

Prevalence of overweight and obesity among school-age children in Jos, North Central, Nigeria

Akinyemi O. D Ofakunrin^{a*}, Janet I. Obayomi^b, Tolulope O. Afolaranmi^c, Udochuckwu M. Diala^a, Collins John^a, Bose O. Toma^a, Esther A. Envuladu^c and Selina N. Okolo^a

^a Department of Paediatrics, University of Jos / Jos University Teaching Hospital, Jos, Plateau State, Nigeria

^b Department of Neonatology, London North West University Healthcare NHS Trust, Harrow, United Kingdom

^c Department of Community Medicine, University of Jos / Jos University Teaching Hospital, Jos, Plateau State, Nigeria

QR Code



*Correspondence Info:

Dr. Akinyemi O. D. Ofakunrin
Department of Paediatrics,
University of Jos / Jos University Teaching Hospital,
Jos, Plateau State, Nigeria
Phone No.: +2348038345783

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Abstract

Background: Overweight and obesity during childhood are gradually becoming a major public health problem in many developing countries in view of their increasing prevalence. This study determined the prevalence of overweight and obesity among school-age children in private and public schools in Jos, North Central, Nigeria.

Methodology: A cross-sectional study of 600 school children aged 6-13 years recruited using the multistage sampling technique. Socio-demographic data of the children were obtained using a proforma. The weight and height were measured, from which body mass indexes were calculated. Overweight and obesity status was determined by the International Obesity Task Force cut-off points.

Results: The overall prevalence of overweight and obesity was 10.3% and 1.7% respectively. More children in private schools (11%, 2%) than in public schools (9.7%, 1.3%) were overweight and obese respectively but the difference was not statistically significant ($p > 0.05$). The prevalence of obesity was highest among girls in both private and public schools compared to the boys. Seventy percent of children from the upper socioeconomic class were obese compared with 30% from the middle class and none (0%) from the lower class ($p < 0.0001$).

Conclusion: There is a high prevalence of overweight and obesity among school-age children in Jos, North Central Nigeria but more among the children in private schools compare to those in public schools. Appropriate intervention programmes targeting school-age children in Northern Nigeria to combat this problem should be planned and implemented by the stakeholders.

Keywords: Overweight, obesity, prevalence, children, Jos, Nigeria.

1. Introduction

Overweight and obesity are major global public health problems and are defined as abnormal or excessive fat accumulation resulting from an energy imbalance between calories consumed and calories expended.[1] Overweight and obesity have been shown to be associated with an increased risk of numerous health problems and comorbid conditions, such as diabetes, coronary heart disease, hypertension, stroke, certain cancers, arthritis, sleep apnea, psychological and behavioral problems.[2-5]

According to the World Health Organization (WHO), over 340 million children and adolescents aged 5-

19 years worldwide were overweight or obese in 2016.[1] The worldwide overweight and obesity prevalence among children and adolescents aged 5-19 years has increased dramatically from about 4% in 1975 to over 18% in 2016.[1] Overweight and obesity that were once regarded as a problem of high-income countries are now on the increase in low- and middle-income countries, especially in the urban regions due to changing patterns of lifestyle.[6] Recent studies in Nigeria and other low- and middle-income countries corroborated the fact of an increasing prevalence of overweight and obesity thus implying a double burden of malnutrition in these parts of the world

that are still grappling with the problem of under nutrition. [7-9]

It has also been reported that from early school age, about half of obese children turn out to become obese adults whereas just about a tenth of non-obese children eventually becomes obese adults.[10] This finding suggests that timely addressing of overweight and obesity in children not only preserves children and adolescents from morbidity and possible mortality, but also saves the future adults from similar burdens.[10]

In spite of the reported increasing prevalence of overweight and obesity worldwide, including in low and middle income countries, available evidence indicates that most of the published data on the subject in Nigerian children were from the Southern part of the country. [11] This thereby limits the knowledge of the magnitude of the problem in Northern Nigeria. This study, therefore, determined the prevalence of overweight and obesity among school age children in Jos, North Central Nigeria. The findings from this study could be useful for health policymakers, educators and other stakeholders in appreciating the burden of overweight and obesity and thereby enable them plan appropriate intervention programmes targeting school-age children in Northern Nigeria.

2. Methodology

2.1 Study area

The study was conducted in six primary schools (three public and three private) in Jos, the capital of Plateau State located in the North Central region of Nigeria. Plateau State and Jos have an estimated population of 3,206,531 and 900,000 respectively.[12] School-age children accounts for 23.5% (753,816) of the population.[12] According to the records obtained from the State ministry of education, there are 23 public and 46 private schools in Jos.

2.2 Study population

This comprised of primary school pupils aged 6-13 years selected from three private and three public schools in Jos.

2.3 Study design

This was a cross-sectional study conducted among 600 pupils to determine the prevalence of overweight and obesity among school-age children. Both private and public schools were chosen in order to have a fair representation from the different social strata of the society.

2.4 Sample size determination

The minimum sample size was determined using the sample size determination formula for cross-sectional study. [13]

$$n = \frac{Z^2 (1-p) (p)}{d^2}$$

Where n is the minimum sample size, Z is the normal deviate at 95% confidence interval (1.96), d is the

precision of the study set at 0.05 and p is the best estimate of prevalence in the target population expressed as a fraction of 100. The prevalence of obesity among school age children in a previous Nigeria study of 18% (0.18) was used. [14] A minimum sample size of 600 pupils (300 each from the private and public schools) were recruited after adjustment to cater for non, poor and incomplete responses.

2.5 Inclusion and exclusion criteria

Apparently healthy pupils aged 6-13 years whose parents/guardians gave consent were recruited into the study. Pupils with obvious lower limb deformity and those on prolonged corticosteroid therapy were excluded.

2.6 Sampling technique

The pupils were recruited using the multistage sampling technique method. In the initial stage, the primary schools in Jos were stratified based on ownership into 46 private and 23 public schools. Based on proportionate allocation, a ratio of two private to one public school was selected. Among the selected schools, six schools (three private and three public) were further selected using a simple random sampling technique. In the next stage, proportion to size technique was used to determine the number of pupils to be sampled in each of the schools. This was also further employed to determine the number of pupils to be sampled per arm of each of the schools. A computer-generated table of random numbers was then used to pick the determined number of pupils from the list of the eligible pupils per arm in each of the schools culminating in a total of 300 per group of public and private schools. An equal number of males and females was ensured by gender grouping before the final selection was done.

2.7 Data collection

A pretested questionnaire was given to each of the pupils to complete at home with the help of the parents. The questionnaires were used to obtain personal, medical and social data of the pupils. The socio-economic status (SES) of the parents was obtained from the occupational and educational history using the Olusanya index scoring method.[15] However, in this study, SES of 486 families was assessed due to non-volunteering of required information specified for this by the remaining parents/caregivers.

2.7.1 Anthropometric measurement:

Weight and height were measured by the investigators (who had been trained) using a portable weighing scale (*Seca* 803, UK) and a mobile stadiometer (*Seca* 213, UK) respectively as previously described. [16] The body mass index (BMI) was then calculated as weight (kg) divided by height squared (m^2). Overweight and obesity status was determined by the International Obesity Task Force (IOTF) reference by Cole et al.[17] In this IOTF reference cut off points, overweight and obesity definition in 2-18year-old children and adolescents are linked to the

adult health-related BMI cutoff points of 25 kg/m² for overweight and 30 kg/m² for obesity.

2.8 Data analysis

The data obtained were analyzed using Epi info statistical software version 3.3.5 The sociodemographic characteristics of the subjects were presented in frequency and percentage. Quantitative data such as the age and the anthropometric parameters were summarized using mean and standard deviation. The proportions of overweight and obese children in private and public schools, as well as across the different social classes were compared using the Chi-square test. The Student t- test was used to determine the differences in the mean anthropometric values in both school groups and a p-value of <0.05 was considered statistically significant.

2.9 Ethical consideration

Approval to conduct the study was obtained from the Research and Ethics Committee of the Jos University Teaching Hospital. Approval was also granted by the Plateau State Ministry of Education, and permission was obtained from the Heads of the schools.

Written informed consent was obtained from the parents/guardians of all the participants while assents were given by the pupils before participation.

3. Results

3.1 The socio-demographic characteristics and anthropometry of the study population

A total of 600 pupils participated in the study (300 each from private and public schools). The children were aged 6-13years with a mean age of 9.43±1.47years for children from private schools and 9.15±1.80years for public schools, and an overall male to female ratio of 1:1.4. There were more pupils whose parents belong to the upper socioeconomic class in the private schools (18.8%) than in the public schools (3.7%). Conversely, more pupils in the public schools (81.9%) than in the private schools (55%) had parents from low socioeconomic class. (Table 1)

The height, weight and body mass index were higher among children in private schools compared with public schools and the differences were statistically significant (p <0.05). (Table 1)

Table 1: Socio-demographic characteristics and anthropometry of the study population

Variable	Private Frequency (%)	Public Frequency (%)	P value
Age group (years)			
6 -9	141(47.0)	187 (62.4)	
10-13	159 (53.0)	113(37.6)	
Total	300(100.0)	300 (100.0)	<0.0001*
Mean age± SD (years)	9.43±1.47	9.15±1.80	0.037**
Gender			
Male	127 (42.3)	127 (42.3)	
Female	173 (57.7)	173 (57.7)	
Total	300(100.0)	300 (100.0)	0.500*
SES of parents			
Upper	51 (18.8)	8 (3.7)	
Middle	70 (25.8)	31 (14.4)	
Lower	150 (55.4)	176 (81.9)	
Total	271(100)	215(100)	<0.0001*
Anthropometry	Mean ± SD	Mean ± SD	P value**
Weight (kg)			
Male	31.86±8.06	29.27±6.49	0.005
Female	33.11±7.87	29.34±6.89	<0.0001
Both	31.92±6.14	28.93±6.98	<0.0001
Height (cm)			
Male	137.38±9.68	133.45±10.05	0.002
Female	138.69±9.85	133.19±10.92	<0.0001
Both	136.49±8.90	133.25±9.05	<0.0001
BMI (kg/m²)			
Male	16.69±2.22	16.29±2.28	0.400
Female	17.01±2.53	16.38±2.38	0.018
Both	16.95±2.50	16.01±2.80	<0.0001

SES = socioeconomic status, SD = standard deviation, * chi-square, ** student t- test.

3.2 Prevalence of overweight and obesity

The overall prevalence of overweight and obesity was 10.3% and 1.7% respectively. In the private schools, 33(11%) children were overweight compared with

29(9.7%) children in the public schools, while the prevalence of obesity was 2% and 1.3% in private and public schools respectively (p>0.05). (Table 2)

The proportion of overweight children whose parents were in the upper socioeconomic class 32(52%) was higher than those whose parents were in the lower socioeconomic class 10(16%). Furthermore, seven (70%) of

children from the upper social class were found to be obese compared with three (30%) from the middle class and none from the lower socioeconomic class, the difference was statistically significant ($p < 0.0001$). (Table 2)

Table 2: Prevalence of overweight and obesity by school category and socioeconomic class

Variable	Underweight	Normal	Overweight	Obesity	P
School category					
Private (n=300)	20(6.7)	241(80.3)	33(11.0)	6(2.0)	0.71*
Public (n=300)	44(14.7)	223(74.3)	29(9.7)	4(1.3)	
Total (n=600)	64(10.7)	464(77.3)	62(10.3)	10(1.7)	
Social class					
Upper	3(5.0)	17(4.9)	32(52.0)	7(70.0)	
Middle	6(9.0)	72(20.5)	20(32.0)	3(30.0)	
Lower	55(86.0)	261(74.6)	10(16.0)	0(0.0)	
Total	64(100.0)	350(100.0)	62(100.0)	10(100.0)	<0.0001*

Data in frequency (percent), * Chi square test

3.3 Prevalence of overweight and obesity by age and sex.

Prevalence of overweight and obesity was age and sex-disaggregated in line with schools ownership. In the private school, the prevalence of overweight was higher in girls 21(12.1%) than in boys 12(9.5%) while a reverse trend of more overweight boys 18(14.2%) than overweight girls 11(6.4%) was observed in the public school. The

prevalence of overweight was highest among girls (14.8%) and boys (16.7%) aged 6-9years in the private and public schools respectively. Furthermore, the prevalence of obesity was higher among girls (2.9%, 2.3%) than boys (0.8%, 0%) in both private and public schools respectively with girls aged 6-9years accounting for the higher prevalence. (Table 3)

Table 3: Prevalence of overweight and obesity by age and sex

Parameter	Private			Public		
	n	Overweight	Obesity	n	Overweight	Obesity
Boys						
6-9	53	4(7.6)	0(0)	72	12(16.7)	0(0)
10-13	74	8(10.8)	1(1.4)	55	6(10.9)	0(0)
Total	127	12(9.5)	1(0.8)	127	18(14.2)	0(0)
Girls						
6-9	88	13(14.8)	4(4.5)	115	7(6.1)	4(3.5)
10-13	85	8(9.4)	1(1.2)	58	4(6.9)	0(0)
Total	173	21(12.1)	5(2.9)	173	11(6.4)	4(2.3)

Data in frequency (percent). n-number.

4. Discussion

The overall prevalence of overweight and obesity found in this study was 12% (10.3% and 1.7% for overweight and obesity respectively). This is higher than what has been reported in some studies among school-age children in urban regions of Nigeria and other low-income countries [18-20]. The higher prevalence in this study may indicate a rising trend in the prevalence of overweight and obesity among school age children in Nigeria. Studies have shown that the prevalence of overweight and obesity are on the increase in many low and middle-income countries especially in the urban regions as a result of changing patterns of the lifestyle characterized by poor dietary habits, physical inactivity and socio-economic improvement.[1,6].

Therefore, putting strategic plans in place to stop the prevalence of overweight and obesity from escalating will confer a lifetime of health benefits.

A similar or higher prevalence than what was found in this study have been reported in studies in some developing countries and many developed countries.[21-23] The differences seen in the results of these studies may be attributed partly to the effect of genetic, lifestyle and environmental factors; and variations in the age groups of the sampled populations and because of different study methods and definitions of obesity / overweight across the various studies. Therefore comparisons on obesity prevalence rates across studies must be done with caution.

The prevalence of overweight and obesity in this study was higher (but not statistically significant) among the students from private schools compared to public schools. This is similar to the findings from previous studies in Nigeria, Kenya and India. [24-26] These findings suggest that children belonging to the relatively higher socioeconomic class who are likely to study in private

schools are at higher risk of obesity, most likely due to associated lifestyle changes leading to inappropriate diet and increasing levels of inactivity. Socio-economic status has been reported to have significant effects on the levels of physical activity [27]. Frequent use of cars to facilitate movement rather than walking and lack of exercises could contribute to low energy expenditure. [27] Similarly, access to electrical/electronic appliances such as television (TV) and video games has made children spend much time watching television and playing electronic games which make them more inactive. [28] These factors that could affect the level of physical activities were, however, not assessed in this study.

This study also found that more girls than boys were obese and this agrees with the reports of previous studies conducted in Nigeria and Cameroon but differs from an American study. [29-31] The reason for the higher prevalence of obesity in girls may be related to differences in gender roles particularly those requiring higher physical exertion. For instance, boys participate more in activities that allow for higher energy utilization than girls thereby aiding expenditure of consumed calories and reduction of fat accumulation. In addition, in some African countries, it is culturally desirable for a female to be fat (overweight) as it is seen as a sign of affluence and prestige. This could also explain the gender differences in the prevalence of obesity. [8]

5. Conclusion

There is a high prevalence of overweight and obesity among school-age children especially those from private schools in Jos, North Central Nigeria. Appropriate intervention programmes targeting school-age children in Northern Nigeria to combat this problem should be planned and implemented by the stakeholders.

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