

# Vegetable Preferences among Preschoolers in Kuantan, Pahang

Nursyafiqah Shaharudin<sup>1</sup>, Pramitha Sari<sup>2</sup>, Nurul Hazirah Jaafar<sup>1,3,\*</sup>

<sup>1</sup>Department of Nutrition Sciences, Kulliyah of Allied Health Sciences, International Islamic University Malaysia, Pahang, Malaysia

<sup>2</sup>Department of Nutrition, Faculty of Health Sciences, Universitas Alma Ata, Yogyakarta, Indonesia

<sup>3</sup>Children Health and Wellbeing Research Group, Kulliyah of Allied Health Sciences, International Islamic University Malaysia, Pahang, Malaysia

## ABSTRACT

**Background:** Vegetable intake among Malaysian children remains insufficient, despite its role in supporting healthy growth. While previous studies have explored overall vegetable intake and contributing factors, limited research has specifically focused on children's vegetable preferences and their association with parental feeding practices. Therefore, this study aimed to identify the vegetables preferred by preschoolers, assess common parental feeding practices, and examine the relationship between these practices and children's preferences. **Methods:** A total of 44 caregiver-child pairs were recruited through convenience sampling. Children aged 4 to 6 years and their primary caregivers were included, with those having medical conditions affecting diet excluded. Data were collected using validated questionnaires, including the Comprehensive Feeding Practices Questionnaire (CFPQ) and visual-based vegetable preference assessment. Data were analysed using descriptive statistics to summarise vegetable preferences and parental feeding practices, and Pearson's correlation to assess the relationship between them. **Results:** A total of 44 caregiver-child pairs participated in the study. Carrot, broccoli, and tomato were the most preferred vegetables, while mustard leaf, capsicum, and lady's finger were the least liked. The most common feeding practices reported were "restriction for weight control," "modelling," and "monitoring." A significant negative correlation was observed between the "child control" subscale and vegetable preferences ( $r = -0.300$ ,  $n = 44$ ,  $p = 0.048$ ), while a significant positive correlation was found with "encourage balance and variety" ( $r = 0.314$ ,  $n = 44$ ,  $p = 0.038$ ). **Conclusion:** Specific parental feeding practices, especially those that are supportive and involve structured feeding strategies, particularly those promoting balance and variety, are essential for fostering vegetable acceptance and healthier dietary habits from an early age.

## Keywords:

vegetable preferences; parental feeding practices; preschoolers; children; Malaysia

## INTRODUCTION

According to the Southeast Asian Nutrition Surveys, vegetable intake among Malaysian children remains below recommended levels, with an average consumption of only 1.07 servings per day, which is considerably lower than the two servings advised in the Malaysian Dietary Guidelines (Chong et al., 2017). Early childhood is a critical period for establishing lifelong eating habits, yet vegetables, despite their richness in vitamins, minerals, and dietary fibre, are often the least accepted food group among young children. Low intake during this formative stage may have long-term implications for diet quality and overall health (Tarro et al., 2022).

Previous studies have shown that children tend to prefer sweeter and milder-tasting vegetables, such as carrots and corn, while bitter-tasting and dark green varieties are less favoured (Cox et al., 2021; Sha An Ali et al., 2020). These preferences are influenced by multiple factors, including sensory properties and familiarity, frequency of exposure, parental influence, as well as cognitive developmental aspects (Estay & Escalona, 2025; Kähkönen, et. al., 2021). As each vegetable contributes distinct micronutrients, limited variety in consumption may result in nutritional gaps, underscoring the need to understand which vegetables are more readily accepted by children.

In shaping children's dietary preferences, positive feeding practices such as modelling healthy eating and maintaining a structured meal environment have been linked to healthier eating habits (Wood et al., 2020). Conversely, excessive child control over food choices or the use of coercive feeding strategies may reduce willingness to try vegetables. International evidence, particularly from

\* Corresponding author.

E-mail address: hazirahjaafar@iium.edu.my

Western contexts, also indicates that early and repeated exposure, including during breastfeeding and complementary feeding, can enhance acceptance.

Despite this evidence, research in Malaysia examining vegetable preferences among preschoolers and their association with parental feeding practices is limited. Cultural norms, local dietary patterns, and parenting approaches may influence both the vegetables to which children are exposed and the feeding strategies employed by caregivers. Without context-specific evidence, it is challenging to develop effective and culturally appropriate interventions to improve vegetable consumption in young children.

Therefore, this study aimed to determine the vegetables most preferred by preschoolers in Kuantan, assess common parental feeding practices, and examine the relationship between these practices and children's vegetable preferences. The findings are expected to provide valuable insights for caregivers, educators, and policymakers in designing strategies that foster greater acceptance of vegetables and support the establishment of healthy eating habits from an early age.

## **MATERIALS AND METHODS**

### **Participants**

A cross-sectional study was conducted among caregivers and their preschool children aged 4 to 6 years enrolled at IIUM Educare, Kuantan. Recruitment was carried out using convenience sampling, whereby all eligible caregiver-child pairs were invited to participate. Children with serious medical conditions that could affect feeding behaviours or food preferences, including diabetes, cystic fibrosis, cancer, food allergies, and autism spectrum disorder, were excluded.

### **Comprehensive Feeding Practices Questionnaire**

Parental feeding practices were assessed using the validated Malay version of the Comprehensive Feeding Practices Questionnaire (CFPQ) by Shohaimi et al. (2014), which contains 39 items across 12 subscales (Cronbach's alpha = 0.56 to 0.86). Caregivers responded using a five-point scale, with higher scores indicating greater use of the respective feeding practice. Mean scores were calculated for each subscale to compare the prevalence of different practices.

### **Vegetable Preferences Questionnaire**

Children's vegetable preferences were assessed using the adapted questionnaire by Sha An Ali et al. (2020), originally developed by Hanbazaza et al. (2015). The tool consisted of 15 images of locally available vegetables, and children indicated their preference for each item using a binary response ('1 = yes' and '0 = no'). The total 'yes' responses were summed to obtain a vegetable preference score (maximum = 15), with higher scores indicating a broader preference. This tool demonstrated strong internal consistency (Cronbach's alpha = 0.926) and was suitable for use in a care centre setting.

### **Statistical Analysis**

A descriptive analysis was performed to outline participants' characteristics, vegetable preference data, and parental feeding practices. Pearson's correlation test was employed to assess the relationship between parental feeding practices and vegetable preferences. Statistical significance was set at  $p < 0.05$ , and all analyses were conducted using the Statistical Package for the Social Sciences (SPSS) version 26.0.

### **Ethical Approval**

This study received ethical approval from the International Islamic University Malaysia Research Ethics Committee (IREC) (IIUM/504/14/11/2/IREC 2025-KAHS/DNS).

## **RESULTS**

### **Characteristics of Participants**

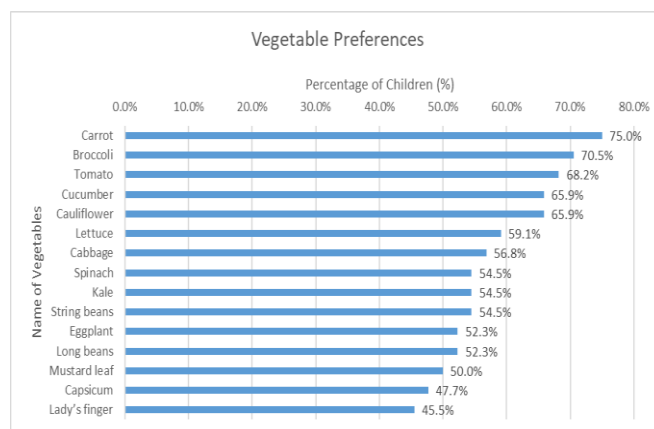
In Table 1, 44 caregiver-child pairs participated in the study. Most caregivers were aged between 30 and 39 years (61.4%) and were mothers (79.5%). All respondents were Malay (100%), with the majority holding a degree or higher qualification (72.7%), employed full-time (93.2%), and earning RM10,000 or more per month (29.5%). Most caregivers breastfed their children for six months or longer (61.4%) and introduced solid foods after six months of age (79.5%). The mean age of the children was 4.6 years ( $SD \pm 0.8$ ), with 54.5% being girls.

**Table 1.** Sociodemographic characteristics of participants (N=44)

Characteristics	Mean (SD)	n (%)
<b>Caregiver characteristics</b>		
<b>Age (years)</b>	37.2 ( $\pm 4.7$ )	
21 - 29		2 (4.5%)
30 - 39		27 (61.4%)
40 - 49		14 (31.8%)
50 - 59		1 (2.3%)
<b>Gender</b>		
Male		9 (20.5%)
Female		35 (79.5%)
<b>Race</b>		44 (100%)
Malay		
<b>Relationship status</b>		
Mother		
Father		35 (79.5%) 9 (20.5%)
<b>Educational level</b>		
Degree/Master/PhD		32 (72.7%)
Diploma		10 (22.7%)
SPM		2 (4.5%)
<b>Employment status</b>		
Employed		41 (93.2%)
Self-employed		1 (2.3%)
Not working		2 (4.5%)
<b>Household income</b>	10,519.51 ( $\pm 6,768.87$ )	
$\leq$ RM 1,000		0
RM 1,001 - RM 2,500		0
RM 2,501 - RM 5,000		11 (25.0%)
RM 5,001 - RM 7,500		7 (15.9%)
RM 7,501 - RM 10,000		10 (22.7%)
$\geq$ RM 10,000		13 (29.5%)
*missing		3 (6.8%)
<b>Breastfeeding duration (months)</b>		
Never		2 (4.5%)
< 1		3 (6.8%)
1 to < 3		6 (13.6%)
3 to < 6		6 (13.6%)
$\geq 6$		27 (61.4%)
<b>Age of introduction to solid food (months)</b>		
4 to 6		9 (20.5%)
> 6		35 (79.5%)
<b>Children characteristics</b>		
<b>Age (years)</b>	4.7 ( $\pm 0.8$ )	
4		23 (52.3%)
5		12 (27.3%)
6		9 (20.5%)
<b>Gender</b>		
Boy		20 (45.5%)
Girl		24 (54.5%)

## Preferences of Vegetables among Children

The mean total score for overall vegetable preferences was 8.73 (SD  $\pm$  6.04), indicating that children, on average, liked slightly more than half of the vegetables listed. As shown in Figure 1, carrot, broccoli, and tomato were the most preferred, each liked by more than two-thirds of participants, while capsicum and lady's finger were the least preferred, with fewer than half of the children indicating a preference.



**Figure 1.** Percentage of vegetable preferences among children (N=44)

## Parental Feeding Practices

As shown in Table 2, the highest mean score was recorded for restriction for weight control (19.59  $\pm$  5.95), followed by modelling (16.11  $\pm$  3.15) and monitoring (15.89  $\pm$  3.09). The lowest mean scores were observed for teaching about nutrition (7.77  $\pm$  1.94), food as a reward (6.86  $\pm$  1.42), and emotional regulation (6.16  $\pm$  2.32).

**Table 2.** Parental feeding practices of caregivers (N=44)

Parental feeding practices (maximum score)	Mean (SD)
Child control (20)	10.73 ( $\pm 2.25$ )
Emotion regulation (15)	6.16 ( $\pm 2.32$ )
Encouragement of balance and variety (15)	12.86 ( $\pm 1.75$ )
Environment (10)	8.39 ( $\pm 1.43$ )
Food as reward (10)	6.86 ( $\pm 1.42$ )
Involvement (15)	12.14 ( $\pm 2.29$ )
Modelling (20)	16.11 ( $\pm 3.15$ )
Monitoring (20)	15.89 ( $\pm 3.09$ )
Pressure (15)	9.66 ( $\pm 2.23$ )
Restriction for health (10)	8.05 ( $\pm 2.18$ )
Restriction for weight control (35)	19.59 ( $\pm 5.95$ )
Teaching about nutrition (10)	7.77 ( $\pm 1.94$ )

## Association Between Parental Feeding Practices and Children's Vegetable Preferences

As shown in Table 3, only two parental feeding practice subscales were significantly associated with vegetable preferences. Child control showed a negative correlation with total vegetable preferences ( $r = -0.300$ ,  $n = 44$ ,  $p = 0.048$ ), whereas encouragement of balance and variety showed a positive correlation ( $r = 0.314$ ,  $n = 44$ ,  $p = 0.038$ ).

**Table 3:** Association between subscales of parental feeding practices and vegetable preferences (N=44)

Parental feeding practices subscales	Vegetable preferences ( $r$ )	$p$ -value
Child control	-0.300	0.048*
Emotion regulation	-0.234	0.127
Encouragement of balance and variety	+0.314	0.038*
Environment	-0.041	0.790
Food as reward	-0.072	0.642
Involvement	-0.135	0.382
Modelling	+0.010	0.948
Monitoring	+0.077	0.620
Pressure	-0.193	0.208
Restriction for health	-0.036	0.816
Restriction for weight control	+0.075	0.628
Teaching about nutrition	-0.257	0.092

Note:  $r$  = correlation coefficient; \* $p < 0.05$  indicates statistical significance.

## DISCUSSION

This study found that preschoolers in Kuantan had a moderate level of vegetable preference, with carrots, broccoli, and tomatoes as the most liked, while lady's finger, capsicum, and mustard leaf were the least preferred. Similar patterns were observed in Sha An Ali et al. (2020), suggesting that certain vegetables remain consistently appealing from early to middle childhood. Early and repeated exposure, particularly during complementary feeding, may explain the preference for carrots and broccoli, as such practices are known to shape children's taste development (Nekitsing & Hetherington, 2022). Interestingly, visual appeal alone did not predict preference, as brightly coloured capsicum was less liked, indicating that taste familiarity, texture, and parental influence may play a stronger role (Nekitsing et al., 2018; Yang et al., 2022).

Among the 12 parental feeding practices assessed, restriction for weight control recorded the highest mean score, possibly reflecting heightened caregiver concern about rising childhood obesity rates in Malaysia (Chua et al., 2024). While restriction may be intended to promote healthy eating, excessive control can reduce willingness to

try vegetables (Mahmood et al., 2021). Conversely, modelling and monitoring, which were also common, are considered more effective strategies for improving diet quality, as children often emulate parents' eating behaviours and benefit from repeated exposure to vegetables (Vaughn et al., 2018). Practices such as teaching about nutrition, using food as a reward, and emotional regulation through feeding were less common in this study. The limited use of food as a reward and feeding for emotional regulation can be beneficial in the context of vegetables as coercive strategies are associated with negative dietary behaviours such as increased preference for sugar-rich foods and emotional overeating. (Jansen et al., 2020).

Significant correlations were observed for two feeding practices. Child control was negatively associated with vegetable preferences, aligning with findings that parent-centered feeding practices, including pressure and verbal directives, are associated with reduced vegetable intake (Kristiansen et al., 2017). In contrast, encouragement of balance and variety showed a positive association, reflecting the benefits of authoritative feeding, which combines structure with responsiveness and has been linked to healthier body mass index and dietary intake in children (Shloim et al., 2015). These results emphasise the importance of balanced, supportive guidance over either excessive control or complete autonomy.

The strengths of the current study include its focus on vegetable preferences, a less frequently explored but critical factor in establishing lifelong healthy eating habits, and its examination of parental feeding practices in a specific care centre setting. However, the findings are limited by the small sample size, potential bias from a low response rate, and the use of raw vegetable images, which may not reflect children's preferences for cooked forms. Additionally, the adapted preference tool, though validated for older children, may have been influenced by the developmental stage of the younger participants. The absence of parents during interviews may also have affected responses.

## CONCLUSION

This study found that carrots, broccoli, and tomatoes were the most preferred vegetables among preschool children, reflecting common trends in early childhood food choices and providing insight into vegetables that are more readily accepted in care centre settings. Restriction for weight control emerged as the most frequently applied parental feeding practice, followed by modelling and monitoring, whereas teaching about nutrition, offering food as a reward, and using food for emotional regulation were the

least common. The significant associations observed between child control, encouragement of balance and variety, and children's vegetable preferences underscore the important role of parents in shaping eating behaviours. These findings suggest that supportive and structured feeding strategies, particularly those promoting balance and variety, are essential for fostering vegetable acceptance and healthier dietary habits from an early age.

## ACKNOWLEDGEMENT

This research was not funded by any grant.

## REFERENCES

- Chong, K., Lee, S., Ng, S., Khouw, I., & Poh, B. (2017). Fruit and Vegetable Intake Patterns and Their Associations with Sociodemographic Characteristics, Anthropometric Status and Nutrient Intake Profiles among Malaysian Children Aged 1–6 Years. *Nutrients*, 9(8), 723. <https://doi.org/10.3390/nu9080723>
- Chua, K. Y., Chua, K. Y., Chinna, K., Lim, C. L., & Seneviwickrama, M. (2024). Prevalence of childhood overweight and obesity in Malaysia: a systematic review and meta-analysis. *Clinical and Experimental Pediatrics*, 10.3345/cep.2024.00899. <https://doi.org/10.3345/cep.2024.00899>
- Cox, D. N., Baird, D. L., Rebuli, M. A., Hendrie, G. A., & Poelman, A. A. (2021). Sensory characteristics of vegetables consumed by Australian children. *Public Health Nutrition*, 25(5), 1205–1216. <https://doi.org/10.1017/s1368980021000847>
- Estay, K., & Escalona, V. (2025). Raw or Cooked? Exploring Vegetable Acceptance Among Chilean Children from Different Socioeconomic Backgrounds. *Foods*, 14. <https://doi.org/10.3390/foods14071133>
- Hanbazaza, M. A., Triador, L., Ball, G. D. C., Farmer, A., Maximova, K., Alexander First Nation, & Willows, N. D. (2015). The Impact of School Gardening on Cree Children's Knowledge and Attitudes toward Vegetables and Fruit. *Canadian Journal of Dietetic Practice and Research*, 76(3), 133–139. <https://doi.org/10.3148/cjdpr-2015-007>
- Kähkönen, K., Sandell, M., Rönkä, A., Hujo, M., & Nuutinen, O. (2021). Children's Fruit and Vegetable Preferences Are Associated with Their Mothers' and Fathers' Preferences. *Foods*, 10. <https://doi.org/10.3390/foods10020261>
- Kristiansen, A., Bjelland, M., Himberg-Sundet, A., Lien, N., & Andersen, L. (2017). Associations between sociocultural home environmental factors and vegetable consumption among Norwegian 3–5-year olds: BRA-study. *Appetite*, 117, 310–320. <https://doi.org/10.1016/j.appet.2017.06.031>
- Jansen, P. W., Derks, I. P. M., Mou, Y., Rijen, E. H. M., Gaillard, R., Micali, N., Voortman, T., & Hillegers, M. H. J. (2020). Associations of parents' use of food as reward with children's eating behaviour and BMI in a population-based cohort. *Pediatric Obesity*, 15(11). <https://doi.org/10.1111/ijpo.12662>
- Langer, S. L., Seburg, E., JaKa, M. M., Sherwood, N. E., & Levy, R. L. (2017). Predicting dietary intake among children classified as overweight or at risk for overweight: Independent and interactive effects of parenting practices and styles. *Appetite*, 110, 72–79. <https://doi.org/10.1016/j.appet.2016.12.011>
- Mahmood, L., Flores-Barrantes, P., Moreno, L. A., Manios, Y., & Gonzalez-Gil, E. M. (2021). The Influence of Parental Dietary Behaviors and Practices on Children's Eating Habits. *Nutrients*, 13(4). <https://doi.org/10.3390/nu13041138>
- Nekitsing, C., & Hetherington, M. M. (2022). Implementing a "Vegetables First" Approach to Complementary Feeding. *Current Nutrition Reports*, 11(2), 301–310. <https://doi.org/10.1007/s13668-022-00399-z>
- Nekitsing, C., Hetherington, M. M., & Blundell-Birtill, P. (2018). Developing Healthy Food Preferences in Preschool Children Through Taste Exposure, Sensory Learning, and Nutrition Education. *Current Obesity Reports*, 7(1), 60–67. <https://doi.org/10.1007/s13679-018-0297-8>
- Sha An Ali, M., Mohd Nazir, N. A., & Abdul Manaf, Z. (2020). Preference, Attitude, Recognition and Knowledge of Fruits and Vegetables Intake Among Malay Children. *Malaysian Journal of Medical Sciences*, 27(2), 101–111. <https://doi.org/10.21315/mjms2020.27.2.11>
- Shloim, N., Edelson, L. R., Martin, N., & Hetherington, M. M. (2015). Parenting Styles, Feeding Styles, Feeding Practices, and Weight Status in 4–12 Year-Old Children: A Systematic Review of the Literature. *Frontiers in Psychology*, 6(6). <https://doi.org/10.3389/fpsyg.2015.01849>
- Shohaimi, S., Yoke Wei, W., & Mohd Shariff, Z. (2014). Confirmatory Factor Analysis of the Malay Version Comprehensive Feeding Practices Questionnaire

- Tested among Mothers of Primary School Children in Malaysia. *The Scientific World Journal*, 2014, 1–11. <https://doi.org/10.1155/2014/676174>
- Tarro, S., Lahdenperä, M., Vahtera, J., Pentti, J., & Lagström, H. (2022). Diet quality in preschool children and associations with individual eating behavior and neighborhood socioeconomic disadvantage. The STEPS Study. *Appetite*, 172, 105950. <https://doi.org/10.1016/j.appet.2022.105950>
- Vaughn, A. E., Martin, C. L., & Ward, D. S. (2018). What matters most - what parents model or what parents eat? *Appetite*, 126, 102–107. <https://doi.org/10.1016/j.appet.2018.03.025>
- Wood, A. C., Blissett, J. M., Brunstrom, J. M., et al. (2020). Caregiver influences on eating behaviors in young children: A scientific statement from the American Heart Association. *Journal of the American Heart Association*, 9(10), e014520. <https://doi.org/10.1161/JAHA.119.014520>
- Yang, W. Y., Ong, S. H., Lee, Y. D., Yen, P. L., Lim, K. Y., Naumovski, N., & Jani, R. (2022). Exploration of Malaysian school-children's food preferences: What do we know? *Journal of Tropical Pediatrics*, 68(5), fmac075. <https://doi.org/10.1093/tropej/fmac075>