

Dietary and lifestyle habits amongst adolescents in Bahrain

Abdulrahman O. Musaiger^{1*}, Zahra Bader², Khaldoon Al-Roomi³ and Reshma D'Souza⁴

¹Nutrition and Health Studies Unit, Deanship of Scientific Research, University of Bahrain, Kingdom of Bahrain; ²Ministry of Health, Kingdom of Bahrain; ³College of Medicine and Medical Science, Arabian Gulf University, Kingdom of Bahrain; ⁴Bahrain Centre for Studies and Research, Kingdom of Bahrain

Abstract

Background: Changes in dietary habits and lifestyle are considered the main factors associated with several diet-related diseases in the Arab Gulf countries. The aim of this study was, therefore, to describe the dietary and lifestyle habits amongst adolescents in Bahrain.

Design: A cross-sectional study was carried out amongst male and female secondary school students selected using the multi-stage stratified random sampling technique. A sample size of 735 subjects (339 males and 396 females), aged 15–18 years, was selected from government schools from all the governorates of Bahrain.

Results: Skipping breakfast was significantly greater in females (62.8%) compared to males (37.2%), ($P < 0.01$). About 88% of adolescents snacked during school break, 70.7% procuring food from the school canteen. Fruit was not consumed by about 27.7% of respondents (33.5% males, 66.5% females) and the gender difference was statistically significant ($P < 0.01$). Fish and lentils were less preferred, while chicken was more popular. There was no significant difference between gender and frequency of eating fast food. About 8.4% of respondents reported not eating burgers, with 68.8% preferring regular size burgers. Furthermore, 24.4% preferred large portions of potato chips (53.1% male, 46.9% female). About 29.8% watched TV for more than 5 hours a day (51.2% females, 48.8% males). About 69% of males practiced sports everyday as against 30.8% of females ($P < 0.01$) and 81.6% of those who participated in sport activity outside school were males compared to 18.4% of females.

Conclusion: It seems that the adolescents in Bahrain are moving toward unhealthy dietary habits and lifestyles, which in turn will affect their health status in the future. Promoting healthy lifestyle and eating habits should be given a priority in school health programs.

Keywords: Bahrain; adolescents; food intake; fast foods; lifestyle; physical activity

Received: 23 March 2011; Revised: 7 July 2011; Accepted: 2 August 2011; Published: 9 September 2011

Evidence shows that dietary quality declines from childhood to adolescence. The intake of fruit, vegetables, milk, and fruit juices decreases, whereas the intake of soft drinks increases during this time (1). Studies among American children indicate that the food choices of adolescents are not consistent with the dietary guidelines and food intake tends to be low in fruit, vegetables, and calcium-rich foods and high in fat (2). Hilsen et al. (3) reported that a large number of Norwegian adolescents consume unhealthy food items at school and very few eat fruit and vegetables. Studies on adolescent food intake in different European countries showed a similar consumption of fat, particularly saturated fat and low fiber intake. Animal sources of protein represented about two-thirds of total protein intake

among adolescent girls with a low intake of calcium and iron (4).

With regard to the Arabian Gulf countries (including Bahrain), poor dietary habits such as skipping breakfast, a low intake of milk, fruits, and vegetables; and a high intake of carbonated beverages, sweets, and fast food were reported by several studies on school children (5–7). In addition, the significant epidemiological transformations that have occurred over the past two or three decades have resulted in the modification of the lifestyle to a more sedentary way of living, with considerable reduction in the extent of physical activity, an increase in the intake of fast foods, and the elevation of stress-related work and other activities (8). A study on Omani adolescent girls has indicated that overweight adolescent girls had a high

intake of energy-rich foods (9). In general, studies in the Arabian Gulf countries have reported a high consumption of foods rich in fats and calories among most communities with the results of increasing the risk of obesity and its co-morbidities (10). In Bahrain, studies on dietary habits among adolescents are, at most, scanty. In 1992 Musaiger and Gregory (11) found that skipping breakfast and consumption of calorie-dense foods was quite common amongst Bahraini adolescents. However, the investigation did not report any information on the lifestyle habits of the adolescents.

In view of the above, it was considered of interest to find out the dietary habits and lifestyle patterns among Bahraini adolescent school children. This will provide a basis to develop suitable intervention programs that encourage healthy eating and lifestyle options for this age group.

Methods and subjects

This study is a part of a project on obesity and lifestyle among adolescents in Bahrain and the United Arab Emirates. The project is divided into three parts: anthropometric measurements and obesity, factors associated with obesity, and lifestyle of adolescents. The current study covered the third part, which related to lifestyle in this age group in Bahrain.

Sampling

This was a descriptive cross-sectional study consisting of male and female grade 1–3 secondary school students selected from government schools from all the governorates of Bahrain. The sample was calculated with the assumption of prevalence of 50% of unhealthy dietary habits, 90% confidence interval, and perception of 0.03.

Students have been selected using a multi-stage stratified and clustered random sampling technique according to the gender, governorates, and grades. The final study sample size was 735, aged between 15 and 18 years (339 males and 396 females). The Kingdom of Bahrain is divided into five governorates: Capital, Al-Muharaq, North, Central, and South. Each governorate is served by a number of schools, which is proportional to the population density of a given governorate. The total number of secondary public schools was 30 (17 school for females and 13 for males) at the time of the study (2006). Male and female public secondary school children attend separate schools. A list of secondary schools in Bahrain was obtained from the Ministry of Education. Separate lists for males and females were used to obtain the sample; stratified by gender, governorate, and grade; and clustered on schools and class. The number of students chosen from each governorate was proportional to the student population density in that governorate.

The students were assembled in their classrooms. The objectives of the study as well as the questions in the

questionnaire were explained to the students. Then the students were asked to fill in the questionnaire, which was self-administrated. All the students attending the chosen classes at the time of collecting the data participated in the study and therefore there were no non-responders.

Ethical consideration

Permission to conduct this research was obtained from the Education and Development Research Committee in the Ministry of Education, which in turn informed the principals of the schools, teachers, and students before conducting the study. Parents were informed about the study through the schools.

Reliability and validity of the questionnaire

The questionnaire for this study was modified from a previously validated questionnaire (12). The current questionnaire was reviewed by nutrition specialists at Bahrain Center for Studies and Research and Ministry of Health in order to check it in terms of the extent to which the items reflect the concept of identifying the dietary habits of adolescents. The content validity of the tool was then tested by five experts in the field of nutrition, public health, and epidemiology from the Ministry of Health, Arabian Gulf University, and Bahrain Center for Studies and Research to ensure that the items in the questionnaire represent the objectives and provide adequate coverage of the purpose of the study. They all generally agreed about the content and some changes were incorporated according to their suggestions.

The stability of the questionnaire has been evaluated by test-retest reliability. The time between test and pretest was 1 week. The questionnaire was administered to the students on two occasions during the pilot study. The comparison between the results of the first and the second questionnaire was obtained by computing Pearson correlation, the result showed the value of 0.87 for Pearson correlation, which indicates that the questionnaire used in the study was reliable.

Pilot study

Forty-eight students (22 male and 26 female students, one class from the male and the female secondary school) were employed in the pilot study by completing the questionnaire after obtaining their permission and explaining the objectives of the study. The pilot study assessed the items where the participants were reluctant to answer any questions. The questionnaire required 15–20 min to be completed by the students. The final draft of the questionnaire had been modified based on the feedback received from the students. The two schools participating in the pilot study were excluded from the selected schools for the study.

The questionnaire

The instrument selected to measure the identified variables (dietary habits, lifestyle, and physical activities) is a structured, self-administered questionnaire. The questionnaire was divided into two parts: the first part relates to socio-demographic data including age, sex, and educational status of parents. Parent's level of education was defined as low (illiterate, those who can read, write, and have primary school education), middle (intermediate and secondary school education), and high (university education).

The second part consists of different questions pertinent to students' dietary habits and lifestyle. Information related to physical activity such as frequency of playing sports inside and outside the school and participation in physical education classes was obtained through self-reported questions.

Data analysis

All the questionnaires were reviewed for completion immediately after administering them to the students in the schools. Data were entered directly from the pre-coded questionnaires. Computer printouts of the data were reviewed for any information that was out of range. The statistical analysis was undertaken using the Statistical Package Social Sciences (SPSS), version 12 relevant descriptive statistics, as well as inferential statistics were compiled. Chi-square tests were used to determine the presence of association between the variables.

Results

Socio-demographic characteristics of the adolescents that participated in the study are given in Table 1. There was no significant difference in age distribution between males and females. About 22% of the adolescents' fathers and 32% of their mothers had low educational level. A higher level of education for fathers (31.2%) was observed as compared with that of the mothers (25.2%).

The food consumption and snacking patterns of the Bahraini adolescents are shown in Table 2. About 56% of the adolescents did not consume breakfast regularly, the proportion of females was nearly double (62.8%) than the males (37.2%), and the difference was statistically significant ($P < 0.01$). Similarly, the proportion of females who did not consume a regular lunch and supper (68.3 and 66.5%, respectively) was twice that of the males (31.7 and 33.5%, respectively) and the gender difference for both lunch and supper was statistically significant ($P < 0.01$).

On the whole about 88% of students consumed food during the school break. Most of them (70.7%) ate from the school canteen, while 34.4% ate food brought from home but with no significant gender difference. Supper was less likely to be eaten regularly (73.6%) than

Table 1. Socio-demographic characteristic of Bahraini adolescents

Socio-demographic	Gender						P-value*
	Total		Male		Female		
	N	%	N	%	N	%	
Number (%)	735	100	339	46.1	396	53.9	
Age (years)							
15	220	29.9	90	26.5	130	32.8	0.054
16	239	32.5	119	35.1	120	30.3	
17	215	29.3	108	31.9	107	27.0	
18	61	8.3	22	6.5	39	9.8	
Father's education							
Low	160	21.8	61	18.0	99	25.0	0.048
Middle	346	47.1	162	47.8	184	46.5	
High	229	31.2	116	34.2	113	28.5	
Mother's education							
Low	233	31.7	93	27.4	140	35.4	0.021
Middle	317	43.7	147	43.4	170	42.9	
High	185	25.2	99	29.2	86	21.7	

*Chi-square test, the p -value indicates the comparison between males and females.

lunch (83.3%). Males were more likely to eat lunch and supper on a regular basis than females. The difference was statistically significant ($P < 0.001$).

The type and frequency of food consumed by Bahraini adolescents are presented in Table 3. About 25% of the respondents reported eating fruit daily, while 27.7% consumed fruit rarely. Of those who rarely ate fruit, 33.5% were males and 66.5% were females. In general, males were more prone to consume fruit than females ($P < 0.001$). In addition, the proportion of respondents who rarely consumed vegetables was higher (38.1%) than those who consumed vegetables everyday (26%). Reverse trends were observed concerning the consumption of milk and other dairy products, where 37% consumed these products daily with the proportion of females (52.7%) more than males (47.3%; $P < 0.02$). The gender difference was also significant with meat consumption ($P < 0.001$), as males were more likely to consume meat than females.

Only 6.9% of the participants consumed fish on a daily basis, while a relatively high proportion (38.9%) did so rarely. Fish consumption was significantly more favored by males than females ($P < 0.003$). Chicken was more popular among the study group, with 18.2% of the respondents consuming chicken every day, while lentils were less preferred (4.1%). A similar preference was observed for nuts (7.6% ate nuts daily) and canned fruit juice (23.9% consumed daily).

Table 2. Food consumption and snacking patterns of Bahraini adolescents

Food and snacking pattern	Total		Male		Female		P-value*
	N	%	n	%	n	%	
Eating breakfast regularly							
No	411	55.9	153	37.2	258	62.8	0.000
Yes	324	44.1	186	57.4	138	42.6	
Place of eating breakfast							
At home	448	61.0	203	45.3	245	54.7	0.001
At school	287	39.0	136	47.4	151	52.6	
Bring food from home							
No	482	65.6	284	58.9	198	41.1	0.000
Yes	253	34.4	55	21.7	198	78.3	
Eating during school break time							
No	88	12.0	49	55.7	39	44.3	0.057
Yes	646	88.0	290	44.9	356	55.1	
Eat from school canteen							
No	215	29.3	104	48.4	111	51.6	0.431
Yes	520	70.7	235	45.2	285	54.8	
Eating food while going home							
No	580	78.9	257	44.3	323	55.7	0.057
Yes	155	21.1	82	52.9	73	47.1	
Eating lunch regularly							
No	123	16.7	39	31.7	84	68.3	0.000
Yes	612	83.3	300	49.0	312	51.0	
Eating supper regularly							
No	194	26.4	65	33.5	129	66.5	0.000
Yes	541	73.6	274	50.6	267	49.4	
Snacking between breakfast and lunch							
Always	126	17.1	59	46.8	67	53.2	0.686
Sometimes	477	64.9	215	45.1	262	54.9	
Never	132	18.0	65	49.2	67	50.8	
Snacking between lunch and supper							
Always	236	32.1	116	49.2	120	50.8	0.498
Sometimes	406	55.2	180	44.3	226	55.7	
Never	93	12.7	43	46.2	50	53.8	
Midnight snacks							
Always	139	18.9	62	44.6	77	55.4	0.303
Sometimes	286	38.9	142	49.7	144	50.3	
Never	310	42.2	135	43.5	175	56.5	

*Chi-square test, the *p*-value indicates the comparison between males and females.

The size and frequency of the intake of fast food and sweets by Bahraini adolescents are seen in Table 4. There was no significant difference between gender and frequency of eating fast foods per week. About 14.4% of adolescents ate fast food daily, while 29% rarely did so. In general, males were more likely to eat fast foods

outside their home than females ($P < 0.001$), whereas females preferred to eat fast foods inside the home ($P < 0.01$). A small percentage (8.4%) of adolescents reported not eating burgers and a majority of respondents (68.8%) preferred regular size burgers. However, the tendency to eat large size burgers was more pronounced among males than females ($P < 0.001$). A regular portion size of potato chips was preferred by 63.3% of the adolescents, among them 58.9% were females and 41.1% were males ($P < 0.002$). There was a wide range of preferences for soft drinks with 42.2% of participants consuming them every day and 27.8% consuming them rarely. Females showed a higher rate in the consumption of small and medium size soft drinks (57.8 and 56.3%, respectively) compared to males (42.2 and 43.7%, respectively) ($P < 0.05$). Females were more prone to consume sweets ($P < 0.01$) and chocolates ($P < 0.001$) than males.

The lifestyle habits of Bahraini adolescents are shown in Table 5. Only a negligible percentage (5.3%) did not watch television (TV) daily. There was no significant difference between males and females in watching TV. Of the adolescents, 41.8% always consumed food while watching TV while only 18.0% did not. No significant difference was reported between genders in eating while watching TV. More than 50% of adolescents browsed the Internet for 1 to 2 hours per day and 17.7% browsed for 3 to 4 hours a day. A very small proportion of adolescents (6.6%) ate while browsing the Internet, of whom 68.6% were males and 31.4% were females.

Over a quarter (26.5%) of the respondents never participated in any sporting activity, with a greater proportion being females (79.5%) compared to males (20.5%). About 69.2% of males practiced sports daily as against 30.8% of females ($P < 0.001$). Participation in sports activities in school was high (79.9%) while only 6.1% never took part in school sports. Amongst the adolescent participants who always engage in sports activities outside school, the majority were males (81.6%) while only 18.4% were females. In general, males significantly participated in more sport activity either at school ($P < 0.01$) or outside school ($P < 0.001$) than females.

Discussion

This study indicates unfavorable dietary habits and lifestyle by a high proportion of Bahraini adolescents. A previous study in Bahrain reported that about 19 and 22% of school males and females skipped breakfast, respectively (11). However, it is difficult to compare these findings with the results of this study due to the differences in age group and the way the questions were phrased. A similar tendency for skipping breakfast has been reported among Swedish (13) and Turkish (14) adolescents, where female adolescents were more likely to display abnormal eating attitudes and dieting behaviors than males. For females, skipping breakfast may be connected

Table 3. Type and frequency of food consumed by Bahraini adolescents

Frequency of eating different food/week	Total		Male		Female		P-value*
	N	%	n	%	n	%	
Fruits							
Daily	186	25.3	95	51.1	91	48.9	0.000
1-3 times	238	32.4	115	48.3	123	51.7	
4-6 times	107	14.6	60	56.1	47	43.9	
Rarely	203	27.7	68	33.5	135	66.5	0.001
Vegetables/salad							
Daily	193	26.3	102	52.8	91	47.2	0.125
1-3 times	192	26.1	89	46.4	103	53.6	
4-6 times	70	9.5	31	44.3	39	55.7	
Rarely	280	38.1	117	41.8	163	58.2	
Milk and dairy products							
Daily	273	37.1	129	47.3	144	52.7	0.017
1-3 times	198	26.9	92	46.5	106	53.5	
4-6 times	100	13.6	57	57.0	43	43.0	
Rarely	164	22.3	61	37.2	103	62.8	
Meat							
Daily	147	20.0	84	57.1	63	42.9	0.000
1-3 times	305	41.5	134	43.9	171	56.1	
4-6 times	125	17.0	67	53.6	58	46.4	
Rarely	158	21.5	54	34.2	104	65.8	
Fish							
Daily	51	6.9	31	60.8	20	39.2	0.003
1-3 times	284	38.6	135	47.5	149	52.5	
4-6 times	114	15.5	62	54.4	52	45.6	
Rarely	286	38.9	111	38.8	175	61.2	
Chicken							
Daily	134	18.2	74	55.2	60	44.8	0.067
1-3 times	364	49.5	154	42.3	210	57.7	
4-6 times	172	23.4	83	48.3	89	51.7	
Rarely	65	8.8	28	43.1	37	56.9	
Lentil/beans							
Daily	30	4.1	15	50.0	15	50.0	0.841
1-3 times	172	23.4	80	46.5	92	53.5	
4-6 times	74	10.1	37	50.0	37	50.0	
Rarely	459	62.4	207	45.1	252	54.9	
Nuts							
Daily	56	7.6	24	42.9	32	57.1	0.144
1-3 times	198	26.9	95	48.0	103	52.0	
4-6 times	67	9.1	39	58.2	28	41.8	
Rarely	414	56.3	181	43.7	233	56.3	
Canned fruit juice							
Daily	176	23.9	66	37.5	110	62.5	0.053
1-3 times	206	28.0	104	50.5	102	49.5	
4-6 times	125	17.0	57	45.6	68	54.4	
Rarely	228	31.0	112	49.1	116	50.9	

*Chi-square test, the *p*-value indicates the comparison between males and females.

Table 4. Fast food intake of Bahraini adolescents

Fast food intake	Total		Male		Female		P-value*
	N	%	n	%	n	%	
Frequency of eating fast food/week							
Daily	106	14.4	52	49.1	54	50.9	.327
1-3 times	277	37.7	132	47.7	145	52.3	
4-6 times	139	18.9	68	48.9	71	51.1	
Rarely or not	213	29.0	87	40.8	126	59.2	
Frequency of eating fast food outside home/week							
Never	133	18.1	49	36.8	84	63.2	0.000
Once	153	20.8	55	35.9	98	64.1	
Twice	171	23.3	66	38.6	105	61.4	
Three times	131	17.8	76	58.0	55	42.0	
Four times +	147	20.0	93	63.3	54	36.7	
Frequency of eating fast food inside home/week							
Never	126	17.2	77	61.1	49	38.9	0.006
One time	136	18.5	60	44.1	76	55.9	
Two times	166	22.6	75	45.2	91	54.8	
Three times	101	13.8	44	43.6	57	56.4	
Four times +	205	27.9	83	40.5	122	59.5	
Size of burger preferred							
Don't eat	62	8.4	25	40.3	37	59.7	0.000
Regular	506	68.8	208	41.1	298	58.9	
Large	167	22.7	106	63.5	61	36.5	
Size of chips preferred							
Don't eat	90	12.2	52	57.8	38	42.2	0.002
Regular	465	63.3	191	41.1	274	58.9	
Large	179	24.4	95	53.1	84	46.9	
Soft drinks							
Daily	310	42.2	175	56.5	135	43.5	0.000
1-3 times	130	17.7	50	38.5	80	61.5	
4-6 times	91	12.4	45	49.5	46	50.5	
Rarely or not	204	27.8	69	33.8	135	66.2	
Size of soft drinks preferred							
Don't drink	85	11.6	45	52.9	40	47.1	0.036
Small	270	36.7	114	42.2	156	57.8	
Medium	268	36.5	117	43.7	151	56.3	
Large	112	15.2	63	56.3	49	43.8	
Intake of sweets/week							
Daily	231	31.4	86	37.2	145	62.8	0.003
1-3 times	193	26.3	93	48.2	100	51.8	
4-6 times	105	14.3	47	44.8	58	55.2	
Rarely	206	28.0	113	54.9	93	45.1	
Intake of chocolates/week							
Daily	239	32.5	85	35.6	154	64.4	0.000
1-3 times	191	26.0	92	48.2	99	51.8	
4-6 times	95	12.9	45	47.4	50	52.6	
Rarely	210	28.6	117	55.7	93	44.3	

*Chi-square test, the *p*-value indicates the comparison between males and females.

Table 5. Lifestyle habits amongst Bahraini adolescents

Lifestyle habits	Gender						P-value*
	Total		Male		Female		
	N	%	n	%	n	%	
Hours watching TV every day							
Do not watch/watch rarely	39	5.3	16	41.0	23	59.0	0.756
1–2 hours	219	29.8	101	46.1	118	53.9	
3–4 hours	270	36.7	121	44.8	149	55.2	
5+ hours	207	28.2	101	48.8	106	51.2	
Eating while watching TV							
Always	307	41.8	135	44.0	172	56.0	0.145
Sometimes	296	40.3	133	44.9	163	55.1	
Never	132	18.0	71	53.8	61	46.2	
Hours using Internet every day							
Not using	202	27.5	87	43.1	115	56.9	0.095
1–2 hours	403	54.8	200	49.6	203	50.4	
3–4 hours	130	17.7	52	40.0	78	60.0	
Eating while using Internet							
Don't eat	498	93.4	241	48.4	257	51.6	0.052
Eat	35	6.6	11	31.4	24	68.8	
Participating in sporting activities							
No	195	26.5	41	21.0	154	79.0	0.000
Yes	540	73.5	298	55.2	242	44.8	
Frequency of participating sport/week							
None	195	26.5	40	20.5	155	79.5	0.000
1–2	167	22.7	62	37.1	105	62.9	
3–4	168	22.9	94	56.0	74	44.0	
5–6	72	9.8	51	70.8	21	29.2	
7+	133	18.1	92	69.2	41	30.8	
Participating in sports activity at school							
Always	587	79.9	268	45.7	319	54.3	0.026
Sometimes	103	14.0	42	40.8	61	59.2	
Never	45	6.1	29	64.4	16	35.6	
Participating in sports activities outside school							
Always	266	36.2	217	81.6	49	18.4	0.000
Sometimes	298	40.5	88	29.5	210	70.5	
Never	171	23.3	34	19.9	137	80.1	

*Chi-square test, the *p*-value indicates the comparison between males and females.

in some way to feelings about body shape and it may also be a method of dieting. For males, however, skipping breakfast may be associated with lack of time or accessibility (15). Skipping breakfast may be related to risk for obesity and cardio-metabolic health. In a longitudinal study, Smith et al. (16) found that participants who skipped breakfast in both childhood and adulthood had a larger waist circumference and higher fasting insulin, total cholesterol, and LDL cholesterol concentrations than those who ate breakfast regularly. In addition, regular breakfast intake has a positive association with attention-concentration, memory, and school achievement among school children (17). Although breakfast was often skipped, we found that lunch and dinner were consumed regularly by most of the adolescents. A similar pattern of food intake has been reported amongst adolescents in Nordic countries (13) where the skipping of breakfast was reported, but about 80% of the adolescents consumed a regular afternoon meal and dinner.

It has been documented that boys and girls with irregular breakfast intake had received a high percentage of their energy needs from in-between meals (18). Musaiger et al. (19) reported that some foods commonly provided by school canteens in Bahrain have a greater caloric value. In addition, in a study describing the contribution of school meals to nutrient intake amongst English primary and secondary schools, it was reported that school meals often failed to make good the shortfalls in the daily intake of essential nutrients (20). The frequent consumption of snacks is a recognized aspect of teenage food behavior. The finding that a greater proportion of adolescents consumed snacks is similar to findings amongst Syrian adolescents, where snacking and light meal consumption was very common (21).

The present study showed that about 25% of total adolescent consumed fruit and vegetables daily. Low intake of fruit and vegetables is associated with several chronic diseases at adulthood (22). In the United States Krebs-Smith et al. (23) found that among children aged 2–18 years, mean consumption of fruit and vegetables was 3.5 servings per day with consumption increasing in older males (4.3 servings per day), but remaining the same among females regardless of age. In general, although the proportion of males who consumed fruit was higher than females, vegetable consumption was higher amongst females. Studies on fruit and vegetable consumption among children indicate that some of the determinants that influence consumption are gender, parental intake, and home availability/accessibility (24).

Fast food has become a prominent feature of the diet of children throughout the world (25). Our study showed a relatively high intake of fast foods by adolescents

in Bahrain. This is especially true when we compare our findings with those previously reported by Musaiger and Gregory (11) where none of the school children mentioned that they consumed fast foods. Studies in Arab Gulf countries (5–7) have shown that fast foods are now becoming an integral part of the lifestyle of school children. The fact that girls consume fast foods more at home than the boys could be due to cultural restrictions on travel and ease of home delivery from fast food restaurants that have become very popular in Bahrain in the past few years, especially among the younger generation. The preference of males for larger portions of burgers and potato chips is similar to that reported amongst Kuwaiti adolescents, where males were more likely than females to consume larger size portions of fast foods (26).

While watching television TV has profoundly changed the use of leisure time in many countries, there is evidence that it is associated with negative outcomes such as poor dietary habits (27). In addition, in recent years, computers have begun to play a vital role in today's generation as the need for information has increased (28). There is mounting evidence that excessive TV viewing among children and adolescents can seriously challenge young people's emotional and physical well-being (29). Our study indicates that a good number of adolescents spend a substantial portion of their time watching TV or surfing the Internet every day. While there are potential benefits from watching some TV programs and using the Internet, studies amongst preschoolers indicate that greater exposure to TV and videos may influence the consumption of unhealthy foods (30). Although the proportion of adolescents who eat while using the Internet in this study was low, snacking while watching TV – especially amongst girls – was high. Snacking, but not necessarily eating meals, while watching TV is associated with increased overall caloric intake and calories from fat (31). It was found that overweight and obesity among school children are directly related to the amount of time spent in front of a TV set or personal computer ($p < 0.01$) (32).

In children and adolescents alike, maintaining an optimal level of physical activity is particularly important as it not only reduces the risk of overweight but also improves body composition and the growth pattern (33). In this study we found that the greater proportion of adolescents who did not participate in sports was females, while a considerable percentage of males participated in physical activity. The exact nature and duration of activity could not be ascertained owing to the fact that students encountered difficulties in describing the activity correctly. Gender difference was significant with regard to practicing sports during school hours and also outside school; however, females were less active than males. Similar findings are reported from other Arabian Gulf countries (34, 35). One of the main

reasons for girls not participating in sports can be social and religious norms and restrictions that may preclude female students from engaging in public sports (36). This cultural drawback further contributes toward the rising epidemic of overweight and obesity prevalent in the Arabian Gulf countries.

In conclusion, adolescents in Bahrain seem to be moving toward unhealthy eating habits in conjunction with a diet high in saturated fats, sugar, and refined foods but low in fiber often termed the 'Western diet' and on lifestyles characterized by lower levels of activity (37). This may increase the risk factors for chronic non-communicable diseases in a later age such as coronary heart disease, diabetes, hypertension, and cancer. These diseases have become the main public health problems in most of the countries in the Middle East (38). Nutrition education among both school children and their parents should emphasize the importance of following dietary guidelines recently developed for the Arab countries (39). Regular interaction between parents, adolescents, school authorities, and health personnel is required to emphasize the connection between health, healthy food choices, and lifestyle habits.

Conflict of interest and funding

The authors have not received any funding or benefits from industry or elsewhere to conduct this study.

References

1. Lytle LA, Seifert S, Greenstein J, McGovern P. How do children's eating patterns and food choice change over time? Results from a cohort study. *Am J Health Promotion* 2000; 14: 222–8.
2. Story M, Neumark-Sztainer D, French S. Individual and environmental influences on adolescent eating behaviors. *J Am Dietetic Assoc* 2002; 102: S40–51.
3. Hilsen M, Eikemo TA, Bere E. Healthy and unhealthy eating at lower secondary school in Norway. *Scand J Public Health* 2010; 38: 7–12.
4. Rolland-Cachera MF, Bellsile F, Deheeger M. Nutritional status and food intake in adolescents living in Western Europe. *Eur J Clin Nutr* 2000; 54: S41–6.
5. Qotba H, Al-Isa AN. Anthropometric measurements and dietary habits of school children in Qatar. *Int J Food Sci Nutr* 2007; 58: 1–5.
6. Bin Zaal AA, Musaiger AO, D'Souza R. Dietary habits associated with obesity among adolescents in Dubai, United Arab Emirates. *Nutr Hosp* 2009; 24: 437–44.
7. Washi SA, Ageib MB. Poor diet quality and food habits are related to impaired nutritional status in 13– to 18-year old adolescents in Jeddah. *Nutr Res* 2010; 30: 527–34.
8. El-Hazmi MAF, Warsy AS. Association of hypertension and non-insulin-dependent diabetes mellitus in the Saudi population. *Ann Saudi Med* 2001; 21: 5–8.
9. Musaiger AO. Nutritional status and dietary habits of adolescent girls in Oman. *Ecology Food Nutr* 1994; 31: 227–37.
10. Musaiger AO. Overweight and obesity in the Eastern Mediterranean Region: can we control it? *East Mediterr Health J* 2004; 10: 789–93.

11. MUSAIGER AO, GREGORY WB. Dietary habits of school-children in Bahrain. *J Royal Soc Health* 1992; 112: 159–62.
12. AL-SENDI AM. Factors determining obesity among adolescents in Bahrain. PhD Dissertation, London School of Tropical Medicine; 2002.
13. SAMUELSON G. Dietary habits and nutritional status in adolescents over Europe. An overview of current studies in the Nordic countries. *Eur J Clin Nutr* 2000; 54: S21–8.
14. BAŞ M, KIZILTAN G. Relations among weight control behaviors and eating attitudes, social physique anxiety, and fruit and vegetable consumption in Turkish adolescents. *Adolescence* 2007; 42: 167–78.
15. SHAW ME. Adolescent breakfast skipping: an Australian study. *Adolescence* 1998; 33: 851–61.
16. SMITH KJ, GALL SL, MCNAUGHTON SA, BIZZARD L, DWYER T, VENN AJ. Skipping breakfast: longitudinal associations with cardio-metabolic risk factors in the Childhood Determinants of Adult Health Study. *Am J Clin Nutr* 2010; 92: 1316–25.
17. GAJRE NS, FERNANDEZ S, BALEKRISHNA N, VAZIR S. Breakfast eating habit and its influence on attention-concentration, immediate memory and school achievement. *Indian Pediatr* 2008; 45: 824–8.
18. SJOBORG A, HALLBERG L, HOGLUND D, HULTHEN L. Meal pattern, food choice, nutrient intake and lifestyle factors in the Goteborg Adolescence Study. *Eur J Clin Nutr* 2003; 57: 1569–78.
19. MUSAIGER AO, AL-JEDAH JH, D'SOUZA R. Nutritional profile of ready-to-eat foods consumed in Bahrain. *Ecology Food Nutr* 2007; 46: 47–60.
20. NELSON M, LOWES K, HWANG V. The contribution of school meals to food consumption and nutrient intakes of young people aged 4–18 years in England. *Public Health Nutr* 2007; 10: 652–62.
21. LOCK K, POMERLEAU J, CAUSER L, ALTMANN DR, MCKEE M. The global burden of disease attributable to low consumption of fruit and vegetables: implications for the global strategy on diet. *Bull World Health Organ* 2005; 83: 100–8.
22. KERKADI A. Evaluation of nutritional status of United Arab Emirates university female students. *Emirates J Agricultural Sci* 2003; 15: 42–50; <http://www.cfs.uaeu.ac.ae/research/ejas.html>. [cited 20 January 2011]
23. KREBS-SMITH SM, COOK DA, SUBAR AF, CLEVELAND L, FRIDAY J, KAHLE LL. Fruit and vegetable intakes of children and adolescents in the United States. *Arch Pediatr Adolesc Med* 1996; 150: 81–6.
24. RASMUSSEN F, JOHANSSON M. The relation of weight, length and ponderal index at birth to body mass index and overweight among 18-year-old males in Sweden. *Eur J Epidemiol* 1998; 14: 373–80.
25. BOWMAN SA, GORTMAKER SL, EBELING CB, PEREIRA MA, LUDWIG DS. Effects of fast-food consumption on energy intake and diet quality among children in a national household survey. *Pediatrics* 2004; 113: 112–8.
26. AL-MULLA D, AL-NAJDI F, AL-AAZMI M, AL-SERRI M, BADOO M, OTHMAN R, et al. Knowledge and practices related to obesity among university students in Kuwait. Paper presented at the 10th International Congress on Obesity, Sydney, Australia, 3–8 September 2006.
27. JEFFERY RW, FRENCH SA. Epidemic obesity in the United States: are fast foods and television viewing contributing? *Am J Public Health* 1998; 88: 277–80.
28. STEFĂNESCU C, CHELE G, CHIRIȚĂ V, CHIRIȚĂ R, MAVROS M, MACARIE G, et al. The effects of computer-use on adolescents [in Romanian]. *Revista Medico-Chirurgicala A Societății de Medici și Naturaliști Din Iași (Iași)* 2005; 109: 871–7.
29. HARDY LL, BAUR LA, GARNETT SP, CRAWFORD D, CAMPBELL KJ, SHREWSBURY VA, et al. Family and home correlates of television viewing in 12–13 year old adolescents: The Nepean Study. *Int J Behav Nutr Phys Activity* 2006; 3: 24.
30. TAVERAS EM, SANDORA TJ, SHIH M-C, ROSS-DEGNAN D, GOLDMANN DA, GILLMAN MW. The association of television and video viewing with fast food intake by preschool-age children. *Obesity* 2006; 14: 2034–41.
31. GORE SA, FOSTER JA, DiLillo VG, Kirk K, Smith West D. Television viewing and snacking. *Eating Behav* 2003; 4: 399–405.
32. RAMIC E, KAPIDZIC-DURAKOVIC S, KARIC E, BATIC-MUJANORIC O, ALIBASIC E, ZILDZIC M. Influence of lifestyle on overweight and obesity in school-age children. *Med Arh* 2009; 63: 280–3.
33. DEHEEGER M, ROLLAND-CACHERA MF, FONTVIELLE AM. Physical activity and body composition in 10 year old French children: linkages with nutritional intake? *International J Obes Related Metab Disord* 1997; 21: 372–9.
34. AMINE EK, SAMY M. Obesity among female university students in the United Arab Emirates. *J Royal Soc Health* 2000; 116: 91–6.
35. RASHEED P. Overweight status: body image & weight control beliefs and practices among female college students. *Ann Saudi Med* 1999; 19: 365–9.
36. HENRY CJK, LIGHTOWLER HJ, AL-HOURANI HM. Physical activity and level of inactivity in adolescent females aged 11–16 years in the United Arab Emirates. *Am J Hum Biol* 2004; 16: 346–53.
37. POPKIN BM, GORDON-LARSEN P. The nutrition transition: world-wide obesity dynamics and their determinants. *Int J Obes* 2004; 28: S2–9.
38. MUSAIGER AO. Diet and prevention of coronary heart disease in the Arab Middle East Countries. *Med Princ Pract* 2002; 11: 9–16.
39. Arab Center for Nutrition. The food dome: dietary guidelines for the Arab Countries; <http://www.acnut.com/en/view.php?id=2>; 2005.

***Abdulrahman O. MUSAIGER**

Director of Nutrition and Health Studies Unit
Deanship of Scientific Research
University of Bahrain
Kingdom of Bahrain
Email: amusaiger@gmail.com