

Relationship between Family Meals away from Home and Nutritional Status of Adolescents

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ABSTRACT

Introduction: Despite the many benefits of family meals, data on association between family meals away from home (FMAFH) and nutritional status of adolescents is limited. This study determined the association between FMAFH with dietary intake and body mass index of adolescents (N=408). **Methods:** Data were obtained through interviewer-administered questionnaire and anthropometric measurements of adolescents. **Results:** Respondents comprised 53.7% females, 67.6% Chinese with the mean age of sample being 13.7 ± 0.6 years old. Generally, male adolescents had higher intakes of energy, macronutrients and micronutrients. All nutrients except calcium (51.3%), iron (females – 54.7%) and vitamin A (females – 86.1%) met the recommended intakes. A higher proportion of male (25.4%) than female (13.6%) adolescents were overweight and obese. About 44% of respondents had family meals ≥ 7 times in the previous week with 48.9% reported having family meals at home ≥ 7 times weekly. The majority (91.2%) of adolescents had FMAFH at least once a week either at restaurants (53%), fast food outlets (41.6%), food courts in shopping complexes (40%) or food stalls (30.2%). As the frequency of FMAFH increased, there was an increasing trend in energy and energy-adjusted nutrient intakes. However, only energy-adjusted fat intake was significantly high ($p < 0.05$) in adolescents having FMAFH > 7 times weekly. No significant association was observed for frequency of FMAFH and body mass index. **Conclusion:** With increasing dependence on foods outside the home, FMAFH can be a source of healthy diet for families provided they have the knowledge, skills and motivation to make healthy food choices.

Keywords: Family meals, adolescents, dietary intake, Body Mass Index

INTRODUCTION

The family meal is well-recognised as being important for family unity and as a symbol of family interaction (Story & Neumark-Sztainer, 2005). Various studies have highlighted the nutritional, psychosocial and cognitive benefits of family meals to

children and adolescents. Among adolescents, the family meal is positively associated with intake of fruits, vegetables, dietary fibre and micronutrients while negatively associated with intake of soft drink, fried food, saturated and trans fat (Larson *et al.*, 2007). Adolescents who have regular family meals (≥ 3 times/week) are more likely to

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have normal weight, healthier dietary and eating patterns (Hammons & Fiese, 2011) and healthful eating habits 5 years later (Burgess-Champoux *et al.*, 2007). Having frequent family meals protects against substance abuse, low grade point average, depressive symptoms and suicidal thoughts (Eisenberg *et al.*, 2004).

However, with both parents working and children busy with school, co-curriculum activities and tuitions, families may struggle with family meals because of time constraints for meal preparation. Purchasing ready-cooked food or eating out provides a convenient alternative for busy families. Globally, the consumption of food-away-from-home (FAFH) is becoming more prevalent. In 1994, more than half (56%) of Americans consumed FAFH at least once a day and in 1998, they spent almost 50% of food money on FAFH (Thompson *et al.*, 2004). Malaysians, on the other hand spent 10.6% of food expenditure on FAFH in 2009/2010 as compared to just 4.6% in 1973 (Department of Statistics Malaysia, 2011). Consumers demand fast and easy meal solutions to fit their busy lifestyle and therefore it is not surprising that FAFH is becoming more common in both the developed and developing countries.

Food away from home (including food bought and eaten at home) are often energy dense, high in saturated fat, cholesterol and sodium while low in dietary fibre and vitamins (Schmidt *et al.*, 2005). Also, their portion sizes are larger than home-cooked food. Frequent consumption of these foods has been linked to poorer diet quality in which the individuals are less likely to meet dietary recommendations for vegetables, fruits, low fat dairy products, and wholegrain but are more likely to have excessive intake of saturated fat and sodium (Smith, Day & Yorgasan, 2009). Studies have also shown a positive association between frequent consumption of outside food with overweight and obesity (Thompson *et al.*, 2004). Eating one meal away from home each week is associated with two extra pounds

each year, even after controlling for potential confounders (Mancino, Todd & Biing, 2009).

Prevalence of overweight and obesity among children and adolescents has significantly increased within the last 20-30 years in nearly all developed countries (Lob-Corzilius, 2007). The developing countries are not spared from this health problem. Recent data showed that the prevalence of childhood and adolescent obesity ranged from 19.3% in Argentina to 41.8% in Mexico (Gupta *et al.*, 2012). In 1991, the prevalence of overweight and obesity in China was 5.2% which steadily increased to 13.2% in 2006 (Cui *et al.*, 2011); while in India, the prevalence of obesity increased significantly from 9.8% in 2006 to 11.7% in 2009 (Gupta *et al.*, 2012). In Malaysia, the Third National Health and Morbidity Survey (NHMS III, 2006) reported that 5.4% of children aged 0-13 years were overweight and there was a higher prevalence of overweight among urban (6.3%) than rural (4%) children.

Identifying the role of family meals and its changing pattern towards eating outside the home in childhood and adolescent obesity is crucial in light of the increasing prevalence of overweight and obesity in children and adolescents as well as the busy schedules of parents, children and adolescents in Malaysia. Hence the present study aims to determine family meal patterns and the association between family meal away from home (FMAFH) with nutritional status of adolescents in Puchong, Selangor.

METHODS

Study design and sample

This cross-sectional study was carried out in Puchong, Selangor. Among ten secondary schools located in Puchong, three were conveniently selected as they were located in the same residential area (SMK Seksyen 4 Bandar Kinrara, SMK Bandar Puchong Jaya and SMK Pusat Bandar Puchong). In each school, 3-5 (Secondary 1 and 2) classes were randomly selected to meet the required

sample size of 323, calculated based on prevalence (70%) of children having family meals more than 3 times weekly, 95% confidence level and 5% margin of error (Cochran, 1977). A total of 450 students were identified but only 415 students fulfilled the selection criteria of Malaysian, male or female students aged 13 to 14 years old with no physical disability, asthma or other diagnosed chronic diseases. The final sample consisted of 408 students.

The research protocol was approved by the Medical Research Ethics Committee of the Faculty of Medicine and Health Sciences, Universiti Putra Malaysia and the Ministry of Education, Malaysia. Students were measured for anthropometry and interviewed for socio-demographic, family meal and dietary intake information.

Measurements

Family meal and family meal away from home

Project EAT Survey Questionnaire (Neumark-Sztainer *et al.*, 2003) was used to assess the frequency of family meals and family meals away from home. Frequency of family meals was based on item 'during the past 7 days how many times did all or most of your family living in your house eat a meal together?' that was ranked on 'never/ 1-2 times/ 3-4 times/ 5-6 times/ more than 7 times'. Family meal location was categorised as at home, fast food outlets, restaurants, food stalls and shopping complex (food court). Frequency of family meals away from home was assessed by item 'in the past 7 days, how often did you have meals with your family members in these places besides at home?' and the choice of answer were 'never/ 1-2 times/3-4 times/5-6 times/more than 7 times.'

Dietary intake

Dietary intake was assessed using 24-hour diet recall for two non-consecutive days. Information on types of food, portion size and preparation methods was recorded. To

facilitate respondents in estimation of food portion size, standard household measurements (cups, spoons, bowls, saucers and others) were used as visual aids. Total energy (kcal), percentage of energy from macronutrients (carbohydrate, protein and fat) and micronutrients (vitamin A, vitamin C, calcium, sodium and iron) were determined using Nutritionist Pro software and compared to the Malaysian Recommended Nutrient Intake (RNI) (NCCFN, 2005).

Anthropometry

Weight and height measurements were taken using Tanita digital weighing scale and SECA body meter, respectively. The average of duplicate values for each measurement was used in the final data analysis. BMI was calculated and classified according to WHO BMI-for-age classification (WHO, 2007).

Statistical Analysis

SPSS version 17.0 was used for data analysis. Data are presented descriptively as mean, standard deviation, and frequency. Analysis of Covariance (ANCOVA) was carried out to determine the differences in energy intake, energy adjusted nutrient intakes (per 1000 kcal), weight and BMI according to frequency of family meals away from home (0-2 times, 3-6 times and ≥ 7 times in the past week), adjusting for covariates (sex, ethnicity, household income, total energy intake and BMI). Bonferroni test was applied to identify statistically significant differences among the groups and significance level was set at $p < 0.05$.

RESULTS

The sample consisted of 53.7% females, 67.6% Chinese and equal proportions of 13- and 14-year-old adolescents (Table 1). About 58.1% of the families had incomes \geq RM4000. The majority of parents had at least lower

Table 1. Socio-demographic characteristics of respondents (N=408)

	N (%)	Mean \bar{O} SD
Age (years)		13.74 \pm 0.56
13	204 (50.0)	
14	204 (50.0)	
Sex		
Male	189 (46.3)	
Female	219 (53.7)	
Ethnicity		
Malay	90 (22.1)	
Chinese	276 (67.6)	
Others*	42 (10.3)	
Household size (person)		5.07 \pm 1.30
Family monthly income (RM)		
\leq 3999	165 (41.9)	
4000-5999	85 (21.6)	
6000-7999	64 (16.2)	
\leq 8000	80 (20.3)	
Parent's educational level		
<i>Father</i>		
No schooling	8 (2.0)	
Primary	16 (4.0)	
Lower secondary	74 (18.3)	
Upper secondary	112 (27.8)	
Tertiary	193 (47.9)	
<i>Mother</i>		
No schooling	6 (1.5)	
Primary	16 (3.9)	
Lower secondary	71 (17.5)	
Upper secondary	158 (38.9)	
Tertiary	155 (38.2)	
Parent's working status		
<i>Father</i>		
Full time	258(63.4)	
Part time	108 (26.6)	
Not working	3 (0.7)	
Don't know	38 (9.3)	
<i>Mother</i>		
Full time	109 (26.8)	
Part time	119 (29.2)	
Not working	154 (37.8)	
Don't know	25 (6.2)	

* Indian, Orang asli, Caucasians, Sarawak and Sabah's ethnic group.

secondary education. Almost all fathers (89.7%) and slightly more than half (55.9%) of mothers were either employed or self-employed.

The mean energy intake of respondents was lower than the recommended intake whereby 73.5% males and 84.0% females did not meet the recommendation (Table 2). In general, macronutrient and micronutrient intakes were higher in male than female adolescents. The mean intake of all nutrients except calcium (for both males and females), iron (females only) and vitamin A (females only) met the recommended levels. Although the mean intake of protein was satisfactory, 30.6% of adolescents did not meet the protein recommendation. The majority of adolescents (95.1%) did not have adequate calcium intake. For vitamin C and iron, 52.5% and 38% of these adolescents did not achieve the recommended levels, respectively. The mean sodium intake was 3694 ± 4192 mg which was higher than the 1500-2300 mg allowed for adolescents (13-18 years old) (Institute of Medicine, 2005). It is worth noting that 67% of these adolescents (78.8% males; 57.5% females) had excess sodium intake (> 2300 mg). Many of these adolescents did not meet the recommended percentage of energy from carbohydrate ($< 55\%$), protein ($> 15\%$) and fat ($> 30\%$). The majority (73.3%) of respondents had normal BMI. A higher proportion of male than female adolescents were overweight (16.9% vs 10%), obese (8.5% vs 3.6%) and thin (9% vs 6.4%).

About 44% of adolescents reported having 7 or more times of sitting down to a family meal and only 5.4% reported not having any family meal in the past week (Table 3). Having family meals at home ≥ 7 times in the previous week was reported by 48.9% of adolescents. In the last 7 days, the majority (91.2%) of adolescents had FMAFH at least once and 53.4% ate out 3 times or more with their families. FMAFH frequently occurred in restaurants (53.0%), fast food outlets (41.6%), food courts in shopping complexes (40.0%) and food stalls (30%).

Intake of energy and most energy-adjusted nutrients tend to increase as the frequency of FMAFH increased (Table 4). However, only energy-adjusted fat intake was significantly higher ($p < 0.05$) in adolescents having FMAFH ≥ 7 times in the past week as compared to those having FMAFH 1-2 times weekly. Body weight and BMI were not significantly different by FMAFH categories. Analyses of dietary intake and BMI status by frequency of family meals and family meals at home also did not show any significant difference although a similar increasing trend of energy and energy-adjusted nutrient intakes were observed as frequency of family meals and family meals at home increased (data not shown).

DISCUSSION

Despite the busy schedules of parents and children, families should make family meals a priority and aim to have 3-4 family meals weekly (Story & Neumark-Sztainer, 2005). The present study found that having a family meal is still frequently practised by urban adolescents with approximately 80% reported having family meals three or more times in the past week. In a local study of Malaysian female adolescents, although the exact frequency was not reported, Chin & Nasir (2009) reported that 76.9% of respondents had family meals. Several studies have found that 35 – 61% of adolescents reported eating family meals, especially dinner, at least 5 times a week (Utter *et al.*, 2008). However, the frequency of family meals tend to decrease as adolescents get older, probably due to increasing independence, school and extracurricular commitments and mobility (Neumark-Sztainer *et al.*, 2003). It is encouraging to observe that in this study, family meals were frequently taken at home. Although it was not clearly indicated whether the meal was taken alone or with family members, Lee & Barlow (2005) reported that Malaysian

Table 2. Dietary intake and body mass index (BMI) of adolescents (N=408)

	Male Mean \pm SD	% not meeting recommendation	Female Mean \pm SD	% not meeting recommendation	Total Mean \pm SD	% not meeting recommendation
Energy and nutrients						
Energy Intake (kcal) ⁺ (% RNI)	2336 \pm 1100 (86.6)	73.5	1665 \pm 620 (76.4)	84.0	1975 \pm 937 (81.2)	79.2
Protein(g) ⁺ (% RNI)	97.96 \pm 52.80 (155.5)	25.9	69.62 \pm 30.61 (126.6)	34.7	82.75 \pm 44.61 (140.0)	30.6
Fat(g)	82.47 \pm 50.12		58.37 \pm 29.58		69.53 \pm 41.11	
Carbohydrate(g)	299.09 \pm 123.11		214.24 \pm 83.23		253.54 \pm 111.83	
Vitamin C (mg) ⁺ (% RNI)	98.78 \pm 107.80 (152.0)	49.2	74.97 \pm 70.59 (115.3)	55.3	86.00 \pm 90.44 (132.3)	52.5
Vitamin A (μ g) ⁺ (% RNI)	846.40 \pm 654.15 (141.06)	0.5	516.59 \pm 334.51 (86.09)	1.8	669.37 \pm 533.58 (111.56)	1.2
Calcium (mg) ⁺ (% RNI)	609.46 \pm 362.01 (61.0)	91.5	429.88 \pm 205.02 (43.0)	98.2	513.07 \pm 301.81 (51.3)	95.1
Iron (mg) ⁺ (% RNI)	26.20 \pm 16.20 (174.7)	28.5	18.03 \pm 11.34 (54.7)	46.1	21.82 \pm 14.38 (110.3)	38.0
Sodium (mg) ⁺⁺	3957.94 \pm 2776.49	78.8	3466.31 \pm 5103.24	57.5	3694.05 \pm 4191.72	67.4
% Energy from Macronutrients						
Carbohydrate (%) ⁺⁺⁺	52.25 \pm 8.95	61.9	52.16 \pm 9.44	59.4	52.20 \pm 9.20	60.5
Protein (%) ⁺⁺	16.63 \pm 3.68	65.1	16.80 \pm 4.35	37.4	16.72 \pm 4.05	50.2
Fat (%) ⁺⁺	31.17 \pm 7.64	56.1	30.88 \pm 8.03	43.4	31.02 \pm 7.84	49.3
Body Mass Index (BMI)						
Weight (kg) (M \pm SD)	51.77 \pm 14.22		46.70 \pm 9.83		49.03 \pm 12.31	
Height (m)(M \pm SD)	1.61 \pm 0.08		1.55 \pm 0.08		1.58 \pm 0.08	
BMI (kg/m ²)(M \pm SD)	19.66 \pm 4.53		19.27 \pm 3.61		19.45 \pm 4.06	
Severe thinness	6 (3.2)		3 (1.4)		9 (2.2)	
Thinness	11 (5.8)		11 (5.0)		22 (5.4)	
Normal weight	124 (65.6)		175 (79.9)		299 (73.3)	
Overweight	32 (16.9)		22 (10.0)		54 (13.2)	
Obesity	16 (8.5)		8 (3.6)		24 (5.9)	

* Bioavailability 10%, < 100 % recommended nutrient intake (RNI); ** - sodium >2300 mg, > 15% protein energy, > 30% fat energy, +++ - < 55% carbohydrate energy

Table 3. Family meal pattern and family meal location of respondents in the last 7 days (N=408)

	N (%)
Family Meal Frequency	
0-2 times	91 (22.3)
3-6 times	139 (34.1)
≥ 7 times	178 (43.6)
Family meals at home	
0-2 times	68 (16.7)
3-6 times	140 (34.4)
≥ 7 times	199 (48.9)
Family meals away from home (at least once in the last 7 days)	
Yes	372 (91.2)
No	36 (8.8)
Frequency of family meals away from home in the last 7 days	
1-2 times	154 (41.4)
3-4 times	80 (21.5)
5-6 times	53 (14.2)
≥ 7 times	85 (22.9)
Location of family meals away from home (at least 1-2 times in the last 7 days)	
Fast food outlets	169 (41.6)
Restaurants	215 (53.0)
Foods stalls	121 (30.2)
Shopping complex food courts	162 (40.0)

Table 4. Dietary intake, body weight and BMI by frequency of family meals away from home in the previous week (N=408)

	Frequency of family meals away from home in the last 7 days			P value
	0-2 times (n = 190) Mean \pm SE	3-6 times (n = 133) Mean \pm SE	≥ 7 times (n = 85) Mean \pm SE	
Dietary intake				
Energy intake (kcal/day)	1984 \pm 65	1915 \pm 97	2077 \pm 100	0.953
Carbohydrate intake ¹ (g/day)	131.10 \pm 1.69	132.02 \pm 2.03	126.9 \pm 2.58	0.241
Protein intake ¹ (g/day)	42.37 \pm 0.74	40.08 \pm 0.89	43.73 \pm 1.13	0.448
Fat intake ^{1*} (g/day)	34.05 \pm 0.64 ^a	34.54 \pm 0.77	34.86 \pm 0.98 ^a	0.043
Calcium intake ¹ (mg/day)	264.96 \pm 7.52	260.75 \pm 9.05	278.33 \pm 11.50	0.936
Iron intake ¹ (mg/day)	11.57 \pm 0.35	10.23 \pm 0.42	10.91 \pm 0.53	0.117
Sodium intake ¹ (mg/day)	1921.38 \pm 280.21	1838.97 \pm 337.00	2648.49 \pm 428.09	0.794
Anthropometry ²				
Weight (kg)	50.09 \pm 0.92	47.26 \pm 1.07	49.94 \pm 1.37	0.881
BMI (kgm ²)	19.75 \pm 0.30	18.80 \pm 0.35	19.84 \pm 0.45	0.933

¹ Energy adjusted nutrient intakes (per 1000 kcal), adjusted for sex, ethnicity, household income and BMI for analysis.

² Adjusted for sex, ethnicity, household income and total energy intake

* Same alphabet indicates significant difference between groups at $p < 0.05$.

adolescents were more likely to have meals at home compared to Singaporean adolescents.

Adolescents who consumed greater quantities of food away from home tend to have higher total energy intake and poorer diet quality (French *et al.*, 2001; Taveras *et al.*, 2005). Bowman *et al.* (2004) reported that children who consumed fast food had higher intakes of energy, fat, carbohydrate, added sugars and sugar-sweetened beverages than those who did not consume fast food. The present study found that intakes of energy and most nutrients were higher among respondents who reported most frequent FMAFH although only fat intake was significantly different. A plausible explanation is that foods prepared away from home and fast foods are more likely to be fried and therefore high in saturated and partially hydrogenated (trans) fats (Litin & Sacks, 1993). Adults and children who frequently consumed food away from home, especially fast foods, also have significantly higher sodium intake than those who did not consume these foods (Paeratakul *et al.*, 2003). Although sodium intake of adolescents in the present study increased with higher frequency of FMAH, the association was not significant.

In this study, female adolescents did not meet the recommended intake for calcium and iron. Although we did not explore the reasons for low calcium and iron intake, lower milk consumption and higher intake of carbonated drinks and sweetened fruit juices have been shown to be associated with low dietary calcium intake in girls (Striegel-Moore *et al.*, 2006). A low calcium intake especially in females and during the premenopausal years reduces bone density and increases the risk of osteoporosis after menopause. Although the mean iron intake of female adolescents in this study was only 54.7% of the recommended intake, it was generally higher than that reported by Foo *et al.* (2004), where approximately 91% of female adolescents in a fishing village in Tuaran, Sabah had a dietary iron intake

below two-thirds of the RDA level. A high sodium intake observed in this study is of concern as high sodium intake has been shown to be associated with hypertension, even among children and adolescents (Quanhe *et al.*, 2012). A meta-analysis of studies on salt-reduction in children showed that a modest reduction in salt intake could lead to an immediate fall in blood pressure (He & MacGregor, 2006). Consistent with other studies among Malaysian adolescents (Foo *et al.*, 2004; Zalilah *et al.*, 2006), adolescents in this study did not meet the acceptable range for percentage of energy from macronutrients.

Studies investigating the relationship between FMAFH and body weight or BMI have produced conflicting findings. Thompson *et al.* (2004) found that adolescent girls who consumed food away from home (FAFH) twice a week had a higher increase in BMI than other peers who only consumed once a week or not at all. In addition, adolescents who consumed more FAFH (average eight times per month) are more likely to be obese (Gillis & Bar-Or, 2003). Our study however did not find any significant association between FMAFH and BMI. French *et al.* (2001) reported a similar finding in that frequency of fast food restaurant consumption was not associated with adolescent's overweight status. In another study, consumption of fast foods in family meals was only associated with weight gain in parents but not in adolescents (Boutelle *et al.*, 2007). The observed inconsistency in findings across studies is primarily due to most studies being on fast food consumption and some specifically on fried foods consumed away from home (Taveras *et al.*, 2005) and not other sources of family meals away from home. Other possible reasons were differences in study design (longitudinal versus cross-sectional), small sample size and convenient sampling (female adolescents only).

This study is not without limitations. Self-reported data and the cross-sectional study design should be considered when

interpreting these results. The generalisation of the study findings are limited by age and study location as the respondents were from selected secondary schools in an urban area. Future studies should include a nationally representative sample and a wider age range of adolescents. In addition, family meals away from home were assessed during the time period of the past 7 days. It is not known whether the past 7 days were representative of adolescents' typical away from home meal. As the foods consumed during family meals away from home were not assessed, we could not conclude that all food choices were unhealthy. In addition, it was also not known whether family meals consumed at home were home cooked or bought from outside, although there was an indication that family meals consumed at home might be similar in nutritional characteristics as family meals away from home. Further research is needed with more comprehensive measurements of family meals away from home. Despite these limitations, to our knowledge, this is the first study that examines family meal patterns and its association with adolescents' nutritional status in Malaysia.

CONCLUSION

Eating out is often related to a busy lifestyle. The increasing consumption of family meals away from home is becoming the norm in today's society with time and convenience being important contributors. As family meals confer both psychosocial social and nutritional benefits, families should be encouraged to make family meals a priority. While it may be impossible for families to limit their family meals away from home, it is essential that they make healthy food decisions when eating out. Nutrition intervention aimed at improving health and nutrition of adolescents should incorporate strategies for adolescents and their parents to prepare and choose healthy and convenient family meals both at home and outside.

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