Prevalence and predictors of household food insecurity in Kuantan, Pahang

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ABSTRACT

Introduction: Food insecurity exists whenever people are unable to access nutritionally sufficient and safe food most of the time for an active and healthy lifestyle. Households are a potentially vulnerable population that may face food insecurity. This study aimed to identify prevalence and predictors of food insecurity among households in Kuantan, Pahang. **Methods:** Food security status was assessed using Food Insecurity Experience Scale (FIES). Variables assessed included socioeconomic background and demographics. **Results:** A total of 110 households in urban and rural areas were chosen using multistage random selection. According to the findings, 45.3% of households were facing food insecurity, with 38.0% experiencing mild food insecurity, 6.4% experiencing moderate food insecurity, and 0.9% experiencing severe food insecurity. Food insecurity in urban areas was 36.7%, while food insecurity in rural areas was 48.8%. Food insecurity was found to be related to household income [*AOR*: 19.33 (95% *CI*: 2.41, 154.95; *p*=0.005)], mother's employment status [*AOR*: 3.92 (95% *CI*: 1.40, 10.97; *p*=0.009)], and mother's marital status [*AOR*: 11.68 (95% *CI*: 1.17, 115.97; *p*=0.036)]. **Conclusion:** The findings indicated that food insecurity is an alarming problem for households in Kuantan, Pahang, which suggests that more research is necessary to address the multifaceted nature of the issue.

Keywords: food insecurity, food insecurity experience scale, households

INTRODUCTION

Food is a basic necessity that provides nutrients for growth and development. Food security exists when all people, at all times, have physical, social and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2002). On the other hand, food insecurity is defined as "limited or uncertain availability of nutritionally adequate, safe foods or the

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inability to acquire personally acceptable foods in socially acceptable ways" (Bickel *et al.,* 2000).

Efforts in understanding the concept of food security are still ongoing worldwide due to its complex and multidimensional nature (Norhasmah *et al.,* 2021). Availability, accessibility, utilisation, and stability are the four dimensions of food security. Food availability refers to the physical presence of a sufficient amount of food produced domestically. Food access is the ability for individuals or households to physically and financially obtain sufficient resources to purchase food. Utilisation refers to the individual's biological and health status in order to absorb and utilise food nutrients. Stability refers to the strength of other dimensions above, including factors of resilience and risks.

Food insecurity occurs not only in low- and middle-income countries but also in developed countries (FAO *et al.,* 2021). It is reported that 17.2% of the global population experiences moderate food insecurity, while 9.2% experiences severe food insecurity, with around 2 billion people affected – 1.04 billion in Asia, 676 million in Africa, 188 million in Latin America, and 89 million in North America and Europe. In each continent, the prevalence of food insecurity is marginally greater among women than men, with the largest difference recorded in Latin America (FAO *et al.,* 2020).

In Malaysia, people who commonly experience food insecurity are women, those from low-income households, aborigines, poor urban dwellers, university students, the elderly, and migrant workers (Zalilah & Merlin, 2001; Zalilah & Tham, 2002; Norhasmah *et al.,* 2021). The prevalence of food insecurity in Malaysia was estimated to range from 22% to 100%, which varied based on the instrument used and sample population. The prevalence of food insecurity among aborigines was reported to be within 81.2% to 88.0%; adults and low-income households, 47.2% to 100.0%; university students, 22.0% to 70.0%; the elderly, 6.9% to 27.7%; and lastly, migrant workers at 5.6% (Norhasmah *et al.,* 2021).

Demographic and socioeconomic data are found to be associated with household food insecurity. Low socioeconomic and demographic status of households is characterised by having a low education level, large household size, low monthly income, low income per capita, and more children going to school (McIntyre & Tarasuk, 2002; Zalilah & Khor, 2005). Some previous studies have found that single female-headed households, unemployed individuals (Coleman-Jensen, 2011; Silva *et al.,* 2023), the elderly (Simsek *et al.,* 2013), the homeless (Kushel *et al.,* 2006), rural dwellers, the urban poor (Zalilah & Khor, 2005), and indigenous people (Norhasmah *et al.,* 2021; Zalilah & Tham, 2002) are the most at risk of being food insecure.

Environmental factors also contribute to food insecurity among households and individuals. The quantity and quality of accessible food, physical accessibility of food (including the location of food outlets within residential areas and transportation systems), and the affordability of food costs are factors that need to be put into consideration (Mabli, 2014; Sadler, Gilliland & Arku, 2013). Sadler *et al.* (2013) found that food security among primary shoppers in Flint, Michigan, had a strong relationship with the distance of grocery shops and homes. Additionally, Stracuzzi & Ward (2010) discovered that, especially for individuals without a vehicle, distance between the grocery shop and home constituted a significant determinant in determining the status of food security. This study conducted on adults in New Hampshire found that accessing nutritious food was

challenging, particularly in communities dominated by convenience/corner stores, lacking supermarkets and local food stores offering healthy and high-quality foods, and with limited transportation alternatives (Stracuzzi & Ward, 2010). Thus, the more access to food stores, the better the chances of people improving their healthy eating.

Food insecurity has many negative consequences on health, including obesity, chronic diseases, anaemia, and mental problems, which may further deteriorate quality of life and increase the burden on the nation's healthcare system (Ali *et al.,* 2020; Moradi *et al.,* 2019; Schmeer & Piperata, 2017). Given the amount of evidence available, food security has emerged as a global priority. The Sustainable Development Goal 2 aims to end hunger, achieve food security, improve nutrition, and promote sustainable agriculture. Nationally, food security has been listed as one of the National Priority areas and documented as the main objective of Malaysia's third National Plan of Action for Nutrition (NPANM III) (NCCFN, 2016). Thus, this study aimed to identify the prevalence and determinants of food insecurity among households in Kuantan, Pahang.

METHODOLOGY

Samples and population
This cross-sectional study was conducted in selected urban and rural areas in Kuantan, Pahang. The list of urban and rural areas in Kuantan was obtained from *Majlis Perbandaran Kuantan (MPK)*. The study sites were randomly selected, but participant recruitment was based on purposive sampling. The inclusion criteria included married women of reproductive age between 19 and 49 years old who were responsible for food production, purchasing and preparation, and were the key person for household food security (Kardooni *et*

al., 2014). Those who were lactating and pregnant were excluded from this study. A total of 110 participants were selected for the study. Ethical approval was obtained from the IIUM Research Ethics Committee (Ref: IIUM/504/14/11/2/ REC 2019-131). Consent from participants was obtained prior to them answering the questionnaire.

Sampling method
A multistage random sampling approach was applied. Two rural *mukim* (Sungai Karang and Beserah) and two urban *mukim* (Kuala Kuantan 1 and Kuala Kuantan 2) were first selected. Within each *mukim*, three villages or residential areas were chosen using simple random sampling (e.g., Kampung Sg. Karang Pantai, Kampung Beserah Pantai, KotaSAS, Indera Mahkota 1). Rural participants were recruited through village heads, while urban participants were approached via residential representatives. Those who met the inclusion criteria were then included in the study.

Questionnaire
A self-administered questionnaire was developed for this study, divided into two sections. The first section comprised eight items of the Food Insecurity Experience Scale (FIES), in the Malay language. All eight questions were answered with 'yes' or 'no', with a raw score of 0 for a negative response and 1 for an affirmative response. The total FIES score was the sum of all 8 questions, which was then divided into four severity levels: food security (0), mild food insecurity (1-3), moderate food insecurity (4-6), and severe food insecurity (7-8). The FIES has been translated and validated for Malaysian use (Roselawati *et al.*, 2021). The second section gathered information on demographics and socioeconomic data. These included age, employment, education, marital status, household

size, household income, household area, food expenses, and number of children going to school.

Statistical analysis

Data were analysed using IBM SPSS Statistics version 24.0 (IBM Corporation, New York, United States), which involved descriptive, univariate, and multivariate analyses. In multivariate analysis, logistic regression was used to determine the predictors of food insecurity. All six independent variables were significant during the preliminary univariate model testing using "Forward Likelihood Ratio" and "Backward Likelihood Ratio" to check for assumptions. The significant variables ($p<0.05$) were marital status, mother's employment status, and household income group. The final model

Table 1. Sociodemographic characteristics (*N*=110)

Variables	n (%)	Mean±SD
Age (years)		36±5
19-30	13 (11.8)	
31-49	97 (81.2)	
Employment status		
Working	45 (40.9)	
Not working	65 (59.1)	
Education		
Higher education	100 (90.9)	
Primary and secondary school	10 (9.1)	
Marital status		
Married	103 (93.6)	
Widowed	7 (6.4)	
Number of children going to school		
1 to 3	86 (78.2)	
>3	24 (21.8)	
Education of spouse		
Higher education	100 (91.0)	
Primary and secondary school	10 (9.0)	
Employment status of spouse		
Working	45 (41.0)	
Not working	65 (59.0)	
Household size		
1 to 5	58 (52.7)	
> 5	52 (47.3)	
Household income		
B40	65 (77.3)	
M40	24 (21.8)	
T20	1 (0.9)	
Household area		
Urban	30 (27.3)	
Rural	80 (72.7)	
Food expenses (Ringgit Malaysia)		186.60±100.32
Rancangan Makanan Tambahan (RMT) of child		
Yes	5 (5.5)	
No	104 (94.5)	

B40: Bottom 40% of income earners; M40: Middle 40% of income earners; T20: Top 20% of income earners

was analysed using the "enter" method. The Receiver Operating Characteristic (ROC) curve showed an area under the curve (AUC) of 0.8, indicating that the model had good predictive power. The reference groups used were married women, working women, and household income in the category of ≥M40, respectively. The logistic regression model was valid (χ^2=37.42, *df*=3, *p*<0.001) and fits the sample as shown by the Hosmer and Lemeshow goodness of fit test (χ^2=1.59, *df*=3, *p*=0.660).

RESULTS

Demographic and socioeconomic characteristics

A total of 110 respondents were included in the analysis. The demographic and socioeconomic characteristics of the respondents are presented in Table 1. Mean age of the respondents was 36.2±5.2 years old. All respondents were Malays and Muslims. Most respondents were wives (93.6%) and widowed (6.4%). Almost equal numbers of respondents had 1-5 family members (52.7%) and >5 family members (47.3%). Most of the respondents were from B40 (77.3%), followed by the M40 group (21.8%), with a mean income of RM3406.00±2536.10. Even though most of the respondents were unemployed (59.1%), the majority of their spouses were employed (86.4%). In addition, the majority of the respondents (90.9%) and their spouses (87.4%) completed higher school education. The mean for weekly food expenses of the families was RM186.60±100.32.

Prevalence of food insecurity

FIES was used to classify households into four categories of food security. A total of 54.0% of the households in this study were classified as food secure (Figure 1). Meanwhile, 38.0% were categorised as mildly food insecure,

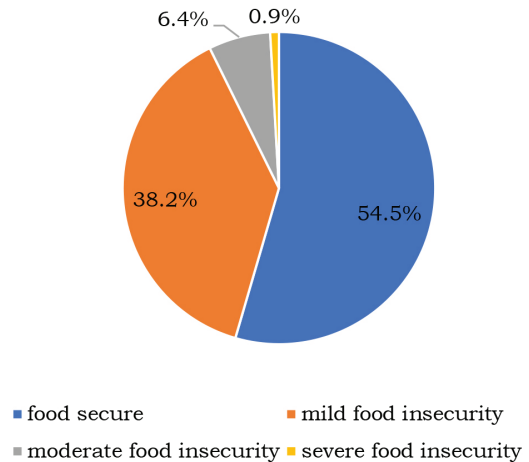6.4% were moderately food insecure, and 0.9% experienced severe food insecurity.

Figure 1. Food security status among respondents (*N*=110)

Associations of demographic and socioeconomic characteristics with food security status

For univariate analysis, women who were unemployed, completed lower school levels, belonged to the B40 household income group, and were widowed were found to be associated with food insecurity, as shown in Table 2.

In multivariate analysis, logistic regression was used to determine the predictors of food insecurity. The odds of having food insecurity among widowed mothers were almost 12 times higher than those married [*AOR*: 11.68 (95% *CI*: 1.17, 115.97; *p*=0.036)]. On the other hand, the odds of having food insecurity among non-working mothers were almost four times higher than those working [*AOR*: 3.92 (95% *CI*: 1.40, 10.97; *p*=0.009)]. In addition, the odds of having food insecurity among the B40 group were 19 times higher compared to M40 and above [*AOR*: 19.33 (95% *CI*: 2.41, 154.95; *p*=0.005)]. The logistic regression analysis is shown in Table 3.

Table 2. Factors associated with food security status (*N*=110)

Variables	Food security status				*p*
	Secure		Insecure		
	n	*%*	*n*	*%*	
Age (years)					
19-30	6	46.2	7	53.8	0.361[a]
31-49	54	55.7	43	44.3	
Employment status					
Working	33	73.3	12	26.7	0.001[a]*
Not working	27	41.5	38	58.5	
Education					
Higher education	58	58.0	42	42.0	0.020[a]*
Primary and secondary school	2	20.0	8	80.0	
Household income					
B40	36	42.4	49	57.6	<0.001[b]*
M40	23	95.8	1	4.2	
T20	1	100.0	0	0.0	
Marital status					
Married	59	57.3	44	42.7	0.030[b]*
Widowed	1	14.3	6	85.7	
Household size					
1 to 5	35	60.3	23	39.7	0.200[a]
> 5	25	48.1	27	51.9	
Number of children going to school					
1 to 3	49	57.0	37	43.0	0.360[a]
>3	11	45.8	13	54..2	
Education of spouse					
Higher education	57	59.4	39	40.6	0.110[b]
Primary and secondary school	2	28.6	5	71.4	
Food expenses (Ringgit Malaysia)					
<300	52	51.5	49	48.5	0.060[b]
>300	8	88.9	1	11.1	
Food aid receiver (*RMT*)					
Yes	1	16.7	5	83.3	0.060[b]
No	59	57.3	44	43.3	
Household area					
Urban	19	63.3	11	36.7	0.260[a]
Rural	41	51.2	39	48.8	
Body mass index					
Underweight	0	0.0	1	100.0	0.300[b]
Normal	29	64.4	16	35.6	
Overweight	19	50.0	19	50.0	
Obese	9	47.4	10	52.6	

B40: Bottom 40% of income earners; M40: Middle 40% of income earners; T20: Top 20% of income earners; RMT: *Rancangan Makanan Tambahan*
Chi-Square test; [b]Fisher Exact test
*Significant at *p*<0.05

Table 3. Predictors of household food insecurity

Parameter	Adjusted odds ratio	95% confidence interval		p
		Lower	Upper	
Mother's marital status				
Widowed	11.68	1.17	115.97	0.036*
Married[a]	1			
Mother's working status				
Not working	3.92	1.40	10.97	0.009*
Working[a]	1			
Household income group				
B40	19.33	2.41	154.95	0.005*
M40 and above[a]	1			

B40: Bottom 40% of income earners; M40: Middle 40% of income earners
[a]Reference group
*Significant at $p<0.05$

DISCUSSION

In the current study, 45.6% of households were food insecure, marginally lower than findings from studies in a systematic review of local research conducted in Malaysia, which found that the prevalence of food insecurity among adult women ranged from 47.2% to 100.0% (Norhasmah *et al.,* 2021). The results concluded that rural areas had a higher household food insecurity prevalence than urban areas. Those living in rural areas were more likely to experience food insecurity, which may be due to low socioeconomic status.

Low socioeconomic status and poverty are closely related to food insecurity (Zalilah & Khor, 2005). Households with better income are less likely to become food insecure than households with no or little income. The analysis also showed that food-insecure households were among the B40 group. This finding is consistent with previous evidence (Zalilah & Khor, 2005), which found that lower-income households are at higher risk of food insecurity.

The prevalence of moderate to severe food insecurity in the current study (26.4%) was slightly below the global prevalence of 28.0% (FAO, 2024). The large variation in the prevalence of household food insecurity may be caused by differences in the instruments selected, the quantity of data sets, and the diverse research populations since food security varies among cultures. According to the current study, the prevalence of food insecurity reduced as the severity increased. This is in line with the fundamental principle of the FIES, which states that the more severe the item, the less likely people are to experience it (Ballard *et al.,* 2013). Several studies postulated that sociodemographic and economic characteristics influence individual or household food insecurity, such as household income (Sinclair *et al.,* 2019), marital status (Schmeer & Piperata, 2017), employment status (Smith, Kassa & Winters, 2017), education level (Noratirah, 2020), household size (Roselawati *et al.,* 2017), and number of children (Ihab *et al.,* 2012).

According to the current study, there were significant associations between mothers' family income, marital status, level of education, and employment status. This study also found that women with lower levels of education were more likely to experience food insecurity. This finding is consistent with a local study by Noratirah (2020), where food insecurity

was associated with a mother's education level in secondary school or lower, and in line with other studies (Sinclair *et al.,* 2019), which found that the prevalence of food insecurity decreased as education level increased. Similarly, a study in Latin Caribbean America found that people with lower education were 15.9% more likely to experience food insecurity and 6.9% more prone to experience severe food insecurity as compared to those with higher education (Smith *et al.,* 2017). With comprehensive education, mothers will have greater employment opportunities and higher income, subsequently increasing their financial access to food. This explains the lower prevalence of food insecurity in households with higher income than in those with low or no income.

Households with higher incomes can afford to spend more money on nutritious meals, thus reducing their risk of food insecurity. Conversely, lower-income people are more likely to eat more affordable but low-nutritional foods. This finding is consistent with previous studies, which found that lower-income households are at a higher risk of food insecurity (Sinclair *et al.,* 2019; Zalilah & Khor, 2005).

The present study also found that more food-insecure households were from the B40 group and unemployed individuals. This is consistent with a study by Smith *et al.* (2017), which reported that unemployed women were more susceptible to food insecurity. This could be explained by the fact that unemployed women usually have no fixed income and depend solely on their spouse's income to buy food for their family. Limited income and high commitments, including housing payments, transportation, and the rise in food prices, decrease purchasing power and lead to an increased risk of food insecurity.

Marital status was associated with food insecurity, which aligns with study that emphasis the higher prevalence of food insecurity was associated with mothers' marital status (Smith *et al.,* 2017). Married individuals were less likely to experience food insecurity than those separated or widowed; the widowed had 3.5% higher odds of becoming food insecure and 3.0% greater chance of severe food insecurity (Smith *et al.,* 2017). Alvares & Amaral (2014) also stated that being single or unmarried was associated with food insecurity. Moreover, being married or living with a partner was associated with lower odds of food insecurity compared to being single, divorced, or widowed (Silva *et al.,* 2023). This may be because married people often receive resources from their spouse, such as money, support, and time, which are protective against food insecurity (Schmeer & Piperata, 2017).

After adjusting for all the associated factors using multiple logistic regression, mothers' marital status, working status, and household income remained significantly associated with food insecurity. Contrary to earlier findings (Roselawati *et al.,* 2017), this study revealed no association between household size and food insecurity. Previous studies suggested that increasing household size increases the likelihood of becoming food insecure due to the need to distribute limited food resources among a larger number of household members, thus resulting in lower food intake. Additionally, the financial needs of larger families are typically higher due to transportation, education, medical, and other expenses that could deplete the food budget.

The current study did not find an association between body mass index (BMI) classification and food security status due to the relatively small sample size and homogeneous characteristics,

with most participants having BMI values within similar ranges. Previous research on the relationship between food insecurity and BMI found inconsistent findings. A systematic review and meta-analysis of 31 studies conducted in 14 different countries found that adults in food-insecure households were more at risk of obesity. However, subgroup analysis by food insecurity level implied that a severe level of household food insecurity could be associated with a higher risk of being underweight (49%) than overweight (37%) or obese (29%) (Moradi *et al.,* 2019).

Zalilah & Khor (2005) found that over 50% of women experiencing food insecurity were overweight and obese. Similarly, Royer, Rosas & King (2025) found that women who were food insecure had higher BMIs compared to food-insecure men. The possible explanation of the association between household food insecurity and obesity is that being overweight and obese may result from high energy-dense food (fatty and sugary) intake, poor nutritious food intake (low protein, fruits and vegetables), low levels of physical activities, and psychological or emotional stress. In contrast, underweight and food insecurity are associated with women in households that commonly reduce their food intake as a coping strategy so that the children can have enough food to thrive. Thus, implementing strategies to reduce the risk of malnutrition (underweight or obesity) in food insecurity should be multidimensional, such as combining nutrition education, improving food affordability and accessibility, strengthening social protection programmes, and promoting supportive food policies.

CONCLUSION

Food insecurity affected over half of the households in Kuantan, Pahang. In this study, household income, education level, and employment status were identified as significant predictors of household food insecurity. Given the significant prevalence of food insecurity observed, a continuous programme to improve food security status among those in need should be prioritised by policymakers.

Conflict of interest

There is no conflict of interest to declare.

Authors' contributions

Wan Azdie MAB, principal investigator, conceptualised and designed the study, prepared the draft of the manuscript and reviewed the manuscript. Roselawati MY, conducted the study, data analysis and interpretation, assisted in drafting of the manuscript, reviewed the manuscript. Jamalludin AR, assisted in data analysis as a statistician. Norhasmah S, Noraishah Mn, Suriati S reviewed the manuscript.

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