ORIGINAL ARTICLE

Malaysian Mothers' Feeding Practices, Household Food Security and Picky Eating Behaviour: Lesson Learnt From Covid-19 Pandemic

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ABSTRACT

Introduction: Drastic changes in food access during the COVID-19 pandemic may impact families' feeding practices, and eating behaviour. This study aimed to determine the association between maternal feeding practices, household food security status, and children's picky eating among Malaysian mothers. **Methods:** A cross-sectional study was conducted virtually among 102 mothers with children aged from 5 to 12 years old (January-June 2022). Self-administered questionnaires on sociodemographic, feeding practices, household food security and child-picky eating behaviour were used. The statistical associations for key variables were analysed. **Results:** Most participants were Chinese mothers (87.3%) aged 30-39 years old (52.0%) with tertiary education (52.0%) and from middle to high household income (64.7%). Restriction domain had the highest median (interquartile range) score of 3.63 (1.00). A quarter of the household was experiencing food insecurity and about 34.3% of the children were classified as 'picky eaters'. A significant difference was found for restrictive feeding practices and household food security status (3.75 (0.97) versus 3.13 (1.19), p=0.022), while mothers of picky eaters were more likely to pressure their children to eat compared to non-picky eaters (3.75 (0.75) versus 3.25 (1.00), p=0.01). **Conclusion:** Despite food secure status during the pandemic, two food parenting approaches (restriction and pressure to eat) were significantly associated with the household food security status and children's picky eating behaviour. While the additional environmental stress from the COVID-19 pandemic could be transient, there should be consideration of the long-term impact of maternal feeding practices on the health and nutritional status of growing children.
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Keywords: COVID-19 pandemic, feeding practices, food security, picky eater, Malaysia

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INTRODUCTION

The COVID-19 pandemic has severely impacted the entire world population. The lockdown imposed affected the health, economic, and social life of most individuals (1). Drastic changes in food access during the COVID-19 pandemic may impair the coping mechanisms of individuals living together within the same household. In fact, families who faced issues accessing sufficient and nutritious food during the pandemic (2, 3) can lead to changes in family feeding practices (4). Thus, understanding the association between these factors is essential in ensuring the family's health and the children's growth and development (5-7).

It is well established that food security has been a significant concern before and during the COVID-19 pandemic globally affecting both developed and developing countries. While 750 million people (9.7%) worldwide were projected by the Food and Agriculture Organisation to experience severe food insecurity in 2019 (8), model-based simulations suggest that COVID-19 has increased food insecurity and poverty on a rapid and global scale (9). In 2021, in a systematic review of food insecurity in Malaysia on studies published between January 2000 and December 2020, the prevalence of household food insecurity was unexpectedly high among the Orang Asli, low-income household/welfare-recipient households, university students, and the elderly (3). Low socio-economic status and poverty have always been associated with food insecurity, which resulted not only in undernutrition but also overnutrition (10), however, results were mixed in the children population (11,12). Food-insecure households irrespective of mild or severe can have lasting implications on the children's diet quality and nutritional status, primarily due to poor dietary intake and low dietary diversity (13,14).

Parental feeding practice refers to the precise goal-oriented directives that parents use to feed their children

and define the ways they feed their children. Feeding is a dynamic and mutual process in which children's characters and behaviour impact how parents feed them, and conversely, the children's eating behaviour is affected by their parent's actions. Food insecurity can indirectly influence children through its effect on parenting (15). Previous research has demonstrated that when experiencing food insecurity with limited purchasing and provision, parents impose restrictive feeding practices due to challenges in providing varied and balanced meals to their children (15-19). Mothers facing limited food resources often employ coping strategies such as buying only familiar items so they would not risk wasting food, prioritising cheaper and less nutritious food options, or stretching meals to make the limited supplies last longer (15, 20). Moreover, evidence posits that food-insecure parents were more likely to exhibit depressive affect, and they would get frustrated with their children quickly and be less responsive to their needs (15, 16, 21). This then affects existing picky eaters as they will be resistant to trying new food which leads to further limiting their key nutrient intake yet consuming more non-nutritive sweet and savoury snacks (16,21). Taken together, changes in families' home food environments during COVID-19 can heighten specific parental feeding practices as compared to before the pandemic (16,21), which could lead to unfavourable dietary patterns such as increased sugar-sweetened beverages and fewer fruits and vegetables.

In the Malaysian setting with a strong Asian parenting culture, mothers are the primary caregivers in preparing, feeding, and providing based on children's food preferences and intake (22,23). Studies from Western countries have reported associations between picky eating and maternal feeding practices (24,25) however, there is a lack of data among Malaysian children in the context of food security, especially during the COVID-19 pandemic. Hence, findings from our study will provide important insight to enable effective strategies to address family food practices to promote the good nutrition status of Malaysian children irrespective of their environment. This study investigated the associations between maternal feeding practices, household food security status, and picky eating behaviour among Malaysian mothers of children aged from 5 to 12 years.

MATERIALS AND METHODS

Study design and sampling

This cross-sectional study was undertaken in Malaysia from January 2022 to June 2022. This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the Research and Ethics Committee of the International Medical University (BDN I-2021 (09)). A sample size of 153 participants was calculated based upon an expected correlation coefficient of 0.20, power of 80%, and $\alpha = 0.05$, and by accounting for the 20% dropout rate, a total of 184 participants was determined to be the final sample size (26). Recruitment of study participants was done through convenient sampling and the data was collected using online survey platforms. Announcements about the study were disseminated via social media, primary schools, kindergartens, and tuition centres. Mothers with children aged 5 to 12 years old who fulfilled the inclusion criteria and gave consent to participate in the study were enrolled while those with children living with disability and chronic diseases were excluded.

Sociodemographic background

The first section of the questionnaire was for participants to provide socio-demographic. Details include age, ethnicity, marital status, education level, household income level, household size, and employment status. The monthly household income was classified into three categories: B40 (<RM4850), M40 (RM4851 - RM10970), and T20 (> RM10,971) based on the national standards by the Department of Statistics (27).

Maternal feeding practices

The Child Feeding Questionnaire was developed and validated by Birch et al. (28), to measure maternal feeding practices, and it has been widely used in feeding practices studies in Malaysia (29,30). In the present study, three domains of food restriction, pressure to eat, and monitoring of food were used to assess parents' attitudes and practices regarding their use of controlling child feeding strategies (28). The domain on food restriction assessed the extent to which parents restrict their child's access to foods; the pressure to eat domain was used to assess parents' tendency to pressure their child to eat more food typically at mealtimes while monitoring food feeding practice was used to assess the extent to which parents oversee their child's eating. Each question was answered based on a five-point Likert scale, ranging from 'never' (=1) to 'always' (=5) or 'disagree' (=1) to 'agree' (=5) depending on the subscale. A higher score in each domain indicated a greater degree of control in feeding.

Household food security

The United States (US) Household Food Security Survey Module: Six-Item Short Form, which consists of 6 parameters, was used to measure food security status (31). It aimed to measure the perception of people experiencing food insecurity and the coping strategies adopted during the food insecurity measurements and had been previously used in two national surveys in Malaysia before the pandemic (32,33). The participants were given one mark for each 'Yes' they answered in the parameters. With a maximum score of 6, the food security status was then determined based on the scoring. With a score ≥ 2, the participants were categorised into the food insecure group. It was also used to determine the participant's food security status by assessing their experience with food insecurity over a

12-month reference period (31), which coincided with the ongoing COVID-19 pandemic.

Child eating behaviour

The 'Food Fussiness' subscale from the Child Eating Behaviour Questionnaire (CEBQ) was used to evaluate picky eating behaviour (34). This subscale included six items related to neophobia and general picky eating. The items were scored on a five-point Likert scale, from 'never' (=1) to 'always' (=5) while for the reversed item* the score will range from 'never' (=5) to 'always' (=1). If the average response score to each question was higher, it was assumed that the children have a potential picky eating character. For children with a mean score of responses more than 3, they were classified as 'picky eaters'.

Statistical analysis

Data were analysed using IBM SPSS Statistics version 28.0. The normality was evaluated using the Kolmogorov-Smirnov test. Descriptive statistics were performed for all the variables. Since most of the data were non-normally distributed, the Mann-Whitney test and Kruskal Wallis test were used to test the differences in sociodemographic, household food security status, and picky eating behaviour by maternal feeding practices. The data assumptions for regression analyses were checked and met. Subsequent explorations were conducted using regression analyses to predict the feeding practices which were found to be significant. All analyses were performed with a level of significance of $p<0.05$.

RESULTS

A total of 133 participants were screened for eligibility to participate in this study. The final sample size analysed was 102 participants as shown in Figure 1. Thirty-one participants were excluded due to various reasons.

In terms of the participant's sociodemographic characteristics (Table I), it was found that participants were mostly above 30 years old, and two-thirds were from the M40 and B40 categories. The children's ages ranged between 5 and 12 years old, with a mean age of 8.5 years old. Most of the participants were of Chinese ethnicity.

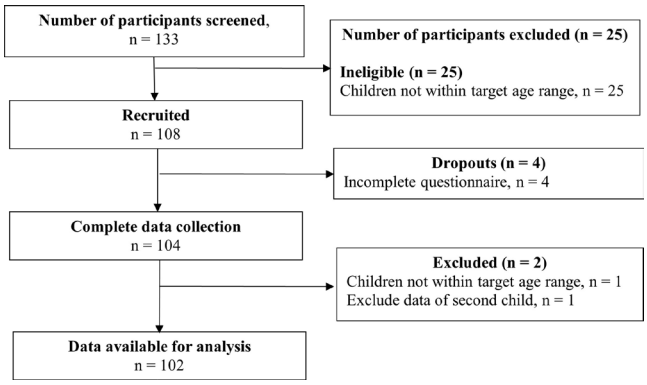


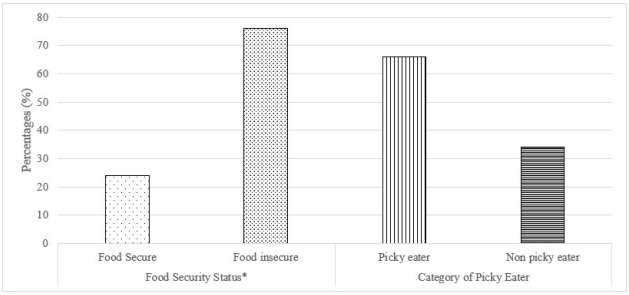
Figure 1: Flow chart of participants

Table I: Sociodemographic characteristics of mothers and children (n=102)

Participant Variables	Category	n(%)
Mother		
Age (years)	< 30	6(5.9%)
	30 – 39	53(52.0%)
	≥ 40	43(42.2%)
Ethnicity	Malay	9(8.8%)
	Chinese	89(87.3%)
	Others	4(3.9%)
Educational Level	Intermediate and below	49(48.0%)
	High	53(52.0%)
Marital Status	Married	96(94.1%)
	Others	6(5.9%)
Employment Status	Employed/ Self-employed	76(74.5%)
	Unemployed	26(25.5%)
Family Size	4 and below	43(42.2%)
	5 and above	59(57.8%)
Monthly household income	< RM2500	9(8.8%)
	RM2500 – RM4850	27(26.5%)
	RM4851 – RM10970	34(33.3%)
	> RM10970	32(31.4%)
Children		
Age (years)	5	16(15.7%)
	6	11(10.8%)
	7	13(12.7%)
	8	12(11.8%)
	9	12(11.8%)
	10	12(11.8%)
	11	7(6.9%)
	12	19(18.6%)
Gender	Female	48(47.1%)
	Male	54(52.9%)
Ethnicity	Malay	10(9.8%)
	Chinese	90(88.2%)
	Others	2(2.0%)

Among the three domains of feeding practices, food restriction had the highest score with a median score of 3.63(1.00) followed by the pressure to eat (3.50(1.00)). The monitoring of food domain had the lowest median score of 3.00(1.33) out of a total score of 5.0. It was found that about 23.5% of this study population experienced food insecurity while 34.3% of them were classified as 'picky eaters' (Fig. 2).

The median score for food restriction was significantly higher in the food-secured households compared to food-insecure households (Table II). Similarly, there is a significant difference between the child's gender in the food restriction domain with boys having higher restriction compared to girls (3.88 (1.00) versus 3.50 (0.97), $p=0.007$). Meanwhile, median scores for pressure to eat were significantly lower in non-picky eaters (3.25) as opposed to picky eaters (3.75). However, no significant difference exists between the monitoring domain with sociodemographic, household food security, and picky eating behaviour.



(*n = 100 households, n = 2 mothers did not provide data)

Figure 2: Status of Household Food Security and Picky Eating Behaviours

In Table III, the univariate regression results for food restriction and pressure to eat were shown. There was no significant prediction observed between pressure to eat with sociodemographic characteristics and food security status, except for being picky eaters. However, simple regression analyses indicated that gender, and household food security status were significant predictors of food restriction feeding practice. The subsequent multiple linear analysis indicated that staying in food-insecure households (β = -0.227, p=0.019) and being male (β = 0.300, p=0.002) explained 11.4% of the variation in restriction scores amongst Malaysian mothers during the COVID-19 pandemic.

DISCUSSION

In the present study, we show that in the background of the COVID-19 pandemic, two feeding practices were significantly related to food security and picky eating behaviour. The mothers were found to practice more food restrictions on their children. During the pandemic when there was movement control and shortage of food supply, the mothers might face challenges in accessing and getting a variety of food. The impact of the lockdowns led to limited access to food sources could have influenced maternal feeding practices, in contrast to earlier findings by Yang et al. (2018) on Malay mothers (35). In non-COVID-19 environments, mothers may have high concerns about their children's weight as childhood obesity has become a rising trend and a major public concern in Malaysia over the last decade based on the National Health and Morbidity Survey (34, 36).

In the Global Food Security Index (GFSI), the Economist Intelligence Unit has ranked Malaysia at 43 and 39 out of 113 countries in 2020 and 2021, respectively (37). GFSI is a tool that measures how well countries are doing in ensuring that people have enough safe and nutritious food to eat. The comparably high ranking alongside the COVID-19 pandemic over recent years (2020 to 2022) is in agreement with the data found in our study regardless of the model-based simulations suggesting higher percentages of global food insecurity (9), and the previously reported prevalence data among the five main Malaysian subpopulations (3). We reported that the proportion of the study population from household food secure (76%) was higher compared to household food insecure population (24%). The participants in this study were mainly from the urban area while the overall Malaysian population comprises both urban and rural settings that can affect the proportion of household income (38,39), and its food security status. Given the transient nature of food security, pockets of

Table II: Differences in maternal feeding practices by sociodemographic, household food security and picky eating behaviour

Variables	Food Restriction	p-value	Pressure to Eat	p-value	Monitoring	p-value
Education level						
Low and Intermediate	3.50 (1.00)	0.12	3.50 (0.88)	0.84	3.00 (1.33)	0.15
High	3.88 (1.00)		3.50 (1.00)		3.67 (1.17)	
Family size						
4 and below	3.75 (0.88)	0.09	3.50 (0.75)	0.87	3.33 (1.00)	0.13
5 and above	3.50 (1.00)		3.50 (1.00)		3.00 (1.67)	
Monthly household income						
B40	3.63 (1.09)	0.07	3.75 (0.94)	0.29	3.00 (1.25)	0.77
M40	3.88 (0.88)		3.50 (1.06)		3.00 (1.00)	
T20	3.50 (0.81)		3.50 (0.94)		4.00 (1.58)	
Marital Status						
Married	3.63 (1.00)	0.69	3.50 (1.00)	0.99	3.0 (1.33)	0.97
Divorced and Widow	3.75 (0.81)		3.63 (1.00)		3.5 (1.58)	
Employment Status						
Employed/Self-employed	3.63 (1.13)	0.57	3.50 (1.00)	0.60	3.0 (1.33)	0.30
Unemployed	3.81 (0.69)		3.75 (0.94)		3.67 (1.58)	
Child's gender						
Female	3.50 (0.97)	0.01*	3.50 (0.75)	0.50	3.00 (1.33)	0.44
Male	3.88 (1.00)		3.75 (1.06)		3.00 (1.42)	
Food Security Status						
Food secure	3.75 (0.97)	0.02*	3.50 (0.75)	0.57	3.33 (1.33)	0.11
Food insecure	3.13 (1.19)		3.50 (1.19)		3.00 (1.83)	
Category of Picky Eater						
Non-picky eaters	3.63 (1.13)	0.91	3.25 (1.00)	0.01*	4.00 (1.33)	0.83
Picky eaters	3.63 (0.88)		3.75 (0.75)		3.33 (1.33)	

Data reported as median ± interquartile range (IQR); *p-value<0.05, Tested using Mann-Whitney U or Kruskal-Wallis

Table III: Regression analyses for food restriction and pressure to eat

Variables	Food Restriction			Pressure to Eat		
	B	Regression Coefficients, β (95% confidence intervals)	p-value	B	Regression Coefficients, β (95% confidence intervals)	p-value
Educational level	0.171	0.128 (-0.092, 0.435)	0.199	0.008	0.006 (-0.240, 0.255)	0.951
Family size	-0.205	-0.151 (-0.470, 0.061)	0.129	-0.014	-0.011 (-0.264, 0.236)	0.911
Monthly household income						
B40 (Reference)						
M40	0.236	0.166 (-0.077, 0.548)	0.138	-0.150	-0.113 (-0.446, 0.147)	0.320
T20	-0.159	-0.111 (-0.477, 0.158)	0.322	-0.216	-0.161 (-0.518, 0.085)	0.158
Employment Status	0.076	0.048 (-0.236, 0.388)	0.630	0.072	0.049 (-0.219, 0.363)	0.624
Gender						
Female (Reference)						
Male	0.362	0.271 (0.106, 0.618)	0.006*	0.102	0.082 (-0.144, 0.349)	0.412
Food security status						
Food Secure (Reference)						
Food Insecure	-0.322	-0.206 (-0.628, -0.015)	0.040*	-0.088	-0.060 (-0.382, 0.206)	0.555
Category of Picky Eater						
Non picky eater (Reference)						
Picky eater	0.031	0.021 (-0.266, 0.328)	0.836	0.392	0.281 (0.126, 0.658)	0.004*

Significant (*p<0.05); Variables with p<0.25 in the univariate regression model were included in the stepwise multiple regression analysis. Multiple linear regression model: R= 0.363, R^2 =0.132, Adjusted R^2 =0.114; F (2,97) = 7.371, p=0.001

food insecurity could exist in vulnerable groups that will benefit from longitudinal studies and continuous monitoring.

The prevalence of picky eating as reported by the mothers was 34.3%, similar to other studies conducted in Malaysia on picky eating ranged from 30 to 40% (40). Comparatively with other studies in Asia, the prevalence of picky eaters among children varied, with rates of 58.9% in India, 59.3% in China and 25.1% in Singapore (41,42,43). Previous studies showed that pressure to eat was associated with picky eating behaviour where mothers of picky eaters were more likely to pressure their child to eat compared to non-picky eaters (44,45). It was reported that parents of picky eaters are especially concerned when their children reject healthy foods, and they may pressure their children to consume the rejected food groups, even though this feeding approach is ineffective (44,45).

Numerous pre-pandemic studies highlighted that families with food insecurity were associated with greater restriction (15-17). In food-insecure households, parents tend to restrict their children's access to unhealthy food and stress about the weight status of their children (18,19). In contrast, our study showed that in the background of the COVID-19 pandemic, such observation instead affected the food-secure households significantly. These findings suggest that restrictive feeding practices were not plausible when food-insecure households were facing issues accessing food, while in food-secure households, it was used as an approach to conserve resources. The impact of the pandemic was significant as it disrupted the food chain system and affected all four pillars of food security (availability, access, utilisation and stability) (9). Therefore, despite limited evidence of associations between food insecurity and nondirective positive behaviours such as parental modelling (46,47), parents from both food-secure and insecure households have fewer or no opportunities to model healthy eating for their children because of food scarcity at home.

There was no significant difference between household food security status and pressure to eat, consistent with a pre-pandemic local study (48), however, contradicted findings from the US (16). Other studies during the COVID-19 pandemic reported increased permissive (49), nonnutritive (21), and reward-based (50) feeding practices amongst parents who experienced more COVID-19 changes and stress than others (21,50). In the local study, Cheah et al. reported that all feeding practices had no significant correlation with household food security but highlighted that household food security was associated with children's weight status at an early age (48). This observation could be partly explained by the small number of households with food insecurity in the study which restricted the detection of any significant associations. Nevertheless, the increased anxiety during the pandemic could lead to greater use of pressure to eat especially amongst households with fluctuating food security status because parents were uncertain of the food chain supply (16). Globally, since COVID-19's impact varies, the magnitude of change could be different in certain home environments, where the effects of food security and feeding practices under stress are not well understood, calling for more investigations to be done.

This study employed validated measurement tools on feeding practices that are widely used in other studies in Malaysia (29,30,35,40). It provides much-needed data on household nutrition status and child feeding practices considering the environmental effect of the COVID-19 pandemic. Nevertheless, this study has several limitations, including the self-reporting nature of the questionnaires which may introduce biased recall and social desirability. The lack of ethnic representation

from other ethnicities limits the representation of the perspectives due to the influence of diverse cultures within different ethnic groups which may impact their behaviours related to feeding practices. Consideration of other primary caregivers is also important as mothers may not be the only person in the family who is responsible for food parenting practices. Moving forward, a larger sample size and longer study duration would broaden the participant backgrounds. Specifically, recruiting larger samples from rural and urban areas with wider socioeconomic backgrounds may provide more evidence on food security, child feeding practices and children's health development.

CONCLUSION

In this study during the COVID-19 pandemic, 1 in 5 study participants experienced food insecurity and up to 30% of study participants were classified as picky eaters. Food-secure households were more likely to develop restrictive feeding practices compared to food-insecure households. Mothers of children that classified as picky eaters tend to pressure their children to eat than mothers of non-picky eaters. It is highly important for mothers to refrain from overly forcing and restricting their children to eat as it will reduce children's enjoyment of food and may increase picky eating behaviour and preference towards restricted foods.

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