

ORIGINAL ARTICLE

3 Parental socioeconomic status and 4 occupation in relation to childhood obesity

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8 ABSTRACT

9 **Background:** Obesity is a significant public health concern. The prevalence of obesity varies remarkably across
10 the countries with different socioeconomic levels. To effectively fight obesity, population-based social and
11 environmental approaches should be considered. The study aimed to assess the association between parental
12 socioeconomic status, occupation, and educational level in relation to childhood obesity.

13 **Methodology:** A cross-sectional study was conducted among 384 obese children in Jeddah city. The sample
14 was collected at various ambulatories of endocrine clinics from May till August 2017. Obese children between
15 3 and 18 years were included in the study while those who are more than 18 or less than 3-year old were
16 excluded.

17 **Results:** The mean body mass index (BMI) of males ($26.6 \pm 3.93 \text{ kg/m}^2$) was higher than the BMI mean of
18 females ($24.6 \pm 4.02 \text{ kg/m}^2$). Among the participants, 63.7% of children, with fathers having a college degree,
19 were overweight, while 61.1% of them were obese (p -value = 0.511). Moreover, 50.7% of children, with moth-
20 ers having a college degree were overweight, while 54.4% of them were obese (p -value = 0.081). Among the
21 participants, 75.3% of children, who had unemployed mothers, were overweight, while 54.6% were obese
22 (p -value = 0.058). However, 89.7% of children of employed fathers were overweight, while 84.7% were obese
23 (p -value = 0.205). Among the participants, 47.4% of obese children belonged to families of high income, while
24 43.8% of them with medium family income were overweight (p -value = 0.0001).

25 **Conclusion:** The rate of overweight and obesity among Saudi children was higher than non-Saudis. The preva-
26 lence of overweight and obesity was higher with high educational levels of both parents, high family income,
27 and among children of employed fathers.

28 **Keywords:** Children, obesity, socioeconomic-status, occupation, parental education.

29 Introduction

30 Childhood obesity and overweight have become one of the
31 most serious problems worldwide [1,2]. The occurrence
32 of overweight and obesity has been rising over the 20th
33 century and recently has risen even more [3]. Previous
34 research studies done before the 20th century reveals that
35 the childhood obesity is significantly high and increased
36 rates of overweight have been observed globally. In the
37 USA, the National Health and Nutrition Examination
38 Survey (1976–1980 and 2003–2004) showed that the
39 prevalence of overweight is increasing [4]; for children
40 age 2–5 years, the prevalence increased from 5% to
41 18.8% [5,6]. While in China, it increased from 6.4% in
42 1991 to 7.7% in 1997; and in India from 16% in 2002 to
43 24% in 2007 [7–9]. The Middle East has its share in this

44 global epidemic of obesity. In national surveillance in
45 the United Arab Emirates, the prevalence of overweight
46 was estimated to be 21.5% and the prevalence of obesity
47 was estimated to be 13.7% among children aged 5–17
48 years [10]. Lebanese children, aged between 6 and 8
49 years, had a prevalence of overweight and obesity at

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25.5% and 6.5%, respectively [11]. In Saudi Arabia, childhood obesity has been studied frequently through cross-sectional surveys covering several cities; however, there is a lack of reported cases about it. A previous research data from a national survey conducted in 1998 showed that approximately 27.4% of Saudi children aged 1–18 years were overweight and 10.4% were obese [3]. Eastern and central regions have the highest prevalence of obesity and overweight and southern regions have the lowest prevalence of obesity and overweight [4]. In 2010, the World Health Organization (WHO) estimated that 42 million children under 5 years of age were overweight or obese [1]. Obesity, in general, is a major risk factor for non-communicable diseases (NCDs), and it is estimated that by the year 2020, three-quarters of all deaths in developing countries will be attributed to NCDs [12].

The alarming increase in the prevalence of overweight may adversely affect the health of the children which may increase the risk for other chronic diseases, such as of hypertension, diabetes, metabolic syndrome, stroke, certain types of cancer (endometrial, breast, prostate and colon), dyslipidemia, gall bladder disease, sleep apnea, osteoarthritis, increase in all causes of mortality, emotional distress, discrimination, and social stigmatization [13]. Type 2 diabetes has increasingly been reported in children and adolescents, so much so that in some parts of the world type 2 diabetes has become the main type of diabetes in children. Therefore, obesity not only affects the child's quality of life but also increases the risk of mortality of children because of chronic complications.

There are other interactions contributing to childhood obesity, including metabolic, genetic, environmental, and behavioral influences, and it is also associated with socioeconomic status (SES); as populations in the developed world are mostly affected by obesity.

Numerous studies published in different countries over the past three decades suggest that SES affects people's risk of developing obesity, both in adults and children. However, the association varies by gender, age, country and educational level and parental occupation. In developed countries, such as the United States of America (USA) and the United Kingdom (UK), obesity has been associated with lower SES and a lower parental education level [14,15]. In contrast, obesity in the developing countries has been associated with higher SES and urbanization; studies in Brazil, China, and India support this association [7,16]. Overall, we found that the prevalence of obesity differs remarkably across countries with different socioeconomic levels.

Subjects and Methods

This study began with a survey on child obesity in relation to parental socioeconomic status, occupation, and educational level in Jeddah, Saudi Arabia.

A cross-sectional study was conducted among 384 obese children in Jeddah city. The sample was collected at

various ambulatories of endocrine clinics from May till August 2017. Obese children between the age of 3 and 18 years were included in the study while those who were more than 18 or less than 3-year old were excluded.

The data were collected by doing non-interventional clinical interviews with children and their parents after verbal consent been taking, time taken to complete the interview was 15 minutes.

Parent/child demographic data were collected, including monthly household income, occupation, educational level, physical activity, and food habits of the children.

Indicators of socioeconomic status

Monthly household income, occupation, and educational level were used as indicators of socioeconomic status, for income, participants were asked: "What was your average monthly household income?", And answers were categorized into, less than 5,000, 5,000 to 10,000 SR, more than 10,000. Education level was divided into six groups: write and read, elementary school intermediate school, high school, and college. The occupation was classified into employed, unemployed, or retired, and if employed is it professional or manual.

Measurements

The child's measurements (weight and height) were measured using weight/height scale and body mass index (BMI) calculated as weight/height^2 (kg/m^2). Standard deviation for height, weight, and BMI were calculated. Individuals were assessed for overweight and obesity according to recent international data, in which age and gender appropriate cutoffs are defined. Overweight: $>+1\text{SD}$ [equivalent to BMI 25 kg/m^2 at 19 years] and Obesity: $>+2\text{SD}$ (equivalent to BMI 30 kg/m^2 at 19 years), according to WHO [17].

Food habits

This study also concentrated on collecting information from participants about what they eat and what's the habits of their food consumption by asking them about the numbers of their main meals per day, if the child eats with the rest of the family, breakfast usually prepared at home or school canteen, number of snacks per day, does the child prefer healthy snacks, type of snacks such as chips, chocolate, ice cream, fruits and vegetables, or mixed kinds of snack, number of times the child eats fast food per week and asked the parents if they have any concern on their child's appetite and how often do they provide fruits and vegetables at home.

Physical activity and sedentary life

As physical activity and type of lifestyle has an important role like other causes of obesity, this study collected information about Attitude and behavior related to healthy eating and was assisted through the survey by collecting the children habits of eating in front of TV,

Table 1. Participants' socioeconomic status.

Characteristics	Groups	Percentage
Gender	Female	180 (46.9%)
	Male	204 (46.9%)
Nationality	Saudi	308 (80.2%)
	Non-Saudi	76 (19.8%)
Age	<6 years	37 (9.9%)
	6-12 years	226 (60.3%)
	12> years	112 (29.9%)
Child Living status	With Parents	349 (90.9%)
	With Father or mother	28 (7.3%)
	With others	7 (1.8%)
Mother's education	Never studied	11 (2.9%)
	Write and read	9 (2.3%)
	Elementary school	21 (5.5%)
	Intermediate school	31 (8.1%)
	High school	105 (27.4%)
	college	206 (53.8%)
Father's education	Never studied	4 (1%)
	Write and read	13 (3.4%)
	Elementary school	5 (1.3%)
	Intermediate school	26 (6.8%)
	High school	97 (25.3%)
	College	239 (62.2%)
Mother's occupation	Employed	107 (27.9%)
	Unemployed	266 (69.3%)
	Retired	11 (2.9%)
Father's occupation	Employed	333 (86.7%)
	Unemployed	21 (5.5%)
	Retired	30 (7.8%)
Family income	less than 5,000 per month	59 (15.4%)
	5,000–10,000 per month	154 (40.2%)
	more than 10,000	170 (44.4%)
Family history of obesity	Yes	229 (61.9%)
	No	141 (38.1%)

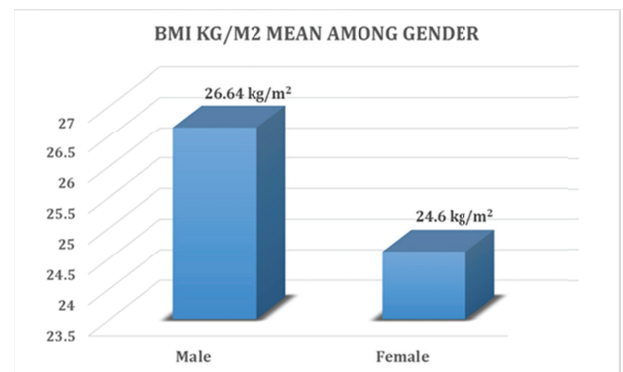


Figure 1. Mean BMI.

number of hours spent on different electrical devices, such as TV, video-games, and internet, by categorizing the time (less than 2 hours, 2–4 hours, or more than 4 hours and none), and then asking does the child practice any sport if the answer was yes we divided sports to three most common sports available in most of the schools, such as football, swimming, basketball, and other.

Data was entered, coded, cleaned, and analyzed using statistical package for social science (IBM SPSS), version 22. The analysis was done by testing the significance difference of BMI (SDS and kg/m²) mean among many factors. All the relations tested by one-way analysis of variance for nominal variables more than two categories and independent sample *t*-test for the nominal variables with two categories after we assumed that the data followed normal distribution depends on the normal curve and excluded some outliers of a continuous variable.

Welch test was used while the assumption of homogeneity of variance was not satisfied by the Levene test. Simple descriptive statistics were reported as proportions for qualitative variables such as frequencies and percentages of child's eating habits and grads also of prenatal information. In addition, statistics were reported as mean and standard deviation for quantitative variables, such as the mean of BMI \pm SD (25.7 ± 4.1) kg/m². The results having a *p*-value of less than 0.05 were considered as statistically significant.

Results

Table 1 represents the participants' socioeconomic status factors. The study included 384 children, among them, 204 (53.1%) were males, 180 (46.9%) were females, between 2 and 18 years of age. The mean age was 11.4 ± 3.7 years for boys and 9.6 ± 3.9 years for girls. Among the participants, 308 (80.2%) were Saudis, 76 (19.8%) were non-Saudis.

Regarding age, 37 (9.9%) children were having less than 6 years of age, 226 (60.3%) children were having age from 6 to 12 years and 112 (29.9%) children were having age more than 12 years.

The mean height of the participants was 142.9 ± 25.5 cm and 131.7 ± 20.9 cm in males and females, respectively. The mean weight of males was 60.5 ± 22.7 kg and the mean weight of females was 46.7 ± 21.7 kg.

Figure 1 shows that the mean BMI of males (26.6 ± 3.93 kg/m²) is higher than the BMI mean of females (24.6 ± 4.02 kg/m²).

The counts of obese and overweight children for every age group of girls and boys are shown in Figures 2 and 3.

Among the parents of the participants, about 239 (62.2%) of the fathers and 206 (53.8%) of the mothers had completed their college education. About 333 (86.7%) of the fathers were employed and 21 (5.5%) were unemployed and 107 (27.9%) mothers were employed, 266 (69.3%) mothers are unemployed.

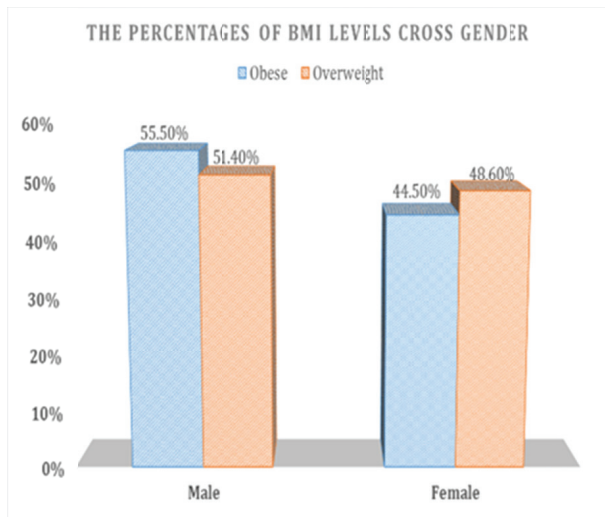


Figure 2. Percentage of BMI Levels cross gender.

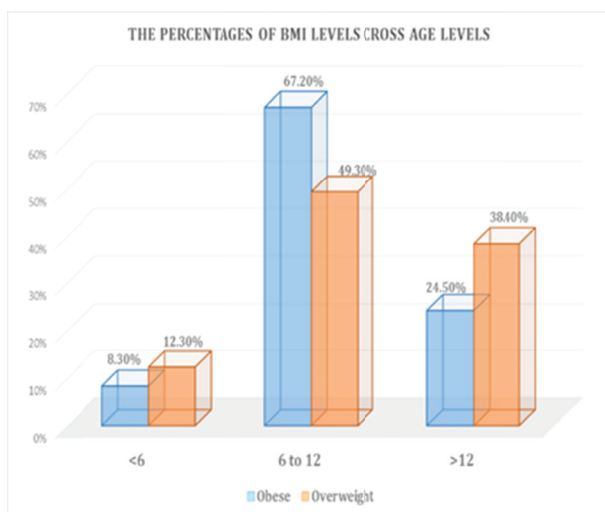


Figure 3. Percentage of BMI levels cross age levels.

According to age group, 12.3% of children less than 6-year old were overweight and 8.3% were obese, whereas 49.3% of children aged between 6 and 12 years old were overweight and 67.2% were obese, while 38.4% of children aged more than 12-year old were overweight and 24.5% were obese (p -value = 0.0001).

Among the participants, 63.7% of children with fathers having a college degree were overweight while 61.1% of them were obese (p -value = 0.511). Moreover, 50.7% of children with mothers having a college degree were overweight, while 54.4% of them were obese (p -value = 0.081). Among the participants, 75.3% of children of unemployed mothers were overweight, while 54.6% were obese (p -value = 0.058). However, 89.7% of children of employed fathers were overweight while 84.7% were obese (p -value = 0.205).

Among the participants, 47.4% of children belonged to families of high income were obese while 43.8% of them with medium family income were overweight (p -value = 0.0001), whereas 62.6% of the participants who had a family history of obesity were obese (p -value = 0.0001).

Table 3 discusses food habits, physical activity, and sedentary lifestyle of the studied individuals as follows:

Discussion

Saudi Arabia has relatively high rates of overall obesity and overweight, which are significantly increasing over the years. Our cross-sectional study was conducted among obese children in Jeddah city. A representative sample of 384 children, out of them, 204 (53.1%) were males, 180 (46.9%) were females, aged 2–18 years, has been taken and among them 75 (51.4%) boys were overweight and 71 (48.6%) girls were overweight, whereas 127 (55.5%) males were obese and 102 (44.5%) females were obese.

While in Riyadh city, the prevalence was 12.7% (17.4% for boys and 9.3% for girls) [3]. The results of other studies support the previous findings which stated that the prevalence of overweight among male school children aged 6–12 years was 7.3% while that of obesity was 17.4%. This prevalence rate is higher than previously reported by El-Hazmi and Warsy, who conducted a cross-sectional epidemiological household survey in different areas of Saudi Arabia from 1994 to 1998. Their study group included 12,071 children (boys 6,281; girls 6,420), with ages ranging from 1 to 18 years. The prevalence of overweight among boys aged 6–12 years was 8.6%, while the prevalence of obesity was 4.9%. This apparent increase could reflect the more deteriorating situation in Saudi Arabia regarding childhood obesity which indicates a need for rapid and effective action to decrease the burden of the problem [18]. In 2008, a locally published study done in Al-Hassa showed that the prevalence of overweight in primary school boys was 14.2% while that of obesity was 9.7%, although the age range in that study was 10–12 years [19].

Approximately, 59 (15.4%) of the families had low income (income is less than 5,000 SAR/month), 154 (40.2%) families had an average income (income is 5,000–10,000 SAR/month), and 170 (44.4%) families had a high income (income is more than 10,000 SAR/month). About 229 (61.9%) participants had a history of obesity in the family.

Table 2 shows the association of BMI with the socioeconomic status of the study participants. Among the participants, 55.5% of males were obese and 44.5% of females were obese, whereas 51.4% of males were overweight and 48.6% of females were overweight (p -value = 0.0001).

Among the participants, 175 (76.4%) were Saudis and 54 (23.6%) were non-Saudis and obese. While 126 (83.3%) of the participants were Saudis and 20 (13.7%) were non-Saudis and overweight (p -value = 0.324).

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Table 2. Association of BMI with socioeconomic status factors of the study participants.

Characteristics	Groups	Overweight	Obese	p-value
Gender	Male	75 (51.4%)	127 (55.5%)	0.0001
	Female	71 (48.6%)	102 (44.5%)	
Nationality	Saudi	126 (83.3%)	175 (76.4%)	0.324
	Non-Saudi	20 (13.7%)	54 (23.6%)	
Age	< 6 years	18 (12.3%)	19 (8.3%)	0.0001
	6-12 years	72 (49.3%)	154 (67.2 %)	
	>12 years	56 (38.4%)	56 (24.5%)	
Child living status	Child live with parents	137 (93.8%)	203 (88.6%)	0.220
	Child live with mother	6 (4.6%)	17 (7.4%)	
	Child live with father	2 (1.4%)	3 (1.3%)	
Mother education	Never studied	5 (3.4%)	6 (2.6%)	0.081
	Write and read	3 (2.1%)	6 (2.6%)	
	Elementary school	9 (6.2%)	12 (5.3%)	
	Intermediate school	13 (8.9%)	18 (7.9%)	
	High school	42 (28.8%)	62 (27.2%)	
	College	74 (50.7%)	124 (54.4%)	
Mother occupation	Employed	33 (22.6%)	73 (31.9%)	0.058
	Unemployed	110 (75.3%)	148 (64.6%)	
	Retired	3 (2.1%)	8 (3.5%)	
Father education	Never studied	1 (0.7%)	3 (1.3%)	0.511
	Write and read	6 (4.1%)	7 (3.1%)	
	Elementary school	2 (1.4%)	3 (1.3%)	
	Intermediate school	10 (6.8%)	16 (7%)	
	High school	34 (23.3%)	60 (26.2%)	
	College	93 (63.7%)	140 (61.1%)	
Father occupation	Employed	131 (89.7%)	194 (84.7%)	0.205
	Unemployed	5 (3.4%)	15 (6.6%)	
	Retired	10 (6.8%)	20 (8.7%)	
Family income	<5,000 SAR	22 (15.1%)	35 (15.4%)	0.0001
	5,000–10,000 SAR	64 (43.8%)	85(37.3%)	
	>10,000 SAR	60 (41.1)	108 (47.4%)	
Family history of obesity	Yes	91 (64.1%)	137 (62.6%)	0.0001
	No	51 (35.9%)	82 (37.4%)	

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289 Socioeconomic status

290 The lack of consistent classifications in various studies
 291 makes it difficult to assess the local situation of childhood
 292 obesity and its relation to SES and parental occupation.
 293 To our knowledge, our study is the first attempt that
 294 explores the importance of parental occupation and its
 295 association with SES in relation to childhood obesity.
 296 However, the number of studies conducted in developing
 297 countries to assess the obesity- SES relationship is
 298 minimal [20]. However, some studies in the US showed
 299 that low SES groups had a higher risk of obesity. By
 300 contrast, in China high SES groups were at an increased
 301 risk. In Russia, a transitional society that has experienced

economic difficulties since the early 1990s [21,22], both
 low-income and high-income groups were at an increased
 risk of obesity compared to the medium-income group.
 One possible explanation for the different SES-obesity
 relationships in the developed countries, such as the
 US and developing countries, such as China, is that the
 influence of SES on people's lifestyles, such as diet and
 physical activity, may differ. Take food consumption
 patterns as an example; in China, rich people have better
 access to meat and other energy-dense foods (which
 are much more expensive than other foods such as
 vegetables) than the poor [23]. While in the US, higher-
 SES groups usually consume more vegetables and fruits,
 which are less energy-dense, than low-SES groups [24].

Table 3. Food habits and physical activity and sedentary life according to the studied variables.

Characteristics	Groups	Overweight	Obese	Total
Number of mea	<3	76 (72.1%)	99 (43.2%)	175 (46.7%)
	3–6	69 (47.3%)	121 (72.8)	190 (50.7%)
	>6	1 (0.7%)	9 (3.9%)	10 (2.7%)
Eat with family	Yes	120 (82.2%)	195 (85.2%)	315 (84.0%)
	No	26 (17.8%)	34 (14.8%)	60 (16.0%)
Number of times the child eat fast food/week	None	8 (5.6%)	17 (7.4%)	25 (6.7%)
	<2	81 (56.6%)	114 (49.8%)	195 (52.4%)
	3–5	46 (32.2%)	72 (31.4%)	118 (31.7%)
	>5	8 (5.6%)	26 (11.4%)	34 (9.1%)
Does the child has habits of eating while watching TV	Yes	93 (65.0%)	162 (70.7%)	255 (68.5%)
	No	50 (35.0%)	67 (29.3%)	117 (31.5%)
Number of hours the child spent in internet	None	25 (17.1%)	32 (14.0%)	57 (15.2%)
	<4	24 (16.4%)	41 (17.9%)	65 (17.3%)
	2–4	36 (24.7%)	57 (24.9%)	93 (24.8%)
	>4	61 (41.8%)	99 (43.2%)	160 (42.7%)

Another study approved that regarding the relationships between obesity and SES which are consistent with findings from many previous studies [25–28]. For example, among the 32 studies conducted among girls from developed societies reviewed by Sobal and Stunkard [26], 40% found an inverse relationship between SES and obesity although 25% found a positive relationship and 35% found no relationship [29].

Our analysis shows that childhood obesity is related to SES, although the relationships differ among populations. We used family income as a primary indicator of SES, while parental occupation and education might serve as an additional indicator. In order to establish independently associated factors for the summary that measures SES for overweight in children, and in order to present a ranking of those factors, a multiple logistic regression was conducted, such as gender, age, education level of parents, and parental occupation, living space per person and single parenthood and others.

Obesity and SES have a correlation relationship, obesity affects children's SES level and the presence of obesity may influence SES as well. We found out that families with a higher SES are more likely to be obese than those with low SES, that might be because parents are less involved in the lives of their children, which might affect their lifestyle, including their access to junk food and patterns of physical activity, and as a result, influence their energy balance diet.

Family income

A cross-sectional survey that was conducted among school children in Riyadh, Saudi Arabia showed the relation of SES income and childhood obesity. A representative sample of 1,243 (542 male and 701 female) children aged 6–16 years found that children were more likely to be

overweight if their families had higher income (p -value < 0.01), compared to families with low income [3]. Another study was done among 1,072 children in Saudi Arabia, 14.9% of them were obese, 95% of the obese children having high family income [30]. Although several studies have focused on the association between SES and obesity, this is the first study to not only demonstrate that the association already prevails in early childhood but also illustrate which socioeconomic factors, in particular, determine this inverse relationship.

Another study has found that almost half (48.7%) of the rural families had a low income (less than SR 5,000 per month) compared with one quarter (24.2%) of urban families. Conversely, significantly more urban families had a high household income (more than SR 12,000 per month) than rural families (41.4% vs. 18.6%).

In less industrialized countries, such as Brazil and China, the prevalence of overweight children is markedly greater in families that have high incomes [22]. Wang et al. suggest that this might be because such families consume more food and have more leisure time to spend on sedentary activities.

No significant independent association was found between family income and overweight or obesity among either rural or urban males or rural females in this study. Similar findings were reported by Zhang et al. [23], who surveyed urban adolescents.

The relationship between socioeconomic factors of parents and BMI of children is not identical to previous literature findings. Our current results show that a higher risk of obesity associated with high family income. That probably due to access of children to energy-rich diets. We evaluate the prevalence of obesity in Saudi children, and we found that most children had a sedentary lifestyle, where 44% lived in villas or big houses. There was a

significant correlation in our study between obesity and higher SES. It is believed that high-income families can afford several meals per day, eat out in restaurants, have food delivered to the home easily, and have more frequent snacks and other foods with high caloric content. In contrast, low-income families tend to save money by eating economic meals at home one or two times daily.

Parental level of education

The fact that young children usually spend more time with their mothers than their fathers [31] might explain the finding that maternal education in the screening population had a greater influence on childhood obesity than paternal education. Mothers are also generally more responsible for the diet intake and upbringing of their children than fathers [32,33]. Nonetheless, nine or fewer years of education of either of the parents is the highest risk factor for childhood obesity. Blue-collar work is very strongly associated with limited school education, explaining the result of the stepwise regression in the case-control study. However, children of self-employed mothers, in spite of high educational levels, also had a high risk of being obese. Self-employed mothers who work more hours outside their homes might probably spend less time with their children, and hence will have less control over food intake, eating habits, and physical activity levels of their children. Gigante et al. [34] showed in their study that it is mothers with higher socioeconomic status whose work intensity is particularly deleterious for their children's overweight status [35].

Another study found that in rural areas the number of mothers who had no education was more than double that of urban mothers (25.9% vs. 10.2%), while the number of rural mothers with university degrees was approximately half that of urban mothers (7.8% vs. 17.4%). Fathers in both areas were more likely to have had some formal schooling compared with mothers, but the proportion of rural fathers with no schooling was almost four times that of urban fathers (12.7% vs. 3.4%). Conversely, the proportion of urban fathers with university degrees was almost four times that of rural fathers (29.3% vs. 7.6%). It is clear that, in general, parents in urban areas had higher educational attainments than those in rural areas. Urban people in Saudi Arabia have access to all levels of education; indeed, tertiary institutions are found only in the main cities and towns. Moreover, people in rural areas tend to leave school early, the men commonly seeking employment in the military and the women marry early.

Despite clear differences in the level of educational attainment between urban and rural parents, this study found no independent association between parental education and overweight or obesity which is consistent with the results of another Saudi study [36]. It might be that environmental (e.g., traffic-free open spaces) and cultural (tradition of home gardens) characteristics of rural Saudi communities have more impact on the lifestyle practices of children and adolescents than the level of parental education [37].

Parental educational level was the most frequently used method as a measure of SES among the included studies. The most important single independently associated factor for a child having a high BMI in the screening population was maternal education because mothers are more responsible for the diet intake and upbringing of their children than fathers. Obesity was particularly prevalent in children whose parents had a high education level. Of all the variables listed, parental education and type of parental occupation were the most influential independent factors in a stepwise forward regression for childhood obesity. The fact that parental education did not turn out to be a significant independent predictor of children's obesity in the case-control study is mainly due to the limited smaller sample size.

Overall, there is a significant direct relationship between obesity prevalence and the education of parents. Among children, 61% of children with parents having at least a college degree are obese compared with 26% of children with parents having less than a high school degree. This may reduce the chances for direct supervision and control by the parents, resulting in an increased risk of childhood obesity, especially if junk food is easily accessible for children.

Parental occupation

Since the relationship between parental occupation and childhood obesity has not extensively been studied, the mechanisms that underlie this relationship are of interest. In the present study, a significant association was observed between childhood obesity and high parental education and employed fathers, these results showed that the risk of childhood obesity was significantly higher in children with higher fathers' occupational and educational level. Children with mothers who do not work are more likely to become obese than children with mothers who have managerial occupations. Children of employed fathers are 40% more likely to be obese than children of fathers who are not employed.

Based on our data, a higher education level of the mother would not be explained by a higher family income. The mother's education remains significant even after adjusting for other factors, such as income, the mother's employment status, and occupation. We noticed that there is no significant relationship between working mothers and having obese children but there are other reasons found for the mother's long absences from home, which expose their children to unhealthy dietary habits of snacks and skipped meals. With that assumption, it seems that highly educated mothers in Saudi Arabia spend more time away from their children either in college, studying, or in social activities. Consequently, most of those mothers depend on foreign caregivers or housemaids to care for their children which explains the sedentary life of the children.

Other factors

Furthermore, our analysis stratified by sex and age to further indicate that social-economic, and environmental

factors may operate through complex pathways to influence childhood obesity [22,38,39]. Saudi Arabia has relatively high rates of overall obesity and overweight, that is significantly increasing over the years [40,41], which has resulted from less regular exercise or physical activities, increased consumption of fast food, and spending a lot of time watching TV, the internet, etc. Our failure to include some important risk factors of overweight and obesity, such as physical activity and dietary factors, are among limitation of reported cases. However, the main objective of the present study is providing evidence for associations but not causation of the relation of childhood obesity and parental occupation and SES.

This study has some limitations; first, the study design is cross-sectional, a longitudinal study would be best to assess causal relationships; second, the study is limited to one city and its urban population mainly.

In conclusion, our study demonstrates that overweight and obesity are serious public health problems among children in Saudi Arabia. Boys are affected more than girls, children of families with a higher income are more likely to be overweight, and children of educated parents and employed fathers are more likely to be obese. Indeed, high socioeconomic status may lead to risky behaviors, including poor diet, lack of physical activity, and a sedentary lifestyle that can result in obesity and overweight. Further studies are needed to assess the effect of other contributing factors on the prevalence of overweight and obesity

Conclusion

Overweight and obesity have become a global epidemic, and in Saudi Arabia, they now represent a national health crisis threatening the welfare of the entire community [42]. The results of this study show the association of socioeconomic status of the parents with overweight and obesity among Saudi children aged 2–18 years. Obesity and overweight were more prevalent in males (55.5%, 51.4% respectively) and in Saudi children (76.4%, 83.3% respectively). The prevalence of obesity and overweight is higher in children of parents with high educational levels and in children of employed fathers and unemployed mothers. Children in families of high income have a high prevalence of obesity. More detailed studies are needed to assess the effects of parental socioeconomic status factors on the prevalence of overweight and obesity among Saudi children in different regions of the kingdom.

List of Abbreviations

BMI	Body mass index
NCD	Non-communicable diseases
SES	Socioeconomic status
UK	United Kingdom
WHO	World Health Organization

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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Consent for publication

Informed consent was obtained from all the participants.

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