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Breakfast Skipping and Its Associated Factors among Undergraduates in a Public University in Kuala Lumpur

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ABSTRACT

An analytical cross-sectional study was conducted in a public university in Kuala Lumpur among a random sample of 2665 undergraduates. The objective was to study the prevalence of breakfast skipping and its associated factors. Data collection was conducted via a self-administered pre-tested questionnaire. There were 43.5% male respondents, with Malays being the majority (58.3%). The prevalence of breakfast skipping was 29.2 (95% CI: 27.3 – 30.3) %. The factors significantly associated with breakfast skipping ($p<0.05$) were age, race, accommodation, faculty and skipping dinner. As the respondents' age increased, their risk of breakfast skipping was lower (OR: 0.95; 0.89 – 0.99). Malays (OR: 1.94; 1.48 – 2.54), Indians (OR: 1.70; 1.08 – 2.66), and students from the Sabah and Sarawak indigenous communities (OR: 2.13; 1.37 – 3.33) were more likely to skip breakfast compared to their Chinese counterparts. Respondents who stayed in their own houses were also less likely to skip breakfast compared to those staying in hostel with meals catered (OR: 2.32; 1.39 – 3.84), hostel with cafeteria (OR: 2.92; 1.74 – 4.91) or in rented houses (OR: 2.08; 1.25 – 3.46). Respondents majoring in Arts & Economics had 1.40 (1.07 – 1.82) times risk of breakfast skipping compared to those majoring in Life Sciences. Those who skipped dinner too had twice the odds (1.47 – 2.77) of breakfast skipping. In conclusion the prevalence of breakfast skipping among the undergraduates of this university was moderately high. Health awareness campaigns or introduction of healthy eating guidelines should be initiated for the undergraduates as well as food caterers in campus. The policy and pricing of catered food in campus should also be reviewed.

Keywords: Breakfast skipping, undergraduates

INTRODUCTION

Young adults in the age group of 18 – 25 years are often the neglected group in any health or nutrition education as compared to children and adults. When these young adults leave home and adjust to independent living, good dietary habits gained from home decline (Harris *et al.*, 2006). Studies show that many young adults have the habits of skipping meals especially breakfast (Keski-Rahkonen *et al.*, 2003; Osako, Takayama &

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Kira, 2005; Song *et al.*, 2005), snacking (Samuelson, 2000; Song *et al.*, 2005) and consumption of fastfood (Niemeier *et al.*, 2006). They appear to be at higher risk for weight gain through these unhealthy eating habits. Increased snacking, lunch skipping, a sedentary lifestyle and obesity have been found to be more common among those who skip breakfast than the breakfast eater (Keski-Rahkonen *et al.*, 2003). Breakfast skipping has also been found to be associated with dysmenorrhea among the females (Fujiwara, 2003). On the other hand, breakfast taking has also been found to be a contributing factor in main-taining weight loss (Wyatt *et al.*, 2002).

During these transitional years of young adulthood, establishment of a healthy lifestyle behaviour can have a long lasting impact on their health and the health of their future family. It is important that these young adults are educated and reinforced in healthy eating behaviour and are able to select a healthy choice of food in the future. Hopefully these healthy eating food habits can be sustained into the future so that problems of chronic diseases such as diabetes mellitus, hypertension and coronary heart disease could be delayed or prevented. All these diseases are lifestyle-related where diet plays an important role (Hu *et al.*, 2001; Sobngwi *et al.*, 2002; Key *et al.*, 2004; Lakka & Bouchard, 2005; Lindstrom, Peltonen & Tuomilehto, 2005).

The university and college arenas represent the final opportunity for health and nutritional education of a large number of young adults from the educator's perspective (Sakamaki *et al.*, 2005). Therefore, a study was initiated in a public university in Kuala Lumpur, Malaysia with the intention of identifying their dietary habits and associated factors contributing to breakfast skipping among the undergraduates. However, this paper will only report the pattern of breakfast skipping and its associated factors.

MATERIALS AND METHODS

An analytical cross-sectional study was conducted from March to May 2003 in a public university in Kuala Lumpur. Using the sample size calculator (Statscalc) from the EPI INFO software, the university undergraduate population of 20,000 and the expected frequency of breakfast skipping of 10% (Siega-Riz Popkin & Carson, 2000) with the worst accepted frequency of 8.5%, a total sample of 1,427 undergraduates would give the power of 80% with 95% confidence interval. The study protocol was approved by the Faculty of Medicine as well as the Unit of Students' Affairs of the university. Informed consent was also given by all respondents. Five thousand pre-tested and self-administered questionnaires were distributed to all faculties of the university. The sampling ratio was 1 out of four undergraduates based on the number of undergraduates of each faculty. Within each faculty, proportionate sampling was used to sample undergraduates of various years. The return of the questionnaire was 53% giving a total of 2665 questionnaires. The questionnaires enquired on socio-demographic characteristics, knowledge on nutrition, dietary habits, pattern of expenditure and accommodation of the undergraduates. However, this paper will only describe the socio-demographic characteristics and factors associated with breakfast skipping (such as skipping of lunch and dinner, consumption of fastfood and nutritional supplements, consumption of vegetables and fruits, smoking, accom-modation and academic performance among the undergraduates).

The operational definitions of some of the terms used in this study are as follows: Breakfast was defined as the first meal of the day, eaten before or at the start of daily activities, within 2 hours of waking, typically no later than 10:00 am as defined by Giovannini *et al* (2008). Skipping of breakfast meant consuming breakfast fewer than 7

days per week while fastfood was defined as convenience foods that can be prepared and served very quickly, including salty french fries, hamburgers, fried chicken, and pizzas which are usually served in fastfood restaurants. Nutritional supplements are preparations to be taken orally intended to supply nutrients such as vitamins and minerals. Consumption of fruits and vegetables was measured by asking if the respondents consumed fruits or vegetables during lunch or dinner. A positive response was given a score of 1 and the fruits and vegetables consumption score ranged from 0 to 4. Academic performance was self-reported Cumulated Grade Point Average (CGPA) points which is commonly used in universities in Malaysia.

Data was entered and analysed using the SPSS for windows 15.0. Univariate analysis was used to describe the variables, bivariate analysis was used to study the association of two variables and when there was significant association, multivariate analysis (Logistic Regression) was conducted to control for confounders. Significance level was pre-set at 0.05. Odds ratio (OR) and 95% confidence interval are reported where applicable. Receiver Operating Curve (ROC) was drawn for the final Logistic Regression model.

RESULTS

The total number of respondents in the survey was 2665 which represented 13% of all undergraduates in the university. As shown in Table 1, there were slightly more females than males in the sample. The racial distribution reflected the country's racial distribution with Malays being the largest group, followed by Chinese, Indian and the

Table 1. Socio-demographic characteristics of the respondents (n=2665)

		n (%)
Sex	Male	1160 (43.5)
	Female	1505 (56.5)
Race	Malay	1551 (58.3)
	Chinese	785 (29.5)
	Indian	160 (6.0)
	Sabahan & Sarawakian	164 (6.2)
Age groups	Less than 20 years	382 (10.7)
	20 – 22 years	1762 (66.8)
	23 – 24 years	412 (15.7)
	$\geq$ 25 years	179 (6.8)
Age (mean $\pm$ s.d.)	21.7 $\pm$ 2.8 years	
Faculty	Life & Health Sciences	763 (29.5)
	Engineering & Physical Sciences	813 (31.4)
	Arts, Social Sciences & Economy	1011 (39.1)
Academic year	Year 1	1040 (39.1)
	Year 2	755 (28.4)
	Year 3	638 (24.0)
	Year 4 & 5	226 (9.2)
Accommodation	Hostel with food catered	1023 (39.2)
	Hostel with cafeteria	535 (20.5)
	Rented house	866 (33.2)
	Own House	185 (7.1)

Table 2. Prevalence of meal skipping and associated factors

		n (%)
Prevalence of meal skipping	Breakfast	778 (29.2)
	Lunch	300 (11.3)
	Dinner	236 (8.9)
Consumption of nutritional supplements	Yes	594 (22.3)
	No	2071 (77.7)
Fast food consumption	Yes	
	No or less frequent	941 (35.3) 1724 (64.7)
Fruits & vegetable consumption score (mean ± s.d.)	1.47 ± 1.16	
Smoking	Yes	158 (5.9)
	No	2507 (94.1)

indigenous communities of Sabah and Sarawak.

About 67% of the undergraduates were in the age group of 20 to 22 years (mean age: 21.7 + 2.8 years) and they came from a variety of backgrounds as shown by the distribution of students from various faculties. There were more Year 1 undergraduates who responded to the questionnaire followed by Year 2 and Year 3 undergraduates, while only a small proportion comprised Years 4 and 5 undergraduates who were from the professional courses such as Medicine, Dentistry, Engineering and Architecture. About 60% of the undergraduates stayed in the university's hostels which could be divided into hostels with food catered and hostels with cafeteria. Those who stayed in hostels with food catered had included meals in their payment with accommodation and they were expected to take their meals in the hostel. Those who stayed in hostels with cafeterias needed to pay when they purchased food from the cafeterias. Most of the undergraduates who stayed in the hostels were the first-year undergraduates. It was the university's policy to allow all first year undergraduates to stay in campus so that they could familiarise themselves with the campus environment.

Table 2 shows that the prevalence of breakfast skipping was 29.2% (95% C.I.: 27.3 – 30.3 %). Reasons for skipping breakfast were no time to eat (n = 341 or 43.8%), did not like to eat early (n=145 or 18.6%), no appetite (n=74 or 9.5%) and overslept (n=74 or 9.5%). Only 11.3 (95% CI: 9.8 – 12.2) % skipped lunch and 8.9 (95% CI: 7.9 – 10.1) % skipped dinner. Reasons for skipping lunch were no time to eat (n=118 or 39.3%), no appetite to eat (n=61 or 20.3%) or food not palatable (n=22 or 7.3%). Reasons for skipping dinner were quite similar to reasons for skipping lunch (no appetite, do not like to eat at dinner time, no time to eat) except that dieting emerged as one of the reasons for skipping dinner.

About 22% of the undergraduates took nutritional supplements on a regular basis (daily) while about one -third (35.3%) of them took fast food at least once a week. The consumption of fruits and vegetables was unsatisfactory as the mean score was only 1.46 + 1.15 (minimum = 0 and maximum score =4). Only about 6% of the undergraduates reported to be current smokers.

Factors found to be significantly associated ($p<0.05$) with breakfast skipping were race, faculty, accommodation, academic performance, age, skipping of dinner, consumption of fastfood, consumption of vegetables and fruits; and smoking (Table 3). Malays, students from non-Life Sciences' majors, staying in hostels or rented houses, those with poorer academic performance and younger undergraduates had significantly higher proportions of breakfast skipping compared to their counterparts. Respondents who skipped breakfast, consumed fastfood at least once a week, consumed less vegetables and fruits daily (with lower scores) were also found to be more likely to

Table 3. Association of variables with breakfast skipping

		Breakfast skipping (n= 778)		*p-value*
		Yes *n (%)*	*No* *n (%)*	
Gender	Male	350 (30.2)	810 (69.8)	0.33
	Female	428 (28.4)	1077 (71.6)	
Race	Malays	532 (34.3)	1019 (65.7)	< 0.01
	Chinese	144 (18.3)	641 (81.7)	
	Indians	48 (30.0)	112 (70.0)	
	Sabahan & Sarawakian	54 (32.9)	110 (67.1)	
Faculty	Arts & Economics	311 (30.8)	700 (69.2)	0.01
	Engineering	252 (31.0)	561 (69.0)	
	Life Sciences	191 (25.0)	572 (75.0)	
Accommodation	Hostel (meals catered)	305 (29.8)	718 (70.2)	< 0.01
	Hostel (cafeteria)	198 (37.0)	337 (63.0)	
	Own house	24 (13.0)	161 (87.0)	
	Rented house	242 (27.9)	624 (72.1)	
AcademicPerformance (CGPA)	<2.5	118 (36.8)	203 (63.2)	<0.01
	2.5 -3.5	438 (29.3)	1059 (70.7)	
	> 3.5	92 (25.1)	274 (74.9)	
BMI	Underweight	182 (28.4)	459 (71.6)	0.78
	Normal weight	513 (29.9)	1204 (70.1)	
	Overweight	58 (29.1)	141 (70.9)	
Age in years	(mean $\pm$ s.d.)	21.33 $\pm$ 2.13	21.90 $\pm$ 3.03	<0.01
Skipping lunch	Yes	100 (33.3)	200 (66.7)	0.094
	No	678 (28.7)	1687 (71.3)	
Skipping dinner	Yes	112 (47.5)	124 (52.5)	<0.001
	No	666 (27.4)	1763 (72.6)	
Nutritional supplements	Yes	157 (30.0)	437 (70.0)	0.093
	No	621 (26.4)	1450 (73.6)	
Fast food consumption	Yes	301 (32.0)	640 (68.0)	0.019
	No	477 (27.7)	1247 (72.3)	
Vege & fruits score		1.37 $\pm$ 1.10	1.51 $\pm$ 1.18	0.003
Smoking	Yes	57 (36.1)	101 (63.9)	0.050
	No	721 (28.8)	1786 (71.2)	

Table 4. Crude and adjusted odds ratio (O.R) for confounders on breakfast skipping

		Crude O.R.	*Adjusted O.R.*
Race	Chinese*	1.00	1.00
	Malay	2.32 (1.89 – 2.86)	1.94 (1.48 – 2.54)
	Indian	1.91 (1.30 – 2.80)	1.70 (1.08 – 2.66)
	Sabahan & Sarawakian	2.19 (1.51 – 3.17)	2.13 (1.37 – 3.33)
Accommodation	Own house*	1.00	1.00
	Hostel (food catered)	2.85 (1.82 – 4.46)	2.32 (1.39 – 3.84)
	Hostel (cafeteria)	3.94 (2.48 – 6.26)	2.92 (1.74 – 4.91)
	Rented house	2.60 (1.65 – 4.09)	2.08 (1.25 – 3.46)
Academic performance (CGPA)	> 3.5*	1.00	1.00
	< 2.5	1.73 (1.25 – 2.40)	1.23 (0.85 – 1.78)
	2.5 – 3.5	1.23 (0.95 – 1.60)	0.97 (0.72- 1.29)
Faculty	Life Sciences*	1.00	1.00
	Arts & Economics	1.33 (1.08 – 1.64)	1.40 (1.07 – 1.82)
	Engineering	1.35 (1.08 – 1.69)	1.20 (0.92 – 1.58)
Skipping lunch	No*	1.00	1.00
	Yes	1.24 (0.96 – 1.61)	1.06 (0.79 – 1.42)
Skipping dinner	No*	1.00	1.00
	Yes	2.39 (1.82 – 3.13)	2.02 (1.47 – 2.77)
Nutritional supplement	Yes*	1.00	1.00
	No	1.19 (0.97 – 1.46)	1.03 (0.81 – 1.31)
Fastfood consumption	No*	1.00	1.00
	Yes	1.23 (1.03 – 1.46)	1.21 (0.99 – 1.49)
Smoking	No	1.00	1.00
	Yes	1.40 (1.00 – 1.96)	1.20 (0.82 – 1.76)
Fruits & vege score		0.90 (0.84 – 0.97)	0.93 (0.85 – 1.01)
Age (years)		0.92 (0.88-0.95)	0.95 (0.89 – 0.99)

*reference group (ROC area under the curve = 0.654)

skipp breakfast. Smoking was marginally significant (p=0.05) with breakfast skipping. Gender, skipping lunch and taking nutritional supplements were not significantly associated with breakfast skipping.

After adjusting for all the above confounders using Multiple Logistic Regression, age, race, accommodation, faculty and skipping dinner were found to be significant (p<0.05) as shown in Table 4. As the respondents' age increased, their risks of breakfast skipping was lower (OR: 0.95; 95% CI: 0.89 – 0.99). Malays (OR: 1.94; 1.48 – 2.54), Indians (OR: 1.70; 1.08 – 2.66); and undergraduates from Sabah and Sarawak indigenous communities (OR: 2.13; 1.37 – 3.33) were more likely to skip breakfast compared to their Chinese counterparts. Respondents who stayed in their own houses were also less likely to skip breakfast compared to those staying in hostels with meals catered (OR: 2.32; 1.39 – 3.84), hostels with cafeteria (OR: 2.92; 1.74 – 4.91) or rented houses (OR: 2.08; 1.25 – 3.46). Respondents majoring in Arts & Economics had 1.40 (1.07

– 1.82) times risk of breakfast skipping compared to those majoring in Life Sciences. Those who skipped dinner too had the odds of 2.02 (1.47 – 2.77) times of breakfast skipping. The area under the Receiver Operating Curve (ROC) was 0.654, meaning that the above variables were able to explain 65.4% of breakfast skipping.

DISCUSSION

The university and college arenas represent the final opportunity for health and nutritional education of a large number of students from the educator's perspective (Sakamaki *et al.*, 2005). It is important that the undergraduates are educated and reinforced in healthy eating behaviours and are able to select a healthy choice of foods in the future.

Skipping of breakfast was found to be quite high (29%) among this group of respondents. Studies show that the prevalence of breakfast skipping is common among young adults in colleges and universities (Samuelson, 2000; Keski-Rahkonen *et al.*, 2003; Osako *et al.*, 2005; Song *et al.*, 2005). People who did not take breakfast were much more likely to have inadequate nutrient intakes. Regular breakfast consumption is associated with better diets for adults overall (Williams, 2005). A study by Ma *et al.* (2003) found that adults and adolescents who skipped breakfast tend to eat more for the rest of the day. Breakfast skipping was also associated with increased prevalence of obesity (O.R. 4.5; 1.57 – 12.90) and dysmenorrhea among the females (Fujiwara, 2003).

After adjusting for confounding factors in the Multiple Logistic Regression model, respondents who were younger, non-Chinese, non-Life Science majors, staying out of own house and skipping dinner were significantly at higher risk of breakfast skipping ($p<0.05$). Reasons for breakfast skipping were more of personal choice such as no time to eat, did not like to eat early, no appetite or overslept. Similar findings have been reported elsewhere (Chitra & Reddy, 2007). The younger undergraduates were more likely to skip breakfast perhaps due to ignorance or inability to adapt to campus life. Non-Chinese had a higher tendency to skip breakfast compared to Chinese perhaps due to the fact that the Chinese culture considers food as an important component of their life (Chang, 1977) and these undergraduates might have been educated from young about the importance of food. Non-Life Science majors might not have been reinforced on the importance of a healthy eating behaviour (including not skipping meals) as the Life Science majors in their current curriculum. Increased knowledge of dietary guidelines appeared to be positively related to more healthful eating patterns (Kolodinsky *et al.*, 2007).

Undergraduates who stayed in their own houses were least likely to skip breakfast possibly due to their family members preparing breakfast for them. Study by Yokoyama *et al* (2002) showed that students who were not supplied with meals from their mothers or dormitory food service had more irregular meal times and skipped breakfast more than the students supplied with meals. A study by Keski-Rahkonen *et al.* (2003) found that those who skipped breakfast were more prone to skipping lunch or dinner, consumed more fastfood and snacked. However, the current study found that only respondents who skipped breakfast were more likely to skip dinner.

Studies show that consumption of vegetables and fruits is unsatisfactory among college or university students (Debate, Topping & Sargent, 2001; Osako *et al.*, 2005). Among our respondents, vegetables were found to be consumed by only about half while fruits were only consumed by less than one-third of them (results not shown). Therefore the score of vegetables and fruits consumption obtained for the whole group was generally low. Reasons for this could be due to the ignorance of students about

the importance of vegetables and fruits in the diet; inaccessiblilty of fruits and vegetables or unaffordable prices at the cafeteria. Respondents who skipped breakfast were also found to have even lower consumption of vegetables and fruits. Similar results were shown by Chung & Hoerr (2005) where a positive association between breakfast taking with vegetable and fruit consumption existed among their participants. However, the association was not statistically significant in this study.

Breakfast skipping is associated with health-compromising behaviours in adults and adolescents such as smoking (Keski-Rahkonen *et al.*, 2003). However, this study did not show significant results possibly due to the small numbers of smokers.

Therefore as observed above, some of the predictors for breakfast skipping were more related to knowledge and information available to the undergraduates. The non Life Science undergraduates especially those from the Arts and Economics faculty urgently need more information or knowledge in healthier choices of food and healthy eating behaviours. This could be achieved through awareness campaigns in campus or introduction of related courses in all faculties of the university. The younger undergraduates should be given more attention by the management of the university where they should be briefed on life in campus and possibly how to adapt to campus life; as well as the importance of a healthy lifestyle especially a healthy diet. The Malaysian Dietary Guidelines should be introduced to these undergraduates with effective awareness campaigns within the campus. This may be a useful mechanism for promoting change in what they choose to eat.

Caterers of the cafeterias in the campus should be educated on the importance of providing a healthy choice in their menu, making vegetables and fruits more available and affordable. The menu and cooking methods of meals catered by the cafeterias should be improved as inpalatibility was mentioned as one of the reasons for skipping meals. The management of the university should also monitor the choices of food offered by the cafeterias in the campus. Glanz & Holscher (2004) found that a changing environment, policy and pricing did manage to result in moderate improvement on the consumption of fruits and vegetables.

CONCLUSION

The prevalence of skipping breakfast among the undergraduates of this university was 29%. Factors influencing breakfast skipping were age, race, accommodation, faculties and skipping dinner. Health awareness campaigns or the introduction of healthy eating guidelines should be implemented to the undergraduates as well as to the caterers in campus. The policy and pricing of catered food in campus should also be reviewed.

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