

# Nutritional Status of Public Elementary School Boys in Al-Baha City, Saudi Arabia

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## Abstract

This cross-sectional study aims to evaluate the nutritional status of Al-Baha elementary male schoolchildren. Multi-stage probabilities proportional to size sampling technique were used to select the study units. 725(16.4%) schoolchildren ranging in ages from 5 to 15 years randomly selected from 15 schools. The elementary schoolchildren were interviewed using a guided questionnaire (Structured interview) to gather information. Detecto's ProMed 6129 Waist-High Digital Health Care Scale USA-manufactured was used to measure the height to the nearest 0.1 cm and weight to the nearest 0.1 kg. The collected data was analyzed using SPSS for windows version 18.0 to calculate frequencies, percentage and to test the significance of different variables. Children's BMI Group Calculator - Metric Version (XLS-3.6 Mb) also was used to compute Body Mass Index - for-age (BMI %ile).

The results of this study shows that schoolchildren in Al-Baha were suffering from both ends of the spectrum of nutritional problems (obesity and under-nutrition). 10% (72) of Al-Baha elementary school boys were found to be underweight, 11% (80) of the school boys were overweight and 15% (109) were obese. Also it was found that; the overweight and obese schoolchildren were found to spend more hours on activities which reduce the physical requirements of daily life and have encouraged sedentary lifestyle compared to schoolchildren who were underweight. The association between BMI %ile of Al-Baha schoolchildren and times periods which was spent on these activities (TV watching hours, computer or other devices hours, and sleeping hours per day) were statistically not significant except with studying and reading hours. Although the BMI %ile and decrease in physical activity were not statistically significant as it appear to be influenced by the frequency of eating behaviors and school health education in many disciplines of Al-Baha schoolchildren. Urgent intervention by activating comprehensive school health programmers is recommended to change sedentary activities and eating behaviors among schoolchildren to control nutritional status and its consequence on health problems.

**Keywords:** Nutritional problems; Schoolchildren; WHO; Malnutrition; Obesity

## Introduction

The goal of nutritional assessment in childhood is to identify and prevent nutritional disorders such as malnutrition and overweight. Nutritional problems; obesity and under-nutrition are the two ends of the spectrum of malnutrition. A healthy diet provides balanced nutrients that satisfy the metabolic needs of the body without excess or shortage. A nutritional assessment can detect any abnormal ranges at an early age so that lifestyle changes can take place before the problem elevates into something more serious with adverse consequences.

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health [1]. The prevalence of obesity is increasing worldwide at an alarming rate in both developing and developed countries. It has become a serious epidemic health problem, estimated to be the fifth leading cause of mortality at global level [2]. According to World Health Organization, worldwide obesity has more than doubled since 1980. WHO global estimates from 2008, 1.5 billion adults, 20 and older, were overweight. Of these over 200 million men and nearly 300 million women were obese. 65% of the world's population lives in countries where overweight and obesity kills more people than underweight. Nearly 43 million children under the age of five were overweight in 2010 [3]. Once considered a high-income country problem, overweight and obesity are now on the rise in low- and middle-income countries, particularly in urban settings. Childhood obesity has reached epidemic levels in developed countries. Twenty five percent of children in the US were overweight and 11% were obese. About 70% of obese adolescents grow up to become obese adults [4,5]. Close to 35 million overweight children are living in developing

countries and 8 million in developed countries. Overweight and obesity are linked to more deaths worldwide than underweight. For example, 65% of the world's population live in countries where overweight and obesity kill more people than underweight (this includes all high-income and most middle-income countries).

Asia containing about 70% of world malnourished children is also facing problem of overweight children [6]. The Gulf Cooperation Council Countries including the Kingdom of Saudi Arabia have witnessed significant lifestyle changes due to rapid urbanization, dominance of the automobile for personal travel, introduction of labor-saving device in the home and the workplace, availability of high-fat and dense-caloric foods, satellite TV, increased reliance on computer, and telecommunication technology as well as decreased occupational-work demands [7].

These lifestyle changes have had a considerable impact on reducing the physical requirements of daily life and have encouraged sedentary

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lifestyle amongst both young people and adults. Consequently, such remarkable lifestyle transformation is thought to be greatly responsible for the epidemic of non-communicable diseases in the whole region [8,9]. Similar to other countries throughout the world Saudi Arabia faces the problem of obesity and overweight in children and adolescents [10,11]. Al-Nuaim et al. [10] determined the prevalence of overweight and obesity among male schoolchildren aged 6–18 years old in Saudi Arabia showed that the overall prevalence of overweight was 11.7% and obesity was 15.8%. Al-Nuaim AR et al. [10] reported that one in every six children aged 6 to 18 years old are obese.

Abahussain et al. [12] findings in 2000 revealed that adolescent girls aged 12 to 19 years from Al-Khobar city, in the eastern province of Saudi Arabia faces two contrasting nutrition situations, underweight and overweight. Using the body mass index (BMI), it was found that 11% of girls were underweight, 61% were normal and 28% were overweight or obese [12].

Madani [13] 2000 concluded that the nutritional problems in Saudi Arabia are mainly due to a change in food habits, illiteracy and ignorance, rather than a shortage of food supply or low income.

The Center for Disease Control and Prevention defined overweight as, at or above the 95<sup>th</sup> percentile of BMI for age and “at risk for overweight” as between 85<sup>th</sup> to 95<sup>th</sup> percentile of BMI for age (7, 8) [14,15]. European researchers classified overweight as at or above 85<sup>th</sup> percentile and obesity as at or above 95<sup>th</sup> percentile of BMI [16].

There is a lack of studies conducted within Saudi hospitals that focus on under-nutrition. In addition, there are no data regarding the targeting of nutritional care actions for patients at under nutrition risk in a hospital sample in Saudi Arabia. Such studies are important for the implementation of nutritional guidelines and might contribute to a greater understanding of possible facilitating and hindering factors in nutritional care in Saudi Arabia. Thus, the aim of the study was to examine the prevalence of under nutrition risk, overweight and obesity among female and male inpatients in hospital-based settings in southwestern Saudi Arabia. It was also the aim of this study to explore the targeting of nutritional care for patients at risk of under nutrition [17].

Childhood obesity is associated with a higher chance of obesity, premature death and disability in adulthood. But in addition to increased future risks, obese children experience breathing difficulties, increased risk of fractures, hypertension, and early markers of cardiovascular disease, insulin resistance and psychological effects.

Malnutrition substantially raises the risk of infant and child deaths, and increases vulnerability to a variety of diseases in later life. Children who are under nourished and underweight are likely to be fewer cleavers than if they were well-fed. Health of children is of great importance as rapid growth occurs during this period [18]. Good nutrition is a basic requirement for good health and a living organism is a product of nutrition [19].

## Materials and Methods

This cross-sectional study was carried out to evaluate the nutritional status of Al-Baha elementary male schoolchildren, specifically to assess the nutritional status and determine the dietary habits and the factors associated with underweight, normal and overweight or obese.

A random sample of 725 out of 4433 (16.4%) schoolchildren, aging from 5 to 15 years selected from 15 of Al-Baha elementary male schools. The sample was drawn from the schools using multi-stage probability proportional to size random sampling technique.

The data was collected using structured interview guided by questionnaire about height and weight as well as, physical activities, school health education and dietary intake (type, frequency and frequency of eating and a brief description of a typical day’s food intake for children). Height was measured while the student was standing without foot wear, to the nearest 0.1 cm using a Detecto’s ProMed 6129 Waist-High Digital Health Care Scale USA-manufactured. Weight was measured with the student standing and wearing school’s uniform (light) clothes to nearest 0.1 kg using electronic scale of Detecto’s ProMed 6129 Waist-High Digital Health Care Scale USA-manufactured.

The collected data were processed and analyzed using SPSS for windows version 18.0 to calculate frequencies, percents and cross tables. Chi-square and ANOVA were used to test the significance between the different variable. Children’s BMI Group Calculator - Metric Version (XLS-3.6 Mb) used to compute Body Mass Index (BMI)-for-age.

## Results

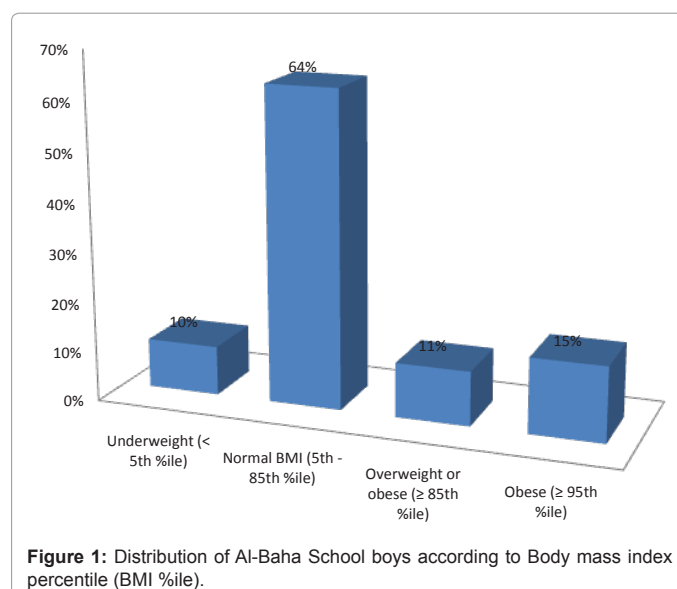
Body mass index percentile was used as an index of nutritional status of the child. As shown in figure 1 10% (72) of Al-Baha schoolchildren boys were found to be underweight. Further 64% (464) were found to be normal weight, 11% (80) of school boys were overweight and 15% (109) were obese.

Although the mean difference between BMI %ile and inactivity time periods were not statistically significant except with reading hours, the results in table 1 showed that the overweight and obese children had a higher average of TV watching hours, compared to normal and underweight children.

Table 1 also shows overweight and obese children had a higher mean of reading hours than the underweight and normal weight children, which may be due to the sedentary action of reading hours. Reading hours showed significant mean difference with the BMI %ile ( $p$ -value=0.036).

### The percentage (%) is within BMI percentile of Al-Baha male schoolchildren

Considering all of the inactivity behaviours which include (TV watching hours, computer or other devices hours, reading hours and



Inactivity actions		Underweight	Normal weight	Overweight	Obese	Total	p-value
TV watching hours	Frequency	72	464	80	109	725	0.635
	Mean	2.3958	2.34331	2.1313	2.2394	2.2394	
	Std. Deviation	1.48452	1.64331	1.49840	1.42654	1.58036	
Computer or other devices hours	Frequency	72	464	80	109	725	0.994
	Mean	1.1736	1.1765	1.2225	1.1679	1.1800	
	Std. Deviation	1.24516	1.41078	1.45079	1.88050	1.47725	
Reading hours	Frequency	72	464	80	109	725	0.036
	Mean	1.0597	1.1502	1.2288	1.3468	1.1794	
	Std. Deviation	0.66854	0.69671	0.90220	0.81724	0.74105	
Sleeping hours per day	Frequency	72	464	80	109	725	0.954
	Mean	7.5278	7.4612	7.4250	7.4404	7.4607	
	Std. Deviation	0.99254	1.19331	1.32908	1.20517	1.19051	

Table 1: The distribution of Al-Baha Schoolchildren based on means different of BMI %ile and inactivity time periods.

Collective inactivity	Underweight	Normal	Overweight	Obese
High inactivity actions	91.7% (66)	91.6% (425)	90% (72)	93.6% (102)
Low inactivity actions	8.3% (6)	8.4% (39)	10% (8)	6.4% (7)
Total	72	464	80	109
P value	0.845			

Table 2: Comparison between Al-Baha schoolchildren boys BMI %ile and inactivity behaviours.

Eating behavior/week	Frequency per week	Underweight	Normal weight	Overweight	Obese	Total	p-value
Eating breakfast every morning	Never	0	0	0	1(9.0%)	1	0.546
	2 days	0	1(0.2%)	1(1.3%)	0	2	
	3 days	0	3(0.6%)	1(1.3%)	1(0.9%)	5	
	4 days	0	5(1.1%)	1(1.3%)	1(0.9%)	7	
	5 days and more	72(100.0%)	455(98.1%)	77(96.3%)	106(97.2%)	710	
Eating lunch every week	Never	0	2(0.4%)	0	3(2.8%)	5	0.198
	1 day	2(2.8%)	3(0.6%)	0	2(1.8%)	7	
	2 days	1(1.4%)	2(0.4%)	0	0	3	
	3 days	1(1.4%)	2(0.4%)	1(1.3%)	1(0.9%)	5	
	4 days	5(6.9%)	18(3.9%)	4(5)	7(6.4 %)	34	
	5 days and more	63(87.5%)	437(94.2%)	75(93.8%)	96(88.1%)	671	
Eating dinner every week	Never	1(1.4%)	3(0.6%)	0	0	4	0.002
	1 day	2(2.8%)	2(0.4%)	1(1.3%)	1(0.9%)	6	
	2 days	0	0	3(3.8%)	0	3	
	3 days	0	7(1.5%)	0	1(0.9%)	8	
	4 days	5(6.9%)	33(7.1%)	5(6.3%)	12(11%)	55	
	5 days and more	63(88.9%)	419(90.3%)	71(88.8%)	95(87.2%)	649	
Eating between meals every day per week	Never	18 (25%)	110(23.7%)	11(13.8%)	29(26.6%)	168	0.042
	Ones a days	49(68.1%)	319(68.8%)	66(82.5%)	68(62.4%)	502	
	Twice a days	3(4.2%)	30(6.5%)	2(2.5%)	12(11%)	47	
	Three times or more a day	2(2.8%)	5(1.1%)	1(1.3%)		8	

Table 3: The distribution of Al-Baha Schoolchildren based on BMI %ile and the frequency of eating behavior per week.

sleeping hours per day); most of Al-Baha schoolchildren boys had practiced high inactivity behaviours 91.7% (665/725). While 91.7% (66/72) of the underweight were highly inactive i.e., only 10.0% (6/72) of the underweight boys spent less than two hours on TV watching, computer or other devices, reading and sleeping per day. Among the overweight or obese 90.0% (72/80) had high inactivity behaviours, while 93.6% (102/109) of the obese boys accounted high inactivity behaviours as shown in table 2. The association between the sum of inactivity behaviours and BMI %ile was not statistically significant (P-value=0.845).

### The percentage (%) is within BMI percentile of Al-Baha male schoolchildren

The association between BMI %ile and frequencies of eating

breakfast every morning as viewed in table 3 was statistically not significant (p-value=0.546). The frequency of those eating breakfast 5 days or more per week among obese, overweight, normal and underweight were 106 (97.2%), 77 (96.3%), 455 (98.1%), and 72 (100.0%) respectively.

The association between BMI % ile and frequencies of eating lunch every day per week as viewed in table 3 also was statistically not significant (p-value=0.198), most of the schoolchildren used to eat 5 or more lunch meals per week. It was found that the frequency of eating lunch every day per week among obese, overweight, normal and underweight were 96 (88.1%), 75 (93.8%), 437 (94.2%) and 63 (87.5%) respectively.

BMI %ile was found to be very significant with eating dinner every day per week ( $p$ -value=0.002). Among obese, overweight, normal and underweight were 95 (87.2%), 71(88.8%), 419 (90.3%) and 63 (88.9%) respectively were used to have 5 or more dinner meals per week.

Eating between meals every day per week and BMI %ile also was statistically significant ( $p$ -value=0.042). Among the schoolchildren who eat two times a days per week; 12(11%) were obese, 2(2.5%), 30(6.5%) and 3(4.2%) were overweight, normal and underweight respectively.

## Discussion

Body mass index percentile (BMI%ile) was used to determine the nutritional status of elementary schoolchildren boys of Al-Baha. The results in figure 1 indicate that the schoolchildren in Al-Baha suffering from both ends of the spectrum of nutritional problems (obesity and under-nutrition). 10% (72) of Al-Baha schoolchildren boys were found to be underweight, 11% (80) of school boys were overweight or obese and 15% (109) were obese. These results go with most of previous studies about nutritional status conducted in Saudi Arabia Al-Nuaim et al. [10] showed that the prevalence of overweight and obesity among male schoolchildren aged 6–18 years old in Saudi Arabia was 11.7% and obesity was 15.8%. Al Nuaim et al. [10] reported that one in every six children aged 6 to 18 years old is obese. Our result also goes with the researches in the US by Nicklas TA et al. [4], and Parsons TJ et al. [5]. Reported that twenty five percent of children in the US were overweight and 11% were obese. The World Health Organ Tech Rep Ser 2000 showed that the prevalence of obesity is increasing worldwide at an alarming rate in both developing and developed countries; our results reflect the seriousness of what this report stated.

As shown in tables 1 and 2; although the mean difference and association between BMI %ile of Al-Baha schoolchildren and time periods which have been spent on TV watching, computer or other devices, reading and sleeping per day were not statistically significant except with reading hours, the overweight and obese schoolchildren boys were found to spend more hours on these sedentary activities. These results agree with what Fox KR [6] reported about Asia that it contains about 70% of world malnourished children, it is also facing problems of overweight among children. The results in table 1 resemble the results of Al-Hazzaa [8]; that stated that the Gulf Cooperation Council Countries including the Kingdom of Saudi Arabia have witnessed significant lifestyle changes due to rapid urbanization, dominance of the automobile for personal travel, introduction of labor-saving device in the home and the workplace, availability of high-fat and dense-caloric foods, satellite TV, increased reliance on computer, and telecommunication technology as well as decreased occupational-work demands. These lifestyle changes have a considerable impact on reducing the physical requirements of daily life and have encouraged sedentary lifestyle. Consequently, such remarkable lifestyle transformation is thought to be greatly responsible for the overweight and obesity.

The association between BMI %ile with frequencies of eating behaviours of Al-Baha schoolchildren was not statistically significant as shown in table 3. These results are the same as what Madani [13] reported. Madani [13] concluded that the nutritional problems in Saudi Arabia are mainly due to a change in food habits, illiteracy and ignorance, rather than a shortage of food supply or low income. Our results are also compatible with what (Park, 2003) reviews; the fundamental cause of obesity and overweight is an energy imbalance between calories consumed and calories expended. Changes in dietary and physical activity patterns are often the result of environmental and

societal changes associated with development and lack of supportive policies.

## Conclusion

Among the schoolchildren boys in Al-Baha at least 26% (11% (80) overweight and 15% (109) obesity) were overweight or obese making them more exposed to major risk factors for a number of chronic diseases, including diabetes, cardiovascular diseases and cancer, and 10% (72) were underweight making them more vulnerable to a variety of diseases in later life. Urgent intervention is recommended to control these health problems.

A decrease in physical activity due to the increase of sedentary activities, eating behaviors and lack of effective school health education among Al-Baha elementary schoolchildren boys, fundamentally influence the prevalence of underweight, overweight and obesity.

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