

## ORIGINAL ARTICLE

# Picky Eating Behaviour and Nutritional Status of Preschool Children in Kuala Selangor, Malaysia

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## ABSTRACT

**Introduction:** Picky eating is defined by the reluctance of consuming familiar foods, trying new food and having strong food preferences. It is common among children; however limited and inconsistent studies have been done to investigate the incidence and its relationship among pre-schoolers in Malaysia. **Aims:** To investigate the prevalence of picky eaters among pre-schoolers and its association with nutritional status. **Methods:** A cross-sectional study was conducted involving 192 preschool children in Kuala Selangor district, Malaysia. A set of online questionnaires consisted of Child Eating Behaviour Questionnaire (CEBQ) was administered online. Self-reported weight and height were also collected. **Results:** 31.8% of the children were identified as picky eaters. Their weight, weight-for-age z-score (WAZ), height, height-for-age z-score (HAZ), Body Mass Index (BMI) and BMI-for-age z-score (BAZ) were significantly lower than non-picky eaters ( $p < 0.05$ ). A lower degree of food responsiveness, enjoyment of food and emotional overeating combined with higher degree of food fussiness and slowness in eating were prevalent among picky eaters ( $p < 0.05$ ). Picky eating behaviour was significantly associated with WAZ, HAZ, and BAZ ( $p < 0.05$ ). **Conclusion:** This study revealed that 1 in 3 children is a picky eater and they are more likely to be underweight. This highlights more comprehensive studies in the future to investigate the long-term effect of such behaviour.

**Keywords:** Children, Eating behaviour, Nutritional status, Picky eating, Underweight

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## INTRODUCTION

Picky eating behaviour which is also described as faddy, fussy, or choosy eating is defined as the reluctance to consume familiar foods or to try new foods and have strong food preferences (1). Picky eating is not only the rejection of familiar food and food neophobia but also includes consumption of inadequate amount of food and rejection of specific food texture (2). Consequently, picky eaters may have poor diet variety and would compensate their daily intake which may lead to adverse health-related outcomes (1). Besides, picky eating may expose them to risk of thinness and developing eating disorders later in life (3).

Many children begin to exhibit picky eating behaviour as they started complementary feeding which exposed them to an increasingly varied diet (4). This behaviour is prevalent among young children, and it has been identified to be the cause of concern and stress among parents (5). Parents may respond to this behaviour by

the practice of force feeding which will worsen the child fussiness. In Asia the prevalence of picky eaters among children was reported as high as 54% in Taiwan and 46.9% in Singapore (6, 7). However, study examining picky eating among Malaysian child is still limited, whereby most studies focusing on the weight status of the child.

Malaysia shows an increasing trend of obesity among children below 18 years old, from 11.9% to 14.8% in four years (2015-2019) (8, 9). Worryingly, the incidence of underweight and stunting were also reported high among children in Malaysia (9). Having the problem of obesity and underweight at the same time can be seen as a double burden to this country. Inappropriate eating behaviour is suggested to highly influence the nutritional status and growth among children (10).

Children with picky eating behaviour were identified as at risk of nutritional deficit, however, the association between picky eating and nutritional status is conflicting (11). To our knowledge, no study reported the association of picky eating and nutritional status among preschools in Malaysia. Hence, this study aims to identify the prevalence of picky eater, their nutritional status, and its association among pre-schoolers.

## MATERIALS AND METHODS

A cross-sectional study was conducted among preschool children aged five to six years old in Kuala Selangor. Kuala Selangor is a rural district located in Selangor, Malaysia. With land area of 119,452.46 hectares, the district has a population of 161,168 (12). 56 government preschools in the district were identified and five of them were selected via convenience sampling.

Sample size was calculated by using Raosoft software, with a 95% confidence level and 5% margin of error, the recommended sample size is 178 subjects. An additional 20% was added to the recommended sample size to accommodate any missing data making the sample size for this study to be 214 children. Those children with genetic disorder such as Down syndrome of known allergy to certain food or medical conditions such as celiac disease or practising vegetarian diet were excluded. Parents of eligible children were contacted, briefed about the study and were asked to sign the consent form if agree to participate.

The data collection commenced in August 2020 and the questionnaire was prepared in both Malay and English language and was administered online through email and social media. The questionnaire consisted of the child's background and validated Children's Eating Behavior Questionnaire (CEBQ).

The CEBQ is a validated tool, to measure the level of children's pickiness on eating (13). CEBQ has been validated among Malaysian children and the subscales showed good internal consistency and has also been used extensively (10). Parents need to rate their children's eating behaviour on a 5-point Likert scale (1 = never; 5 = always). It consists of eight subscales which represent eight types of eating behaviours. CEBQ has a total of 35 items with three of the items are reversed items. Four of the subscales assess food approach behaviours which are food responsiveness, enjoyment of food, emotional overeating, and desire to drink. The other four subscales assess food avoidance which are satiety responsiveness, slowness in eating, emotional undereating, and food fussiness. For identifying the prevalence of picky eater, the mean total score of 'Food Fussiness' subscale was analysed to identify the children's eating behaviour using Steinsbekk's cut-off to identify the prevalence of picky eating among the children. Those with mean total score of  $\geq 3.0$  were categorised as picky eaters while those with mean total score of  $< 3.0$  were categorised as non-picky eaters (14). The subscale was also used to identify the association between picky eating behaviour and nutritional status. The remaining subscales will be used to identify the characteristics of picky eaters and non-picky eaters.

Data on children's weight and height were self-reported. Parents were encouraged to measure their child's weight

and height or report the latest measurement. Body Mass Index (BMI) was computed by dividing weight (kg) by the square of height (m). It was then categorised according to the z-score by using WHO AnthroPlus; a software from World Health Organization (WHO) that is based on WHO Growth Chart 2007. Data on the date of birth, height and weight of the children were keyed into the software for this purpose.

Statistical analyses were performed using IBM SPSS version 25.0. Descriptive analysis was performed to analyse children and the parents' details. All descriptive data were reported as frequency (percentage) while all continuous data were presented as mean  $\pm$  standard deviation (SD). Independent sample T-tests was used to identify the difference between picky eaters and non-picky eaters. Chi-square test and Fischer's exact test were used to determine the association of picky eating behaviour with weight, height, and BMI. The value of  $p < 0.05$  was established as statistically significant.

All parents gave their informed consent for inclusion before they participated in the study. The study was conducted in accordance with the Declaration of Helsinki, and ethical approval was obtained from the Research Ethical Committee, Universiti Teknologi MARA (Ref. No. REC/03/2021 (UG/MR/1336)).

## RESULTS

A total of 192 children had participated in this study, which met the minimum sample size required (Table I). The response rate for this study was 89.7%, which calculated from the 214 questionnaires distributed via email. However, the exact response rate based on advertisement via social media is unsure. The mean age of children was  $5.98 \pm 0.42$  years. About two-thirds of the participants were girls (67.7%), and majority of the participants were Malay (94.3%). The mean age of the parents was  $35.8 \pm 4.1$  years, and more than half of the parents were working (57.8%) while the rest were either self-employed or not working (22.4% and 19.8% respectively). B40 category was the highest for the household income followed by M40 and T20 (62.0%, 29.7% and 8.3% respectively) (15).

As shown in Table II, 31.8% of the preschool children were classified as picky eaters by using Steinsbekk's cut-off; those with mean total score of  $\geq 3.0$  were classified as picky eaters. The average weight, height and BMI of the preschool children were  $17.13 \pm 1.45$  kg,  $106.32 \pm 2.66$  cm and  $15.25 \pm 1.59$  kg/m<sup>2</sup> respectively. The average z-score of weight-for-age, height-for-age and BMI-for-age of the preschool children were -0.22, -0.29 and 0.02, respectively. On average, the study sample had normal weight-for-age z-score (WAZ), height-for-age z-score (HAZ) and BMI-for-age z-score (BAZ). From the z-score classification, 75.4% ( $n = 46$ ) of picky eaters and 65.3% ( $n = 79$ ) of non-picky eaters have normal

**Table I:** Background profile of children, N=192

Variables	n	%	Mean ± SD
<b>Age</b>			5.98 ± 0.42
5 years old	88	45.8	
6 years old	104	54.2	
<b>Gender</b>			
Boy	62	32.3	
Girl	130	67.7	
<b>Race</b>			
Malay	181	94.3	
Non-Malay	11	5.7	
<b>Age of parents</b>			35.8 ± 4.1
≤ 30 years old	97	50.5	
> 30 years old	95	49.5	
<b>Number of children</b>			
One child	46	24.0	
>One child	146	76.0	
<b>Level of education</b>			
No formal education	3	1.6	
Primary school	7	3.6	
Secondary school	129	67.2	
College/University	53	27.6	
<b>Occupation</b>			
Working	111	57.8	
Self-employed	43	22.4	
Not working	38	19.8	
<b>Household income</b>			
B40 (<RM4,360)	119	62.0	
M40 (RM4,360 – RM9,619)	57	29.7	
T20 (>RM9,619)	16	8.3	

**Table II:** Prevalence of picky eater, N=192

Items	n	%
Picky eater	61	31.8
Non-picky eater	131	68.2

weight-for-age. 89.8% (n = 53) of picky eaters and 90.0% (n = 108) of non-picky eaters were shown to have normal height-for-age. Besides that, 83.1% (n = 49) picky eaters and 66.7% (n = 80) of non-picky eater had normal BMI-for-age. Table III shows that picky eaters had significantly (p<0.01) lower weight, height and BMI than non-picky eaters.

From Table IV, it is shown that picky eaters had significantly lower mean score for food responsiveness (p<0.001), enjoyment of food (p<0.001) and emotional overeating (p<<0.001) than non-picky eaters. For food avoidance, picky eater had significantly higher mean score for food fussiness (p<0.001) and slowness in eating (p <0.001) than non-picky eater.

Table V showed that picky eating behaviour has significant association (p<0.05) with weight-for-age z-score, height-for-age z-score and BMI-for-age z-score.

**Table III:** Mean difference of nutritional status of picky eaters and non-picky eaters

Items	Picky eater Mean (SD)	Non-picky eater Mean (SD)	p-value <sup>a</sup>
Weight (n = 182) <sup>b</sup>	16.56 (1.33)	17.80 (1.02)	0.006**
Weight-for-age z-score (n = 182) <sup>b</sup>	-0.35 (0.96)	0.22 (0.87)	0.004**
Height (n = 179) <sup>b</sup>	104.71 (2.56)	110.66 (2.01)	0.002**
Height-for-age z-score (n = 179) <sup>b</sup>	-0.43 (0.48)	0.19 (0.37)	0.002**
BMI (n = 179) <sup>b</sup>	14.87 (1.58)	16.78 (1.44)	< 0.001**
BMI-for-age z-score (n = 179) <sup>b</sup>	-0.17 (0.34)	0.20 (0.27)	< 0.001**

<sup>a</sup> Independent samples T-test

<sup>b</sup> Due to missing data, total "n" does not always adds up to total responses of 192.

\*\* significant value (p<0.05)

**Table IV:** Mean difference of Child Eating Behaviour Questionnaire (CEBQ) subscales between picky eaters and non-picky eaters.

Items	Picky eater (n = 61) Mean (SD)	Non-picky eater (n = 131) Mean (SD)	p-value <sup>a</sup>
<b>Food approach</b>			
Food responsiveness	2.34 (0.16)	3.28 (0.22)	< 0.001*
Enjoyment of food	2.89 (0.20)	4.13 (0.35)	0.001*
Emotional overeating	1.55 (0.36)	2.76 (0.19)	< 0.001*
Desire to drink	2.25 (0.51)	3.54 (0.40)	0.349
<b>Food avoidance</b>			
Food fussiness	3.26 (0.31)	2.26 (0.46)	0.02*
Satiety responsiveness	3.58 (0.23)	2.80 (0.18)	0.071
Slowness in eating	3.10 (0.12)	2.63 (0.28)	< 0.001*
Emotional undereating	3.15 (0.12)	3.03 (0.20)	0.137

<sup>a</sup> Independent samples T-test

\*significant value (p<0.05)

**Table V** Association of picky eating behaviour and nutritional status

Items	Picky eater n (%)	Non-picky eater n (%)	p-value
Weight-for-age z-score (n = 182) <sup>c</sup>			0.033 <sup>a*</sup>
Severely underweight / underweight	11 (18.0)	18 (14.9)	
Normal	46 (75.4)	79 (65.3)	
Overweight / obese	4 (6.6)	24 (19.8)	
Height-for-age z-score (n = 179) <sup>c</sup>			0.049 <sup>b*</sup>
Severely stunted / stunted	6 (10.2)	9 (7.5)	
Normal	53 (89.8)	108 (90.0)	
Tall / very tall	0 (0)	3 (2.5)	
BMI-for-age z-score (n = 179) <sup>c</sup>			0.026 <sup>a*</sup>
Severely wasted / wasted	8 (13.6)	11 (9.2)	
Normal	49 (83.1)	80 (66.7)	
Overweight / obese	2 (3.4)	29 (24.2)	

<sup>a</sup> Chi-square test

<sup>b</sup> Fisher's exact test

<sup>c</sup> Due to missing data, total "n" does not always adds up to total responses of 192.

\*significant value (p<0.05)

It can be seen from Table III that more picky eaters were underweight/stunted/wasted while more non-picky eaters were overweight/obese.

## DISCUSSION

This present study provides an overview of picky eating behaviour among children aged five and six years old.

This study also provides insight regarding the association of the behaviour and the nutritional status of the children.

Picky eating behaviour was defined variably. Some studies used single question for the parents to determine whether the child is a picky eater or not (16, 17, 18). In contrast, our study used six items from the food fussiness subscale in CEBQ to identify picky eaters which resulted to the prevalence of 31.8%. With the use of CEBQ, our study has set up a standard criterion in identifying picky eater children as the prevalence has yet to be identified in Malaysia. Picky eating behaviour has been considered as a complex behaviour (7). However, the accurate definition, assessment and standardised method to identify picky eating behaviour is not yet established. Therefore, the prevalence found in other studies is largely varied from 9% up to 59.3% (11).

There is no consistent relationship between picky eating behaviour and nutritional status of preschool children (11). In our study, we found that picky eaters mostly had normal weight, height, and BMI. However, it was revealed that picky eaters significantly had lower weight, height and BMI when compared to non-picky eaters. Similar findings were observed in previous studies (6, 19, 20, 21, 22, 23). This suggests that picky eaters are at risk of being underweight (24). Studies also found that picky eaters consumed lower calories than non-picky eaters (25, 26). As eating a variety and balance food is essential for growth and health, being picky and inadequately consuming variety of foods may potentially risk child's growth.

Our study is one of the few studies that had employed the subscales in CEBQ to identify the characteristics of picky eaters. In the food approach subscales, picky eaters were presented with lower degree of food responsiveness, enjoyment of food and emotional overeating than non-picky eaters. In the food avoidance subscales, picky eaters appeared to have lack of interest in eating because they had higher degree of food fussiness and slowness in eating than non-picky eater. Children with fussy eating behaviour are characterized by low enjoyment of food and food responsiveness in combination with high food fussiness and slowness in eating (19). Picky eaters also showed to have lower food responsiveness (27). Nonetheless, there is scarce evidence that indicates picky eaters displayed lower emotional overeating. The said characteristics give a more in-depth in term of eating behaviour of picky eaters. From our results, it can be said that picky eaters not only displayed one behaviour (picky eating), but they had a combination of different eating behaviours.

Worryingly, our study found higher incidence of overweight among non-picky eaters. We observed that those non-picky eaters scored higher in the food approach (pro food) scales compared to picky eaters. Similar to numerous other studies (28, 29, 30), our study

shows that overweight children are highly responsive to environmental food cues, more emotional eating, and enjoyment of food. Possibly, those non-picky eater experiences increased appetite, thus increased their calorie intake compared to picky eaters. Other than that, a previous study also suggests that emotional eating among children may increase the risk of weight gain (31). Thus, our finding supports earlier studies which concludes that children with picky eating habits were less likely to be overweight (20, 22).

This present study had several limitations. The findings of our study is not generalizable as the sample were only from a single geographical area. The findings is limited to the population of our study if it were to be generalized. With the lack of a standardized method for assessing picky eating behaviour, the results do not necessarily mirror the actual behaviour of the children. However, our study has tried to overcome this limitation by using one of the most comprehensive questionnaires that existed which CEBQ (20). Next, causal inferences cannot be allowed as our study was a cross-sectional study. Furthermore, our study relied on self-reported height and weight of preschool children. Overestimation and underestimation were possible to occur. The self-reported anthropometric measurements were also probably misreported and might not be accurate.

## CONCLUSION

Our study revealed high prevalence of picky eating among pre-schoolers. The picky eaters are more likely to be in underweight category as compared to non-picky eaters. Thus, we suggest a cohort study to investigate the cause and effect of such behaviour. It is also crucial to establish a positive eating environment and proper dietary interventions for the better growth of our children.

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