

Prevalence of food insecurity and associated factors among free-living older persons in Selangor, Malaysia

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ABSTRACT

Introduction: Older persons are vulnerable to food insecurity. This study aimed to determine the prevalence of food security and associated factors among free-living older persons in Petaling District, Selangor. **Methods:** A total of 220 free-living older persons aged 60-87 years were selected by using the cluster sampling method in this cross-sectional study. Face-to-face interviews were conducted to obtain information concerning the demographic and socioeconomic background, food security, oral health, and psychosocial status. Chi-square test and binary logistic regression analysis were used to analyse the studied variables. **Results:** The median age of the respondents was 65.5 years, and 19.5% were found as food insecure. There were significant associations between marital status ($\chi^2=6.818$), education level ($\chi^2=6.242$), occupation status ($\chi^2=7.540$), monthly income ($\chi^2=9.940$), and oral health status ($\chi^2=9.627$) with food security status. Those with a low monthly income (AOR=2.449, 95% CI: 1.046-5.732), poor oral health status (AOR: 3.306, 95% CI: 1.387-7.889) and living in rented accommodation (AOR=6.218, 95% CI: 1.458-26.518) were more likely to be food insecure. **Conclusion:** Respondents with an income lower than the poverty line income (PLI), living in rented accommodation and poor oral health status face increased risk of food insecurity. A nutrition assistance programme is suggested to improve the socioeconomic and food security status of older persons. Regular oral check-ups are recommended to improve the oral health status of the elderly.

Keywords: Older persons, food security status, food insecurity, Malaysia, oral health

INTRODUCTION

Ageing leads to gradual decrease in the physical and mental capacity, and growing risk of disease (WHO, 2015). The United Nations have established the

cut-off age for older people as 60 years and above. In Asia, the older people made up 11.0% of the total population in 2012, and this is expected to increase to 24.0% by 2050 (United Nations, 2012).

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In 2010, about 5.0% of Malaysia's total population consisted of older persons, and Malaysia is expected to become an ageing society by 2021 (Department of Statistics Malaysia, 2012).

Food insecurity occurs whenever the ability to procure enough food is uncertain, being unable to live a healthy life and unsatisfied feeding (Schroeder & Smaldone, 2015). A lack of access to nutritious foods may lead to the earlier onset of ageing symptoms (Food Security and Agriculture Cluster, 2013). Food insufficiency, hunger, and malnutrition are terms that are closely related to food insecurity (Norhasmah, Zalilah & Asnarulkhadi, 2010). Several studies have reported food insecurity prevalence in the older population. About 13.0% of older Australians were food insecure (Russell *et al.*, 2014) while 19.0% of the elderly in the United States were food insecure (Hernandez *et al.*, 2017). In Malaysia, Rohida *et al.* (2017) reported prevalence of food insecurity among the older in Lubuk Merbau, Kedah was 27.7%, while Nurzetty Sofia *et al.* (2017) found 6.9% prevalence in an urban area in the Klang Valley.

Several factors are associated with food insecurity. Low monthly income and unemployment are consistently associated with food insecurity (Garg *et al.*, 2015; Wang *et al.*, 2015). Low-income persons are more likely to consume non-nutritious foods due to lower prices (Wang *et al.*, 2015) or use assistance programmes whenever they face financial constraints (Oemichen & Smith, 2016). In addition, low social support has been found to be independently associated with food insecurity (Markwick *et al.*, 2014).

It is known that food insecurity contributes to poor nutritional status among various populations. A food insecure person is one whose intake of nutrients is lower than those who are food secure (Davison & Kaplan, 2015).

Similarly, Na *et al.* (2016) found that food insecure households are less likely to consume vegetables and fruits than food secure households. Poor nutritional status includes malnutrition, decreased resistance to infection, and lengthier hospital stays among the older (Barker *et al.*, 2011).

Besides, there is a lack of study on the contribution of oral health towards food security status among the older. Previous studies on food security status and poor oral health were mostly conducted among children (Chi *et al.*, 2014; Santin *et al.*, 2016). There is a need to assess the contribution of oral health on food insecurity status among the elderly.

There are limited published studies on factors affecting food insecurity among the older in Malaysia. This study is aimed at determining the prevalence of food security and associated factors among free-living older persons in the urban Petaling district, Selangor.

MATERIALS AND METHODS

Study design and samples

This cross-sectional study was conducted in two selected sub-districts (Petaling II and Damansara) in Petaling district. Petaling district was selected due to it having the highest older population in Selangor (Department of Statistics Malaysia, 2012). After obtaining the estimated total number of elderly residents in a sub-district from the headman (*Penghulu*) of the Petaling district, two out of six sub-districts were needed to meet the sample size requirement. The two sub-districts were selected based on the simple random sampling carried out by using select cases method in IBM SPSS version 21. All of the older person residents in the residential areas in Petaling II and Damansara sub-districts were recruited. As food security status was determined

at the individual level, more than one respondent in a household could be included. A total of 273 older were identified in both sub-districts, of which 220 gave their consent to participate giving an overall response rate of 80.6%. Individuals with hearing problems and critical mental illness, such as Alzheimer's disease, were excluded.

Measurements

The researchers made house visits and conducted face-to-face interviews with the respondents to collect data on the demographic and socioeconomic background, food security, oral health, and psychosocial status. The respondents were asked by the researcher based on the pre-tested questionnaire. Demographic and socioeconomic background includes age, gender, marital status, living arrangements, house status, household size, education level, occupation status, and monthly income. Food security status was determined using the six-item Short Form of Food Security Status (United States Department of Agriculture, 2012). This is a short form module of the 18-item U.S. Household Food Security Status Module and 10-item U.S. Adult Food Security Status Module. The short form module has been shown to assess food insecure households and very low food security with reasonably high specificity and sensitivity with minimal bias compared to the 18-item measure (United States Department of Agriculture, 2012). Those who responded affirmatively to none or one item were considered as having high or marginal food security. Those who responded affirmatively to two to four items were considered as having low food security, and those who responded affirmatively to five or six items were considered as having very low food security. Low and very low food security were considered to indicate food insecurity. In this study,

reliability test was carried out and the Cronbach's alpha (α) obtained was 0.749 with item-scale correlation ranging from 0.245 to 0.657.

The Geriatric Oral Health Assessment Index (GOHAI) was used to assess the oral health status. This comprised a 12-item scale consists of a six-point scale in which the lowest point scale is designated as 'never', and the highest point scale is designated as 'always'. A total score of 50 and below indicates poor oral health status; a total score of 51 - 56 indicates moderate oral health status, while 57 - 60 score indicates good oral health status (Nicholas *et al.*, 2010). The GOHAI showed the Cronbach's alpha (α) of 0.873 with item-scale correlation ranging from 0.228 to 0.744. The six-item Lubben Social Network Scale (LSNS-6) was used to measure the psychosocial status. This part comprises two sub-scales; namely, family and friend relationships. A total score of 12 or below indicates at-risk of social isolation (Boulos *et al.*, 2013). In this study, the LSNS-6 shows acceptable reliability with Cronbach's alpha (α) at 0.616 and the item-scale correlation ranging from 0.251 to 0.495. The Ethics Committee for Research Involving Human Subjects, Universiti Putra Malaysia [FPSK (EXP15) P014] gave approval, and written consent from the respondents was obtained prior to data collection.

Statistical analysis

Data were analysed using IBM SPSS version 21. Descriptive statistics – frequency, percentage, median, and interquartile range (IQR) – were used to analyse all the variables. The chi-square test was used to determine association between each categorical variable and food security status. Binary logistic regression was used to determine the factors associated with food insecurity by adjusting for all covariates associated

with food insecurity with $p < 0.20$ in the unadjusted analyses. The significance level was set at $p < 0.05$.

RESULTS

The distribution of the respondents based on the demographic and socioeconomic background, oral health, and psychosocial status are shown in Table 1. Over two-thirds of the respondents (70.9%) were aged 60 to 69 years. Just over half (57.7%) of the respondents were female, and 33.2% were separated or widowed. Almost all of the respondents were Malay and 6.8% of them lived alone. Over half of the respondents (57.7%) lived with less than five household members. Over half of the respondents (57.7%) had attained primary education level, and 52.3% were unemployed or a housewife. In addition, 4.5% of the respondents lived in rented accommodation, and 54.1% had a monthly income of less than Poverty Line Income (PLI) or below than RM940 (241.21 USD). In terms of oral health status, about 24.1% of the respondents had poor oral health status. About 16.8% of the respondents were at risk of social isolation.

The prevalence of food insecurity among the respondents was 19.5% while 18.2% had low food security and 1.3% had very low food security. Being separated or widowed (51.2% vs. 28.8%), living in rented vs. owner accommodation (14.0% vs. 2.3%), having lower vs. higher secondary education (86.0% vs. 65.0%), being unemployed or as housewife (69.8% vs. 48.0%), and having a monthly income of less than the poverty line income (76.7% vs. 48.6%) were significantly more prevalent among the food insecure respondents, compared to the food secured (Table 2). In addition, poor oral health status was significantly higher among the food insecure respondents (34.0%) than the food secured (13.5%)

However, no significant associations were found between age group, gender, living arrangement status, household size, and psychosocial status, and food security status in this study.

Respondents with a monthly income of less than the PLI were twice as likely to suffer food insecurity (AOR=2.449, 95% CI: 1.046-5.732). Respondents who lived in rented accommodation had the highest odds of food insecurity compared to those who lived in their own house (AOR=6.218, 95% CI: 1.458-26.518). Also, respondents with poor oral health status were three times more likely to become food insecure compared to those who had good oral health status (AOR=3.306, 95% CI: 1.387-7.884) (Table 3).

DISCUSSION

The prevalence of food insecurity (19.5%) in the studied sample of older people living in an urban area was consistent with the findings of Brewer *et al.* (2010), and Hernandez *et al.* (2017), who respectively reported that 18.7% and 19.0% of older people in United States were food insecure. In contrast, the prevalence of food insecurity in this study was lower than that (27.7%) among older people in rural areas (Rohida *et al.*, 2017). The difference may be due to differences in income sources and levels available in an urban setting compared to the rural FELDA settlement in the study by Rohida *et al.* (2017). The latter were dependent primarily on income from rubber and oil palm small holdings. The respondents in this study had several sources of income including salary, retirement pension or monthly financial aid (from welfare department). Majority of the respondents received monthly living allowance from their working adult children, and also through other financial support such as payment of utility bills and groceries. A similar finding of children providing

Table 1. Demographic, socioeconomic background, oral health and psychosocial status (n=220)

<i>Demographic background</i>	<i>n</i>	<i>%</i>	<i>Median (IQR)</i>
Age (years)			65.50(8)
60-69	156	70.9	
70-79	57	25.9	
≥80	7	3.2	
Gender			
Male	93	42.3	
Female	127	57.7	
Ethnicity			
Malay	218	99.0	
Non-Malay	2	1.0	
Marital status			
Married	147	66.8	
Single/Separated/Widow	73	33.2	
Living arrangement			
Living alone	15	6.8	
Living with others	205	93.2	
House ownership status			
Own	210	95.5	
Rent	10	4.5	
Household size [†]			4(3)
1-4	127	57.7	
>4	93	42.3	
Education level			
No formal education	25	11.4	
Primary education	127	57.7	
Secondary education	62	28.2	
Tertiary education	6	2.7	
Occupation status			
Employed	18	12.3	
Unemployed/housewife	70	47.6	
Retired	59	40.1	
Monthly income (RM) [‡]			900(1100)
<RM940 (241.21 USD)	119	54.1	
≥RM940 (241.21 USD)	101	45.9	
Oral health status [§]			
Poor	53	24.1	
Moderate	63	28.6	
Good	104	47.3	
Psychosocial status [¶]			
At-risk of social isolation	37	16.8	
Normal	183	83.2	

[†]Average household size based on the average family size (persons) by Malaysian census (2010)

[‡]Income category based on the Poverty Line Income (PLI) by Economic Planning Unit (EPU, 2014), USD= RM3.90 (on 30th January 2018)

[§]Cut-off by Nicholas *et al.* (2010)

[¶]Cut-off by Boulos *et al.* (2013)

Table 2. Association between factors and food security status

<i>Variables</i>	<i>Food secure n (%)</i>	<i>Food insecure n (%)</i>	χ^2 / <i>Fisher's exact</i>	<i>p</i>
Age (years)			-	0.580 [†]
<75	158 (89.3)	40 (93.0)		
≥75	19 (10.7)	3 (7.0)		
Gender			0.849	0.357
Male	78 (44.1)	15 (34.9)		
Female	99 (55.9)	28 (65.1)		
Ethnicity			-	0.353 [†]
Malay	176 (99.4)	42 (97.7)		
Non-Malay	1 (0.6)	1 (2.3)		
Marital status			6.818	0.009 [*]
Married	126 (71.2)	21 (48.8)		
Single/Separated/Widow	51 (28.8)	22 (51.2)		
Living arrangement			-	0.741 [†]
Living alone	13 (7.3)	2 (4.7)		
Living with others	164 (92.7)	41 (95.3)		
House ownership status			-	0.005 ^{**}
Own	173 (97.7)	37 (86.0)		
Rent/others	4 (2.3)	6 (14.0)		
Household size			0.639	0.424
1-4	105 (89.8)	28 (90.7)		
>4	72 (10.2)	21 (9.3)		
Education level			6.242	0.012 [*]
Below secondary level	115 (65.0)	37 (86.0)		
Secondary and above level	62 (35.0)	6 (14.0)		
Occupation status			7.540	0.023 [*]
Employed	29 (16.4)	2 (4.7)		
Unemployed/housewife	85 (48.0)	30 (69.8)		
Retired	63 (35.6)	11 (25.6)		
Monthly income (RM)			9.940	0.002 [*]
<940	86 (48.6)	33 (76.7)		
≥940	91 (51.4)	10 (23.3)		
Oral health status			9.627	0.008 [*]
Poor	35 (19.8)	18 (41.9)		
Moderate	52 (29.4)	11 (25.6)		
Good	90 (50.8)	14 (32.6)		
Psychosocial status			0.015	0.903
Normal	148 (83.6)	35 (81.4)		
At-risk of social isolation	29 (16.4)	8 (18.6)		

*Significant at level $p < 0.05$

†Fisher Exact Test

Table 3. Factors associated with food security status

Variables	Adjusted OR (95% CI)	p
Marital status		0.571
Married	1.000 (ref)	
Single/ Separated/ Widow	1.274 (0.552-2.939)	
Education level		0.157
Below secondary level	2.060 (0.758-5.603)	
Secondary and above level	1.000 (ref)	
Occupation status		
Employed	1.000 (ref)	
Unemployed/housewife	3.486 (0.730-16.660)	0.118
Retired	2.782 (0.545-14.198)	0.219
House ownership status		0.014*
Own	1.000 (ref)	
Rent	6.218 (1.458-26.518)	
Monthly income (RM)		0.039*
<RM940	2.449 (1.046-5.732)	
≥RM940	1.000 (ref)	
Oral health status		
Poor	3.306(1.387-7.884)	0.007*
Moderate	1.351(0.531-3.440)	0.528
Good	1.000 (ref)	

*Significant at level $p < 0.05$, Cox & Snell $R^2 = 0.146$, Nagelkerke $R^2 = 0.233$. Model fits well.

groceries to their older parents was reported by Tengku Fatimah Muliana (2016). Further, their adult children often provided groceries for the parents.

Low education and being unemployed were associated with food insecurity, and this finding is consistent with the results of previous studies (Alvares & Amaral, 2014; Kim *et al.*, 2011; Wang *et al.*, 2015). Low education level was associated with instable job and low wages (Nie & Souza, 2018). Being non-married was also significantly associated with food insecurity (Alvares & Amaral, 2014). Spouses could help the older people in preparing balanced meals, especially among those with poor physical functions (Chang *et al.*, 2017). Those who eat alone or eat without spouse had low eating pleasure and at a high risk of losing interest in food (Oemichen & Smith, 2016).

In the current study, an income of less than the PLI increases the odds of food insecurity by 2.4 times (AOR=2.449; 95% CI: 1.046-5.732), compared with

those with income above the PLI. Low income persons were more likely to consume low nutritional value foods such as sugary and high fat foods due to the affordable price (Wang *et al.*, 2015). Further, low income persons reduced the size of meals and daily meal frequency (Norhasmah *et al.*, 2011).

Respondents living in rented accommodation were found to increase the odds of food insecurity by six folds, probably owing to high rental and other living costs in urban areas. Similar findings were reported by Matheson & McIntyre (2014) and Russell *et al.* (2014). Risk of food insecurity increased when the monthly accommodation cost is high (Sriram & Tarasuk, 2016).

Poor oral health status was one of the main factors found associated with food insecurity among the older persons. Muhamad Adib Aiman and Norhasmah (2014) had reported a similar finding. The most common oral health problem faced by the older people is loss of teeth leading to difficulty in chewing (Ozkan *et*

al., 2011). Chewing difficulty can lead to limited intake of food with hard texture (Iwasaki *et al.*, 2016). Older people with no teeth (edentulous) had significantly greater difficulty in eating raw food, such as fruits than the older with their real teeth (dentate) (De Andrade *et al.*, 2012).

Social networks provide protective benefits by sharing food and nutrition concerns (Chhabra *et al.*, 2014). Previous studies found less social support positively associated with food insecurity (Dean *et al.*, 2011; Markwick *et al.*, 2014). Majority of the respondents in this study reported had high social support, living with or nearby family members in keeping with tradition (Noran *et al.*, 2010). Hence, psychosocial status was not a significant factor associated with food security status among older people in this study.

There are several limitations in this study. This is a cross-sectional study whereby the causal relationship between two variables could not be drawn. Further, this study covered sensitive issues such as shortage of food due to financial constraints, which might be an embarrassing topic for to discuss with the respondents. It is suggested that olfactory functions (smell and taste function) in future studies on food security status of older people.

CONCLUSION

Food insecurity prevalence of 19.5% was present among a sample of older persons living in Petaling district, an urban area. Social programmes are recommended to improve the food security status of older people, include providing food assistance, oral health check-ups and encouraging family members to spend more time with their older parents.

Acknowledgements

This research was funded by the Fundamental Research Grant Scheme (Vot no: 04-01-14-1450FR), Ministry of Higher Education of Malaysia.

Authors' contributions

SFM collected and analysed the data as well as wrote the manuscript; NS supervised the flow of the research and reviewed the manuscript; ZMS reviewed the manuscript; ZI reviewed the manuscript.

Conflict of interest

All of the authors declared no conflict of interest.

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