

ORIGINAL ARTICLE

FAMILY FOOD CHOICES MOTIVE AMONG MALAYSIAN PRESCHOOL CHILDREN'S PARENTS

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ABSTRACT

It is important to determine the factors influencing the family, specifically the parent's food choice motives (FFCMs). These factors are perceived to relate to the nutritional status, eating habits of the children and, subsequently, their future well-being. This study aimed to determine the FFCMs factors (including health concerns, natural content, sensory appeal, convenience, weight control, price, mood, and familiarity) of the parents who had preschool children in Selangor, Malaysia. A cross-sectional study was conducted among seventy-six pairs of mothers and children aged 4 to 6 years in six selected preschools in the Klang Valley, Selangor. A set of self-administered questionnaires measuring demographic data, dietary records, and FFCMs of the parents were answered by the mother, and anthropometric measurements of the children were then taken. The mean FFCMs score found that "health" (mean 3.5 ± 0.53) was reported as the most important factor in parents' food choices than the "familiarity" factor (mean 2.78 ± 0.67). Compared to the ethnic groups, both Chinese and Indians mostly chose "natural content", compared to Malay parents who chose "health" (3.55 ± 0.50) as an important factor to consider when choosing food. In conclusion, this study showed that by determining the most important factors influencing a family's food choices, it is likely to improve the nutritional status and well-being of children and their family members. Thus, this study proposed the utilization of FFCMs as an instrument to design and develop food- and nutrition-related interventions for further studies.

Keywords: Parental influence, Nutritional status, Food choice motive, Preschool children

INTRODUCTION

Children in the preschool years (typically aged 2-6 years) are in a crucial year to develop a healthy eating behaviour for its positive effects on the short- and long-term health of an individual¹. A high-quality diet is typically comprised of regular consumption of fruits, vegetables, whole grains, lean sources of protein, and dairy products, and infrequent consumption of foods rich in sugar, salt, and fat that are low in nutritional density. On a short-term basis, a high-quality diet in preschoolers is positively related to better cognitive development and a lower prevalence of childhood overweight and obesity¹⁻⁵. Meanwhile, in the longer term, diet quality during preschool may act as a lifelong predictor for an individual's risk of having poor or good health during adolescence and beyond¹⁻³.

In the era of economic achievement and the advancement of the health industrial revolution, it has not yet guaranteed a better diet quality and nutrition status among all preschool children in the country^{2,3}. must be studied because it is an indicator and predictor of their future well-being and health conditions in adulthood⁴. No exception exists in Malaysia, where a lot of efforts have been made by many parties and

scholars to emphasize the importance of fruit and vegetable intake and to decrease foods with high sugar and fat content in the children's food intake^{5,6}.

Among the major determinants of children's food intake are their parents' characteristics. These include their role as influencers for children to eat, receive encouragement, gain nutrition knowledge, experiment with food preferences, and develop feeding practices⁷. Besides, the practice of regular meal patterns, consistent family meals, and accessible fruits at home have proven to encourage the intake of fruits and vegetables among school children^{7,8}. Prior studies have also shown that children always take their parents' food intake and choices as an example for their own food intake^{7,8,9}. Several factors that influence parental food choice and intakes are food sensory appeal, food perceptions, beliefs, and attitudes towards certain foods, health issues, price, or mood⁹. Aside from these socio-cultural factors, some personal factors may influence parents to choose food for their children, such as their level of nutrition knowledge, psychological and physiological conditions, and influences from peers and family, as measured by family food choice motives (FFCMs)¹⁰.

Previous studies have shown that FFCMs were diverse across the countries^{11,12}. For instance, in the United Kingdom, key motivating factors in choosing food for an individual were sensory appeal, health, convenience, and price⁷. Meanwhile, in Japan, the price was the most significant factor as compared to New Zealand, which prioritized sensory appeal⁸. The study found the prioritizations of motives in food choice was related to cultural differences in values and norms as well as ethical concerns and different perceptions about food quality in certain countries⁸. Other research has linked FFCMs to age, gender, and monthly income¹³. Those with low incomes put price as the most important factor, while those with high incomes usually put sensory appeal as the most important factor¹⁴. In other countries, like Uruguay, the study found that people who chose health or natural content as their main reason for choosing food for their family and children tended to eat more milk and dairy products and less fatty foods¹⁵.

Due to these relationships between FFCMs and certain food and nutrient intakes, many studies have highlighted parental factors as major influencers in choosing what types of foods are available at home¹⁶⁻²⁰. The parent's FFCMs are seen as imperative, because they affect food availability at home and how certain foods are treasured within the family. Despite this, there is a scarcity of data to predict the relationship between parental FFCMs and Malaysian children's nutritional status based on multiethnicity. Hence, this study aimed to determine the current nutritional status of the children and their relationships with parental FFCMs.

METHODS

Using multi-stage sampling, a cross-sectional study was conducted in six randomly selected public preschools under *Jabatan Perpaduan Negara dan Integrasi Nasional* (JPNIN), *Kementerian Perpaduan Negara Malaysia* (KPM), known as *Tabika Perpaduan* (TP). This study was conducted from February until April 2018 around the Klang Valley, mainly located in the districts of Kuala Selangor, Malaysia. This study location was chosen for a few reasons. Firstly, Tabika Perpaduan around Klang Valley, Selangor, was purposely selected because it was one of the leading public preschools in Malaysia that prioritised the elements of nationality and multiethnic children that may resemble the Malaysian population. TP is also an institution that strictly adheres to the Malaysian Ministry of Education's National Preschool Curriculum, or *Kurikulum Bersepadu Prasekolah Kebangsaan* (KSPK). TP is well-known for sternly following the standard guidelines for menu planning, food preparation, and food serving as advised by the Nutrition Division of the Ministry of Health. Permission and approval to conduct this study

were obtained from the Universiti Teknologi Malaysia [UTM.J.53.05.02/13.11/1/4Jld.23(67)] and JPNIN, IKLIN, Putrajaya [IKLIN.01/267/42. Jld.2(31)].

Sets of information and consent forms were distributed to the parents and children. By using Krejcie & Morgan, the sample size of this study was 76 subjects, aged from four to six years, with multi-racial backgrounds, Malay, Chinese, and Indian²¹. The children included were those registered in the selected preschools, healthy children who did not have a chronic disease, were not medically ill, and had been hospitalized for the past 6 months, as well as children with no physical disabilities, including amputations in any parts of the body, deaf and unable to speak.

Data collection

Subjects in the quantitative survey were 76 pairs of mothers-children. The self-administered questionnaire was given to the mothers who had given consent to participate in the study. In this study, we assumed that parents (especially mothers) are often responsible for their children's food intake. While acknowledging the importance of the actual person (father/caregiver/grandparents) who may be responsible for children's food intakes, the current study focused on mothers as the primary caretaker, role model, and food controller in the family, which is consistent with the majority of research that links child feeding to the maternal role^{22,23}.

Mothers were allowed to bring back the questionnaire and were given a week to complete it. A diet record of the children's food intakes for 2 days on weekdays and 1 day at the weekend was obtained with the mothers' assistance. The instructions for filling in the diet record with the details of serving size and food measurement were explained in the questionnaire. After the mothers completed and submitted the questionnaires, the anthropometric measurements of the children were taken by the researcher in the respective preschools.

Height and weight were measured at least twice to get the average with a standard procedure by using a TANITA digital scale model HD-309 (Tanita Corporation, Tokyo, Japan) and a SECA body metre (SECA 208, Germany), respectively. The Z-score distribution of body mass index for age (BMI-for age), weight for age, and height for age of the child were calculated using using Anthroplus app and classified based on the WHO Growth Reference⁵.

Questionnaire

The questionnaire was divided into three parts: A, B, and C. Part A of the questions consisted of general demographic information about the child and parents. Part B questions consisted of

anthropometry data that were filled out by the researcher. Meanwhile, part C questions consisted of three days of diet records of the children as well as parental FFCMs that were adapted from Roos, Lehto, and Ray's and Steptoe, Pollard, and Wardle's questionnaires^{7,24}. In Malaysia, FFCMs with modifications were available and were tested for reliability on the Malaysian population²⁵. The internal consistency of the scale and test-retest reliability is good^{24,25}. The internal consistency of the FFCMs factors in this study was good, with Cronbach's α scores of 0.89.

In this FFCMs assessment, parents were asked to rate the important factors in choosing foods for their child. A total of eight components of FFCMs with 30 items were analyzed. This included health concerns (6 items), natural content (3 items), sensory appeal (4 items), convenience (3 items), weight concerns (3 items), price (2 items), mood (5 items), and familiarity (3 items). The mean score of each component was measured and analyzed to find the most influential parental factors in feeding the children.

Data analysis

All statistical analyses were performed using the IBM Statistics Package for Social Sciences (SPSS) version 22.0. Frequency and percentage were used to present the categorical data, while the mean for continuous data was for the descriptive

statistics of variables. A chi-square test was used to test the association between ethnicity and the children's BMI-for-age, weight-for-age, and height-for-age in categorical form. For continuous data, Pearson Product Moment Correlation (PPCM) was used to determine the relationship between FFCMs and children's nutritional status (weight, height, BMI, energy, fat, protein, iron, and calcium) with the level of significance was at $p < 0.05$. Nutritionist Pro (First Data Bank, 2005) was used to perform the dietary analysis, which was then compared to Malaysian Recommended Nutrient Intake (RNI) for children aged four to six years old.

RESULTS

Socio-demographic background

The children's mean age was 5.08 years, with 52.6% being Malay, 32.9% being Chinese, and 14.5% being Indian. About 23.7% by 4 years, 34% by 5 years, and 31.6% by 6 years, with the majority being the first child in the family (46.1%). The highest average household incomes from the parents were in the RM 3001 to RM 4500 range with 30.3%, followed by the RM 4501 to RM 6000 range with 28.9%, the RM 1501 to RM 3000 range with 21.0%, and the more than RM 6001 range with 15.8%. About 69.7% of the mothers were in higher education, followed by secondary education (30.3%) (Table 1).

Table 1a: Socio-demographic data and characteristics of the participants, (n=76)

Data	Characteristics	Total (n = 76) n (%)
Gender	Male	43 (56.6)
	Female	33 (43.4)
Age	4	18 (23.7)
	5	34 (44.7)
	6	24 (31.6)
Ethnics	Malay	40 (52.6)
	Chinese	25 (32.9)
	Indian	11 (14.5)
Number of Siblings	1	12 (15.8)
	2	32 (42.1)
	3	16 (21.1)
	4	8 (10.5)
	5	4 (5.3)
	6	4 (5.3)
Child Rank	1	35 (46.1)
	2	20 (26.3)
	3	12 (15.8)
	4	4 (5.3)
	5	2 (2.6)
Average Household Income	6	3 (3.9)
	RM 1000-RM 1500	3 (3.9)
	RM 1501- RM 3000	16 (21.0)
	RM 3001-RM 4500	23 (30.3)
	RM 4501 -RM 6000	22 (28.9)
More than RM 6001	12 (15.8)	

Table 1b: Socio-demographic data and characteristics of the participants, (n=76)

Maternal Education Level*	Never been to school	0 (0)
	Primary School	0 (0)
	Secondary School	23 (30.3)
	Higher Education	53 (69.7)

*Maternal education level: Primary school: UPSR

Secondary school: SPM

Higher education: STPM, certificates, Diploma, Degree, Master & PhD

The growth and its ethnic distribution

Overall, the prevalence of childhood overweight and underweight was 10.5% and 19.7%, respectively. There was a statistically significant difference between weight-for-age and height-for-age among ethnic groups (p<0.05). Whilst the relationship between BMI-for-age with ethnic group had found no statistically significant difference (p-value>0.05) (Table 2).

Comparison of energy, protein, calcium, and iron intakes with RNI

Overall, all of the children, regardless of gender or ethnicity, consumed less energy than was recommended. Meanwhile, the protein intake of all children exceeded the recommendation, with

the highest reported intake of 41.6 g/day (181% higher than recommended) in Chinese girls. Most of the children also did not have enough calcium, especially the Malay girls, with the lowest calcium intake of 197.5 mg/day (33% lower than recommended). Most of the boys in all three ethnic groups were getting enough iron: with 12.3 mg/day (205% higher than recommended) for Malay, 10.4 mg/day for Chinese (174% higher than recommended), and 9.35 mg/day (156% higher than recommended) for Indian. Girls too have enough iron, Chinese with 9.04 mg/day (151% more than recommended), Malay with 8.46 mg/day (141% more than recommended), and Indian with 7.82 mg/day (130% more than recommended) (Table 3).

Table 2: The growth based on WHO Growth Charts and its relationship among different ethnics of children (n=76)

Parameter	Total n = 76 n (%)	Ethnics			p-value
		Malay (n =40)	Chinese (n =25)	Indian (n =11)	
BMI-for-age					0.508
normal	44 (57.9)	27 (67.5)	13 (52.0)	4 (36.4)	
overweight	8 (10.5)	4 (10.0)	2 (8.0)	2 (18.2)	
severely wasted	7 (9.2)	2 (5.0)	3 (12.0)	2 (18.2)	
wasted	17 (22.4)	7 (17.5)	7 (28)	3 (27.3)	
Weight-for-age					0.000*
normal	55 (72.4)	35 (87.5)	17 (68.0)	3 (27.3)	
overweight	6 (7.9)	0 (0)	6 (24.0)	0 (0)	
underweight	15 (19.7)	5 (12.5)	2 (8.0)	8 (72.7)	
Height-for-age					0.001*
normal	54 (71.1)	35 (87.5)	16 (64.0)	3 (27.3)	
severely stunted	1 (1.3)	0 (0)	1 (4.0)	0 (0)	
stunted	21 (27.6)	5 (12.5)	8 (32.0)	8 (72.7)	

*p-value <0.05 showed a statistically significant difference WHO Growth Reference⁵

Table 3: Energy, protein, calcium, and iron intakes based on RNI according to gender and ethnics of the children (n=76)

	Means (RNI %)			
	Energy (kcal/day)	Protein (g/day)	Calcium (mg/day)	Iron (mg/day)
Boy (RNI)	1340	23	600	6
Malay (n=21)	1192 (89)	41 (180)	592 (99)	12 (205)
Chinese (n=15)	1129 (84)	39 (172)	493 (82)	10 (174)
Indian (n=7)	1063 (79)	41 (180)	359 (60)	9 (156)
Girl (RNI)	1290	23	600	6
Malay (n=19)	1089 (84)	38 (167)	197 (33)	8 (141)
Chinese (n=10)	1050.20 (81)	42 (181)	393 (65)	9 (151)
Indian (n=4)	1057 (82)	36 (157)	268 (45)	8 (130)

Recommended Nutrient Intakes for Malaysia⁶

Family food choice motives (FFCMs)

Table 4 shows "health" as the most important factor to consider in food choice, with a mean score of 3.55. The item "keeps us healthy" was reported as having the highest mean (3.91), while the item "is high in fibre" was reported as having the lowest mean (3.55). The second most important factor was "natural content," with a mean score of 3.47. The items "contains natural ingredients" and "contains no artificial

ingredient" were the highest at 3.74, while "contains no additives" was the lowest at 3.54. The third most important factor perceived by the parents in food choice was "mood," with a mean score of 3.22. The item "makes us feel good" was reported as having the highest mean (3.86). The "sensory appeal" factor was following behind with a mean score of 3.11. The highest score was 3.66 for "tastes good," while the lowest score was 3.20 for "has a pleasant texture."

Table 4: Mean scores of questions from family food choice motives (FFCMs) (n=76)

Factors	Mean
Health	3.50
...is high in fibre	3.55
...is nutritious	3.89
...contains lots of vitamins and minerals	3.75
...is high in protein	3.74
...keeps us healthy	3.91
...is good for my skin/teeth/hair/nails etc	3.88
Natural content	3.47
...contains no additives	3.54
...contains natural ingredients	3.74
...contains no artificial ingredients	3.74
Sensory appeal	3.11
...tastes good	3.66
...smells nice	3.32
...has a pleasant texture	3.20
...looks nice	3.62
Convenience	3.07
...is easy to prepare	3.41
...can be bought in shops close to us	3.49
...is easily available in shops and supermarkets	3.26
Weight control	3.07
...is low in calories	3.37
...is low in fat	3.36
...helps our family in weight control	3.39
Price	2.88
...is not expensive/cheap	2.99
...is good value for money/worthwhile	3.20
Mood	3.22
...cheers up our family	3.74
...helps us to cope with stress	3.13
...keeps us awake and alert	3.50
...helps us to relax	3.49
...makes us feel good	3.86
Familiarity	2.78
...is familiar to us	3.29
...is like the food I ate when I was a child	2.70
...is what we usually eat	3.22

The family food choice motives (FFCMs) questionnaire was adapted and modified^{7,24}. The mean was obtained from the total scores of 1

(not important), 2 (not as important), 3 (moderately important), and 4 (very important) answered by the mother.

Both factors of "convenience" and "weight control" were reported with the same mean score of 3.07. For the "convenience" factor, the item "can be bought in shops close to us" obtained the highest score of 3.49, as compared to "is easily available in shops and supermarkets" with a score of 3.26. Meanwhile, for the "weight control" factor, the item "helps our family in weight control" had the highest score with 3.39. "Price" factor was found to be the second-least important factor for parents to choose food, with a mean score of 2.88. The item with the highest score of 3.20 was "is good value for money or worthwhile". The least important factor picked by the parents was the "familiarity" factor, with a mean score of 2.78. The item "is familiar to us" was reported as the highest with 3.29, while the item "is like the food I ate when I was a child" was the lowest with 2.70.

In comparison with the ethnic groups, both Chinese and Indian parents had chosen "natural content" rather than Malay parents, who chose "health" (3.55 ± 0.50) as an important factor to consider when choosing foods (Figure 1).

Overall, "weight control", "familiarity," and "price" were the least important factors for parents when choosing foods. In comparison between the ethnic groups, both Chinese and Indian parents found the factor of "natural content" (3.48 ± 0.59 and 3.55 ± 0.52) to be more important than the "health concern" factor (3.55 ± 0.50) as perceived by Malay parents while choosing their children's food.

Relationship between FFCMs with nutritional status of the children

Table 5 shows the relationship between eight factors from FFCMs (health, natural content, sensory appeal, convenience, weight control, price, mood, and familiarity) and the nutritional status (weight, height, BMI, energy, protein, fat, calcium, and iron) of the children. Overall, the factor "health" was negatively correlated with BMI (r=-0.242, n=76, p=0.036). Convenience was found to be positively related to height (r = 0.286, n = 76, p = 0.012), while price was found to be negatively related to height (r = -0.236, n = 76, p = 0.045). While, "sensory appeal", "natural content", "weight control", "mood" and "familiarity" were not at all associated with the nutritional status of the children.

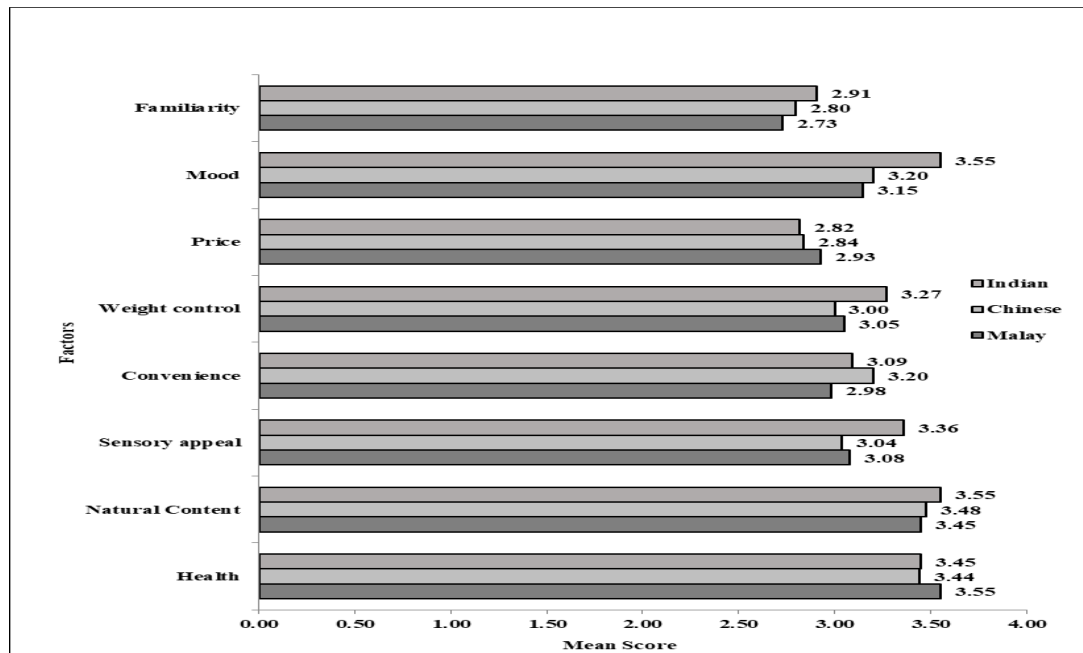


Figure 1: Mean score of parental FFCMs according to ethnicity

Table 5a: Pearson correlation estimates between FFCMs with weight, height, BMI, and nutrient intakes of the multiethnic children (n=76)

	Health	Natural Content	Sensory appeal	Convenience	Weight control	Price	Mood	Familiarity
Weight	-.049	-.068	.018	.179	.012	.223	.009	.056
Height	.160	.047	.062	.286*	.166	.230*	.161	.178
BMI	-.242*	-.125	-.017	-.001	-.116	.089	-.130	-.073
Energy	-.035	.014	.133	.008	.076	.042	-.019	.082

Table 5b: Pearson correlation estimates between FFCMs with weight, height, BMI, and nutrient intakes of the multiethnic children (n=76)

Protein	-.156	-.138	-.002	.052	-.078	.116	-.018	-.119
Fat	-.017	-.053	.097	-.003	.020	.023	-.061	.053
Calcium	-.039	.123	.067	-.017	.071	-.083	-.041	.008
Iron	-.019	.071	-.029	-.093	.058	.033	-	.171

*Correlation is significant at the 0.05 level (2-tailed)

DISCUSSION

Our findings on the prevalence of overweight (10.5%) and underweight (19.7%) in preschool-aged children match those of the 2015 National Health and Morbidity Survey²⁷. Overall, the national survey reported 11.9% and 13.0% respectively, of the overweight and underweight prevalence of children aged below 18 years old. However, as compared to other studies done among preschool-aged children, the incidence of overweight and underweight in this study was considerably higher²⁷. Since the current study aims to compare between ethnic groups, it was found that more Chinese had the highest prevalence of overweight (24.0%), more Indians had the highest prevalence of underweight (72.7%), and more Malay had the highest prevalence of normal weight (87.5%). This pattern was also seen in a previous national survey²⁷.

Childhood development may differ between ethnic groups. Another study has found a strong association between certain ethnic groups of children and lower physical stature²⁹. Other related combination factors included low socioeconomic status and parental education level²⁹. Meanwhile, another study in a developed country has related the difference in height of the multiethnic children with gradual changes in the children's environmental factors. Racial and ethnic factors were included, as well as the manifestation of biological potentials such as inadequate nutrition, infectious disease, and food accessibility³⁰. Other studies have linked economic growth levels to differences in anthropometric parameters between Chinese ethnic minorities and Han Chinese across all age groups³¹.

In regards to the nutrient intake, this study found no statistically significant difference between the three ethnic groups ($p > 0.05$). This study believed it may be due to the children's adaptation to the food served in their respective preschools without being influenced by their ethnic's food preferences and traditional eating patterns. Nonetheless, few studies have discovered a significant difference in food intake between ethnicities³². According to Baroudi and colleagues, there was a strong relationship between the ethics of Arabs and Berbers and their nutrient consumption, especially in total fat, monounsaturated fat (MUFA), calcium,

folates, zinc, and vitamin E³². They linked the children's parents' low education level as a major contributing factor to the children's obesity³². The parents of certain ethnic groups encourage overconsumption of food among their children because they perceive obesity as desirable and see it as a symbol of richness, productivity, and charm³². Other studies have associated children from underprivileged and minority ethnic groups, like Puerto Ricans and non-Hispanic Blacks in New York City, with unhealthy diets and low physical activity compared to Mexican children, who practised healthier diets and high physical activities³³.

In addition to the ethnic difference, this study also found no statistically significant difference between the mean energy and macronutrient intakes by gender ($p > 0.05$). Nevertheless, in general, the trends toward higher intakes (energy, protein, calcium, and iron) were found in boys than in girls. In general, the percentage of children (regardless of gender) was not meeting the Malaysian RNI for energy (lower than 20%) and calcium (lower than 50%), except for protein and iron intakes that met the requirement. This is congruent with Malaysian national dietary intake data for children under 12 years of age, which reported the same findings except for the age groups of 0.5 to 0.9 years and 1 to 3-years³⁴. The gender differences in energy and macronutrient intakes could be explained by the food choices and preferences of boys and girls, with boys appearing to favour meat, processed meat products, eggs, and high-energy-dense foods that are rich in fat as compared to girls³⁴. According to a review by Hallam et al., there are gender differences in food cravings, with boys preferring savoury dishes to girls preferring sweet foods. Understanding this situation may aid in the development of more effective obesity and weight loss treatments in the future study³⁵.

Parental family food choice motives must be investigated because children's food intake and behaviour are typically influenced by their parents and family members^{8,9,16}. Overall, current findings show that "health", "natural content" and "mood" were the most important parental FFCMs. "...keep us healthy" was the most important dimension reported under the health factor; while "...contain natural ingredients" and "...no artificial ingredients" were the most reported dimensions from the natural

content factor; and "...make us feel good" was the most reported dimension from the mood factor. If compared between ethnic groups, Chinese and Indian parents ranked the factor of "natural content" as the most important motive to choose food for their children, rather than the "health" factor ranked by Malay parents. The results also showed that several parental FFCMs were associated with the nutritional status of preschoolers.

The present study found the "health" factor of the FFCMs was negatively associated with children's BMI. Niemier et al. discovered something similar in their healthy weight-related programmes intervention with parent-child participation. The study found that the longer the parents participated in those interventions (exercise class, nutrition class, and behaviour class), the higher the chance their children's BMI could be reduced³³. However, few studies have linked the effects of parents who are overly concerned about their children's health to the pressure to eat method. The study found that the control practices by the parents eventually resulted in underweight and stunted children^{8,18}.

The present study also found a few positive and negative associations between the height of the children and convenience and price factors for the parents, respectively. It is not surprising that we have found those associations since several studies have reported that price and convenience are among the barriers to choosing more nutritious food. According to Tin and colleagues' findings, for example, height was found to be increasing while BMI was decreasing among high-income household children who preferred more convenient and quality foods regardless of food prices³⁶. Other previous literature also supported a negative association between socioeconomic status and BMI^{37,38}. Some questioned the parents' ability to provide their children with adequate nutrition and medical care. When it comes to meeting their children's nutritional needs, parents with lower incomes may have to deal with more stressful financial problems than parents with higher incomes. This can lead to poor diets and nutritional status^{38,39}. Nevertheless, education was a more significant determinant as compared to parents' income when relating to obesity's occurrence^{12,39}.

The study has three limitations. Firstly, there may be an information bias as there is no question of whether the mothers are the real caregivers responsible for the children's food intake. Secondly, there is insufficient information regarding the parents, including the job status of the parents (mother and father) and the family's food beliefs, knowledge, and practices as well as its dietary environment. In the future, this information should be designed to reflect the diet quality of the parents and

family. Third, cross-sectional surveys are ineffective at conveying causality and reflecting the food preferences of the entire Malaysian family to preschool children. These aspects should be improved in future research.

CONCLUSION

The findings of this study have provided knowledge on family food choice motives (FFCMs), which consist of health concerns, natural content, sensory appeal, convenience, weight concern, price, mood, and familiarity motives concerning the children's nutritional status. The mean FFCMs scores found that "health", natural content' and "mood" were reported as the most important factors for parents who have preschool children in making food choices. Several, but not all, of the FFCMs were associated with the children's nutritional status. In conclusion, this study showed that by determining the most important factors influencing a family's food choices, it is likely to improve the nutritional status and well-being of children and their family members. Therefore, this study suggested that FFCMs be used as a tool to design and develop interventions related to food and nutrition in future studies.

ACKNOWLEDGEMENT

The authors would like to thank the Ministry of Higher Education Malaysia for Fundamental Research Grant Scheme, UTM, FRGS/1/2018/SSI09/UTM/02/18) who supported this study. Special thanks to Zamalah UTM for the scholarship awarded to the main author.

Conflict of interest

The authors declare that they have no competing interests.

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