the questionnaire. Evaluation of items distribution was assessed using means and standard deviations of the individual item. Then, preliminary assessments were carried out to determine the adequacy of the correlation matrix using measure of sampling adequacy value (MSA) where MSA

value more than 0.5 was considered as acceptable. In addition, a sample adequacy for factor analysis was also conducted by using the Kaiser-Meyer-Olkin (KMO), while the Bartlett's test of sphericity was used to test identity matrix. The KMO value of more than 0.6 was considered as acceptable, whereas p-value of less than 0.05 for Bartlett's test of sphericity showed that the original correlation matrix was not an identity matrix. Apart from that, the principal component analysis with varimax rotation was performed to obtain an initial solution, factor matrix, and scree plot for visual inspection of the factor solution. The conclusion of the factor analysis had been based on these outputs, whereby it was expected that all the items correlated with each other and the number of a factor was one. Besides, the factor loading assessments were based on correlation, whereby if the correlation value is within 0.3 and 0.9, the variable is said to be adequately correlated. In addition, the significance level was specified at $p < 0.05$.

3. Results

Internal consistency for the items of AFSSM is shown in Table 1. After all the ten items were analysed, the internal consistency, as indicated by Cronbach's alpha coefficient, was 0.62. All the items for AFSSM also showed adequate Cronbach's alpha coefficient values, whereby all the items showed internal consistency values that ranged from as low as 0.55 to as high as 0.62. Moreover, as observed from the corrected item-total correlation, only Q1 was observed to have lower than the acceptable ranges (0.2-0.9). Nevertheless, Q1 was still considered in the main questionnaire since its elimination would hamper the meaning of the questionnaire and its Cronbach's alpha if an item valued at 0.62 is deleted; further supporting this decision though. Therefore, all the items were included in the final analysis. This suggested that all items showed an adequate correlation with each other and no further item elimination was required.

Table 1. Internal consistency for adult food security survey module

Item	Factor loading	Cronbach's alpha if item deleted	Cronbach's Alpha
Q1 I got worried if my food could run out before I got the money to buy more.	Low	0.62	0.62
Q2 The food that I bought just didn't last, and I didn't have money to get more.	Low	0.61	
Q3 I couldn't afford to eat balanced meals	0.37	0.61	
Q4 In the last 12 months, did you ever cut the size of your meals or skip meals because there wasn't enough?	0.55	0.58	
Q5 How often did this happen?	0.56	0.56	
Q6 In the last 12 months, did you ever eat less than you felt you should because there wasn't enough money for food?	0.58	0.59	
Q7 In the last 12 months, have you ever felt hungry because there wasn't enough money for food?	0.74	0.55	
Q8 In the last 12 months, did you lose weight because there wasn't enough money for food?	0.45	0.60	
Q9 In the last 12 months, have you ever not eaten for a whole day because there wasn't enough money for food?	0.54	0.61	
Q10 How often did this happen?	0.53	0.60	

Apart from that, factor analysis was used to investigate the underlying structure of the AFSSM. Briefly, the procedures involved evaluation of matrix, evaluation of determinant, measurement of sampling adequacy (MSA), test for identity matrix, KMO value determination, and lastly, principal component analysis with varimax rotation.

The evaluation of the matrix showed that the correlation items in scale ranged from -0.04 to 0.33. This matrix showed a moderate correlation with some and low correlation with others, which suggested just one factor available on this scale. Furthermore, the determinant obtained for this scale was 0.045, which is between the adequate ranges of 0 to 1. This suggested

that the items in the scale were acceptable for factor analysis. In addition, the result of the Bartlett's test of sphericity was also significant ($p < 0.001$). This result further suggested that the matrix not be an identity matrix, and factor analysis was possible.

Prior to data extraction, Kaiser-Meyer-Olkin (KMO) that measured the sampling adequacy showed a value of 0.566. The value again further suggested that the data in this present pilot study were adequate for factor analysis. The measurement of sampling adequacy (MSA) also showed adequate result as all the items showed MSA value of more than 0.5.

Meanwhile, principal component analysis with varimax rotation was used to investigate the underlying factors in the instrument. The analysis demonstrated three factors emerged with an eigenvalue greater than 1. However, since the AFSSM scale only measured one factor, which was food security status, the eigenvalues obtained were then compressed into 1 factor. Besides, prominent one-factor solution was also observed from the scree plot obtained. The number of factors was identified by the number of distinct breaks between the steep slope of the larger eigenvalue and the tailing off of the smaller one. Therefore, only one factor was chosen since there was a prominent break-off from the remaining points, showing just only one-factor solution on this scale. This further suggested that the AFSSM only had a one-factor solution for that scale.

4. Discussion

This study had been among the first to examine the structure of the AFSSM using young adults among the non-Western sample. The findings of this present study make a significant contribution to the existing literature on food security status among young adults, especially in the Malaysian perspective by highlighting cross-cultural differences and similarity since most of the current literature on food security status were carried out in Western countries (Masuri et. al. 2015; Md. Isa., 2011). From this pilot study, AFSSM showed to be adequately valid and reliable to be used to measure food security status even though when used outside its parent population, which is the American population, where it derived from. This further suggested that there is a universal dimension of food security feature from this and previous research that is suggestive of some unifying features around the food-insecurity condition. In particular, this present study is in agreement with an earlier study with Hawai'i sample that suggested that the AFSSM had been validated and found reliable at least to Asians and Pacific Islander living in Hawai'i (Chaparro et al., 2009).

Furthermore, the mean for all items clustered around its mean indicated that the respondents had the tendency to choose responses at the middle scale. This suggested that the items were suitable to be answered by the respondents. In other words, the questions were not too easy or too difficult for the respondents to give either strong positive or strong negative responses.

On top of that, factor analysis showed that the AFSSM was valid for measuring food insecurity status at least among the young adult population in the present study sample. The sample size of $N=149$ participants had been greater than the recommended both for respondents per item and for the total sample size. It was loaded with a one-factor solution that was prominently shown by the scree plot; the plot used to determine the number of factors that are adequate with the instrument (Cattell, 1966). It further proved that all the items asked the same factor, which was food security status. As for other indicators of sample adequacy and matrix condition, the KMO and Bartlett's test of sphericity portrayed adequate value.

In fact, several caveats were considered while interpreting the results of this study and at interpreting the findings. The samples were recruited from one tertiary education facility mainly consisted of Malay students. Thus generalisation to other races, such as Chinese and Indians, seemed inappropriate (Masuri, et al. 2011). This study, therefore, cannot claim to provide greater insight into food security status of the Malaysian university students as a whole. Second, social desirability bias might also exist, but as the present study had been anonymous, it was not likely to have substantially affected the data. Nevertheless, future research should consider including other races to investigate if the AFSSM could be used in their population and social desirability measure to minimize any confounding effects of such biases. On a positive note, a major advantage of this study had been the understanding of AFSSM, and its benefit in estimating food security status among the young adult population that attended to tertiary education in Malaysia.

5. Conclusion

The results of this present study provided much-needed insight into the nature of food security dimension in the young adult population. The ten items of the AFSSM were suitable and appropriate for a quick assessment in measuring food security status.

Nonetheless, further study with other major races in Malaysia, such as Chinese and Indians, is welcomed, and it is indeed necessary to assess the extent of which this AFSSM could be generalized to other populations.

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