Dietary practices of adolescents in Singapore and Malaysia

K Lew, P J Barlow

ABSTRACT

Introduction: This study sets out to investigate any differences in dietary practices between adolescents in Singapore and Malaysia.

Methods: An adolescent dietary practices survey was conducted in Singapore and Malaysia involving 200 adolescents (100 from each country) aged 11 to 21 years in order to have a better understanding of the adolescents' dietary practices. Dietary practices were assessed by a self-administered dietary practices questionnaire (DPQ).

Results: The major differences identified between adolescents' dietary practices in Singapore and Malaysia are related to alcohol consumption and venue for taking of lunch. More Malaysian adolescents have their lunch prepared at home (32.9 percent), compared with 7.2 percent of Singaporean adolescents. More adolescents in Malaysia drink alcohol (49.4 percent), compared with only 21.7 percent of Singaporean adolescents.

Conclusion: From the dietary practices survey of adolescents from Singapore and Malaysia, it may be concluded that while general dietary practices are similar, the major differences identified were significantly (p-value is less than 0.05) higher alcohol consumption by Malaysian adolescents and significantly (p-value is less than 0.05) more Malaysians took their lunch at home compared with Singaporeans. The reasons for the differences are discussed in the paper.

Keywords: adolescent dietary practice, diet, food habits, nutritional behaviour

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INTRODUCTION

Adolescence is defined as the period between childhood and adulthood, i.e. from puberty, the period during which the generative organs become capable of exercising the function of reproduction, to maturity. In this study, the age range 11-21 years, was used to define adolescence. There is generally an increase in nutrient requirements during the normal development process of adolescents. An increase in the amount of or change in the type of food consumed puts adolescents at a greater risk of becoming obese, especially when energy input is greater than output. Societal promotion of the ideal female body with extreme thinness (which normally corresponds to underweight), prompts many female adolescents to pursue weight loss and weight control relentlessly in an often cyclical pattern[1].

It is said that adolescents are not fed like children but they eat what and when they want. It is well-recognised that nutrient needs are high during the rapid growth and development of adolescence. It is therefore important that adolescents have reliable nutrition information and develop dietary patterns that will serve them well at that time and for the future. Energy needs during adolescence may be very different for individuals – an actively growing adolescent boy at 15 or 16 years of age may require as much as 4,000 calories per day while a slowly-growing girl of the same age may only need 2,000 calories per day to maintain her weight.

Diet plays a major role in a person's everyday life. The nutritional behaviour in adolescents is often less than ideal. Due to their busy schedules, peer pressure, independent nature and self-identity searching, adolescents may sometimes skip a meal, eat only snacks, try unconventional meals or consume excessive amounts of fast food, soft drinks and/or alcohol, and diet to the extreme[2]. In today's lifestyle, and particularly in adolescence, snacks have become an important part of the daily food intake. Snacks are reported to provide up to one-quarter of an adolescent's daily intake of energy but are generally high in fat and sugar but low in iron, calcium, vitamins A, C and folate[3].

Psychologically, adolescents develop their independence, and try and fit into their social circle. Peer pressure may cause them to choose soft drinks

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Table I. Age and ethnic origin of participants.

		Singaporean adolescents (%)	Malaysian adolescents (%)
Ethnic	Chinese	85	90
	Malays	10	7
	Indians	4	2
	Other races	1	1
Age group	11-14 years	25	25
	14-17 years	8	32
	18-21 years	67	43

instead of milk and to skip lunch to "hang around" with their peers. Adolescents want to develop independence and make choices for themselves. They choose what and where to eat and drink. Truswell[4] has suggested the following eating behaviours as common in adolescents, such as missing meals, eating snacks and confectionery, consuming high levels of fast food, consuming unconventional meals, drinking high amounts of alcohol and/or soft drinks, generally consuming low levels of minor nutrients (empty calories) and often "being on a diet".

In view of the above, it was considered of interest to investigate the dietary practices of two different groups of adolescents in the South-East Asia region. One population group was from Singapore and one from Malaysia. The study set out to compare and contrast the dietary practices in typical adolescents from the two countries. A random sample of 100 adolescents (in the age range 11 to 21 years) from each country was selected, and information on their dietary practices was elucidated by means of a self-administered questionnaire. This survey was part of a more detailed research project on "malnutrition in adolescents – with particular reference to Singapore and Malaysia" exploring obesity, anorexia nervosa, bulimia nervosa and iron deficiency in adolescents (Lew Ker, independent study project, food science and technology programme, 2003 – unpublished data). The adolescent dietary practices survey reported here was conducted to provide information on the selected adolescent population's dietary practices, and to compare and contrast such practices in adolescents from Singapore and from Malaysia.

METHODS

The adolescent dietary practices survey was conducted in both Singapore and Malaysia. A sample of 100 adolescents aged 11 to 21 years both from Singapore and Malaysia (200 subjects in total) were randomly-selected for participation in the survey. Subjects were obtained from schools and colleges in Singapore and Malaysia through personal contact and were considered representative of the adolescents from both countries. Dietary practices were assessed by a self-administered dietary practices questionnaire (DPQ).

The DPQ was developed based on the questionnaire used for the national nutrition survey 1998 (NNS 98) and the 1993 food consumption study[5,6]. It consisted of 17 multiple choice questions and was translated into Chinese and Malay. The topics covered in the questionnaire included usual venues for breakfast, lunch and dinner, frequency of eating at home and outside the home, usual frequency

Table II. Body mass index in relation to age for the studied participants.

Age group	Body mass index (BMI) (kg/m^2)	Singaporean adolescents (%)	Malaysian adolescents (%)
11-14 years	15-17.9	39	17
	18-19.9	30	41
	20-23	27	29
	>23	4	13
14-17 years	16-17.9	6	10
	18-20.9	12	9
	21-24	74	69
	>24	8	12
18-21 years	18-19.9	6	13
	20-21.9	4	25
	22-25	87	58
	>25	3	4

Fig. 1 Dietary habits in adolescents from Singapore.

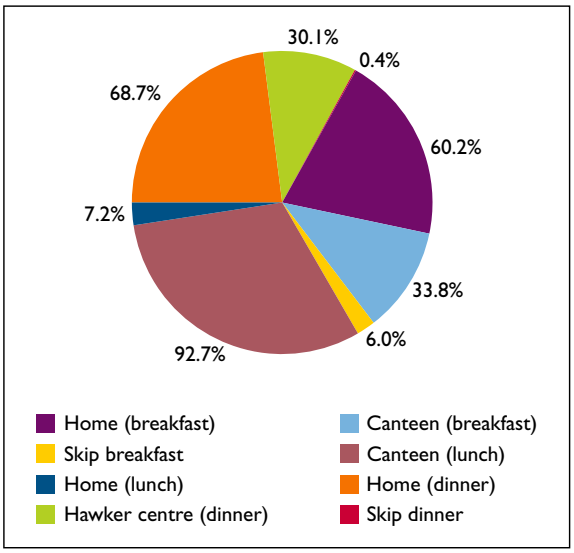
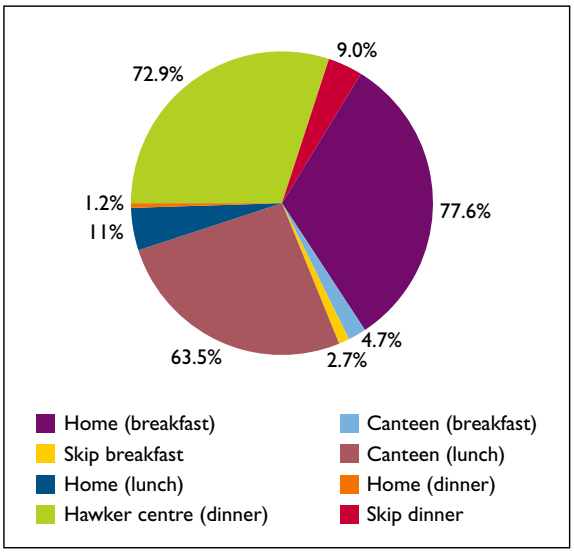


Fig. 2 Dietary habits in adolescents from Malaysia.



of intake of selected food and beverages, and food habits and attitudes. Details of the actual participants from both countries are presented in Tables I and II. DPQ were analysed using Statistical Package for Social Sciences (SPSS) for Windows version 12.0 (Chicago, IL, USA). To compare the differences between the choices, ANOVA and Tukey's test were used.

RESULTS

A comparison of venues for meals for each group is shown in Figs. 1 and 2. The percentage of adolescents in Singapore having breakfast at home is significantly more ($p \leq 0.05$) than that of adolescents having breakfast at other venues or not eating breakfast at all. The percentage of adolescents having lunch at school and junior college canteens is significantly more ($p \leq 0.05$) than that of adolescents having lunch packed from home and at restaurants and coffee houses. The percentage of adolescents having dinner at home is significantly more ($p \leq 0.05$) than that of adolescents having dinner at other venues or not eating dinner at all.

The percentage of adolescents in Malaysia having breakfast, lunch and dinner at home significantly exceeds ($p \leq 0.05$) meals at other venues, with hawker centres being the most common venue when lunch is taken outside the home. Only a small number skip breakfast (8.2%) and dinner (3.6%) but all reported to have taken lunch. The percentage of adolescents eating supper once a week or less is significantly more ($p \leq 0.05$) than that of adolescents eating supper 6-7 times a week or not eating supper at all.

The percentage of Malaysian adolescents having lunch at home is significantly more ($p \leq 0.05$) than that of Singaporean adolescents. 60.2% of adolescents in Singapore eat three meals a day (52.9% males, 66.3% females). 24.1% of adolescents eat four meals a day (38.2% males, 14.3% females), 8.4% eat two meals a day (2.9% males, 12.2% females), 4.8% eat 5-6 times a day, while 1.2% eat only once a day (2.0% females). The percentage of adolescents in Singapore consuming three meals a day is significantly more ($p \leq 0.05$) than that of adolescents consuming meals at other frequencies. The percentage of adolescents consuming four meals a day is significantly more ($p \leq 0.05$) than that of adolescents consuming one meal a day.

60.0% of Malaysian adolescents eat three meals a day (54.3% males, 66.7% females), 16.5% eat four meals a day, 14.1% eat two meals a day (12.8% males, 15.2% females), while 9.4% eat once a day (13.0% males, 5.1% females). The percentage of Malaysian adolescents consuming three meals a day is significantly more ($p \leq 0.05$) than that of adolescents consuming meals at different frequencies. 89.2% of Singaporean adolescents eat at western fast food restaurants. Of these, 66.3% eat at fast food restaurants once a week (67.6% males and 65.3% females), followed by 15.7% 2-5 times a week, 1.2% 6-7 times a week and 1.2% 8 times a week or more.

The percentage of adolescents in Singapore eating at western fast food restaurants once a week is significantly more ($p \leq 0.05$) than that of adolescents eating at western fast food restaurants at other frequencies or do not eat at western fast food restaurants at all. The percentage of adolescents eating at western fast food restaurants 2-5 times a week is significantly more ($p \leq 0.05$) than that of adolescents eating at western fast food restaurants at other frequencies or who do not eat at western

fast food restaurants at all. The percentage of adolescents who do not eat at western fast food restaurants at all is significantly more ($p \leq 0.05$) than that of adolescents eating at western fast food restaurants more than five times per week.

75.3% of Malaysian adolescents eat at western fast food restaurants. 28.3% of males and 20.5% of females never eat at western fast food restaurants. 63.6% eat at fast food restaurants once a week (63.0% males, 64.1% females). 4.7% eat at western fast food restaurants 2-5 times a week, followed by 2.4% 8 times a week or more, and 1.2% 6-7 times a week. The percentage of Malaysian adolescents eating at western fast food restaurants once a week is significantly more ($p \leq 0.05$) than that of adolescents eating at western fast food restaurants at other frequencies and that of adolescents that do not eat at western fast food restaurants at all. The percentage of adolescents that do not eat at western fast food restaurants is significantly more ($p \leq 0.05$) than that of adolescents eating at western fast food restaurants more than once per week.

91.6% of Singaporean adolescents consume "fast" takeaway food frequently, except 17.6% of males and 2.0% of females. 49.4% consume these foods 2-5 times a week (41.2% males, 55.1% females), followed by once a week (37.3%, 38.8% females and 35.3% males). 2.4% of adolescents consume these 6-7 times a week, and 2.4% 8 times a week or more. The percentage of Singaporean adolescents consuming "fast" takeaway food 2-5 times a week is significantly more ($p \leq 0.05$) than that of adolescents consuming these 6-7 times a week, 8 times a week or more, and those who do not consume these at all. The percentage of adolescents consuming "fast" takeaway food once a week is significantly more ($p \leq 0.05$) than that of adolescents consuming these 6-7 times a week, 8 times a week or more, and those who do not consume these at all.

74.1% of Malaysian adolescents consume "fast" takeaway food frequently. However, 19.6% of males and 33.3% of females have never consumed these types of food. 43.5% consume these once a week (50.0% males, 35.9% females), followed by 2-5 times a week (25.9%, 23.9% males and 28.2% females). 2.4% consume these 6-7 times a week, and 2.4% 8 times a week or more. The percentage of Malaysian adolescents consuming "fast" takeaway food once a week is significantly more ($p \leq 0.05$) than that of adolescents consuming these 6-7 times a week and 8 times a week or more. The percentage of adolescents that do not consume "fast" takeaway food is significantly more ($p \leq 0.05$) than that of adolescents consuming these 6-7 times a week and 8 times a week or more. The percentage of adolescents consuming "fast" takeaway food 2-5 times a week is significantly more ($p \leq 0.05$) than that of adolescents consuming these 6-7 times and 8 times a week or more.

44.6% of Singaporean adolescents eat vegetables twice a day (50.0% males, 40.8% females). 28.9% of adolescents eat vegetables 2-6 times a week, 22.9% eat vegetables once a day (20.6% males, 24.5% females), and 3.6% of adolescents do not eat vegetables at all (6.1% females). The percentage of Singaporean adolescents eating vegetables twice a day is significantly more ($p \leq 0.05$) than that of adolescents eating vegetables once a day or who do not eat vegetables at all. The percentage of adolescents eating vegetables 2-6 times a week is significantly more ($p \leq 0.05$) than that of adolescents who do not eat vegetables at all.

47.1% of Malaysian adolescents eat vegetables twice a day (47.8% males, 45.2% females), 27.1% eat vegetables once a day (19.6% males, 36.9% females), 22.4% eat vegetables 2-6 times a week (28.3% males, 15.4% females), and 3.5% do not eat vegetables at all (4.3% males, 2.6% females). The percentage of Malaysian adolescents eating vegetables twice a day is significantly more ($p \leq 0.05$) than those who do not eat vegetables at all.

97.6% of Singaporean adolescents consume sweetened drinks, including soft drinks, fruit drinks, packet drinks, cordials, yoghurt-based drinks and cultured milk drinks. 49.4% consume these 2-5 times a week (20.6% males, 53.1% females), 32.5% consume these 7 times a week (58.8% males, 14.3% females), and 25.3% consume these once a week or less. 95.3% of Malaysian adolescents consume sweetened drinks, including soft drinks, fruit drinks, packet drinks, cordials, yoghurt-based drinks and cultured milk drinks. 4.7% males and 2.6% females do not drink these at all. 54.1% consume these once a week or less (58.7% males, 48.7% females), 36.5% consume these 2-6 times a week (32.5% males, 41.0% females), and 4.7% consume these 7 times a week or more.

The percentage of Malaysian adolescents consuming sweetened drinks once a week is significantly more ($p \leq 0.05$) than that of adolescents consuming these 7 times a week or more, and those who do not drink soft drinks at all. The percentage of adolescents consuming these 2-6 times a week is significantly more ($p \leq 0.05$) than that of adolescents consuming these 7 times a week or more, and those who do not drink these at all.

78.3% of Singaporean adolescents reported never to have consumed alcohol (85.3% males, 73.5% females). 20.5% of adolescents consume alcohol once

a week or less (14.7% males, 24.5% females), and 1.2% consume alcohol 7 times a week or more (2.0% females). It should be noted that the surveyed population comprised 85% ethnic Chinese. In contrast, 50.6% of Malaysian adolescents reported never to have consumed alcohol (54.3% males, 46.2% females). 45.9% consume alcohol once a week or less (41.3% males, 51.3% females), and 1.2% consume alcohol 7 times a week or more. In this surveyed population, 90% were ethnic Chinese. The percentage of Malaysian adolescents consuming alcohol is significantly more ($p \leq 0.05$) than that of Singaporean adolescents.

Most Singaporean adolescents consume snack and confectionery (98.8%), with the exception of 1.2% (2.9% females). 45.8% consume these 3-5 times a week (58.8% males, 36.7% females), 37.3% consume these 2 times a week or less (17.6% males, 51.0% females), and 15.7% consume these 6 times a week or more. 89.5% of Malaysian adolescents consume snacks and confectionery. 6.5% males and 15.4% females have never consumed these. 71.8% consume these twice a week (73.9% males, 69.2% females), 16.5% consume these 3-5 times a week (19.6% males, 12.8% females), and 1.2% consume these 6 times a week or more (2.6% females). The percentage of Malaysian adolescents eating snack and confectionery foods twice a week is significantly more ($p \leq 0.05$) than that of adolescents eating these at other frequencies or not at all.

The majority of Singaporean adolescents consume deep fried food, with the exception of 3.6% (6.1% females). 48.2% consume these twice a week or less, 30.1% 3-5 times a week, and 18.1% 6 times a week or more (36.3% males, 6.1% females). 90.6% of Malaysian adolescents consume deep fried food. 6.5% males and 12.8% females have never consumed these. 75.3% consume these 2 times a week or less (87.0% males, 61.5% females), 12.9% consume these 3-5 times a week (6.5% males, 20.5% females), and 2.4% consume these 6 times a week or more. The percentage of Malaysian adolescents consuming deep fried food twice a week or less is significantly more ($p \leq 0.05$) than that of adolescents consuming these at other different frequencies or not consuming these at all.

54.2% of Singaporean adolescents trim some of the fat from meat (55.9% males, 53.1% females). 31.3% trim all the fat from meat (14.7% males, 42.9% females), and 14.5% do not trim the fat from meat (29.4% males, 4.1% females). 56.5% of Malaysian adolescents trim some of the fat from meat (52.2% males, 61.5% females). 22.4% trim all the fat from meat (26.1% males, 17.9% females), 20.0% do not trim the fat from meat (19.6% males, 20.5% females), and 1.2% do not eat meat at all. The percentage of Malaysian adolescents trimming some of the fat from meat is significantly more ($p \leq 0.05$) than that of adolescents trimming all of the fat from meat, do not trim fat from meat, and do not eat meat at all.

49.4% of Singaporean adolescents trimmed some of the skin from poultry (47.1% males, 51.0% females). 24.1% do not trim the skin from poultry (38.2% males, 14.3% females), 20.5% trimmed all of the skin from poultry (32.7% males, 2.9% females), and 6.0% do not eat poultry at all (11.8% males, 2.0% females). 48.2% of Malaysian adolescents trim some of the skin from poultry (50.0% males, 45.2% females). 27.1% trim all of the skin from poultry, 23.6% do not trim the skin from poultry (21.7% males, 25.6% females), and 1.2% do not eat poultry at all. The percentage of Malaysian adolescents trimming some of the skin from poultry is significantly more ($p \leq 0.05$) than that of adolescents trimming all of the fat from poultry, do not trim skin from poultry and do not eat poultry at all. The percentage of Malaysian adolescents trimming all of the skin from poultry is significantly more ($p \leq 0.05$) than that of adolescents who do not eat poultry at all. The percentage of adolescents that do not trim the skin from poultry is significantly more ($p \leq 0.05$) than that of adolescents who do not eat poultry at all.

As summarised in Fig. 3, most Singaporean adolescents (50.6%) are not on a special diet and eat almost everything. 28.6% try to cut down fatty foods, sugar and/or red meat on their own accord (17.6% males, 36.7% females). 9.6% are on a red meat-free diet, and 7.2% on a fat-modified diet. The percentage of Singaporean adolescents not on a special diet is significantly more ($p \leq 0.05$) than that of adolescents on a red meat-free diet, fat-modified diet and other diets. As summarised in Fig. 4, most Malaysian adolescents (60.0%) are not on a special diet and eat almost everything. 28.2% try to cut down fatty foods, sugar and/or red meat on their own accord (26.1% males, 30.8% females). 4.7% are on a weight loss diet, 3.5% on a red meat-free diet, 2.4% on a fat- modified diet, and 1.2% are strict vegetarians.

The percentage of Malaysian adolescents not on a special diet is significantly more ($p \leq 0.05$) than that of adolescents on a low fat, sugar, red meat diet, a red meat-free diet, fat-modified diet, strict vegetarian diet and a weight loss diet. The percentage of Malaysian adolescents on a low fat, sugar, red meat diet is significantly more ($p \leq 0.05$) than that of adolescents on a red meat-free diet, fat-modified diet, strict vegetarian diet and a weight loss diet.

Fig. 3 Types of diet of adolescents from Singapore.

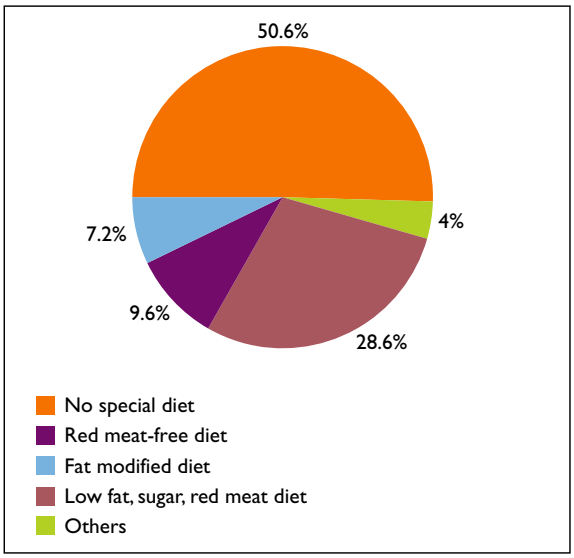
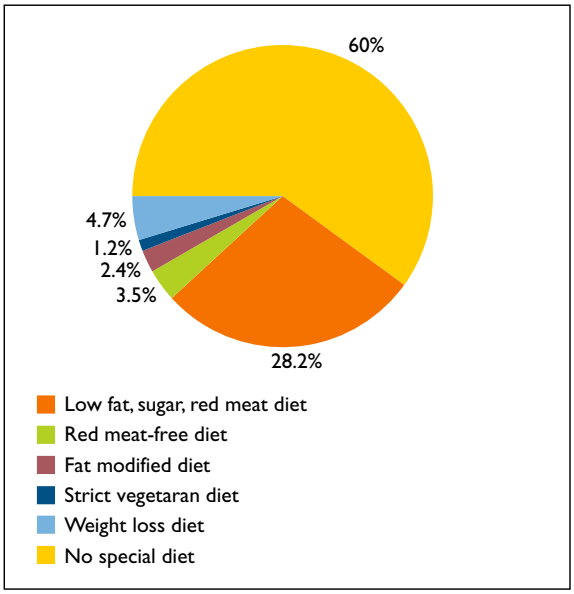


Fig. 4 Types of diet of adolescents from Malaysia.



As summarised in Fig. 5, most Singaporean adolescents (67.5%) have never dieted (82.4% males, 57.1% females), 24.1% have dieted occasionally in the past (17.6% males, 28.6% females), 4.8% are continually dieting, and 2.4% have dieted frequently in the past. The percentage of Singaporean adolescents who have never dieted is significantly more ($p \leq 0.05$) than that of adolescents who have dieted occasionally, frequently in the past, and those who are continually dieting.

As summarised in Fig. 6, most Malaysian adolescents (81.2%) have never dieted (84.8% males, 76.9% females). 9.4% have dieted occasionally in the past (6.5% males, 12.8% females), 7.1% are continually dieting, and 2.3% have dieted frequently in the past. The percentage of Malaysian adolescents who have never dieted is significantly more ($p \leq 0.05$) than that of adolescents who have dieted occasionally, frequently in the past, and those who are continually dieting.

The majority of Singaporean adolescents (94.0%) reported never to have been diagnosed with any of the common adolescent malnutrition conditions, including obesity, anorexia nervosa, bulimia nervosa, and other nutrient deficiencies, especially iron deficiency. 3.6% have been diagnosed with obesity (6.1% females), followed by 2.4% with iron deficiency (2.9% males, 2.0% females). The percentage of Singaporean adolescents who have never been diagnosed with any of the malnutrition conditions is significantly more ($p \leq 0.05$) that of adolescents having been diagnosed with obesity and iron deficiency.

The majority of Malaysian adolescents (92.9%) reported never to have been diagnosed with any of the above-mentioned malnutrition conditions. 3.5% have been diagnosed with obesity (4.3% males, 2.6%

Fig. 5 Frequency of dieting of adolescents from Singapore.

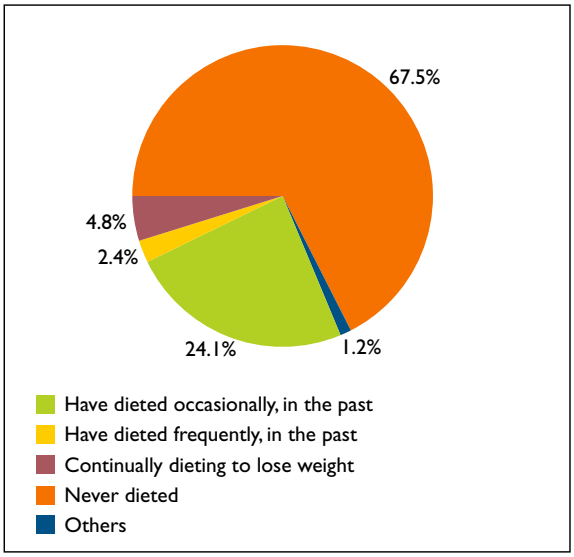
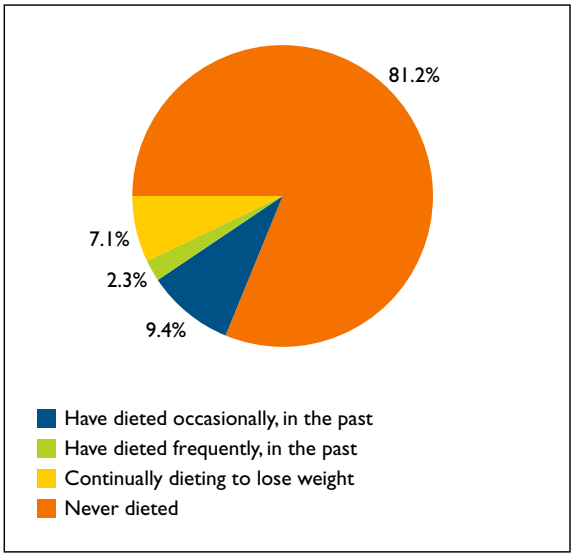


Fig. 6 Frequency of dieting of adolescents from Malaysia.



females), 1.2% with anorexia nervosa, and 1.2% with bulimia nervosa. The percentage of Malaysian adolescents that have never been diagnosed with any of the malnutrition conditions is significantly more ($p \leq 0.05$) than that of adolescents having been diagnosed with such conditions.

DISCUSSION

From the results obtained, it can be seen that there is scope for both groups of adolescents to improve their dietary practices. Perhaps the main practices that they need to consider are limiting their eating at western fast food restaurants, reducing their consumption of deep fried food, snacks, sweetened drinks and alcohol, as well as trimming fat and skin from poultry. Generally, from these results, it may be concluded that most of the dietary practices of both Singapore's and Malaysia's adolescents are similar but with some variations. One of the most notable differences is that 7.2% of Singapore's adolescents have their lunch prepared at home, compared with 32.9% of Malaysia's adolescents. Singapore's adolescents (89.2%) eat at western fast food restaurants more frequently compared with Malaysia's adolescents (75.3%). This is probably a reflection of availability of the restaurants and the monetary resources of adolescents in Singapore. Moreover, Singapore's adolescents (91.6%) consume more "fast" takeaway food compared with Malaysia's adolescents (74.1%). This might also be due to the accessibility of these foods in Singapore compared with Malaysia.

The consumption of snacks and confectionery is more frequent in Singapore's adolescents (98.8%) compared with Malaysia's adolescents (89.5%). More adolescents in Malaysia (49.4%) drink alcohol compared with that of Singapore (21.7%). The reason for this large difference is not known, but it may be related to the relatively cheap price of alcohol in Malaysia, in this case usually beer, or the Chinese Malaysian culture of gathering in "pubs". In addition to that, adolescents in Malaysia (85.9%) eat supper more frequently compared with that of Singapore (75.9%). This may be due to the presence of more "mamak stalls" in Malaysia. One more thing to note is that adolescents in Singapore (42.5%) are more weight conscious than Malaysia's adolescents (18.8%) and have dieted occasionally or frequently in the past, and some still continue to diet in order to lose weight.

Thus, the two major differences identified between adolescents' dietary behaviour in Singapore and Malaysia are: alcohol consumption, in that Malaysian adolescents appear to consume alcohol on a more regular basis than Singaporean adolescents; and taking of lunch, in that more Malaysian adolescents seems to have home prepared food for lunch compared with Singaporean adolescents. From this survey, it can be concluded that the dietary practices of adolescents can still be improved. More health education needs to be carried out in schools and colleges as well as through the mass media to convey the necessity of adopting sound dietary practices in adolescence. Better nutritional information on all products may also need to be provided to help adolescents to choose food wisely for better nutrition and health.

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