

## **Rural-Urban Differences in Prevalence of Overweigh and Obesity among Adolescents: a comparison approach.**

السمنة وزيادة الوزن عند الأطفال في سن المراهقة؛ دراسة الاختلاف بين المناطق الحضرية والريفية في المملكة

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### **ملخص**

مقدمة: السمنة الان اصبحت مصدر قلق صحي رئيسي امام المهتمين بالصحة بالاضافة الى انها الان مشكلة خطيرة في الناس من جميع الأعمار في جميع أنحاء العالم.  
الهدف: الهدف الرئيسي من هذه الدراسة هو التحقيق والمقارنة بين انتشار زيادة الوزن والسمنة بين المراهقين في المناطق الحضرية والريفية في المملكة العربية السعودية.  
المنهجية: دراسة مقطعية أجريت في عام ٢٠١١ باستخدام طريقة التوزيع العشوائي متعدد المراحل بين ١١٣٩ المراهقين، ٤٤٧ من المناطق الريفية والحضرية و ٦٩٢ من أحياء منطقة الرياض في المملكة العربية السعودية. وأظهرت النتائج أن ٢١.٧٪ من مجمل العينة لديهم زيادة الوزن و ٢٨.٩٪ كانوا يعانون من السمنة المفرطة. في المناطق الحضرية، كانت ٢٤.١٪ زيادة الوزن و ٣٥.٣٪ يعانون من السمنة المفرطة. من المشاركين في الريف في سن المراهقة، كانت ١٧.٩٪ زيادة الوزن و ١٩٪ يعانون من السمنة المفرطة.  
والخلاصة: زيادة الوزن والسمنة الان تعتبر أزمة صحية للمراهق السعودي في المناطق الحضرية والريفية. ومن الأهمية السعي باسرع وقت لمحاربة هذه المسألة الصحية الخطيرة بين هذه الفئة العمرية في كلا المنطقتين الحضرية والريفية.

### **Abstract**

**Background:** Obesity is now a major health concern for health agencies and become a serious problem in people of all ages worldwide.

**Objective:** The main aim of this approach is to investigate and compare the prevalence of overweight and obesity among adolescents in urban and rural area of Saudi Arabia.

**Methodology:** Cross-sectional study conducted in 2011 using a multistage randomization method among 1139 adolescents, 447 from rural areas and 692 from urban districts of Riyadh region in Saudi Arabia.

**Results:** Results showed that overall 21.7% of were overweight and 28.9 % were obese. Among urban adolescents, 24.1% were overweight and 35.3% obese. Of the rural adolescent participants, 17.9% were overweight and 19% obese.

**Conclusion:** Overweight and obesity is a national health crisis Saudi community in urban and rural districts. It is crucial to fight against this serious health issue among this age group in both areas.

**Keywords;** overweight, obesity, adolescents, rural, urban, Saudi Arabia

### **Introduction**

In recent decades obesity has become a serious global epidemic [1-3]. It is estimated that 1.4 billion adults and about 200 million children and adolescents are overweight or obese [4, 5]. Moreover, the prevalence of obesity is increasing and it is predicted that by the year 2020

more than one billion more will be affected [6]. It has become a major health problem in Middle Eastern countries [7], and especially in the countries of the eastern Mediterranean [8, 9] and in the Arabian Gulf states [7, 10]. Saudi Arabia, one of the six Arabian Gulf countries, is experiencing an alarming prevalence of overweight and obesity and is now one of the fattest nations on Earth as one in every three Saudis is obese[11] [12]. This study aims to explore the prevalence of overweight and obesity among adolescents in urban and rural districts of Riyadh, Saudi Arabia.

## **Methodology**

This is a cross-sectional study conducted among adolescents in Riyadh region, Saudi Arabia in 2011. It surveyed 370 school children in elementary and secondary schools. Participants had their height and weight measured using electronic scales (Seca Medical 770). This study used the WHO 2007 Growth Standards; BMI- age- and gender-specific Z-scores to determine overweight and obesity levels among adolescents. This study was approved by the Social and Behavioral Research Ethics Committee of Flinders University (Project No 4793: 11 May 2010). Data-entry and statistical analyses were conducted using Excel 2010 and SPSS software version 19.0 (SPSS, Inc., Chicago IL.) and STATA version 12.0 (StataCorp. 2011).

## **Results**

### **Weight status**

Figure 1 shows the overall distribution of weight status of the 1139 participants. The prevalence of thin or severely-thin adolescents was 10.6%. The normal weight prevalence was 38.8%. Just over half of the participants were overweight (21.7%) or obese (28.9%).

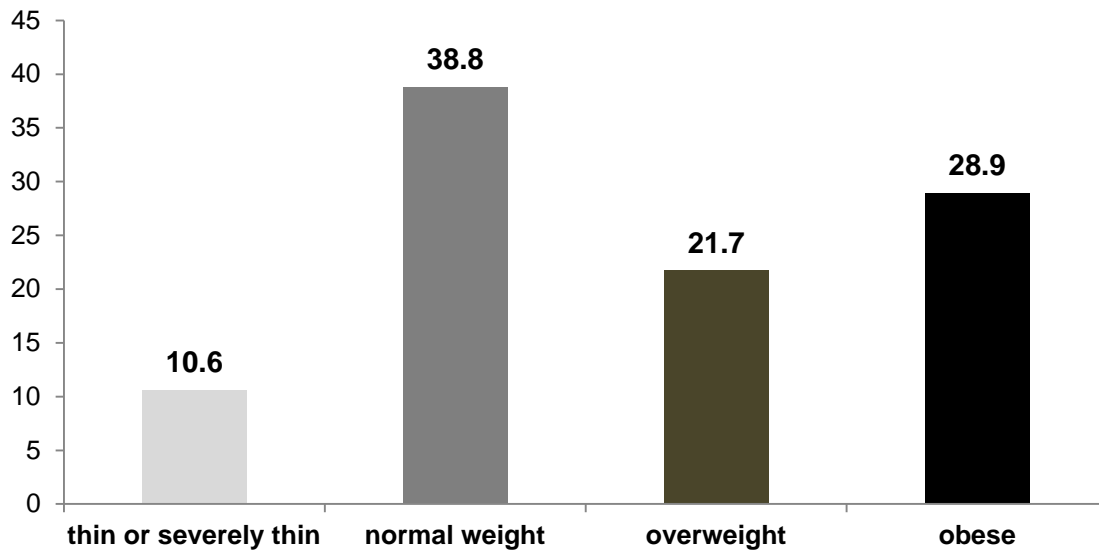


Figure 1. Percentages of thin/severely thin, normal weight, overweight, and obese participants.

For the purpose of investigating the association of demographic and lifestyle factors and weight status only those participants who were in the healthy-weight category or heavier were included in the remaining analysis.

### **Weight status by gender**

Figure 2 shows the weight-status in both genders, and it can be seen that more females were of a healthy weight compared with males (42.6% vs. 35.7%). Conversely, the prevalence of obesity was higher amongst males than females (30.7% vs. 26.7%).

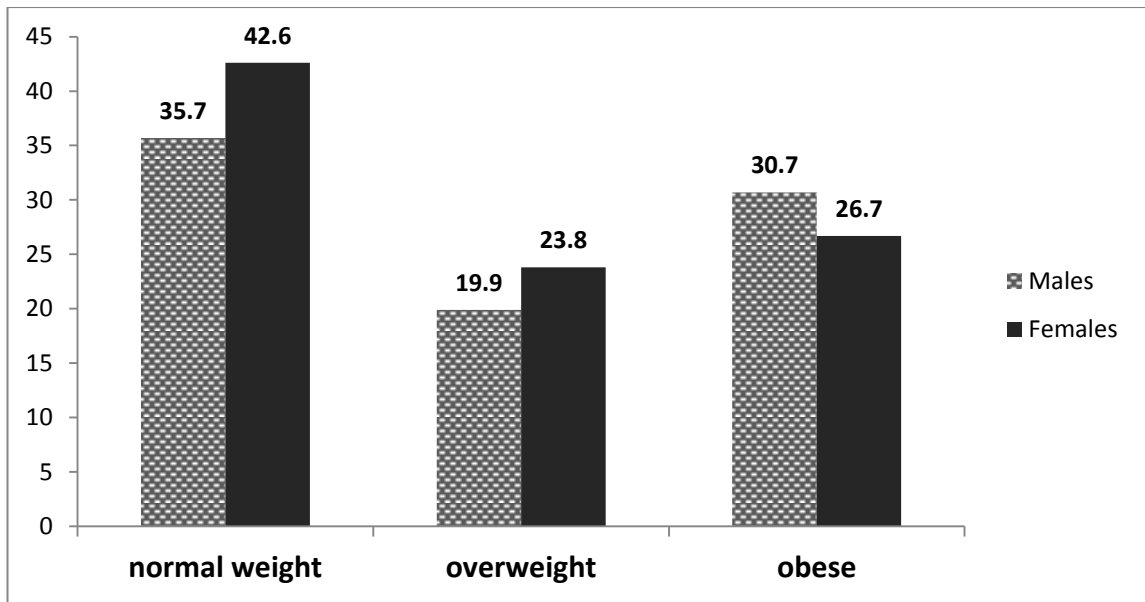


Figure 2 Percentage of normal weight, overweight, and obese male and female participants.

### Weight status by gender and location

Figure 3 shows that there were marked differences in weight status between males and females ( $p < 0.001$ ) according to where they lived. For males, the prevalence of overweight and obesity was significantly higher in urban than in rural participants. The proportion of females who were overweight was similar for the rural and urban areas, but significantly more urban females were obese. Moreover, in both genders there were noticeably more normal weight participants in rural areas than in urban areas.

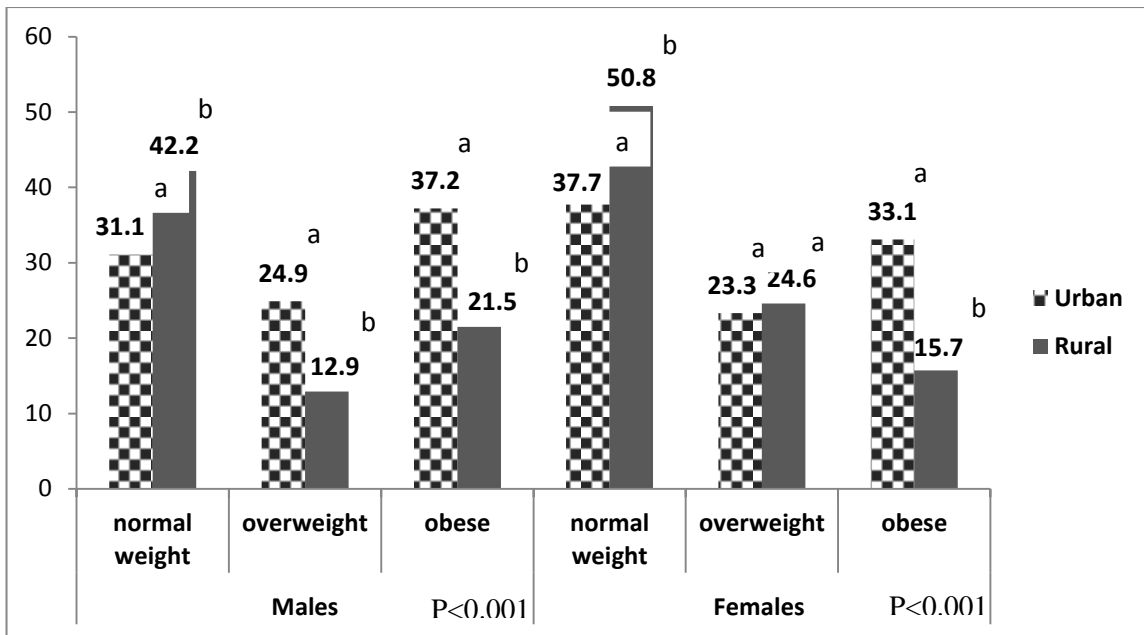


Figure 1 Weight status of male and female participants by location of residence  
 A different superscript above WHO weight status categories indicates a significant difference in column proportions ( $p<0.05$ ).

### Weight status by age-group

Figure 4 shows that there was a close association between age and weight-status in males ( $p<0.001$ ). The prevalence of overweight and obesity increased with age in males, however, there were no significant differences in weight-status in female participants in different age groups.

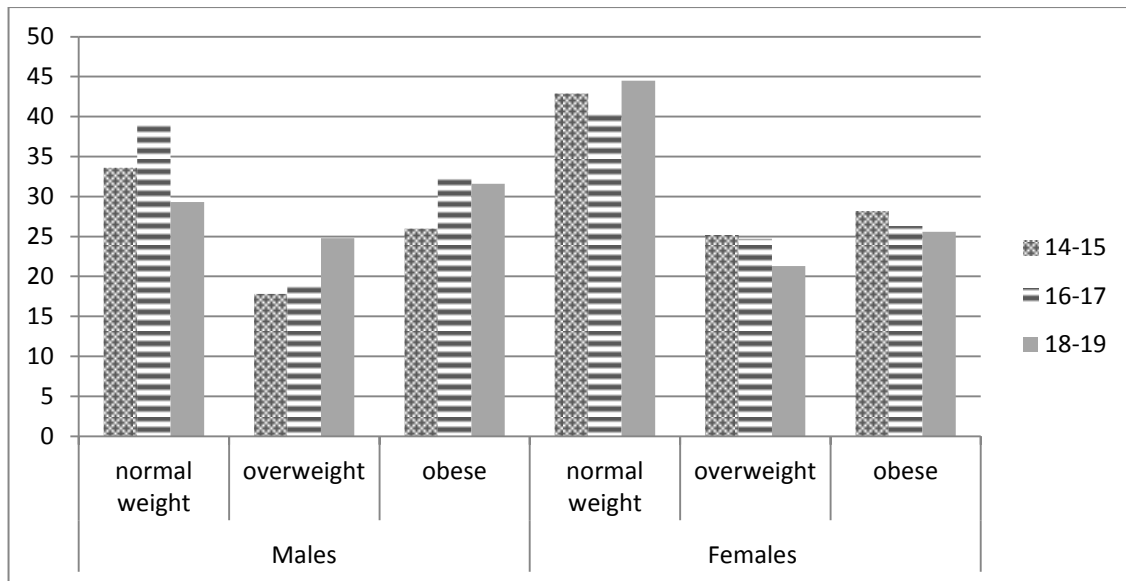


Figure 4 Percentage of normal weight, overweight, and obese adolescent participants by gender and age group.

Table 1 shows that there was a noticeable association between age and weight status for urban males and that the prevalence of obesity increased with age ( $p=0.02$ ). There were no significant associations between weight-status and age amongst urban females and also amongst rural male and female participants.

Table 1 Weight status of participants by age group, gender and location of residence

Age and gender	Urban(n=648)					Rural(n=370)				
	N	Normal	OW	Obese	P*	N	Normal	OW	Obese	P*
<b>Males</b>										
14-15	30	20.0 <sup>a</sup>	43.3 <sup>b</sup>	36.7 <sup>c</sup>	0.02	83	51.8	15.7	32.5	0.80
16-17	233	38.2	21.9	39.9		77	58.4	18.2	23.4	
18-19	78	24.4 <sup>a</sup>	34.6 <sup>b</sup>	41.0 <sup>c</sup>		36	55.6	16.7	27.8	
<b>Females</b>										
14-15	81	32.1	24.7	43.2	0.19	76	56.9	27.6	14.5	0.92
16-17	115	38.3	27.8	33.9		59	55.9	25.4	18.6	
18-19	111	47.7	21.6	30.6		33	51.3	28.2	20.5	

P\* values are based on Chi-square test between urban and rural areas; P values of less than 0.05 were considered statistically significant.

Differing superscript letters denote significantly different column proportions at the 0.05 level. Absence of superscript letters denotes no significant difference between column proportions.

## Discussion

The overall prevalence of overweight and obesity identified in this study was 21.7% and 28.9% respectively. This result is comparable with the findings of a recent cross-sectional study among urban adolescents in Saudi Arabia's eastern province; there, 20% of participants were found to be overweight and 27% obese [13]. However, the levels of overweight and obesity reported in this current study were higher than those reported in other Saudi studies [14-16]. These various differences can be explained mainly by the different locations, age group, gender and the diagnostic criteria used to categorise weight status. This study is the first reported Saudi study which has had included both urban and rural adolescents of both genders. In this project the WHO 2007 cut-offs [17] were used to categorise the weight status of participants whereas some other Saudi studies have used either the CDC [15] or Cole- IOTF cut-offs [16]. In one instance, Shatoor (2011) in a study of 15-19 year old urban Saudi males inappropriately used adult BMI ranges, which is likely to underestimate prevalence of overweight and obesity in the younger males in particular. For example, the WHO BMI cut-points for a 15 year male is 22.4 for overweight and 26.5 for obesity, both being considerably lower than the adult cut-points of  $\geq 25 \text{ kg/m}^2$  for overweight and  $\geq 30 \text{ kg/m}^2$  for obesity.

### Prevalence of obesity by location of residence

This study found that the prevalence of overweight and obesity was higher in urban adolescents than in the participants from the rural district. That is, 24.1% of urban adolescent were overweight and 35.3% were obese while for rural adolescents the figures were 17.9% and 19% respectively.

This result is similar to the findings of cross-sectional studies in other countries. In New Zealand, for example, 32.6% of children living in rural areas were found to be overweight or obese whereas the figure for their peers living in urban areas was 44.7% [18]. In Poland, 14.1% of urban children and adolescents were overweight and in the rural districts 7% were overweight [19]. The low physical activity in urban adolescents might be the reason which explains the differences.

However, some studies have found different and seemingly contradictory results. For instance, in the USA, rural children and adolescents in Georgia had a higher incidence of overweight and obesity compared to those living in urban areas in Georgia (23.3% vs.19.1%) [20]. Another American study which used data from the 2003 National Survey of Children's Health (NSCH) found that the proportion of rural adolescents who were overweight was higher than their urban counterparts (16.5% vs. 14.3%) (OR=1.13; 95% CI 1.01-1.25) [21]. One explanation is the generally lower levels of family income in rural areas, a factor which tends to prevent household members from completing higher education (Liu, Bennett et al. 2008). Children from families whose members have minimal education have been observed to consume more unhealthy foods [22] and spend more time in sedentary activities such as watching TV and playing video games [23]. The other reason is the differences in culture and environment (Davis, Bennett et al. 2011). In rural areas in the USA, people consume relatively more fast food, more deep-fried food, and smaller amounts of fruit and vegetables. Compared to urban adolescents, rural children and youths are less likely to meet the recommended 60 minutes/day of moderate to vigorous physical activity and are more likely to spend two or more hours per day on screen-based activities [24].



## **Conclusion**

This study found that the prevalence of overweight and obesity among Saudi adolescents was very high, more than half of the sample being found to be overweight or obese. Moreover, these findings showed an increase in the prevalence of overweight and obesity among adolescents compared to previous Saudi studies, and the rates of overweight and obesity were higher than for other Middle Eastern and Western countries.

Another pertinent result is that levels of overweight and obesity were higher amongst urban adolescents than among those from rural areas, reflecting the more prevalent practice of unhealthy lifestyles amongst urban adolescents. Nevertheless, obesogenic factors were found in the rural area and these are likely to increase with continued globalisation of the food supply, improved infrastructure and transportation making access to unhealthy foods easier and widespread access to media which heavily promotes these foods and contributes to sedentary behaviour.

Overweight and obesity now represent a national health crisis threatening the welfare of the entire community in general, and adolescents in particular. An immediate action is indeed important to fight against this serious health issue among this age group.

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