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ASSOCIATION OF HOUSEHOLD FOOD INSECURITY WITH ACADEMIC PERFORMANCE AND NUTRITIONAL STATUS OF FISHERMAN'S SCHOOL-AGED CHILDREN IN TERENGGANU, MALAYSIA

NUR SHAFIKAH HASHIM[1], ASMA' ALI[1*], KHAIRIL SHAZMIN KAMARUDIN[1], HAYATI MOHD YUSOF[1], NOOR SALIHAH ZAKARIA[1], NORHASMAH SULAIMAN[2] and ZALILAH MOHD SHARIFF[2]

[1]Department of Food Science, Faculty of Fisheries and Food Science, Universiti Malaysia Terengganu, 21030 Kuala Nerus, Malaysia
[2]Department of Nutrition and Dietetics, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[*]E-mail: asma.ali@umt.edu.my

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ABSTRACT

This study was conducted to establish the relationship between household food insecurity (via Household Food Insecurity Access Scale), academic performance (overall class position through School Exam Analysis System), and the nutritional status (BMI-for-age and height-for-age determination) of fishermen's children in Terengganu. This was a cross-sectional study involving 101 fishermen's children aged 7 to 11 years old. The data were analyzed using the Chi-square test. The result shows that the prevalence of children with food insecurity was 43.2%. It was found that 24.2% of fishermen's children were good at the academic level while 51.3% were moderate and 24.2% were poor. BMI prevalence for children who were normal 69.3% and remaining was 6.9% obese, 2.0% overweight, 12.9% thinness, and 8.9% severe thinness. For height-for-age, 8.9% were stunting, normal 88.1%, tallness 2.0%, followed by severely stunted 1.0%. There is no association found between household food insecurity and academic performance $\chi^2(1, n=101) = 1.891$, $p=0.169$. There is also no association found between household food insecurity with BMI-for-age $\chi^2(1, n=101) = 1.105$, $p=0.293$ and height-for-age, $p>0.05$ (with Fischer exact value = 0.093). Further studies must be carried out to produce further evidence of household food insecurity for fishermen in other Malaysian states, to prevent this group from being ignored.

Key words: Academic performance, fishermen's children, household food insecurity, Malaysia, nutritional status

INTRODUCTION

In recent decades, household food insecurity has been one of the key issues for the vulnerable community, particularly for the children of fishermen, to meet their basic needs such as food (Nursabrina *et al*, 2018). Many researchers have paid significant attention because increasing household food insecurity raises the risk of poor academic performance and lower cognitive function (Fiese *et al*., 2018; Asma' *et al*., 2020; Chin *et al*., 2020; Teh *et al*., 2020) as well as social-emotional challenges, poor dietary intake (Ahmad *et al*, 2020) and psychosocial issues among children (Ali Naser *et al*., 2014). Thus, children are exposed to many adverse effects, particularly in terms of their academic performance (Faught *et al*., 2017; Esfandiari *et al*., 2018; Zhang & Yang, 2019) and nutritional status (Pei *et al*., 2018; Drysdale *et al*., 2020; Ieiri *et al*., 2020) due to high household food insecurity.

Food insecurity is one factor that leads to a higher prevalence of underweight, stunting, and wasting. This is because of poor household conditions resulting in lower consumption of foods rich in energy and nutrients that affect improvements in children's health. A study has shown that in Kelantan – one of the top five states in Malaysia receiving food basket assistance (Ministry of Health Malaysia, 2000), the prevalence of stunting was 69.0%, underweight was 63.4%, with wasting of

* To whom correspondence should be addressed.

40.0% considered high, indicating inadequate diets in the early years of children (Cheah *et al*., 2012). The economic status of fishing communities in Malaysia remains relatively poor, despite significant improvements in the fishing sector regarding technology and landings (Amin & Salim, 2012). In Peninsular Malaysia, especially on the east coast, fishermen are experiencing a high rate of poverty (Aisyah *et al*., 2014). According to statistics, Terengganu has 7,038 extremely poor households, while Kelantan has 9,391 and Sabah has 13,837 (Rhoumah, 2016). According to Mario *et al*. (2018) study, many fishermen's children are malnourished because of natural disasters such as typhoons and tsunamis, and a lack of economic capacity. Extreme incidents harm children's welfare. Apart from that, children from low-income families typically have limited access to food and nutrition. These two factors, however, are not the only ones. Apart from that, the quality of food consumed, food availability, household size, guardians' and household head's literacy contribute to the nutritional status outcome. Another study, led by Saleha *et al*. (2017), focuses on Indonesian children's nutritional status. The study discovered a substantial prevalence of underweight among children living along the coast.

Several studies have shown a significant relationship between household food insecurity, academic performance, and nutritional status. However, little study has been done on the food insecurity of households, academic performance, and nutritional status of fishermen's children. This study has thus shown whether a relationship exists in Terengganu between household food insecurity, academic performance, and the nutritional status of fishermen's children.

MATERIALS AND METHODS

Research design

This cross-sectional study was conducted for two months, from July to September 2019, among fishermen's children in Kuala Terengganu and Kuala Nerus, two districts in the state of Terengganu. The study involved 101 fishermen's children aged between 7 and 11 years and their mothers, who had no physical disability, good health status, and the ability to speak Malay. The research's human ethical approval was obtained from the Universiti Malaysia Terengganu (UMT) Human Research Ethics Committee with reference number JKEPM/2019/37. Mothers are informed of the study and invited to participate in it. Written consent is obtained from mothers before data collection. Based on the Cochran formula, given the 95% confidence interval, 5% margin of error, and the expected proportion of food insecurity in Kuala Nerus, Terengganu was 98.8% (Nursabrina *et al*., 2018), the required sample size for this study was 101 fishermen's children and their mothers.

Research instruments

This study's research tool was a set of a survey questionnaire that was distributed to the respondents. The survey questionnaire consists of four vital parts, part 1 Socio-demographic question: information on mother's age, religion, ethnicity, mothers' level of education, marital status, household size, number of children, monthly household income, occupation, house status, recipient of financial support, recipient of food assistance and source of financial aid. Next is Part 2 on the Household Food Insecurity Access Scale (HFIAS), where the household access component towards household food insecurity in a local setting was conducted. The validated Malay translated-HFIAS (Maarof, 2018) consists of nine questions asked with a four-week (30-day) recall period. The mother was asked an occurrence question, which was whether the condition in the question happened in the past four weeks (yes or no). If the respondent answers "yes" to an occurrence question, a frequency-of-occurrence question was asked to determine whether the condition occurred in the past four weeks rarely (once or twice), sometimes (three to ten times), or often (more than ten times). Two main things were determined by HFIAS, which were; 1- the total summative score of HFIAS ranged from 0 to 27 points (1 point = Rarely (once or twice in the past four weeks), 2 points = Sometimes (three to ten times in the past four weeks) and 3 points = Often (more than ten times in the past four weeks)) and 2 – Categorization of the total summative score of HFIAS into either Category 1 (food secure), Category 2 (mildly food insecure), Category 3 (moderately food insecure) or Category 4 (severely food insecure). The categorization follows Coates (2004) and Nursabrina *et al*. (2018). Part 3 is on academic performance to indicate the level of academic performance of fishermen's children based on their school position. Academic performance was measured by grading fishermen's children in the class and their overall class position excluding children 7 years of age due to no examination results at that time. The School Exam Analysis System was used to check the fisherman's children's overall position permitted by their mother. A percentile basis was referred to determine fishermen's children's academic achievement: <25th percentile – good ranking in class; 25th-50th percentile – moderate ranking in class; >75th percentile – poor ranking in class. Part 4 is the anthropometric measurement of the weight and height of the fishermen's children for

BMI-for-age and height-for-age determination. The children's weight and height were measured using an electronic weighing scale (Tanita Bioelectrical Impedance Analysis BC-541, Japan) and SECA portable stadiometer 225 (SECA, Hamburg, Germany), respectively. The respondents were asked to step on the weighing scale and maintain a straight posture; measurements were then taken to the nearest 0.1 kg. The fishermen's children were instructed by the researcher to step on the stadiometer, standing upright in the middle. The fishermen's children's heads, shoulders, buttocks, knees, and heels touch the board. The measurement was announced to the nearest 0.1 cm. The measurement taken was analyzed using a WHO Anthro version 3.2.2 software to assess the children's nutritional status in z-score (BMI-for-age and height-for-age).

Data collection

The mother-child pair were approached through a home visit and asked about their willingness to take part. Once agreed, written consent is obtained from the mother before data collection. Mothers were required to answer Part 1 Socio-demographic questions and Part 2, Household Food Insecurity Access Scale, assisted by the researcher. The researcher instructed the children to answer Part 3 of the question, which was about the previous final examination's academic performance. Next, children's body weight and height were determined and categorized based on BMI-for-age and height-for-age in WHO Reference 2007. The respondents were given a token of appreciation before the researcher left.

Data analysis

Version 20 of the SPSS was used to analyze and report the data collected. The normality test is used to check the distribution of normality. Descriptive analysis was used to determine the demographic, socio-economic profile, distribution of household food insecurity status, academic performance, and nutritional status of fishermen's children. The Chi-square at $p<0.05$ was used to assess the association between household food insecurity, academic performance, and the nutritional status of fishermen 's children. However, Fisher's Exact Test was used when more than 20% of the expected value in each cell is greater than 5 was attained.

RESULTS

Table 1 shows that most parents of children who were willing to participate were between 40 and 49 (50.5%). About half of the fishermen (62.4%) and their wives had secondary education (74.3%). Approximately 88.1% of household revenues were below RM1500, and 41.6% of household size was between 6-8 people per household. More than half of the fishermen's families had 3-5 children (55.4%). The majority of mothers were housewives (72.3%). About 67.3% of the fishermen's households live together with their parents/in-laws or in a house that the landowner gave them to live in. Approximately 56.4% of the families received financial assistance. More than half of those surveyed received financial support from *Majlis Agama Islam Dan Adat Melayu Terengganu* (MAIDAM) but received no food help. Approximately 49.5% of those interviewed received financial aid. Some fishermen received *Jabatan Kebajikan Masyarakat* (JKM) financial support (5.0%), while 2.0% received financial support from others. About 43.6% received no financial support from any source, which is a bit worrying since there is no fixed income for fishermen.

In Table 2, the HFIAS prevalence distribution among fishermen's households in Kuala Terengganu and Kuala Nerus is shown. Shariff *et al*.'s study (2008) stated that 50% of households experienced food insecurity and reported hunger for children due to larger households, more children, and moms as housewives. The most protuberant aspect of the current data is that most respondents in the food security category accounted for 56.4%, but about 43.5% found food insecurity. Specifically, of the 43.5% of food insecurity: 17.8% were mild food insecurity, followed by 19.8% moderate food insecurity and 5.9% severe food insecurity. About half of those surveyed reported food insecurities, which is not a good phenomenon. This study showed that, although this was not a monsoon season, most respondents reacted more frequently to their severe food conditions.

Table 3 shows the academic distribution of the children of fishermen based on the percentile position. Around 51.3% of fishing children had moderate performance, followed by 24.4% for good performance, and 24.2% had a poor academic performance.

Table 4 shows the nutritional status of Kuala Terengganu and Kuala Nerus children of the fishermen. Nutritional status is one of the vital factors suitable to indicate whether children have food insecurity or food security. This is because adequate food and nutrition play a significant role in children's physiology, growth, and development. The results obtained for BMI-for-age indicate that children who were normal 69.3%, obese 6.9%, overweight 2.0%, thinness 12.9%, and severe thinness 8.9%. This data shows that the thinness percentage was far above obesity and overweight. The reported percentage for stunting was 8.9%, followed by 1.0% of severely stunted.

Table 1. Socio-demographic profile of fishermen's children mother (*n*=101)

Demographic Characteristics	Frequency (%)	Mean ± SD
Age		40.07 ± 6.08
18-29	6 (5.9)	
30-39	37 (36.6)	
40-49	51 (50.5)	
50-59	7 (6.9)	
Religion		
Islam	101 (100.0)	
Ethnicity		
Malay	101 (100.0)	
Education level (Mother of the children)		
No formal education	1 (1.0)	
Primary school	19 (18.8)	
Secondary school	75 (74.3)	
Sijil/STPM/Diploma	5 (5.0)	
Degree	1 (1.0)	
Education level (Father of the children)		
No formal education	2 (2.0)	
Primary school	32 (31.7)	
Secondary school	63 (62.4)	
Sijil/STPM/Diploma	4 (4.0)	
Degree	0 (0.0)	
Marital status of parents		
Married	99 (98.0)	
Widow	2 (2.0)	
Household size		
< 5	39 (38.6)	
6-8	42 (41.6)	
9-11	17 (16.8)	
> 12	3 (3.0)	
Number of siblings		
<2	13 (12.9)	
3 -5	56 (55.4)	
6-8	26 (25.7)	
9-11	4 (4.0)	
12-14	2 (2.0)	
Household monthly income		
<RM1500	89 (88.1)	
RM1500-RM2999	11 (10.9)	
RM3000-RM3999	1 (1.0)	
Mother occupation		
Small Business	8 (7.9)	
Store assistant	4 (4.0)	
Babysitter	4 (4.0)	
Housewife	73 (72.3)	
Others	12 (11.9)	
House status		
Purchased	20 (19.8)	
Rented	13 (12.9)	
Living with parents/in-laws	68 (67.3)	
Financial support receiver		
Yes	57 (56.4)	
No	44 (43.6)	
Food assistance receiver		
Yes	2 (2.0)	
No	99 (98.0)	
Source of financial support		
MAIDAM	50 (49.5)	
JKM	5 (5.0)	
Others	2 (2.0)	
None	44(43.6)	

MAIDAM = *Majlis Agama Islam Dan Adat Melayu Terengganu.* JKM = *Jabatan Kebajikan Masyarakat.*

Table 2. Household Food Insecurity Access Scale (HFIAS) prevalence among fishermen's households (*n*=101)

HFIAS Prevalence	Frequency
	n (%)
Food secure	57 (56.4)
Mildly Food Insecure	18 (17.8)
Moderately Food Insecure	20 (19.8)
Severely Food Insecure	6 (5.9)

Table 3. Rank percentile of academic performance of fishermen's children based on position in class (*n*=78) ‡

Position ranking in class based on percentile*	Indicator	Frequency, *n* (%)	Median (IQR)
<25th percentile	Good	19 (24.4)	53.9 (49.6)
25th – 75th percentile	Moderate	40 (51.3)	
>75th percentile	Poor	19 (24.2)	

*The lower the percentile, the better the position ranking in class
‡The analysis involved *n*=78, excluding children 7 years of age due to no examination results at that time.

Table 4. Nutritional status of fishermen's children (*n*=101)

Nutritional status	Characteristics	Frequency (%)	Median (IQR)
BMI-for-age (z-score)			-1.03 (1.90)
	Obesity	7 (6.9)	
	Overweight	2 (2.0)	
	Normal	70 (69.3)	
	Thinness	13 (12.9)	
	Severe Thinness	9 (8.9)	
Height-for-age (z-score)			-0.59 (0.12)
	Normal	89 (88.1)	
	Stunted	9 (8.9)	
	Severely stunted	1 (1.0)	
	Tallness	2 (2.0)	

Association of household food insecurity with academic performance and nutritional status of fishermen's children

The Chi-Square test showed no significant association between household food insecurity and nutritional status in the BMI-for-age and height-for-age z scores at $\chi^2(1, n=101) = 1.105$, $p=0.293$ and ($p=0.057$) respectively. The Chi-Square test showed no significant association between household food insecurity and academic performance at $\chi^2(1, n=101) = 1.891$, $p=0.169$, respectively as shown in Table 5.

DISCUSSION

This study on the distribution of household food insecurity is consistent with the results of Maarof (2018) and Jomaa *et al*. (2019), which reported food insecurity in Kelantan and Lebanon at 40.0 to 49.3%. It is also alleged that overcrowding, low parental education, and low wages make them live below the poverty line and can not afford to buy enough food for one family member, particularly a household with more children (Jomaa *et al*., 2019). A previous study conducted by Farhadian *et al*. (2015) in the Sabah community showed that it is sometimes difficult to get enough food because the community does not have enough money and a source of food. It may also be explained that low-income households are likely to have high living costs because of unforeseen expenses (Shariff & Khor, 2008; Mamat *et al*., 2019).

Moreover, fishermen's performance may be children were inadequate in academic performance because of their parents' low socioeconomic status, which resulted in low interest in children's education

Table 5. Association between household food insecurity, fishermen's children nutritional status, and academic performance (*n*=101)

Nutritional Status	Level of food security		Pearson Chi-Square	
	Food Secure *n* (%)	Food Insecure *n* (%)	χ^2	*p*-value
BMI-for-age				
Normal	35 (34.7)	32 (31.7)	1.105[a]	0.293
Others	14 (13.9)	20 (19.8)		
Height-for-age				
Normal	47 (46.5)	44 (43.6)		0.093[b]
Others	2 (2.0)	8 (7.9)		
Academic performance‡				
Good	33 (42.3)	26 (33.3)	1.891[c]	0.169
Poor	14 (17.9)	5 (6.4)		

*Chi-square significant at $p<0.05$.
[a] 0 cells (0.0%) have an expected count less than 5. The minimum expected count is 16.50.
[b]1 cells (25.0%) have an expected count less than 5 (use fisher exact test value after creating 2×2 dummy table).
[c]0 cells (0.0%) have an expected count of less than 5. The minimum expected count is 7.55.
‡The analysis involved *n*=78, excluding children 7 years of age due to no examination results at that time.

(Hanafi, 2008; Poh *et al*., 2019). Therefore, poor academic performance at school, where the undernourished or poor life, can harm the overall development of children (Shariff *et al*., 2000, Poh *et al*., 2019). A study by Tsai and Liu (2013) mentioned that family socioeconomic status and the parent-child relationship are positively correlated with student achievement. Most parents have a low educational level, which may also be a factor in their having less interest in their children's education, which may cause the parents to not know how to help their children. This can reduce parent-child interaction and, thus, affect children's achievement.

One major factor that could indicate if children are food insecure or secure is their nutritional status assessment. Adequate food and nutrition play a key role in children's bodies, which play a role in physiology, growth, and development. Wong *et al*. (2014) have reported a higher percentage of underweight (about 45.3%) when households have a larger sibling size, which means they will experience pressure in the economy to feed each family member. Thus, some parents would easily neglect their children when they are in a bigger family. This study is consistent with the studies carried out by Whye Lian *et al*. (2012), Jomaa *et al*. (2019), and Khan-Khattak and Ali, (2010), which demonstrate that fishermen's children are malnourished because of deficiencies in micronutrients and macronutrients. One possible reason for this could be that food with low-calorie consumption is consumed because of the economic conditions that re-elected nutritious foods' buying power. A study by Pek Geik (2016) in Gua Musang, Kelantan, found that 76.2% of stunting is much higher for children under the age of five. This can be explained by the fact that most of them are still fed by their mothers. In contrast, a study by Chong *et al*. (2016) indicated that children over seven years old had less stunting in their food because they could find and eat. Still, stunting occurs because they have an irregular eating pattern and sometimes skip meals because they spend extended periods at school. Furthermore, this could be because children in rural areas, such as fishing children, often come from lower-income families with low food expenses, making it impossible to eat all three main meals daily, leading to reduced food intake (Mutisya *et al*., 2015).

This finding runs counter to previous studies' results, which suggest that household food insecurity is linked to children's nutritional status. Food insecurity has been a possible determinant that causes malnutrition in children, especially in families with low incomes who live in rural communities, since they often have food shortages. Multiple macronutrients and micronutrient deficiencies were present in most malnourished children, consistent with other studies (Donnen *et al*., 1996; Khor, 2003; Ahmed *et al*., 2012). Compared with the recommended nutrient intake (RNI) of Malaysia, the dietary intakes were inadequate in energy and vitamin A. It was highly reported among malnourished children in Kelantan, Malaysia, where they mainly had a low intake of staple foods, especially rice, noodles, and bread. The low-calorie intake could be due to inadequate access to food, poor feeding practices, and frequent illness (Wong *et al*., 2014). The household-level of food insecurity is growing by saying that Malaysia is one of the countries facing malnutrition (Ali Naser *et al*., 2014) and diet-related diseases (Ministry of Health Malaysia, 2005). Children in food-secure households are less likely than children in food-insecure

households to be underweight, chronically energy-efficient, and wasted (Abdulrahman *et al*., 2016). Previous research also indicated that household food insecurity was significantly related to children's stunting and undergrowth status. Still, wasting did not show that the consumption of expensive food items decreased initially, followed by drop-in portion size and, ultimately, food frequency (Ali Naser *et al*., 2014). However, this recent study was unable to find any link between household food insecurity and the nutritional status of fishing children.

This study shows that academic performance is not associated with fishers' children's household food insecurity. The previous study shows that poor academic performance in school could be explained by having food insecurity, where they score low on intelligence and achievement tests (Fiese *et al*., 2018). Food insecurity can cause certain nutrients to be taken low. For children's cognitive development, nutrients such as vitamin D, zinc, iodine, and folate are essential. This is one factor that generally contributes to poor school outcomes among children in disadvantaged communities (Shariff *et al*., 2000). The lack of a food source also hinders intellectual development.

Moreover, some fishermen's children helped their parents ensure they had enough food, whether they went fishing or doing some small business. Thus, they were exhausted from focusing on homework and studying, which led to poor performance (Chong *et al*., 2016). Meanwhile, in Ghana, school children make money by fishing and not going to school regularly (Live & Poipoi 2012). Thus, work time impairs the studies of the children of fishermen. Children will probably find it challenging to balance their time between helping their parents and concentrating on their education. Parents were highly vulnerable to anxiety and helplessness, control loss, family dysfunction, and psychological impairment in food-insecure households (Ali Naser *et al*., 2014). It could also make it hard for children to concentrate on education and choose to help their parents.

The present study only considered the context of fishermen's children in Terengganu. Thus, these study findings need to be interpreted cautiously. Future research in this field would be of great help if the sampling location could be extended to Malaysia's other states to be more representative of the fishermen's population overall. This study was done to raise awareness of how important it is to maintain a good supply of food to ensure the healthy growth and development of children, especially among fishermen's children. Besides, it will provide baseline information on academic performance and the nutritional status of fishermen's children in Terengganu. Lastly, to give a better understanding of household food insecurity with the academic performance and nutritional status of fishermen's children.

CONCLUSION

This study aimed to ascertain the relationship between household food insecurity, academic performance, and the nutritional status of children of fishermen in Kuala Terengganu and Kuala Nerus. This study discovered no correlation between household food insecurity and the academic performance or nutritional status of fishermen's children. Despite its exploratory nature, this study added some details to the status of household food insecurity, academic performance, and nutritional status of fishermen's children in Terengganu, Peninsular Malaysia's East Coast.

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