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## Research Article

# Dietary and Activity Habits in Adolescents Living in the United Arab Emirates: A Cross-Sectional Study

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### Abstract

**Background:** The Global School Health Survey 2010 reported that 40% of pupils aged 12-15 years are overweight or obese; double what was reported in 2005. Following such concerns the government introduced mandatory school health education sessions to students, and produced strict guidelines on school food and drink provision (September 2011). The aim of this survey was to obtain information about adolescents' dietary and activity habits, and their association with the increased prevalence of obesity.

**Methods:** A cross-sectional study of 1,022 students (539 boys; 483 girls) aged 12-16 years, from 17 government schools in Dubai, UAE. Dietary practices and physical activity was collected using a short self-completed questionnaire.

**Results:** Non-Emirati pupils, especially the girls appear to eat more healthily than their Emirati counterparts. Overall, 16% of students reported never eating breakfast, 31% reported drinking sugar sweetened beverages everyday 18% said they never drank milk and 15% never ate fruits. 67% reported buying food from school every day; Emiratis spending more than non-Emiratis. 37% of pupils reported exercising or playing sport daily, whereas 60% reported they daily watch more than 2 hours of TV.

**Conclusion:** Despite the recent changes in school policies, pupils are still failing to eat a healthy diet and engage in physical activity. There needs to be further interventions promoting changes in lifestyle amongst adolescents, and enhancing provision of healthy food in schools to be more appealing to students.

**Keywords:** dietary habits, physical activity, sedentary behaviors, UAE, adolescents

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## 1. Introduction

Studies of dietary habits and nutritional status in Mediterranean countries emphasize the significant change in the diet of the population [34]. These changes show up most

clearly in children and young people, because of their greater vulnerability to advertising and a more permissive attitude of parents towards consumption of cariogenic foods. Today, we know that certain risk factors are determined from a very early age and eating habits established during childhood and school age persist over time and influence the subsequent habits [17].

There is a real concern about the increase of unhealthy dietary habits, including skipping breakfast and greater consumption of sweetened soft drinks by young people, and the possible role of these habits in the pathogenesis of childhood obesity [11, 13, 14]. Data from a study conducted on American adolescents indicated that breakfast consumption during school years was associated with about a 30% lower likelihood of later becoming overweight or obese [10]. Moreover, research studies and reviews indicate that breakfast skipping is highly prevalent among adolescents in the United States and Europe [32]) as well as in many Arab countries [1, 9, 26].

Over the last decade, the unhealthy lifestyle and poor dietary habits have been of great concern to the local health authorities in most Arab countries [28] where obesity has reached an epidemic rate for both children and adults [28]. This current epidemic of childhood obesity is largely due to an environment that promotes excessive food consumption and encourages sedentary behaviors [22]. The diet of Arab adolescents is characterized by a low intake of fruit, vegetables, and milk and a high intake of sugar-sweetened beverages, fast foods, and sweets [3, 5, 8]. The prevalence of overweight and obesity in children in the United Arab Emirates (UAE) is extremely high; the Global School Health Survey (GSHS) 2010 reported that approximately 40% of school children are overweight or obese. Specifically, the prevalence of obesity was found to be highest in students aged 12 to 15 years [27]. Obesity not only affects children's physical health and well-being, but it has also been shown to have a negative impact on children's mental health. Being overweight or obese can be particularly devastating for children and teens, who are often the targets of early social discrimination and subject to negative stereotyping by peers. They experience more teasing and are more likely to be bullied. Thus, being overweight can have a negative impact on a child's self-esteem, behavior, friendships and academic performance [15, 16, 23, 35, 36].

Also, the GSHS reported that almost 73% of school students didn't engage in sufficient amount of daily physical activity (obtaining at least 60 minutes of physical activity per day), which is very similar to results reported by Guthold et al. where 85% of girls and 75% of boys aged 13–15 years in seven Arab countries (Djibouti, Egypt,

Jordan, Libya Morocco, Oman, and the UAE) did not engage in a sufficient amount of daily physical activity [19].

This is associated with many risk factors later on in life including increased risk of having cardiovascular diseases and type 2 Diabetes Mellitus. Prevalence rates for type 2 diabetes mellitus and cardiovascular diseases in the Arab Gulf are between 25 and 35% for the adult population, whilst evidence of the metabolic syndrome is emerging in children and adolescents [7]. According to the World Health Organization, a healthy diet and physical exercise are the two main factors in the prevention of chronic diseases such as hypertension or diabetes [40]. It is important to introduce strategies that will help to reverse this trend, one of which is to improve the knowledge and awareness of children and adolescents about healthy eating through delivering health education sessions and implementing standards for school canteens whereby unhealthy food items are restricted or banned.

As adolescence is a time of developmental plasticity in which lifelong habits can become established, lifestyle interventions during this period may have a significant influence on lifelong health. Specifically, the promotion of sensible eating and physical activity during adolescence may modify an adolescent's risk of adult obesity [2, 21]. Therefore, mandatory health education sessions delivered by school nurses or doctors have been recently introduced into the public school curriculum in the UAE. A new guide for school canteen has also been certified by the Abu Dhabi Food Control Authority and the Ministry of Education (MoE) which has been implemented in all public Schools from September 2011. These changes should have resulted in improving school pupils' food and drink choices and habits both in and out of school.

The aim of this study was to obtain information about pupils' dietary habits both when at school and more widely throughout the day after the introduction of the mandatory food policy. Results obtained from this study will increase our understanding on what children and adolescents diet is composed of, and their association with this increased prevalence of obesity within this particular age group. Results will also confirm if changes in the school canteen and health education sessions contributed to improvement in pupils food and drink choices. Results will also benefit policy makers as feedback from children on the new canteen will be obtained.

## 2. Methodology

This was a descriptive cross sectional study of 1,500 randomly selected (convenience sampling) adolescents attending secondary government schools in Dubai; UAE.

	Emirati		Non-Emirati		Total	
	n	%	n	%	n	%
<b>Male</b>	455	49.7	84	78.5	539	52.7
<b>Female</b>	460	50.3	23	21.5	483	47.3
<b>Total</b>	915	100	107	100	1022	100

TABLE 1: Sample Characteristics.

The study protocol obtained Ethical Approval from Zayed University Research Ethics Committee (ZU12-013-F), and was also approved by the UAE Ministry of Education. The Ministry of Education in turn informed all 17 governmental secondary schools in Dubai, both male and female, that they have been selected to take part in this study. One classroom section was then randomly selected from each of the grades 6, 7, 8 and 9. Parents of these students were then informed about the study, and verbal assent was obtained from students. The sample was drawn from different educational grades and geographical areas of Dubai to ensure that the target population is representative. Both national and non-national adolescents were included.

A short, self-completed questionnaire was designed by a nutrition specialist and reviewed by a committee at the Ministry of Education to check applicability of the questions. The questionnaire was then piloted and tested in order to check that questions read well and reflected what was being asked and the final version of the questionnaire was modified based on the feedback received by the students. Selected trained school staff administered the questionnaire to students. The students were assembled in their classrooms and the objectives of the study as well as the questionnaire were explained to the students. The questionnaire was structured and collected information relating to students' food and drink choices and preferences; how often they consume breakfast, milk or yogurt, fruits and vegetables, fast food items, and sugar sweetened beverages. Information relating to students' eating behaviors in school was collected and included questions on: how often they use the canteen versus bringing food from home, how much money they spend, what items they purchase from school or bring from home, their views on the new canteen policy etc.). In addition, information relating to students' physical activities and sedentary behaviors were collected. All students' responses were confidential; their names and contact details were not provided.

The data in the questionnaire were entered into an excel sheet and statistical analysis was carried out using the Statistical Package for the Social Sciences (SPSS). Chi-square statistics were used to determine the presence of associations between variables, and the level of significance was set at  $p < 0.05$ .

### 3. Results

#### 3.1. Sample Characteristics

A total of 1,033 students completed the questionnaire, of which 11 did not provide information about their nationality and were excluded from the analysis. Hence the final sample included a total of 1,022 students aged between 12 and 16 years. Table 1 shows characteristics of the sample, separated by gender and nationality. A total of 539 students were boys, and 483 were girls. 915 (89%) of those were Emirati nationals and 107 (11%) were non-Emirati. There were no significant differences in ages between gender ( $p = 0.1$ ) or nationality ( $p = 0.3$ ). There was a significant association ( $p < 0.001$ ) between gender and nationality with males more likely to be Emirati. To minimize any effect of confounding by nationality of gender, all subsequent results show frequencies and percentages based these four groups.

Table 2 shows the dietary and lifestyle patterns of the sample, separated by nationality (Emirati versus non-Emirati). Table 3 further separates response by gender and nationality.

#### 3.2. Dietary Habits

In relation to dietary habits, non-Emirati pupils tend to have a healthier approach to breakfast in terms of the frequency with which it is eaten, compared with Emirati pupils, with 17% of Emirati respondents reporting never eating the meal. Fewer than half (41%) of this group reported eating it every day, compared with 63% of non-Emirati pupils. Boys from both nationalities were more likely never to eat breakfast compared to girls.

Non-Emirati pupils appear to eat more healthily than their Emirati counterparts, with 23% saying that they never eat fast food, compared with 8% of Emirati pupils. Similar proportions in both groups (61% Emirati and 59% non-Emirati) eat this type of food in moderation (on one to three days per week). Frequency of consumption of fast food was reported to be higher in boys from both nationalities compared to girls.

Both Emirati and non-Emirati pupils tend to have similar habits with respect to drinking sweetened or energy drinks, with approximately one third overall (31%) reporting consuming them every day, particularly Emirati males (36%) and non-Emirati females (43%). Overall, only 12% of students reported they never drink these types of drinks.

When students were asked to report the frequency of drinking milk or yogurt, 17% of Emirati and 26% of non-Emirati students said they never consumed it, with females from both nationalities more likely not to consume it compared to males ( $p < 0.001$ ).

Frequency/week	Total		Emirati		Non-Emirati	
	N	%	n	%	n	%
<b>Eating breakfast</b>						
Every day	442	43.5	376	41.3	66	62.9
3 to 5 days	145	14.3	132	14.5	13	12.4
1 to 3 days	269	26.5	252	27.7	17	16.2
Never	160	15.7	151	16.6	9	8.6
<b>Buying food at school</b>						
Every day	682	66.8	626	68.5	56	52.3
3 to 5 days	123	12.0	111	12.1	12	11.2
1 to 3 days	166	16.3	136	14.9	30	28.0
Never	50	4.9	41	4.5	9	8.4
<b>Taking food from home</b>						
Everyday	93	9.3	59	6.6	34	33.3
1 to 3 days	189	18.9	170	19.0	19	18.6
Never	716	71.7	667	74.4	49	48.0
<b>Eating fast food</b>						
Every day	118	11.8	109	12.1	9	8.6
3 to 5 days	185	18.4	175	19.5	10	9.5
1 to 3 days	609	60.7	547	60.8	62	59.0
Never	92	9.2	68	7.6	24	22.9
<b>Drinking sugar sweetened or energy drinks</b>						
Every day	319	31.4	293	32.2	26	25.0
3 to 5 days	186	18.3	168	18.4	18	17.3
1 to 3 days	385	37.9	339	37.2	46	44.2
Never	125	12.3	111	12.2	14	13.5
<b>Drinking milk or yogurt</b>						
Every day	306	30.2	277	30.5	29	27.6
3 to 5 days	190	18.8	172	18.9	18	17.1

TABLE 2: Lifestyle and dietary habits of students by nationality.

In response to the frequency of fruit consumption, only about one quarter of students (24%) reported that they ate it at least 3 days per week, and 15% of students

	Total		Emirati		Non-Emirati	
<b>1 to 3 days</b>	333	32.9	302	33.3	31	29.5
<b>Never</b>	184	18.2	157	17.3	27	25.7
<b>Eating fruits</b>						
<b>None</b>	153	15.1	138	15.2	15	14.3
<b>1 to 2 days</b>	619	61.0	560	61.5	59	56.2
<b>3 or more</b>	243	23.9	212	23.3	31	29.5
<b>Frequency/week</b>	<b>N</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
<b>Playing sports/Exercising</b>						
<b>Every day</b>	372	36.7	324	35.6	48	45.7
<b>3 to 5 days</b>	180	17.8	161	17.7	19	18.1
<b>1 to 3 days</b>	367	36.2	338	37.2	29	27.6
<b>Never</b>	95	9.4	86	9.5	9	8.6
<b>Screen time</b>						
<b>1 hour or less</b>	195	19.2	172	18.9	23	21.9
<b>2 hours</b>	226	22.3	197	21.6	29	27.6
<b>3 hours</b>	193	19.0	169	18.6	24	22.9
<b>4 hours or more</b>	401	39.5	372	40.9	29	27.6

TABLE 2: Table continued.

reported never eating it. There were no differences between nationalities, however girls from both groups were less likely to consume fruits compared to boys.

### 3.3. Activity and Sedentary Behaviors

Students were then asked to provide typical daily time spent on physical activity and screen time. No significant differences in physical activity patterns were observed between Emirati and non-Emirati students. However, Emirati boys were significantly more likely than Emirati girls to report doing some form of exercise on a daily basis (52% versus 19%;  $p < 0.001$ ). There were no differences in activity levels between genders in non-Emiratis. The opposite pattern is true for the amount of time spent watching TV or taking part in some other form of sedentary activity, with females of both nationalities spending more time than males engaged in such behavior. Overall, almost 60% of students spent more than guidelines of a maximum of 2 hours screen time per day [6]; more Emiratis compared to non-Emiratis not meeting the guideline (60% versus 50% respectively).



	Emirati						Non-Emirati					
	Total		Males		Females		Total		Males		Females	
Frequency/week	n	%	n	%	n	%	n	%	n	%	n	%
<b>Eating breakfast</b>												
Every day	376	41.3	221	48.8	155	33.8	66	62.9	54	65.1	12	54.5
3 to 5 days	132	14.5	69	15.2	63	13.8	13	12.4	10	12.0	3	13.6
1 to 3 days	252	27.7	99	21.9	153	33.4	17	16.2	13	15.7	4	18.2
Never	151	16.6	64	14.1	87	19.0	9	8.6	6	7.2	3	13.6
<b>Buying food at school</b>												
Every day	626	68.5	338	74.4	288	62.6	56	52.3	49	58.3	7	30.4
3 to 5 days	111	12.1	45	9.9	66	14.3	12	11.2	8	9.5	4	17.4
1 to 3 days	136	14.9	55	12.1	81	17.6	30	28.0	21	25.0	9	39.1
Never	41	4.5	16	3.5	25	5.4	9	8.4	6	7.1	3	13.0
<b>Taking food from home</b>												
Everyday	59	6.6	32	7.1	27	6.0	34	33.3	27	32.9	7	35.0
1 to 3 days	170	19.0	70	15.6	100	22.4	19	18.6	15	18.3	4	20.0
Never	667	74.4	347	77.3	320	71.6	49	48.0	40	48.8	9	45.0
<b>Eating fast food</b>												
Every day	109	12.1	52	11.6	57	12.6	9	8.6	6	7.2	3	13.6
3 to 5 days	175	19.5	89	19.9	86	19.0	10	9.5	4	4.8	6	27.3
1 to 3 days	547	60.8	267	59.7	280	61.9	62	59.0	55	66.3	7	31.8
Never	68	7.6	39	8.7	29	6.4	24	22.9	18	21.7	6	27.3
<b>Drinking sugar sweetened or energy drinks</b>												
Every day	293	32.2	163	36.1	130	28.3	26	25.0	17	20.5	9	42.9
3 to 5 days	168	18.4	90	19.9	78	17.0	18	17.3	16	19.3	2	9.5
1 to 3 days	339	37.2	154	34.1	185	40.3	46	44.2	39	47.0	7	33.3
Never	111	12.2	45	10.0	66	14.4	14	13.5	11	13.3	3	14.3
<b>Drinking milk or yogurt</b>												
Every day	277	30.5	156	34.5	121	26.5	29	27.6	25	30.1	4	18.2
3 to 5 days	172	18.9	102	22.6	70	15.4	18	17.1	16	19.3	2	9.1
1 to 3 days	302	33.3	144	31.9	158	34.6	31	29.5	24	28.9	7	31.8

TABLE 3: Lifestyle and dietary habits of Emirati students by gender.

	Emirati						Non-Emirati					
	Total		Males		Females		Total		Males		Females	
Never	157	17.3	50	11.1	107	23.5	27	25.7	18	21.7	9	40.9
<b>Eating fruits</b>												
None	138	15.2	63	13.9	75	16.4	15	14.3	8	9.6	7	31.8
1 to 2 days	560	61.5	269	59.4	291	63.7	59	56.2	47	56.6	12	54.5
3 or more	212	23.3	121	26.7	91	19.9	31	29.5	28	33.7	3	13.6
<b>Frequency/week</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>
<b>Playing sports/Exercising</b>												
Every day	324	35.6	236	52.3	88	19.2	48	45.7	46	55.4	2	9.1
3 to 5 days	161	17.7	89	19.7	72	15.7	19	18.1	13	15.7	6	27.3
1 to 3 days	338	37.2	105	23.3	233	50.9	29	27.6	21	25.3	8	36.4
Never	86	9.5	21	4.7	65	14.2	9	8.6	3	3.6	6	27.3
<b>Screen time</b>												
1 hour or less	172	18.9	110	24.3	62	13.5	23	21.9	22	26.5	1	4.5
2 hours	197	21.6	113	25.0	84	18.3	29	27.6	21	25.3	8	36.4
3 hours	169	18.6	86	19.0	83	18.1	24	22.9	20	24.1	4	18.2
4 hours or more	372	40.9	143	31.6	229	50.0	29	27.6	20	24.1	9	40.9

TABLE 3: Table continued.

### 3.4. Food Choices and Views

Emirati students, particularly boys, were significantly more likely than non-Emiratis to buy food at school on a daily basis (69% compared with 52% for pupils overall). When asked how much pupils spend on food at school, Emirati pupils significantly have greater spending power than non-Emirati pupils with 51% compared with 21% spending at least 6 AED everyday ( $p < 0.001$ ).

Non-Emirati students were far more likely than Emirati pupils to report taking food from home on at least one day per week (52% compared with 26%). For those who said that they took food to school from home and gave information about items, the most popular was sandwiches, particularly so for non-Emirati pupils (73% compared with 32% of Emirati pupils;  $p < 0.001$ ). Chocolate was more likely to be taken to school by Emirati compared with non-Emirati students (29% compared with 14%;  $p < 0.05$ ) and in both nationality groups this item was more popular amongst females than males.

When students were asked whether they felt that the school canteen had changed, non-Emirati pupils (both males and females) were significantly less likely than Emirati

pupils to consider that there had been any recent changes to the school canteen (50% versus 63%;  $p < 0.001$ ). Although similar proportions of both nationalities considered that any changes seen were for the worse (28%), a third of Emirati pupils (34%) thought that changes was an improvement in the school canteen. Emirati pupils were more likely than non-Emiratis to report that the school offers a range of healthy choices, although the proportion offering this response in both groups is low (28% versus 15% respectively). Over half (53%) of the non-Emirati group considered that a range of healthy foods was not offered, with similar proportions in both groups (17% and 18%) saying that they did not care about the issue.

Students were also given the opportunity to comment on any issues related to food and health, particularly in relation to the school canteen and school food. A total of 342 students who provided comments were generally divided between those who would like a greater variety of less healthy foods (such as carbonated, sweetened drinks and fried foods) to be provided and those who would like to food to be healthier. Some students commented that they would like to see fast food chains and sugar sweetened beverages sold in their schools. Other more interesting comments included provision of free breakfast at schools, provision of full lunch at school, an anti-obesity program in the school, more physical education lessons.

## 4. Discussion

The current study provides an update on dietary and lifestyle behaviors among adolescents in Dubai, especially after the introduction of the school Canteen policy and health education sessions in schools. Governmental schools in Dubai mainly include Emirati students, and are segregated. Results indicate some variation in dietary habits and lifestyle between genders and nationality. However, it is worth noting that comparing nationalities in this study should be viewed with some caution due to the difference in sample size between the Emirati and non-Emirati populations.

Unhealthy eating habits has become very common among young adolescents. Skipping breakfast, decreased consumption of fruits and dairy and increased consumption of fast food and sweetened or energy drinks has been reported in many studies, both in the West, Eastern Mediterranean region and the Gulf [4, 9, 12, 18, 31, 38]. This type of diet is strongly associated with the incidence of obesity and other chronic diseases such as type 2 diabetes and hypertension [40]. Results of this study is in line of what has been reported elsewhere; non-Emiratis tend to have healthier dietary practices compared to Emiratis. With the exception of energy drinks consumption, females are more likely to have unhealthier dietary habits compared to males. Almost one third

of Emirati females never consume dairy. This is especially an issue with the increased prevalence of Vitamin D deficiency in the Gulf region despite the area's sunny climate [33], females are at increased risk of getting osteoporosis and not reaching their full potential bone growth.

The presence of sedentary behavior among adolescent students in this study was found to be very high. The American Academy of Pediatrics recommends that screen time not to exceed 2 hours per day for this age group [6]. Only 40% of the sample met these recommendations; with females more likely to be engaged in sedentary behavior compared to males. The prevalence rate of screen time appears to be higher than what has been reported in many other countries in Europe [24, 37] but similar to what has been reported in Canada [25] and Saudi Arabia [4]. Females were more likely to spend more screen time compared to males which was supported by previous studies [4, 20, 24, 25]. This is of great concern, as the practice of consuming meals, which tends to be high in salt, fat and sugar, whilst watching television has become very popular among adolescents in the UAE, especially amongst the girls [30]. This may be due to cultural differences in Gulf countries, whereby adolescent males have more of an opportunity to go out and be more active compared with adolescent females. It was however not possible to draw any conclusions on the association between lifestyle habits with weight status as this was not collected in this study.

Almost two thirds of our population reported buying food at school every day. This was more common among the Emirati males. Reasons for the differences in frequency of buying food from school should be investigated and addressed; it might be, for example, that the food choice is more acceptable to particular groups of students in which case the food offered should be modified to appeal to a greater range of cultures. Almost half the sample reported noticing changes to the school canteen with just over two thirds saying it was an improvement to what was offered prior the introduction of the school canteen policy. The interpretation of questions relating to whether they thought food offered was healthy or not should be interpreted with caution, as students' perceptions of what they consider is healthy or unhealthy might not be true. This was observed where some students commented that they would like to see more 'healthy' items in the canteen such as fast food and high sugary drinks. Other comments included wanting to see more variety (reported by almost 36% of students) and more local/Emirati (reported by 22%) foods being offered in their school canteens. This information can be used by the authorities or schools to help achieve more appealing canteens to their students.

## 5. Conclusion

Although a lot of efforts by the governmental authorities have been made to try changing students dietary and lifestyle habits, it seems that students are still practicing unhealthy habits and lifestyles, and the perceptions of many students remain unchanged. One reason may be that the mode of delivery of the health education sessions is not interactive or interesting to students. Research has recently shown that students tend to be more engaged and more likely to listen and make changes when information is delivered to them using non-traditional teaching methods such as games, activities etc. [39]. Another possible reason is that the school canteen items sold are not appealing to students or are not presented in the age appropriate way. For example, young children are more likely to consume fruits or vegetables when presented to them cut rather than whole. Hence, the Ministry of Education has recently signed an agreement with a number of approved food suppliers to ensure that all food and drink items provided in schools meet the school canteen food and drink standards and are presented to students in a more appealing and appropriate manner. Furthermore, the Ministry of Health is now working on adopting the life-skills approach in the delivery of health education sessions to students, through providing training to school health educators on how to deliver health education using a skills-based approach. A follow-up study assessing both overweight and obesity levels of students in addition to their dietary and lifestyle habits would be key once these changes are effectively implemented in schools. This will help assess the effectiveness of those strategies or school health policies in changing levels of obesity and habits among school students.

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