

# Assessing the Lifestyle (Physical Activity Levels, Sedentary Behaviour and Eating Habits) of Omani Adolescent Girls: A Mixed Methods Study

Zuwaina Humaid Al-Mahrouqi

## ABSTRACT

**Introduction:** Rising body mass index in the world population is a serious global health issue of 21<sup>st</sup> century. Epidemiology and management of high BMI have been the themes of many studies. In the Arab world, including in Oman where this study is based, the prevalence of obesity and inactivity emerged late but is accelerating rapidly, particularly among the youth. Study objective was to assess the lifestyle characteristics (physical activity level, sedentary behaviour, and eating habits) among Omani girls aged 15–18 years, and to understand their perceptions related to this lifestyle.

**Material and methods:** An explanatory sequential mixed methods study was conducted by enrolling total of 421 female students who were randomly selected from two schools in Ibri, Oman, to participate in this study. A validated online questionnaire (N = 421) and focus groups (n = 16) were used as data collection instruments.

**Results:** Most participants had low physical activity levels and increased screen time. The overweight participants were significantly more likely to consume Fast food. The participants perceived environmental and sociocultural factors, rapid modernisation, and acculturation of Omani society as barriers to physical activity.

**Conclusion:** Mitigation of Omani girls' increasingly unhealthy lifestyle is the responsibility of public policy makers, school authorities, community leaders, families, and adolescents themselves, to seek ways to safeguard the health of the upcoming generation.

**Keywords:** Adolescent, Oman, Lifestyle, Physical Activity, Sedentary Behaviour, Fast Food, Sleep

## INTRODUCTION

Balanced diet and regular exercise are key components of a healthy lifestyle. Evidence shows that living sedentarily consuming high sugar, high fat foods leads to increase in body weight.<sup>1</sup> Obesity increases the risk for many health problems such as hypertension, cardiovascular diseases, and diabetes mellitus.<sup>2</sup> Sedentary behaviour refers to physical inactiveness characterised by low level energy consuming activities<sup>3</sup> such as sitting or lying down, which consumes minimal energy, typically, < 1.5 Metabolic Equivalent (METs) a day.<sup>4</sup> Physical inactivity can be defined as doing inadequate amounts of physical activity or failing to achieve the minimum prescribed physical activity.<sup>5</sup>

A meta-analysis of 2,416 population-based measurement studies involving 128.9 million people across age groups and nationalities has demonstrated increasing overweight

and obesity among children and young people, particularly in the well-to-do emerging economies in the Middle East.<sup>6</sup> The main reasons for this appear to be non-compliance with the principles of healthy eating and increasing sedentary behaviour. These habits decrease the quality of life and increase the risk for chronic diseases.<sup>7</sup>

The aim of this study, conducted in the Arabian nation of Oman, was to bridge the research gap that exists regarding Omani adolescent girls' lifestyle and their association with body weight status by studying the diet and activity habits of this population using a mixed method approach. This was the first study of its kind from Oman.

Girls were chosen as study subjects because of the nature of Arab culture, which is intensely based on the family with the mother as its focal point. An Arab man improving his lifestyle benefits him personally; but when an Arab woman improves hers, it benefits her entire family. Her family's lifestyle will be modelled on hers, and will ultimately decide the future health of the family, community, and ultimately the nation. The present study has taken that role seriously by involving adolescent girls to participate actively in the research, to contribute to improving the general health of this age group and ultimately benefit the health of their peers as well. A semirural town was selected to conduct the study.

## MATERIAL AND METHODS

This paper is based on a detailed mixed methods study conducted during the academic year 2015–2016 in two schools of Al Dhahira Governorate (Oman), using the 'explanatory sequential mixed method'. This study has adopted the validated Arab Teens Lifestyle Study (ATLS) questionnaire<sup>8</sup> (Al-Hazza 2013). Permission to use the questionnaire was obtained from its designer.

In the current study data was collected using two methods: the quantitative data collected by an online self-administered ATLS questionnaire (N = 421) and the qualitative data collected by using focus group discussion (n = 16). This triangulation helped improve the reliability of the findings.

The quantitative data was collected and analysed first, and informed the qualitative part of the research. The findings

<sup>1</sup>Tutor, Oman College of Health Sciences (Al Dhahira Branch)

**Corresponding author:** Dr. Zuwaina Humaid Al-Mahrouqi, Tutor, Oman College of Health Sciences (Al Dhahira Branch)

**How to cite this article:** Al-Mahrouqi ZH. Assessing the lifestyle (physical activity levels, sedentary behaviour and eating habits) of omani adolescent girls: a mixed methods study. International Journal of Contemporary Medical Research 2022;9(4):D9-D15.



from the quantitative data are presented numerically. The qualitative part explored in-depth the subjective reasons and opinions that may have given rise to the quantitative data. For example, regarding physical activity, the questionnaire quantified the participants' physical activities, while the focus group discussions discovered the participants' perceptions on the same.

The inclusion criteria were: the participants should be schoolgirls, Omani nationals, aged 15–18 years, enrolled in 10<sup>th</sup> to 12<sup>th</sup> grades, and free from physical disabilities.

The ethical approval for this research was obtained from Ministry of Education, research committee Oman. Informed consent was obtained from the participants and their parents, and the confidentiality of the collected data maintained.

The quantitative data from the online Arab Teens Lifestyle (ATLS) questionnaire were analysed using SPSS Version 23, IBM. In addition, six steps of qualitative analysis<sup>9</sup> were used to analyse the qualitative data of this study (Figure 1).

## RESULTS

### 1. Quantitative Results

The participants were 421 Omani adolescent schoolgirls aged

School	Number	%
School (1)	259	62
School (2)	162	38
Total	421	100

**Table-1:** Distribution of Participants by School

15–18 years. The responses of the participants were collected through online questionnaire. The internal consistency and reliability of the data set, when tested with Cronbach Alpha, yielded an acceptable value of 0.76.

The participants were recruited randomly from two girls' high schools in Ibri, a semi-rural town in Oman. Initially a total of 442 participants were selected and invited to participate. After 21 (5%) invitees withdrew from the study (due to their own or parental refusal to sign the consent form), the number of participants who completed the study was N=421 (response rate 95%), Table (1).

### Physical Activities

Most participants (88%) reported spending less than the recommended daily one hour in moderate intensity sports, irrespective of BMI. The sample *t*-test (Table 2) indicated that the true daily mean time spent by the participants in moderately intensive sports was 27.8 minutes. Their participation in vigorous intensity sports was even lower, at 11 minutes daily. The extremely low participation in vigorous physical activity was further confirmed by crosstab analysis which revealed that 95% of the participants across all BMI groups were working out less than <2,520 METs/ week.

### Sedentary behaviour

Table (3) reveals that the vast majority (97%) of participants in all BMI groups spent more than the recommended daily two hours in front of electronic screens (TV and DVD) during weekdays. All overweight participants had more than 2 hours' screen time during the weekdays. During weekends

Variable	Mean (Mins)/ Day	*SD	Recommended minutes/ day (NICE 2015)	t	p
Moderate Intensity Sports	27.8	26.7	60	-24.25	< 0.001

\*SD= Standard Deviation

**Table-2:** One Sample t-Test for Moderately Intensive Sports

BMI	No of participants using screens (Weekdays)			p
	≤2 (Hours/Day)	>2 (Hours/Day)	Total	
Underweight	3 (11%)	25 (89%)	28	0.041
Normal	8 (3%)	239 (97%)	247	
Overweight	0 (0%)	87 (100%)	87	
Obese	2 (3%)	57 (97%)	59	
Total	13 (3%)	408 (97%)	421	

**Table-3:** Reported Screen Time during Weekdays Compared with Recommended Two Hours by NICE (2015)

Watching *TV & **DVD Weekends (Hours/ day)	Watching TV & DVD Weekdays (Hours/ day)	Z	p
Median	Median		
2	2.4	-2.883	0.004

\*TV= Television, \*\*DVD= Digital Video Disc, \*\*\*IQR= Interquartile Range

**Table-4:** TV & DVD Hours on Weekdays and Weekends

Weekends (Hours/ day)		Weekdays (Hours/ day)		Z	p
Median	*IQR	Median	*IQR		
3	2–5	2.8	1–5	-2.556	0.011

\*IQR= Interquartile Range

**Table-5:** Computer & Internet Hours on Weekends and Weekdays

BMI	Sleeping Hours/ weekdays		Total	p
	<8 (Hour/Day)	≥ 8 (Hour/Day)		
Underweight	6 (86%)	1 (14%)	7	0.010
Normal	36 (88%)	5 (12%)	41	
Overweight	4 (40%)	6 (60%)	10	
Obese	6 (75%)	2 (25%)	8	
Total	52 (79%)	14 (21%)	66	

**Table-6:** 18-year-old Girls Reported Sleeping Duration during Weekdays Compared with Recommended 8 hours by NSF (2015)

Variables	Under-weight	Normal weight	Over weight	Obese	p
Daily Consumption of Breakfast	8 (29%)	97 (39%)	13 (15%)	9 (15%)	<0.001
Daily Consumption of Vegetables	11 (39%)	110 (45%)	39 (45%)	26 (44%)	0.96
Daily Consumption of Fruits	8 (29%)	71 (29%)	23 (26%)	18 (31%)	0.002
Soft Drinks >3 times/week	15 (54%)	116 (47%)	30 (35%)	23 (39%)	0.12
Dairy Products >3 times/week	16 (57%)	130 (53%)	47 (54%)	26 (44%)	0.57
Fast Food (Pizza) >3 times/week	1 (4%)	38 (15%)	26 (30%)	25 (42%)	<0.001
French Fries & Crisps >3 times/week	17 (61%)	118 (48%)	71 (82%)	43 (73%)	<0.001
Sweets >3 times/week	14 (50%)	105 (43%)	47 (54%)	36 (61%)	0.04
Cake/ Doughnuts >3 times/week	12 (43%)	103 (42%)	64 (74%)	42 (71%)	<0.001
Energy Drinks >3 times/week	1 (4%)	13 (5%)	3 (3%)	2 (3%)	0.85

Note: p value tested by Chi-square test

**Table-7:** Proportion of Omani Adolescent Girls Exceeding the Cut-off Values for Food Intake

also there was no significant difference between BMI groups regarding the time they spent in front of screens. Wilcoxon Signed Ranks test indicated that the median TV and DVD watching hours among the participants were significantly higher during weekdays than weekends (Table 4). This trend reversed for computer and internet usage, being more during weekends (Table 5).

### Sleep Duration

The National Sleep Foundation (NSF) recommends 8 hours sleep daily for 18–25-year-olds, and 9 hours for 14–17-year-olds.<sup>10</sup> In the present study, 79% of the 18-year-old girls slept less than 8 hours during weekdays, with significant differences in sleep duration between BMI groups as per the Pearson  $\chi^2$  test (Table 6). During weekends, half of the 18-year-olds reported sleeping less than 8 hours. Sleep deficit was most prevalent among the underweight girls (86%). Among the 15–17-year-old subjects, 58% slept less than the recommended 9 hours during weekends, which included 65% of the obese girls (Pearson  $\chi^2$  significance at  $p=0.025$ ). During the weekdays 92% of the 15–17-year-olds slept less than 9 hours, with the overweight girls (97%) dominating the weekday sleep-deficit trend.

### Dietary Habits

The current results give a descriptive analysis of the dietary

food habits of Omani adolescent girls. The average value of most of the dietary food intake was between 3–6 times per week. The mean consumption trend for fast food and energy drinks was twice a week. Table (7) displays the proportion of adolescent girls in different BMI groups who exceeded the normal cut-off values of the consumption of different foods.

## 2. Qualitative Results

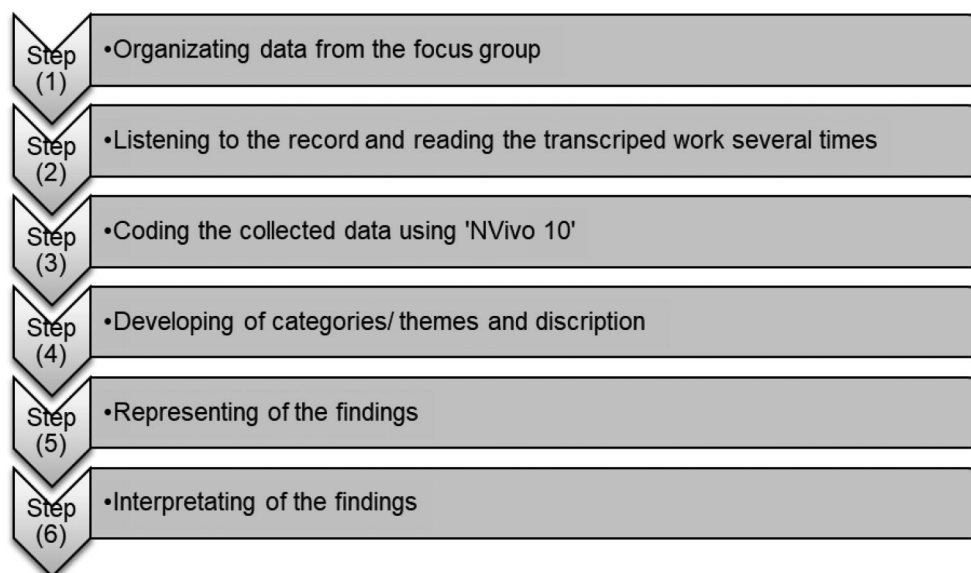
Two semi-structured focus group discussions were conducted with  $n=16$  participants, 8 participants in each group (4 participants with normal weight and 4 overweight/ obese participants). They were aged 16 ( $n=3$ ), 17 ( $n=8$ ), and 18 ( $n=5$ ) years, and students of tenth, eleventh or twelfth grades respectively. The discussion sessions were conducted in the participants' own schools. They revealed their perceptions and views regarding their lifestyles including food habits, physical activities, and barriers they faced.

### Thematic Analysis

Three major themes emerged from the qualitative data.

#### Theme 1. Perception of physical activity

Omani adolescent girls had a positive perception about physical activities. "Physical exercise is good for the body" (p.8 Normal Weight). "Walking is the best for the girls." (p.15, Obese). "Doing body exercises, I mean moving the body and protect it from the health problems like heart



**Figure-1:** Steps of Focus Group Data Analysis (Adopted from Creswell <sup>8</sup> p.197)

*disease and diabetes.*" (p.2, Obese).

### **Theme 2. Perception of barriers to physical activity**

Adolescents in different BMI groups identified various barriers to physical activity. These included environmental factors, seeing exercise as gendered, sociocultural factors, resource deficits, lack of encouragement from family and friends, and lack of role models. Environmental factors were seen as barrier for young women to perform physical exercises outdoor due to hot weather and lack of resources. "I cannot do physical activities outside; weather is too hot." (p. 3, Overweight). A further factor which effected the girls' physical activity was sociocultural. They indicated that community beliefs, cultural values, family systems, influenced their physical activity. Labour-saving modern technology was yet another factor.

Exercising opportunities were described as linked to gender. Frequently cited was the lack of suitable places for girls and women to exercise, as well as limited resources. Regarding older girls and women using bicycles publicly, the participants revealed that this was unacceptable in Omani culture. "... not allowing the girls to ride a bike." (p.10, Normal Weight).

Modernisation and affluence of Omani Society were also perceived as barriers to physical activity. Modern equipment pervaded their homes, reducing the need for manual housework. All participants agreed that even for short walkable distances people took cars and spent much time sitting in front of TV, computers, and mobile phones. They also said that expatriate housemaids performed most housework, leaving them relatively free of domestic chores. "... we have a housemaid." (p.16, Overweight). Lack of self-motivation was another factor that emerged from the discussion. In addition, they were also not being encouraged by their family members, friends, and teachers. The absence of role models such as Omani sportswomen also seemed to be a de-motivator.

Lack of time was perceived as a barrier to physical activity.

Homework load was cited, especially by the older students in their 12<sup>th</sup> grade. "Busy studying, I am in 12<sup>th</sup> grade and most of my time is spent studying." (p.7, Normal Weight). "Yes, teachers are giving us more homework to do. Till midnight..." (p.13, Obese). The girls said they often missed breakfast in the early morning rush to catch the school bus. "No, because no time to eat, I have to reach school before 7 am." (p.3 Overweight)."

Omani adolescent girls gave suggestions to help them to perform their physical activities effectively. They wanted their own club to practice physical exercises. "... to have sport club for ladies ..." (p.1 Obese). Furthermore, participants discussed about having knowledge about their physical activities. "Increase awareness about PE [Physical Education] by reading about the importance of PE." (p.7 Normal Weight). "Valuing the importance of PE, after school PE classes or during holidays." (p.14 Overweight). They suggested to increase the number of physical education classes in the school and initiate other practices to follow to increase physical activities. "... increasing number of periods [PE sessions] per week." (p.9 Normal Weight).

### **Theme 3. Perception of eating habits**

Omani adolescent girls perceived fast food to be harmful to the body, but said they were tasty and popular. "The best meal for the youth and children, but people ignore its negative effect on the body." (p.15, Obese). They and their peers were influenced by the food advertisements and the attractive way of serving and displaying colourful pictures. 'Attractive, advertising it in a beautiful picture.' (p.3 Overweight). Additionally, some participants pointed out that they were following the trend of Western culture in their eating habits by eating fast food and other unhealthy foods at home and at food outlets. 'Max Sandwiches' [double-sandwiches], from shop.' (p.7 Normal Weight). '... Fried chips, burger...' (p.16 Overweight). 'I like chips and pizza, home baked.' (p.3 Overweight).

The type of food available at home and in school also

influenced their eating habits. Participants were critical of the school canteen food. *“Most of them are not healthy and lead to obesity, but we don't have a choice, no fruits or vegetables. Milk available and it is healthy...”* (p.1, Obese). Omani adolescent girls gave suggestions to assist their school canteen to provide clean and healthy meals to school children. They wanted well-equipped dining halls in their schools. *“No place where we can sit and eat, now sitting under the trees with friends, but sometimes the weather is not good, we need a dining hall.”* (p. 4, Overweight). Most participants asked for healthy foods such as fresh milk and milk products, fruits and vegetables in their school canteen. *‘Provide fresh milk and milk products with different flavours.’* (p.2 Obese). *‘Provide fruits and vegetables and serve in an attractive way ...’* (p. 4 Overweight).

## DISCUSSION

### Physical Activity

In the current study, the participants reported as spending average 27.8 minutes/day on moderate intensity sports, far shorter than the recommended daily 60 minutes. This indicated that 88% of the participants were leading physically inactive lifestyles.

According to our qualitative findings, the barriers to exercise included: limited resources to exercise, hot weather, the housemaids doing most housework, use of cars for even walkable distances, and time constraints due to excessive school homework. The girls in this study also perceived that lack of encouragement from parents, teachers, friends, and relatives formed an important barrier against physical activity. The present study's focus group perceptions support the evidence from an earlier Omani study<sup>11</sup> of lack of culturally acceptable interventions to encourage physical activity among Omani girls.

The quantitative findings of the current and previous Omani studies indicate that Omani girls are significantly less physically active than their peers in Iraq (69% inactivity) and Kuwait (76% inactivity) These studies had investigated similar age groups under similar weather conditions and had similar sample sizes<sup>12,13</sup> It is possible that Omani communities are more conservative regarding girls exercising outdoors in mixed gender environments. This, however, needs further investigations.

### Sedentary Behaviour (Screen Time)

During the weekdays, 97% of our total participants across all BMI groups exceeded the daily two-hour screen time limit for watching TV, DVD and video as recommended by NICE<sup>14</sup> guidelines. The longer screen hours during weekdays might be attributed to using computers for homework in addition to entertainment. Indeed, during the focus group discussions the participants revealed having substantial homework assignments during school days. This was similar to findings from other Middle Eastern countries among similar age groups.<sup>12,13,15</sup>

Longer screen time promotes a powerful and self-perpetuating cycle towards inactivity and the consequent obesity. It begins on weekdays with the more than two hours of screen

time, which consumes the evening hours that encroach into homework time involving more computer time. Staring at the daylight-mimicking screen upsets the circadian rhythm leading to late and insufficient sleep. Early next morning, breakfast gets skipped in the rush to catch school bus, which in turn triggers the mid-morning hunger pangs and craving for an energy-rich lunch. In the evening, the screens take over again where fast food advertisements on prime TV and on social media fuel the attraction towards sweet and fat-rich foods. The very act of sitting still in front of attention-grabbing screens might be adding to the sedentary habit among teenagers. Educate parents about establishing screen time contract with their children. Drastically cutting screen time (mainly employing the traditional Arab-Islamic parental authority) should end perpetuation of the above-mentioned cyclical pattern and help Omani adolescent girls towards healthier lifestyle.

### Sleep Duration

In this study 79% of Omani girls aged 18 years and 92% of girls aged 15–17 years of age slept less than the recommended daily hours during the weekdays. There was a statistically significant difference in the percentage of participants in different BMI groups and their sleeping hours during weekdays. In addition, among the 18-year-old participants, those with normal weight slept less (88%) than their heavier peers during weekdays. Across the BMI groups, the mean sleep duration was significantly lower during weekdays ( schooldays) than during weekends. The burden of homework was cited as the reason by the focus group participants. The screen time during weekdays was also higher than during weekends. The focus group participants also attributed the lower school-day sleep time to having to rise as early as 5 am to be at school at 7 am.

American high school adolescents may have even more sleep deficit, as evidenced by 73% girls and 70% boys getting less than eight hours of sleep, with significant statistical differences between the genders.<sup>16</sup>

### Food Habits

#### Daily Breakfast

Daily breakfast consumption was significantly higher among the participants with normal body weight (39%) compared to overweight and obese participants, at 15% each. During the focus group discussions, several participants reported that they had to leave home as early as 6 am to catch the school bus to arrive at school on time, which left them with little time for breakfast.

In comparison, the daily breakfast consumption rates among Kuwaiti, Iraqi, and Bahraini 15–18-year-old girls were 18%, 36% and 43% respectively, lower than among the Omani girls in the current study<sup>12,17,13</sup> On the other hand, 69.5% Lebanese boys and girls aged 12–19 years of different BMI groups consumed higher daily breakfast—more than the participants of this study.<sup>18</sup>

#### Fast Food

In the present study, 42% of the obese participants consumed fast food more than three times a week, against 30% among

overweight and 15% among normal weight participants. The preferred fast food among most focus group participants were chicken sandwiches, fried chips, burgers, and pizzas. They liked the taste of such foods, and advertisements often influenced their choice. In comparison, fast food consumption was less prevalent among Syrian, and Iraqi adolescents of both genders, at 14% and 31%, respectively.<sup>19,17</sup> International studies show that adolescents are also subject to peer pressure. Oinam et al.<sup>20</sup> found that 70% of adolescents took their fast food with friends. Our focus group participants said they liked eating with friends than alone or at home.

### Fruits and Vegetables

In the current study, daily vegetable consumption was similar across the BMI groups (44%–45%). However, the obese group consumed more fruits daily (31%). The low intake of fruits and vegetable could be due to lack of knowledge about the nutritional guidelines<sup>21</sup>

The tendency among our participants to avoid fresh fruits goes against Omani culture. In Oman fresh fruits have always been prized, traditionally served to everyday visitors, and feature prominently during all social and religious occasions. Ramadan fasts are ideally ended with water and fresh fruit. Re-education is called for, to return the Omani youth to appreciating the cultural significance of fresh fruits. The present study's findings on fruit and vegetable consumption was consistent with those of a large multinational study conducted by; Al Ani et al.<sup>22</sup> among 26,328 13–15-year-old boys and girls in 11 Eastern Mediterranean Region nations including Oman. Only 19% participants reported consuming fruit and vegetables five times or more per day. The highest consumption was recorded among Djibouti adolescents (40%) and the lowest among Pakistani adolescents (10%). Except for Oman, Libya, and Djibouti, significantly more boys than girls ate fruit and vegetables  $\geq 5$  times/day. In that study Omani boys (n=97) reported consuming more fruit and vegetables than Omani girls (n=93).

### CONCLUSION

The results of this mixed methods study on the lifestyle characteristics of 421 Omani schoolgirls aged 15–18 years, chosen from a typical semi-rural town of Ibri, can be considered representative of this demography in Oman. The overweight and obese participants were significantly more likely to consume fatty and energy rich, foods than those in other BMI groups. Most participants had low physical activity levels. Thus, poor lifestyle in Omani adolescent girls as revealed by this study suggests a suboptimal future where obese young mothers becoming poor role models for the next generation of Omani children.

Omani ministries of health and education should work together to establish a renewed and targeted health education programme. This could be part of Oman's School Health Programme and school nurses should be responsible for its implementation. It is important to make health education a prominent part of the school biology curriculum. Learning healthy habits at young age might help in improving health in later life. The screen-time among adolescents need to

be reduce. Schools may also consider starting later in the morning, say, at 8 am, so that Omani teenagers get more sleep before dawn.

### REFERENCES

- Gharib, N., Rasheed, P., Obesity among Bahraini Children and Adolescents: Prevalence and Associated Factors. *Journal of the Medical Society* [Online]. [Viewed 28 December 2018]. Available from: <http://www.jbmsonline.com/index.php/jbms/article/view/67>
- Badran, M., Laher, I., Obesity in Arabic-Speaking Countries. *Journal of Obesity* [Online]. [Viewed 5 October 2019]. Available from: <http://www.hindawi.com/journals/job/2011/686430/>
- Rowlands, A.V., Physical Activity, Inactivity and Health during Youth—2016. *Pediatric exercise science*. 2017; 29:26-30.
- Tremblay, M. Letter to the Editor: Standardized use of the terms “sedentary” and “sedentary behaviours” *Applied Physiology, Nutrition and Metabolism* , 2018;37:540–542.
- British Heart Foundation (BHF), What is sedentary behaviour? [Online]. [Viewed 15 July 2015]. Available: [www.bhfactive.org.uk/files/1336/whatis-sedentary-behaviour.pdf](http://www.bhfactive.org.uk/files/1336/whatis-sedentary-behaviour.pdf)
- Abarca-Gómez, L., Abdeen, Z.A., Hamid, Z.A., Abu-Rmeileh, N.M., Acosta-Cazares, B., Acuin, C., et al. Worldwide trends in body-mass index, underweight, overweight, and obesity from 1975 to 2016: a pooled analysis of 2416 population-based measurement studies in 128·9 million children, adolescents, and adults. *The Lancet*, 390(10113), pp. 2627-2642 [Online]. [Viewed 25 May 2018]. Available from: [https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736\(17\)32129-3.pdf](https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)32129-3.pdf)
- Zhu, W., Owen, N., Sedentary behavior and health: Concepts, assessments, and interventions. *Human Kinetics* [Online]. [Viewed 22 January 2019] Available from: <http://tinyurl.com/yys6p3xz>
- Al-Hazzaa, H., Arab teen's lifestyle study physical activity questionnaire [Online]. [Viewed 27 October 2014]. Available from: <http://faculty.ksu.edu.sa/hazzaa/DocLib31/ATLS%20Questionnaire.pdf>
- Creswell, J., *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. 4<sup>th</sup>. ed. Los Angeles: Sage. 2014.
- National Sleep Foundation (NSF). *Teens and Sleep* [Online]. [Viewed 1 December 2019]. Available from: <https://sleepfoundation.org/sleep-topics/teens-and-sleep>
- Al-Siyabi, H., Al-Anquodi, Z., Al-Hinai, H., Al-Hinai, S., *Nizwa Healthy Lifestyle Project Evaluation Report 2010*. Directorate General of Health Services, Ad Dakhliyah Region, Ministry of Health, Oman. 2010.
- Allafi, A., Al-Haifi, A.R., Al-Fayez, M.A., Al-Athari, B.I., Al-Ajmi, F.A., Al-Hazzaa, H.M., MUSAIGER, A.O., et al. Physical activity, sedentary behaviours and dietary habits among Kuwaiti adolescents: gender differences. *Public health nutrition*. 2014;17:2045-2052.
- MUSAIGER, A.O., Al-Mannai, M., Al-Marzog, Q., Overweight and obesity among children (10-13 years) in Bahrain: A comparison between Two International

- Standards. Pakistan journal of medical sciences. 2014; 30:497.
14. National Institute For Health and Care Excellence (NICE). Maintaining a healthy weight and preventing excess weight gain among adult and children. [Online]. [Viewed 2 July 2016]. Available from: <http://tinyurl.com/yyyyqwvl>
  15. Al-Hazzaa, H. M., Abahussain, N. A., Al-Sobayel, H. I., Qahwaji, D. M., and Musaiger, A. O., Lifestyle factors associated with overweight and obesity among Saudi adolescents. BMC Public Health, 12, 354 [Online]. [Viewed 4 November 2018]. Available from: <http://doi.org/10.1186/1471-2458-12-354>
  16. Wheaton, A.G., Jones, S.E., Cooper, A.C., Croft, J.B., 2018. Short Sleep Duration among Middle School and High School Students—United States, 2015. Morbidity and Mortality Weekly Report. 2018; 67:85-90.
  17. Musaiger, A., Al-Mufti, B., Al-Hazzaa, H., Eating habits, inactivity, and sedentary behaviour among adolescents in Iraq: Sex differences in the hidden risks of non-communicable diseases. Food and Nutrition Bulletin. 2014;35:12-19.
  18. Nasreddine, L., Naja, F., Akl, C., Chamieh, M., Karam, S., Sibai, A.M., Dietary, lifestyle and socio-economic correlates of overweight, obesity and central adiposity in Lebanese children and adolescents. Nutrients. 2014;6:1038-1062.
  19. Musaiger, A.O., Kalam, F., Dietary habits and lifestyle among adolescents in Damascus, Syria. Annals of Agricultural and Environmental Medicine. 2014; 21:416-419.
  20. Oinam, J., Singh, Y.N., Devi, H.S., Prevalence of Fast Food Intake among Adolescent School Students in Imphal West, Manipur. International Journal of Scientific Research. 2018; 5:49-51.
  21. Rooney, C., Mckinley, M.C., Appleton, K.M., Young, I.S., Mcgrath, A.J., Draffin, C.R., How much is '5 a day'? A qualitative investigation into consumer understanding of fruit and vegetable intake guidelines. Journal of Human Nutrition and Dietetics, 2019;30:105-113.
  22. Al Ani, M.F., Al Subhi, L.K., Bose, S., Consumption of fruits and vegetables among adolescents: a multi-national comparison of eleven countries in the Eastern Mediterranean Region. British Journal of Nutrition. 2016; 116:1799-1806.

**Source of Support:** Nil; **Conflict of Interest:** None

**Submitted:** 12-02-2022; **Accepted:** 01-03-2022; **Published:** 30-04-2022