

NUTRITIONAL STATUS AND FEEDING BEHAVIOUR OF YOUNG CHILDREN IN THE NORTHEASTERN REGION OF MALAYSIA

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ABSTRACT

Introduction: The dietary choices of young children can significantly impact their nutritional well-being, particularly if they exhibit selective eating habits. Avoiding familiar foods and failing to consume sufficient amounts of nutritious food can harm a child's overall nutritional status. As such, this study aims to assess the feeding behaviour and nutritional status of young children in the Northeastern region of Malaysia. **Methods:** A cross-sectional study was conducted involving 60 children aged one to five years in five districts of Kelantan, Malaysia. Online questionnaires were used to collect data, including sociodemographic information and the Child Eating Behaviour Questionnaire (CEBQ). Individual Dietary Diversity Scores (IDDS) were calculated to evaluate the children's eating habits. Anthropometric measurements were also taken, including body mass index (BMI), weight-for-age (WAZ-score), height-for-age (HAZ-score), and weight-for-height (WHZ-score). The data were analysed using the Statistical Package for the Social Sciences (SPSS) version 26.0. **Results:** Findings revealed that 55% of young children were picky eaters and had low IDDS scores. Picky eaters were more likely to be underweight (11.7%), stunted (15%), and wasted (6.7%) compared to non-picky eaters. However, no significant association existed between nutritional status and feeding behaviour or IDDS scores. **Conclusion:** To address picky eating, it is crucial to provide nutrition education and raise caregiver awareness about their children's feeding habits. This approach can help improve the nutritional well-being of young children in Kelantan, Malaysia, and potentially contribute to broader efforts to combat childhood malnutrition.

KEYWORDS: Nutritional status, picky eater, feeding behaviour, children, Kelantan

INTRODUCTION

A child's growth throughout the first five years of life is significantly influenced by their dietary intake (Mkhize & Sibanda, 2020). Children who consume minimal nutrients will struggle to grow and acquire weight as they should, which eventually causes them to become persistently malnourished (Tan et al., 2022). According to the World Health Organization (2019), malnutrition is caused by insufficient or excessive dietary intake as well as an inefficient use of energy, macronutrients, and micronutrients. Undernutrition, unrecognised hunger, and obesity are the three strands of malnutrition (UNICEF, 2019). These traits can be addressed in some circumstances because undernutrition is a major contributor to stunting and wasting, while overnutrition can contribute to being overweight. Since malnutrition raises the risk of illness and death in children, this is an urgent public health concern in the majority of countries. In Malaysia, 14.8% of children under the age of 17 are obese and 15% are overweight. According to the reports, stunting affects 22% of children under the age of five, with an increasing trend from 17% in 2011 to 18% in 2015 (National Health and Morbidity Survey, 2019). Among the factors contributing to stunting is feeding behaviour created within the family's structure which most certainly has an impact on the child's experience (Pai & Contento, 2014).

It is crucial for a child's diet to have a balanced ratio of macronutrients to micronutrients and a healthy eating pattern (Braet et al., 2014). This pattern is usually influenced by the child's family members and can promote physical growth and food preferences (Ek et al., 2016). It includes various behavioural patterns that enable children to consume food that satisfies them while also getting all the necessary nutrients. However, studies have shown that about 50% of picky eater children have a family history of picky eating behaviour (Mok et al., 2022). In modern families, there may be a tendency to consume too much or too little energy, leading to obesity or undernutrition (Herle et al., 2020). A study by Kwon et al. (2017) mentioned that about 70% of children were picky eaters, and 30% of them were eating small amounts of food, reducing their energy and micronutrient intake. These children also exhibited neophobic behaviour, characterised by a constant fear of trying new foods and the refusal of specific food groups or preparation methods. If these eating patterns persist, malnutrition may develop, which could negatively affect young children's health and well-being. However, in Malaysia, only a few studies have documented the nutritional status of young children aged below five years old (Hanapi et al., 2022). Therefore, this study aims to identify the current nutritional status and feeding behaviour of young children in Kelantan to address this gap.

METHODS

Participants

A cross-sectional study was conducted in February 2023 whereby caregivers and their children aged one to five years old were recruited using stratified random sampling. Nine kindergartens were randomly selected from five districts (i.e., Kota Bharu, Pasir Mas, Tanah Merah, Machang, Tumpat) and caregivers were randomly selected from the name list. Caregivers with children aged below 5 years old were recruited. Caregivers of children with illnesses that affect their dietary habits or were previously hospitalised over six months were excluded.

Anthropometric assessments

Children's anthropometric assessments including height and weight were measured at the kindergarten. The height was measured in centimetres (cm) using measuring tape and the weight was measured in kilogrammes (kg) using a digital weighing scale at least 2 times. The body mass index (BMI) and sex-specific Z-scores for height-for-age, weight-for-age, and weight-for-height were assessed using WHO AnthroPlus Software. Their nutritional statuses were classified according to the WHO Child Growth Standard 2006.

Dietary assessments

Caregivers were interviewed for their children's 3-day diet recall, of which two days were weekday and one weekend day. Caregivers were asked to report their children's portion size in household measurements such as teaspoons, tablespoons, cups, bowls, and other daily household measures provided during the session. Individual Dietary Diversity Score (IDDS) which includes 12 food groups was used to evaluate children's daily meals based on the dietary assessment (FAO, 2010). The total score was calculated to be between 0 and 12. Using IDDS terciles, the total scores were then classified into low (≤ 8.0) and high (9.0-12.0) groups.

Children Eating Behaviour Questionnaire

Feeding behaviour was assessed using the Children Eating Behaviour Questionnaire (CEBQ) consisting of 35 items which demonstrated 8 subscales of enjoyment of food, food responsiveness, emotional overeating, desire to drink, satiety responsiveness, slowness in eating, emotional under-eating, and food fussiness. On a 1-5 point scale, caregivers were required to rate their children's feeding behaviour as the following, 1=never; 2=rarely; 3=sometimes; 4=often; 5=always. The mean total score of the picky eater subscale was analysed to determine the children's feeding behaviours using Steinsbek's cut-off to determine the prevalence of picky eaters among the children. Picky eaters were those with a mean total score of ≥ 3.0 , whereas non-picky eaters were those with a mean total score of < 3.0 .

Statistical analysis

A descriptive analysis was performed to evaluate participant characteristics and the nutritional status of young children. An independent t-test was conducted to assess the feeding behaviour among young children. Meanwhile, the chi-square test was used to assess the relationship between feeding behaviour and children's nutritional status. The Statistical Package for the Social Sciences (SPSS) version 26.0 was used for all analyses, with a significance level set at $p < 0.05$.

Ethical Approval

This study has been granted ethical approval by the International Islamic University Malaysia Research Ethical Committee (IREC) (KAHS 3/24).

RESULTS

Participants' characteristics

The sociodemographic characteristics of the caregivers are presented in Table 1. Majority of the responding Malay caregivers were female (73.3%, $N=44$), with those aged between 30 and 39 years old (68.3%, $N=41$) and had tertiary education (38.3%, $N=23$). In this study, the majority (83.3%, $N=50$) of them had more than 4 people in a house. The mean household income of the respondents was RM4935.35 ($SD \pm 3447.78$), as most of them were employed (80%, $N=48$) and in the category of B40 (60%, $N=36$).

Meanwhile, a total of 60 Malay children aged 1 to 5 years old participated in this study, in which 56.7% ($N=34$) of them were boys and 43.3% ($N=26$) were girls. The mean age of the children was 3.48 years ± 1.36 , with most of them aged 5 years old (31.7%, $N=19$).

Table 1: Sociodemographic characteristic of respondent, N=60

<i>Variables</i>	<i>n</i>	<i>(%)</i>	<i>Mean ± SD</i>
Gender of caregiver			
Male	16	(26.7)	
Female	44	(73.3)	
Age of caregiver			36 ± 6.65
21-29 years old	5	(8.4)	
30-39 years old	41	(68.3)	
40-49 years old	14	(23.3)	
50-59 years old	0	0	
≥60 years old	0	0	
Relationship status			
Father	16	(26.7)	
Mother	44	(73.3)	
Gender of children			
Boy	34	(56.7)	
Girl	26	(43.3)	
Age of children			3.48 ± 1.36
1 years old	6	(10.0)	
2 years old	10	(16.7)	
3 years old	12	(20.0)	
4 years old	13	(21.7)	
5 years old	19	(31.7)	
Level of education			
Degree/Master/PhD	23	(38.3)	
Diploma	21	(35)	
SPM	16	(26.7)	
PMR	0	0	
Occupation status			
Employed	48	(80)	
Self-employed	10	(16.7)	

Pensioner	0	0	
Not working	2	(3.3)	
Household income			4935.35 ± 3447.78
B40 (<RM4850)	36	(60)	
M40 (RM4851-RM10959)	20	(33.3)	
T20 (>RM10959)	4	(6.7)	
Household size			4.95 ± 1.56
2 people	1	(1.7)	
3 people	9	(15)	
≥ 4 people	50	(83.3)	

Nutritional status of young children

The children's nutritional status and anthropometric measurements are presented in Table 2. Their average weight was 13.05 kg (SD±3.30), average height was 93.49 cm (SD±12.04), and average BMI was 13.39 kg/m² (SD±3.01). The mean z-scores for weight-for-age, height-for-age, and weight-for-height were -0.91 (SD±1.19), -1.19 (SD±1.20), and -0.38 (SD±1.31), respectively. Based on the WHO growth chart, 16.7% (N=10) of the children were underweight, 23.3% (N=14) were stunted, 6.7% (N=4) were wasted, and 10% (N=6) were overweight.

Table 2: Anthropometric assessment and nutritional status of children of children, N=60

<i>Variables</i>	<i>n</i>	<i>%</i>	<i>Mean ± SD</i>
Height			93.49 ± 12.04
Weight			13.05 ± 3.30
BMI			13.39 ± 3.01
Weight-for-age (WAZ-score)			-0.91 ± 1.19
Normal	50	(83.3)	
Underweight	10	(16.7)	
Height-for-age (HAZ-score)			-1.19 ± 1.20
Normal	46	(76.7)	
Stunting	14	(23.3)	
Weight-for-height (WHZ-score)			-0.38 ± 1.31
Normal	50	(83.3)	
Wasting	4	(6.7)	
Overweight	6	(10.0)	

Diet Diversity Scores

According to Figure 1, legumes, nuts, and seeds are the least consumed food category among young children (0.17 ± 0.38), while cereals are the most consumed food category among children (1.00 ± 0). Findings revealed that the mean IDDS score among young children was 7.59 (1.52). The majority (73.3%, N=44) of the children fell within the low IDDS group, while 26.7% (N=16) were in the high IDDS group (Table 3).

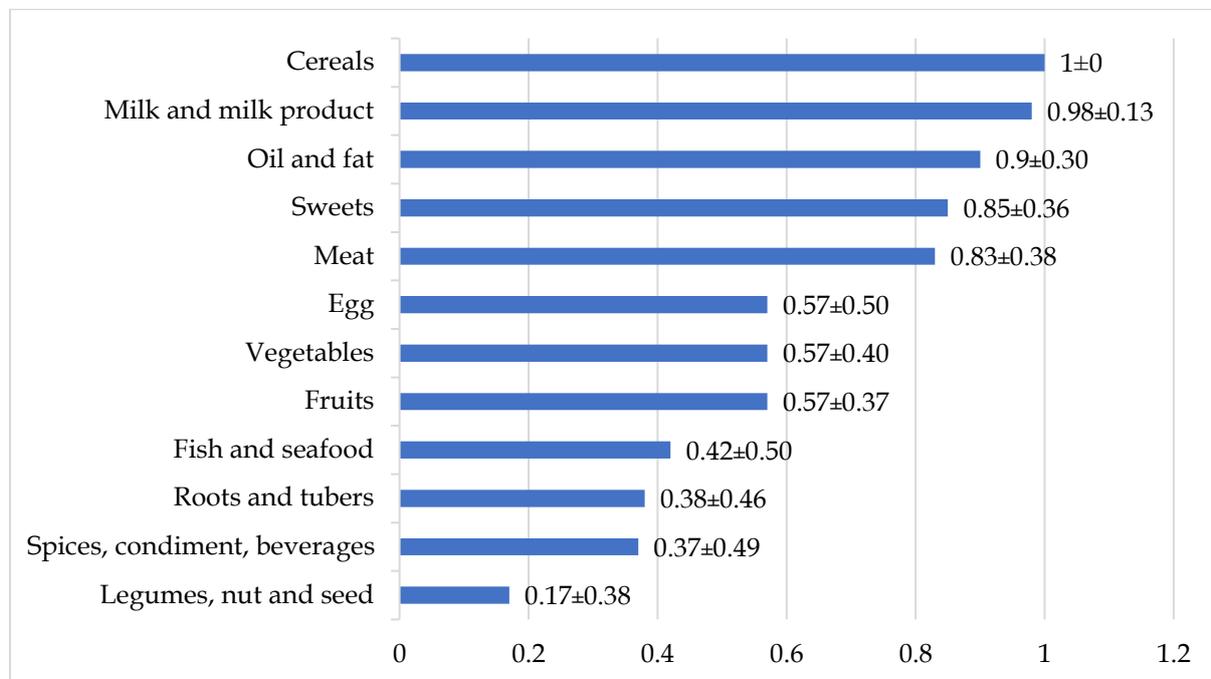


Figure 1: Mean dietary diversity of the different food groups.

Table 3: Mean dietary diversity score group.

Variables	n (%)	Mean (SD)
Low	44 (73.3)	7.59 (1.52)
High	16 (26.7)	

Children's Mealtime and Picky Eating Behaviour

As shown in Table 4, the majority (55%, N=33) of children were classified as picky eaters by using Steinsbekk's cut-off. With regards to their mealtime behaviour, the most problematic mealtime behaviour was seen in the enjoyment of food (3.5 ± 0.75) while the least problematic behaviour was reported in emotional over-eating (1.48 ± 0.54).

Table 4: Children's Eating Behaviour characteristics, N=60

Variables	Mean ± SD	Prevalence of picky eater Steinbekk's score	
		<3.00 (n, %)	≥3.00 (n, %)

Food responsiveness (FR)	2.7 ± 0.76		
Emotional over-eating (EOE)	1.48 ± 0.54		
Enjoyment of food (EF)	3.5 ± 0.75		
Desire to drink (DD)	3.08 ± 0.81		
Satiety responsiveness (SR)	3.13 ± 0.62		
Slowness in eating (SE)	2.71 ± 0.65		
Emotional under-eating (EUE)	2.42 ± 0.90		
Food fussiness (FF)	2.89 ± 0.49	27, 45%	33, 55%

Children Eating Behaviour Questionnaire (CEBQ) subscales between picky eaters and non-picky eaters.

Picky-eater children had significantly higher mean scores for food fussiness ($p < 0.001$), emotional overeating ($p = 0.002$), desire to drink ($p = 0.009$) and satiety responsiveness ($p = 0.004$) when compared to non-picky eaters (Table 5).

Table 5: Mean difference of Children Eating Behaviour Questionnaire subscales between picky eaters and non-picky eaters, N=60

Variables	Picky eater (n=33)	Non-picky eater (n=27)	Mean difference (95% CI)	df	p-value
	Mean ± SD	Mean ± SD			
Food responsiveness (FR)	2.8 ± 0.76	2.58 ± 0.76	0.22	58	0.714
Emotional over-eating (EOE)	1.62 ± 0.60	1.31 ± 0.42	0.32	58	0.002
Enjoyment of food (EF)	3.62 ± 0.78	3.36 ± 0.71	0.26	58	0.744
Desire to drink (DD)	3.13 ± 0.67	3.01 ± 0.96	0.12	58	0.009
Satiety responsiveness (SR)	3.13 ± 0.46	3.13 ± 0.78	-0.01	58	0.004
Slowness in eating (SE)	2.80 ± 0.55	2.60 ± 0.75	0.20	58	0.090
Emotional under-eating (EUE)	2.58 ± 0.86	2.22 ± 0.93	0.35	58	0.543
Food fussiness (FF)	3.22 ± 0.24	2.49 ± 0.42	0.72	58	0.001

*Using independent t-test

Association between feeding behaviour and nutritional status of young children

Table 6 showed no significant association between picky eating behaviour with weight-for-age z-score ($p=0.524$), height-for-age z-score ($p=0.907$) and weight-for-height z-score ($p=0.420$).

Table 6: Association of picky eating behaviour and nutritional status, N=60

Variables	Picky eater	Non-picky eater	X^2	df	p-value
	n (%)	n (%)			
Weight-for-age			0.406	1	0.524
Underweight	7 (11.7)	4 (6.7)			
Normal	26 (43.3)	23 (38.3)			
Height-for-age			0.014	1	0.907
Stunting	9 (15.0)	7 (11.7)			
Normal	24 (40.0)	20 (33.3)			
Weight-for-height			1.737	2	0.420
Normal	27 (45.0)	23 (38.3)			
Wasting	4 (6.7)	1 (1.7)			
Overweight	2 (3.3)	3 (5.0)			

*Using Chi-square test

Association between feeding behaviour and dietary diversity score of young children

Similarly, picky eating behaviour was not significantly associated with diet diversity score ($p=0.639$) (Table 7).

Table 7: Association of picky eating behaviour and dietary diversity score, N=60

Variables	Picky eater	Non-picky eater	X^2	df	p-value
	n (%)	n (%)			
Low	25 (41.7)	19 (31.7)	0.22	1	0.639
High	8 (13.3)	8 (13.3)			

*Using Chi-square test

DISCUSSION

The Northeastern region of Malaysia still has significant rates of underweight (17%), wasting (7%), stunting (23%), and overweight (10%) among young children, which is comparable to data from the National Health Morbidity Survey (NHMS) 2022. In the year 2020 - 2021, 15% of children were underweight, 11% were wasting, 21% were stunted, and 6% were overweight (NHMS, 2022). Meanwhile, Chile and Barbados had similar rates of overweight children at 9.3% and 12.2%, respectively, according to Corvalán et al. (2017). According to Pai and Contento (2014), parents often do not effectively monitor their children's food intake and dietary preferences, which can lead to

uncontrolled eating habits and a lack of nutritional food consumption. These eating-related problems can be linked to malnutrition.

The data shows that 73.3% of the children had inadequate dietary diversity scores, while only 26.7% had excellent scores. This means that most children did not consume the required 9 to 12 food groups for proper growth and nutrition in the previous 24 hours. The food categories that were consumed the least were legumes, nuts and seeds, roots and tubers, and fish and seafood. On the other hand, cereals were the most frequently consumed food group. A similar study conducted by Ogechi et al. (2016) among Nigerian children aged 2 to 5 years showed that 73.5% had low IDDS, while 25.2% and 1.3% had medium and high IDDS respectively. The least consumed food group was eggs, while cereals and vegetables were commonly consumed. The poor IDDS can be attributed to food insecurity, as nutritious food sources were not readily available in the area.

This study identified that 55% of young children were picky eaters. This percentage is comparable to the findings of Mok et al. (2022), who discovered that the majority of children (61.9%) are non-picky eaters while the remaining 38% and 15.9% are moderate and severe picky eaters, respectively. The research highlighted that picky eaters tend to have particular preferences for their favourite foods, which was evident from the high enjoyment scores. Picky eaters showed reluctance towards trying new foods and often felt full or thirsty even before or during meals, indicating a lack of interest in eating. Similar results were reported by Sandvik et al. (2018) and Cardona Cano et al. (2015), who identified high satiety responsiveness, slow eating, and reduced enjoyment of food among picky eaters aged between 1 to 5 years old. Maternal negative affectivity was identified as a potential risk factor for picky eating, leading to heightened child emotionality and the onset of fussy behaviour (Cardona Cano et al., 2015). According to Krijnen and colleagues (2022), maternal negative affectivity is a consistent personality trait in mothers characterized by their tendency to experience negative thoughts, feelings, and emotions. This trait has been linked to more psychosocial problems in their children and poorer quality of mother-child interactions.

This study found no correlation between picky eaters and their nutritional status in terms of weight-for-age, height-for-age, and weight-for-height. In fact, picky eaters were more likely to have a normal weight, height, and BMI for their age. This is consistent with previous studies which have shown that mild to moderate picky eaters generally have a normal weight (Antoniou et al., 2016; Li et al., 2017). However, when compared to non-picky eaters in this study, picky eaters were found to have significantly lower weight, height, and BMI. These findings have been observed in other studies, such as those conducted by Hanapi et al. (2022) and Chao (2018). This suggests that picky eater children may be at risk of being underweight, stunted, or wasted.

Picky eaters who are malnourished often have insufficient nutrients necessary for their growth throughout life. The majority of picky eater children in this study did not consume the recommended daily servings of fruits, vegetables, and seafood. Similar to studies conducted by Mok et al. (2022) and Chao (2018), picky eater children in this study consumed fewer fruits, vegetables, dairy products, and protein sources.

CONCLUSION

The study found that picky-eater children in Kelantan were more likely to become underweight, stunted, and wasted compared to non-picky eaters. However, there was no association found between the nutritional status of picky eaters and their food preferences. Picky eaters exhibited higher satiety responsiveness, slower eating and greater enjoyment of food. The low dietary diversity score was attributed to their fussiness in food preference. They consumed fewer vegetables, fruits, fish, and legumes than non-picky eaters. It is important to note that the sample size of 60 participants may not fully represent the entire population of Kelantan. Therefore, it is recommended that caregivers introduce nutrition education for children.

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