

# Eating habits, physical activity, and sedentary behaviors of Jordanian adolescents' residents of Amman

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**Abstract.** The aims of this study were to examine the prevalence of overweight and obesity among Jordanian adolescents and to assess their lifestyle patterns including eating habits, physical activity and sedentary behaviours. The study was carried out as part of the Arab Teens Lifestyle Study. The sample consisted of 735 high school students aged 14–20 years (52.5% males and 47.5% females). Students were randomly selected from the city of Amman, Jordan, using a multi-stage stratified cluster sampling technique. Participants completed a self-administered questionnaire. Dietary habits (breakfast consumption, intakes of vegetables, fruit, milk and milk products, sugar-sweetened drinks, fast food, sweets and energy drinks), physical activity and screen time were assessed. Students' body weight and height were measured. The prevalence of overweight was 16.1% and 12.6% among males and females, respectively. Obesity prevalence was higher among males (9.6%) than females (4.3%). There were significant age and gender effects for some of the selected eating habits, physical activity, and sedentary behaviors. Less than one third of the adolescents ate breakfast, vegetables, fruits, and drink milk daily. Consumption of unhealthy foods was high. About 95% of the adolescents spent more than 2 hours in screen time. In addition, more males than females met the recommended amount of daily physical activity.

In conclusion, a considerable proportion of Jordanian adolescents have undesirable lifestyle habits. Such behaviors increase adolescents' risks for chronic non-communicable diseases later in life. The findings have important implications for health promotion and disease prevention programs directed towards adolescent population.

Keywords: Adolescents, dietary behaviors, Jordan, exercise, lifestyle

## 1. Introduction

The number of overweight and obese children is increasing dramatically in both developed and developing countries. Worldwide, it is estimated that about 10% of school-aged children are overweight or obese and so are more likely to have hypertension, type 2 diabetes mellitus, hypercholesterolemia, stroke, hepatic steatosis, arthritis, sleep apnea, gall bladder disease, and bronchial asthma [18]. Poor eating habits and lack of exercise are two important factors that contribute to the development of childhood obesity [24].

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Current recommendations to prevent childhood obesity include (a) limiting consumption of sugar sweetened beverages; (b) encouraging diets with recommended quantities of fruits and vegetables; (c) eating breakfast daily; (d) limiting eating at restaurants, particularly fast food restaurants; (e) eating a diet rich in calcium; (f) limiting television viewing and other screen time by allowing no more than 2 hours per day; and (g) participating in 60 minutes of moderate to vigorous physical activity per day [13]. Therefore, a study dealing with assessing lifestyle variables including dietary habits, level of physical activity and sedentary behaviors is necessary to understand obesity determinants among adolescents and developing intervention programs to combat obesity. In Jordan, data on the prevalence of overweight and obesity among youth are few [2] or limited to certain areas [5, 17]. In addition, some of these studies were gender specific [10]. Specifically, prevalence of overweight and obesity among females aged between 14 and 19 years are not available. Moreover, these studies used different definitions of overweight and obesity, which making comparison of studies hard. Also, none of the studies looking at the prevalence of overweight and obesity among Jordanian adolescents living in Amman have looked at their eating habits, physical activity, and sedentary behaviors. Therefore, sufficient information to assess the extent to which Jordanian adolescents are meeting dietary and physical recommendations is lacking. The aims of this study were to examine the prevalence of overweight and obesity and to assess lifestyle habits including eating frequency, physical activity and sedentary behaviors in a sample of Jordanian adolescents living in Amman, the capital city.

## 2. Material and methods

### 2.1. Sample

The present study is part of the Arab Teens Lifestyle Study (ATLS). ATLS is a school-based cross-sectional study that was conducted in several major cities in the Arab countries [9]. The current sample was obtained from high school students in Amman, the capital city of Jordan. A multi-stage stratified cluster random sampling technique. Sample was obtained from students enrolled in both public and private schools within west and east of Amman. First, schools were randomly selected and stratified according to gender, type of school (private and public), and location (west and east). Four schools were selected from each location. Then, one class from each grade (10th, 11th, and 12th) was randomly chosen in each selected school. Hence, a total of 12 classes were surveyed. The needed sample size was calculated so that the sample proportion would be within  $\pm 0.05$  of the population proportion with a 95% confidence level and assumed population proportion of 0.50. The survey was conducted over three months from October to December 2009. The study protocol was approved by the Jordanian Ministry of Education, and students gave their consent to participate in the study.

### 2.2. Measurements

Body weight was measured to the nearest 100 g by a calibrated portable scale, with minimal clothing and without shoes. Height was measured to the nearest cm with the participant in a standing position without shoes using calibrated stadiometer. Body mass index (BMI) was then calculated as the ratio of weight (kilograms) to the square of height (meters). The International Obesity Task Force (IOTF) age- and gender-specific BMI reference values were used to define overweight and obesity in adolescents aged 14–17 years [12]. For participants aged 18 years, we used the cut-off points for adults (overweight, 25–29.9 kg/m<sup>2</sup>; obesity 30 kg/m<sup>2</sup>).

A valid self-administered questionnaire from ATLS [9] was used to assess the level of physical activity of the study participants. The questionnaire was previously validated for the use among young Arab males and females aged 14–19 years [8]. Participants completed the questionnaire in their classrooms in the presence of their teachers and the research assistant. The questionnaire included items aimed to collect information on frequency, duration and intensity of a variety of light-, moderate- and vigorous-intensity physical activities during a typical week. As part of the same questionnaire, participants also reported time spent in sedentary behaviors (hour/day) including Television (TV) and video viewing as well as computer and internet use. Based on published estimates of physical activity expenditure for youth, physical activities were assigned metabolic equivalent (MET) values [6, 22] The total METs-min per week and the METs-min per week spent in the moderate- and vigorous-intensity

Table 1  
Demographic profile of the study sample (total  $n = 735$ )

Variable	<i>n</i>	Percentage
Gender		
Males	386	52.5
Females	349	47.5
Age groups (years)		
14-15	180	24.7
16-17	477	65.3
18-20	73	10.0
School type		
Public	353	48.0
Private	382	52.0

physical activities were used to estimate the participants' energy expenditure on physical activity as was described previously [7]

The ATLS instrument also included items related to the consumption of breakfast, sugar-sweetened drinks including soft beverages, vegetables (cooked and uncooked), fruit, milk and dairy products, donuts and cakes, candy and chocolate, energy drinks and fast foods. Each question had 8 different responses ranging from zero intakes to a maximum intake of 7 days per week (every day). Thereafter, we calculated the proportions of adolescents who had healthy eating habits including a daily intake of breakfast, fruit, vegetables and milk and those having three or more intake per week of the unhealthy dietary habits.

### 2.3. Statistical analyses

Data were analyzed using NCSS software (version 2000; NCSS Statistical Software, Kaysville, UT). Continuous variables are presented as mean values  $\pm$  standard deviation while categorical variables are presented as proportions (%). Multiple analysis of variance (MANOVA) was applied for evaluating the associations between groups of study and continuous variables. Chi-square was calculated to test the differences in the percentages of male and female adolescents who exceeded certain cut-off values for physical activity, screen time and dietary habits. The level of significance was defined at  $P < 0.05$ .

## 3. Results

Table 1 shows the demographic profile of the study sample. A total of 735 adolescents between the ages of 14 and 20 years participated in the present study, of which 52.5% were males. Almost half of the participants attended private schools. As shown in Table 2, the prevalence of overweight was higher than that of obesity for males and females at the different age groups. The overall prevalence of overweight was 16.1% and 12.6% among males and females, respectively, whereas that for obesity was 9.6% among males and 4.3% among females.

Table 3 presents the mean values for selected eating habits of Jordanian adolescents grouped by age and gender. There was no significant interaction of age and gender for all the studied eating habits. The main effect of age was significant only for vegetable consumption. While, there was significant main effect of gender for most variables. The females' frequency of intake of sweets was higher than males. While males' frequency of intakes of fast foods and sugar-sweetened drinks were higher than females. However, also the frequency of consumption of breakfast and the frequency of intake of milk and milk products were higher in males than females. The overall frequency of intakes of breakfast, vegetables, fruits and milk were  $3.3 \pm 2.6$ ,  $4.5 \pm 2.1$ ,  $4.2 \pm 2.2$ , and  $4.0 \pm 2.5$  times per week, respectively. Whereas, the overall average weekly intake of French fries and potato chips, cakes and donuts, and candy and chocolate were  $3.9 \pm 2.4$ ,  $3.4 \pm 2.3$ , and  $4.4 \pm 2.3$  times/week, respectively. The mean frequency of intake of energy drinks per week was  $1.0 \pm 1.8$ .

Table 2  
Anthropometric measurements (mean  $\pm$  SD) of the participants and prevalence of overweight and obesity in Jordanian adolescents grouped by gender and age (total  $n = 735$ )

Variable	Gender	Age Group (years)		
		14–15	16–17	18–20
Weight (kg)	M	61.2 $\pm$ 13.6	66.5 $\pm$ 16.4	69.3 $\pm$ 19.9
	F	56.4 $\pm$ 10.0	55.9 $\pm$ 9.4	57.0 $\pm$ 8.2
Height (cm)	M	167.8 $\pm$ 8.5	172.4 $\pm$ 6.6	174.1 $\pm$ 7.6
	F	159.7 $\pm$ 6.4	161.2 $\pm$ 6.4	161.7 $\pm$ 5.8
BMI (kg/m <sup>2</sup> )	M	21.7 $\pm$ 4.3	22.3 $\pm$ 4.8	22.9 $\pm$ 7.3
	F	22.1 $\pm$ 3.7	21.5 $\pm$ 3.4	21.8 $\pm$ 3.0
Overweight (%)	M	17.2	16.0	11.1
	F	12.3	11.5	12.7
Obesity (%)	M	7.1	10.4	11.1
	F	7.4	3.8	1.8

M = males; F = Females.

Table 3  
Eating habits of Jordanian adolescents grouped by gender and age (total  $n = 735$ )

Variable	Gender	Age Group (years)		
		14–15	16–17	18–20
Breakfast consumption (frequency/week) <sup>b</sup>	M	3.9 $\pm$ 2.5	3.8 $\pm$ 2.6	3.4 $\pm$ 2.4
	F	3.1 $\pm$ 2.5	2.7 $\pm$ 2.4	2.4 $\pm$ 2.3
Vegetables consumption (frequency/week) <sup>*</sup>	M	4.6 $\pm$ 2.1	4.4 $\pm$ 2.1	4.1 $\pm$ 1.9
	F	4.5 $\pm$ 2.3	4.7 $\pm$ 2.1	3.6 $\pm$ 2.1
Fruits Consumption (frequency/week)	M	4.3 $\pm$ 2.0	4.6 $\pm$ 2.0	4.1 $\pm$ 1.8
	F	4.0 $\pm$ 2.6	3.9 $\pm$ 2.3	3.7 $\pm$ 2.1
Milk/dairy products intake (frequency/week) <sup>**</sup>	M	4.7 $\pm$ 2.2	4.3 $\pm$ 2.4	4.2 $\pm$ 1.9
	F	3.5 $\pm$ 2.6	3.6 $\pm$ 2.5	3.6 $\pm$ 2.6
Sugar-sweetened drinks (frequency/week) <sup>**</sup>	M	5.5 $\pm$ 2.1	5.4 $\pm$ 2.2	5.4 $\pm$ 1.9
	F	4.8 $\pm$ 2.4	5.0 $\pm$ 2.3	4.3 $\pm$ 2.6
Fast foods (frequency/week) <sup>**</sup>	M	2.8 $\pm$ 2.0	2.5 $\pm$ 2.0	2.1 $\pm$ 1.5
	F	2.2 $\pm$ 1.8	2.1 $\pm$ 1.7	2.2 $\pm$ 2.0
French fries/potato chips (frequency/week)	M	3.8 $\pm$ 2.3	3.5 $\pm$ 2.2	3.9 $\pm$ 2.3
	F	3.8 $\pm$ 2.5	4.3 $\pm$ 2.4	4.3 $\pm$ 2.5
Cake/donuts (frequency/week)	M	3.2 $\pm$ 2.1	3.3 $\pm$ 2.3	3.4 $\pm$ 2.2
	F	3.4 $\pm$ 2.4	3.8 $\pm$ 2.4	3.6 $\pm$ 2.3
Sweets (frequency/week) <sup>**</sup>	M	4.3 $\pm$ 2.3	3.9 $\pm$ 2.3	3.5 $\pm$ 2.1
	F	4.4 $\pm$ 2.4	5.1 $\pm$ 2.2	4.3 $\pm$ 2.5
Energy drinks (frequency/week)	M	1.2 $\pm$ 2.0	1.1 $\pm$ 2.0	0.6 $\pm$ 0.9
	F	1.1 $\pm$ 2.0	0.8 $\pm$ 1.7	0.7 $\pm$ 1.5

Data are means and standard deviations. M = males; F = Females. Two-way MANOVA tests: \* = significant differences at  $p < 0.05$  for the effect of age; \*\* = significant differences at  $p < 0.05$  for the main effect of gender.

Table 4 shows the mean values for physical activity indices and sedentary behavior of Jordanian adolescents grouped by age and gender. There were no significant age and gender interactions for all the studied physical activity indices and sedentary behavior. There was significant effect of age for some variables including TV-viewing, computer

Table 4  
Physical activity and sedentary behaviors of Jordanian adolescents grouped by gender and age (total  $n = 735$ )

Variable	Gender	Age Group (years)		
		14-15	16-17	18-20
TV Viewing (hours/day)*	M	3.6 ± 1.8	3.3 ± 1.5	3.0 ± 1.6
	F	3.9 ± 1.8	3.7 ± 1.7	2.9 ± 1.7
Computer use (hours/day) *	M	3.5 ± 2.0	3.2 ± 1.7	2.6 ± 1.9
	F	4.0 ± 2.0	3.2 ± 1.9	2.0 ± 1.4
METs-min/week of Moderate –intensity physical activity **	M	1224.5 ± 1013.2	1236.6 ± 1060.6	1790.5 ± 1135.8
	F	1054.9 ± 1143.2	997.5 ± 838.5	1370.0 ± 964.5
METs-min/week of Vigorous –intensity physical activity **	M	3667.7 ± 2723.2	3265.8 ± 2895.2	2975.0 ± 2654.2
	F	1134.0 ± 1301.2	848.6 ± 1391.5	1137.0 ± 1816.8
Total METs-min/week **	M	4867.5 ± 3128.5	4424.3 ± 3352.3	4765.5 ± 3231.9
	F	2037.2 ± 1949.0	1797.8 ± 1747.3	2507.0 ± 2424.6

Data are means and standard deviations. M = males; F = Females. Two-way MANOVA tests: \*=significant differences at  $p < 0.05$  for the effect of age; \*\*=significant differences at  $p < 0.05$  for the main effect of gender.

Table 5

The proportion (%) of Jordanian adolescents who exceeded certain cut-off values for physical activity, careen time and dietary habits

Variable	Males	Females
>2 hours of screen time	96.9	95.7
>1680 METs-min/week †	75.9	41.7*
>2520 METs-min/week ‡	64.8	24.4*
Daily breakfast intake	29.4	17.5*
Daily vegetables intake	27.5	29.2
Daily fruits intake	23.6	21.6
Daily milk Intake	31.43	24.6*
Sugar-sweetened drinks intake (>3 day/week)	79.7	66.3*
Fast food intake (>3 day/week)	27.7	15.6*
French fries/potato chips intake (>3 day/week)	46.2	56.4*
Cake/donut/biscuit intake (>3 day/week)	40.5	46.4
Sweets/chocolates intake (>3 day/week)	55.6	66.1*
Energy drinks intake (>3 day/week)	12.5	9.2

† = 60 min per day × 7 days/week × 4 METs (moderate-intensity physical activity). ‡ = 60 min per day × 7 days/week × 6 METs (moderate- to vigorous-intensity physical activity), \* Significant difference between males and females at  $p < 0.05$ .

use and METs-min/week of moderate –intensity physical activity. Older adolescents spent less time on TV viewing and computer use. Moreover, older adolescents spent more energy expenditure expressed as METs-min/week of moderate –intensity physical activity. Gender also showed significant effect on various level of physical activity as males were more physical active than females. The average screen time for all participants was  $6.7 \pm 2.7$  hours, while the total energy expenditure in METs-min per week for all was  $3329.6 \pm 3022.3$ .

The proportions of adolescents exceeding the specific cut-off values for the lifestyle variables are shown in Table 5. About 95% of the adolescents reported spending more than 2 hours watching TV and working on computers (screen time). There was no significant difference between males and females in screen time spending. More males than females met the recommended daily physical activity. For example, about 75% of the males met the recommended one hour of daily moderate-intensity physical activity compared to 42% of the females. Similarly, more males (64.8%) met the recommended level of one hour of daily moderate- to vigorous-intensity physical activity than females (24.4%). Less than the third of the adolescents ate breakfast, vegetables, fruits, and drink milk daily. There were no

significant difference in the proportion of males and females who consumed vegetables and fruits daily. Compared to females, adolescents males consumed more frequently breakfast (17.5% versus 29.45), milk (24.6% versus 31.4%), and sugar-sweetened drinks (66.3% versus 79.7%). In addition, about 27.7% of males ate fast food more than 3 times a week compared to 15.6% of females ( $p < 0.05$ ). Females showed a higher rate in the consumption of French fries/potato chips, and sweets/chocolates for more than 3 times a week (56.4 and 66.1%, respectively) compared to males (46.2 and 55.6%, respectively). About 12.5% of the males and 9.2% of the females consumed energy drinks more than 3 times a week.

#### 4. Discussion

This study is the first study aimed to assess the lifestyle pattern including eating habits, sedentary behavior and physical activity of a sample of Jordanian adolescents living. Clearly, our results demonstrate undesirable lifestyle behaviors among adolescents of both sexes. In addition, the prevalence of overweight in this sample is of a concern. Adolescence is a life stage characterized by dramatic increases in height and weight, which necessitate an increase in nutrient requirements. The increased need for energy and nutrients combined with increasing independence in lifestyle pattern including food choices, sedentary behaviors, and physical activity level put adolescents at nutritional risk.

Data on eating habit show low frequency of intake of important food groups including milk, vegetables and fruit. On the other hand, the frequency of intake of foods rich in sugar and fat was high. In addition, the majority of the adolescents skip the breakfast meal. Undesirable eating habits are common among adolescents as have been shown by studies from other countries. For example, data from the 2009 National Youth Risk Behavior Surveillance conducted in the United States showed that about 78% of high school students had not eaten fruit and vegetables five or more times per day [14]. Findings from the 2004–2005 National Health Survey-Australia [4] showed that 30% of 12–14 year olds usually ate four or more daily serves of vegetables or three or more daily serves of fruit. A similar survey to the one used in the present research, which was conducted on Saudi adolescents showed that less than quarter of Saudi adolescents consumed vegetables and fruits daily [7].

Eating foods high in fat and sugar is common among youth. Fast foods, fried potato and or chips, sugar sweetened drinks as well as sweets were consumed frequently by the study participants. The proportion of adolescents in this study consuming fast food more than three times per week was 27.7% and 15.6% for males and females, respectively. These percentages are lower than the rates of fast food intake that were recently reported for adolescents from United Arab Emirates [11] Bahrain [20] and Saudi Arabia [7]. This may be due to the lower economic status of our sample compared with those in the previously mentioned countries. The highest frequently consumed food with added sugar in this study was sugar-sweetened drinks that were consumed by more than two thirds of the adolescents for more than 3 times a week. Al-Hazzaa et al. [7] also found that 67.2% and 57.4% of Saudi adolescent males and females, respectively, consumed sugar-sweetened drinks more than 3 days a week. In the United States, about 29.2% of high school students had drunk soda or pop at least once per day [14].

Skipping breakfast was shown to be common habits among males and females in our sample. Skipping breakfast was also observed among American and European children and adolescents, ranging from 10% to 30%, depending on age-group, population and definition [21]. Skipping breakfast has been also reported among Arab adolescents. Among Arab adolescents, skipping breakfast was also shown to be widespread. In Bahrain, significantly greater percentage of females (62.8%) skipped breakfast compared to males (37.2%) [20]. Breakfast skipping was reported to be 71% and 80% among Saudi adolescents males and females, respectively [7], and among about 10% of adolescent males and nearly 19% of females in the United Arab Emirates [11]. It is well recognized that omitting breakfast has negative impacts on cognitive performance, quality of overall diet, body weight, and emotional well-being.

Nevertheless, the majority of the adolescents in this sample showed unhealthy eating habits characterised by low frequency of intake of fruits, vegetables and milk, and high frequent intake of foods high in sugar and fat. These results are inconsistent with the WHO Global Strategy for Diet and Physical Activity recommendations [3] and if persisted during adulthood would increase the risk for chronic noncommunicable diseases such as coronary heart disease, diabetes, hypertension, and cancer

Current guidelines recommend that screen time should not exceed 2 hours per day [1, 13] The majority of our sample exceeded the current screen time (television and computer) recommendation. The proportion of adolescents in

this study who met the recommendation is much lower than those in other Arabs countries [7] and western countries [15, 19]. This is an alarming as watching television for more than 2 hours per day has been linked with unfavorable body composition, decreased fitness, lowered scores for self-esteem and pro-social behavior and decreased academic achievement [25].

The benefits of physical activity on primary and secondary prevention of chronic diseases are well-known [27] Hence, physical-activity guidelines for adolescents recommend that they should participate in at least 60 minutes of moderate to vigorous physical activity on a daily basis [13]. We used 1680 METs-min per week as cut-off scores to correspond to 60 minutes of daily moderate-intensity physical activity and 2520 METs-min per week as cut-off scores corresponding to 60 minutes of daily moderate- to vigorous-intensity physical activity. In the present study, males were more likely than females to meet the physical activity recommendations. High rates of physical inactivity especially among female adolescents have also been reported in other countries such as Australia [23] Italy [26] Baharin [20] and Saudi Arabia [7] The consistent findings that females participate in less physical activity than males indicate that there are many constraints that limit female adolescents' involvement in physical activity. Future research should focus on identifying such constraints.

In regard to BMI data in the present study, most of the adolescents have values that are in the normal range, based on the International Obesity Task Force criteria for BMI cut-offs for adolescents [12] or the WHO adult cut-off points for adults. The high percentage of overweight among adolescents is worrying, and necessitates counteractive strategies to weight gain. Our prevalence data of overweight are almost comparable with some rates recently reported for Jordanian adolescents previously. As Khader et al, reported that among adolescents, the overall prevalence rates of overweight and obesity were 13.7% and 10.0%, respectively [17]. Another study among 824 Jordanian adolescents living in Irbid showed higher prevalence rates of overweight than ours as the prevalence of overweight was 21% and 17% among females and males, respectively [16]. In the present study, no adolescent was classified as underweight, which draw attention primarily onto obesity epidemic in this group of Jordanian adolescents.

The present research has some limitations. This was a cross-sectional study and the findings do not imply a cause and effect relationships. Also, the assessment of dietary habits was based on frequency of intakes, which presents only part of a comprehensive assessment. An assessment of total dietary intake and energy expenditure is necessary to obtain a good picture of energy balance status in this age group. Nevertheless, the lifestyle behaviors described in this study are valuable and appear as significant information for public health.

## 5. Conclusions

The majority of the Jordanian adolescents in this study have undesirable lifestyle behaviours characterised by skipping breakfast, low intake of fruits, vegetables and milk, high intake of foods rich in sugar and fat, and have high sedentary behaviours and low levels of physical activity, especially in females. These behaviours increase the risk factors for chronic non-communicable diseases later in life. Hence, this study has important implications for health promotion and disease prevention programs geared for adolescent population in Jordan and neighbouring countries.

## Conflict of interest

The authors declare that they have no conflict of interest.

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