



# Comparative Assessment of Childhood Overweight and Obesity among Public and Private Schools Pupils in Obio/Akpor Local Government Area, Rivers State, Nigeria

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#### Abstract

**Background:** Childhood overweight and obesity is a risk factor for the onset of chronic non-communicable diseases like type II diabetes and hypertension. Between May and August 2019, researchers conducted this study in Obio/Akpor to compare the prevalence of overweight and obesity among pupils attending public and private elementary schools.

**Method:** The research was a comparative descriptive study. In Obio/Akpor Local Government Area of Port Harcourt, Nigeria, 1040 pupils aged 6-12 years from public and private elementary schools were assessed. The pupils' height and weight were measured in order to determine their body mass index. Chi-square test was used for test statistics. To gather pertinent information, a semi-structured questionnaire was utilized. The significance criterion for each statistical test was set at P 0.05.

**Result:** A total of 205 (19%) pupils in public and private schools out of the 1035 pupils who later completed study were found to be overweight or obese. Pupils in private schools made up the majority of cases, with 82 (15.9%) and 49 (9.5%) of them being overweight and obese, respectively, as opposed to 41 (7.9%) and 33 (6.4%) of pupils in public schools. The difference in overweight and obesity among the private and public school was statistically significant ( $\chi^2 = 19.901$ ,  $P=0.001$ ). Higher socioeconomic class was significantly associated with the higher prevalence ( $P<0.001$ ).

**Conclusion:** The prevalence of childhood overweight and obesity was high in both study populations, while it was significantly higher among students enrolled in private primary schools.

**Keywords:** Comparative, overweight, obesity, pupils, public, private, Obio/Akpor

#### Introduction

The future of primary school pupils is threatened by childhood overweight and obesity, as the most prevalent risk factors for chronic non-communicable diseases affecting children.<sup>1</sup> Overweight and obesity in children, is a condition where a child accumulates excess adipose tissue to an extent that it impairs the physical, as well as psychosocial health of the child.<sup>2</sup>

Childhood overweight and obesity are some of the most serious public health challenges of the 21st century.<sup>3</sup> This is because forty-three million children between the ages of 0-5 years are overweight and obese. Meanwhile, thirty-five million of these are said to be from developing countries, and it is estimated that the number of overweight and obese children would increase to seventy million by 2025 if no effort is made towards reducing overweight and obesity in children.<sup>3</sup>

Pupils who attend public schools are mostly children from families of low socioeconomic status, while pupils who attend private schools are children from families of high socioeconomic status.<sup>4,5</sup> This shows that the socioeconomic status of a parent influences the choice of the school made for the child.<sup>6</sup> In Nigeria, private schools are seen as a better option for gaining quality education and have gained more acceptance and popularity because of the failures of public schools.<sup>7</sup> World Health Organization-Ending Childhood Obesity Commission,<sup>8</sup> stated that childhood overweight and obesity are not the faults of the children but that of their parents or caregivers. Additionally, children with obesity are bullied and teased more than their normal-weight peers and are more likely to suffer from social isolation, withdrawal, depression, and lower self-esteem.<sup>9,10</sup>

Globally, forty-three million (thirty-five million in developing countries) children between the ages of 5-19 years are overweight and obese.<sup>11</sup> The number would increase to seventy million by 2025 if no effort is made.<sup>12</sup> In India, the overall prevalence of overweight and obesity was 18.2% by the International Obesity Task Force (IOTF) classification and 23.9% by the WHO standards.<sup>13</sup> In Africa, the prevalence of childhood overweight and obesity was 5% in 2017.<sup>14</sup> While in Sub-Saharan Africa, nine million, five hundred thousand children are overweight and obese.<sup>15</sup>

Notable progress has been made in the reduction of stunting<sup>16</sup> but overweight and obesity in children are on the increase. In 2014 a prevalence of 26% was recorded among children 5 to 12 years in primary schools in Lagos State.<sup>17</sup> The prevalence of obesity among pupils attending private schools was 18.4% in Benin city Nigeria.<sup>18</sup> In Rivers State, overweight and obesity remain a major risk factor for non-communicable among children, its prevalence being 29%.<sup>19</sup>

There need to be a change in societal perception of childhood overweight and obesity because, despite research showing the existence of childhood obesity among families with high and low socioeconomic statuses, childhood overweight and obesity in Nigeria is still perceived as a reflection of the affluence status of parents and extraordinary care given to a child.<sup>20</sup> Therefore, this study aims to find out the prevalence of overweight and obesity among children in Obio/Akpor LGA thereby providing recommendations on how best to tackle the problem of overweight and obesity among primary school pupils in Obio/Akpor.

## Method

### Study Area

The study was carried out in public and private schools in the Obio/Akpor Local Government Area

(OBALGA) of Rivers State. OBALGA is an LGA in the metropolis of Port Harcourt. There are about 113 private schools in OBALGA registered under the National Association of Proprietors of Private School (NAPPS)<sup>21</sup> and 54 public primary schools in OBALGA.<sup>22</sup>

### Study Design

This study is a comparative, cross-sectional design.

### Study Population

The study population comprised children between the ages of 5-12 years old who were pupils of the selected public and private primary schools in OBALGA.

### Sample Size Determination

The sample was derived using the formula by Kelsey *et al*, (2014).<sup>23</sup>

$$n = \frac{Z\alpha/2 + Z\beta^2 P_1(1-P_1) + P_2(1-P_2)}{P_1 - P_2^2}$$

After adjusting for a non-response rate of 10%, a total minimum sample size was 1,040 (520 pupils from private schools and 520 pupils from public schools to ensure an equal representation of pupils from each stratum).

### Sampling Method

The multistage sampling method was employed for the studies. This method is similar to the method employed by <sup>4</sup>. A list of primary schools which contains two strata of the public (54 public schools) and private schools (113 private schools) was obtained from Obio/Akpor Local Government Area Education Authority (OBALGEA). Using the list of schools in Obio/Akpor, the ratio of public to private schools to be selected from each stratum was calculated.

Using simple random techniques of balloting without replacement, a total of 5 public and 10 private schools were selected from the different strata of public and private schools. The ratio of 2:1 was used because the ratio of registered private schools to registered public schools was 113:54. The class register was later used as a sampling frame to systematically select the number of pupils required from each class.

### Study Instruments

A developed and pretested structured questionnaire served as a study instrument. The questionnaire was given to pupils to complete with the help of their parents. The questionnaire inquired into the pupils' demographic data and the socioeconomic class. The socioeconomic status was obtained using the format of <sup>24</sup>. Seca measuring scales of 0.1kg sensitivity and a stadiometer measuring to the nearest 0.1cm were used in

obtaining the weight and height of the pupils respectively.

Two United State Center for Disease Control (US CDC) BMI for age chart for boys and girls,<sup>25</sup> were used in classifying the pupils' anthropometric indices.

#### ***Study Procedure/ Data Collection Procedure***

Research assistants were trained on weight and height measurement and recording of data for the research. The head teachers at the selected schools were visited prior to the research to discuss the objectives and significance of the study and obtain permission to carry out the study. All measurements were taken during break periods to avoid disrupting academic activities. Anthropometric measurements of height and weight were then taken for each pupil. Their Body Mass Index (BMI) was then obtained from the measurements. BMI is defined as body weight in kilograms divided by the square of height in meters.

$$BMI = \frac{\text{Weight (Kg)}}{\text{Height}(M^2)}$$

#### ***Classification of Anthropometric Measurement***

The pupils were grouped as overweight and obesity using the US CDC reference growth chart. The US CDC charts are a growth reference, describing how certain children grew in a particular place and time.<sup>25</sup>

Obesity and overweight status are classified according to the following categories using the US CDC (2000) reference chart for overweight and obesity are:

85th to 95th percentile: overweight  
>95th percentile: obesity

#### ***Classification of Socioeconomic Status***

The socio-economic status (SES) of the parents was obtained using the model of <sup>26</sup>. This instrument for the classification of socioeconomic class groups socioeconomic classes into high, medium and low based on the occupation and level of education. It is graded on a score of 1 to 5 with 1 being the highest and 5 being the lowest. Each score has two variables, occupation, and level of education.

Scores 1 to 2 = high socioeconomic class

Scores 2.1 to 3= medium socioeconomic class  
Scores 3.1 to 5=low socioeconomic class

#### ***Data Analysis***

Data for the study was collected by the researcher and screened for appropriateness before being entered into version 2016 of Microsoft excel spreadsheets for pre-processing and coding. Pre-processed data was then imported into version 23 of the Statistical Package for Social Science for analysis and visualization.

Categorical data were presented using frequency table then chi-square was used as statistical test for comparison with statistical significance level set at <0.05. Continuous data was summarized in means and standard deviation and the results were presented in tables and charts. T-test was used to compare and draw inference for the results while level of significance for this study was set at a p-value < 0.05.

#### ***Validity/Reliability of the instrument***

A validated and pretested questionnaire was a major data collection instrument. The questionnaires were given to Nutritionists and Dieticians at the Department of Nutrition and Dietetics, University of Port Harcourt Teaching Hospital for content validation and their corrections and modifications were applied to the questionnaire. The questionnaire was then pre-tested on school children in Oyiabo who were not included in the study.

#### ***Ethical consideration***

Ethical approval was obtained from the ethical review committee of the University of Port-Harcourt with reference number UPH/CEREMAD/REC/MM61/030. Permission was obtained from the Obio/Akpor Local Government Education Authority (OLGEA). In the various schools, the letter of authorization obtained from OLGEA was presented to the head teachers. Written consent was sought through an introductory letter addressed to the parents of the selected pupils. The signature or thumbprint of the parent indicated their approval. There was no consequence for the selected pupil who refused to participate or whose parents refused to give their consent. This study had no risk.

## Results

A total number of 1040 questionnaires were administered among respondents with response rate being 99.5%

### Socio-Demographic Characteristics of all the Pupils in Public and Private Schools

Variable	Groups	Public (n=518) n (%)	Private (n=517) n (%)	Df	X <sup>2</sup> (P-value)
Age	5-6 years	125(24.1)	168(32.5)	3	17.202(0.001)
	7-8 years	116(22.4)	118(22.8)		
	9-10 years	215(41.5)	200(38.7)		
	11-12 years	62(12.0)	31(6.0)		
Sex	Male	212(40.9)	323(62.5)	1	48.117(0.001)
	Female	306(59.1)	194(37.5)		
Family Income	Below ₦100,000	390(73.0)	145(28)	1	231.268(0.001)
	Above ₦100,000	128(24.7)	372(71.90)		
Family setting	Monogamy	471 (90.90)	515(99.3)	1	186(0.666)
	Polygamy	47(9.1)	2 (0.7)		
Food Expenditure	Below ₦100,000	413(79.7)	198(38.3)	1	186.663(0.001)
	Above ₦100,000	105(20.3)	319(61.7)		
Socioeconomic Class	Low	239(46.1)	44(8.5)	1	315.694(0.001)
	Middle	225(43.4)	170(32.9)		
	High	54(10.5)	303(58.6)		

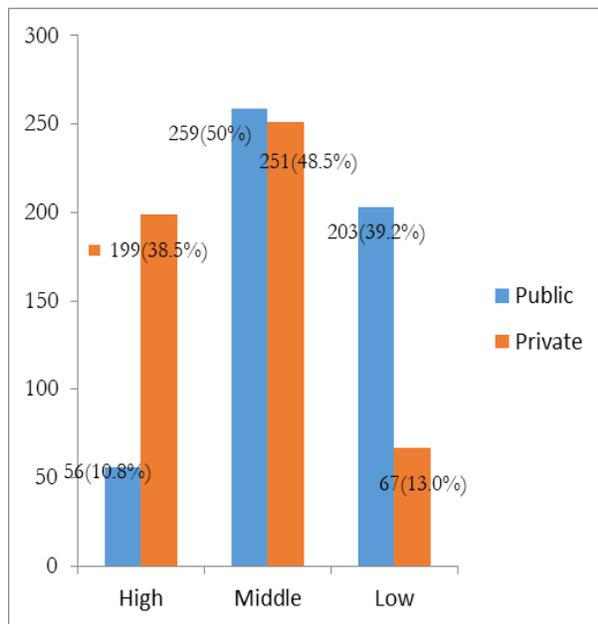
Table 1 shows that 303(58.6%) of the pupils who attended private schools were from a high socioeconomic class compared to 54(10.4%) of pupils who attended public schools. The result also shows there were a few groups of 11-12 years old pupils in private schools (6%) compared to pupils in public schools (12%). The majority (71%) of pupils in private schools were from families with income above N 100000 compared to pupils in public schools (24%).

**Table 2:** Overweight and obesity status of the primary school pupils in Obio/Akpor

Type of School	Nutritional status		df	X <sup>2</sup> (P-value)
	Underweight/Normal Weight n (%)	Overweight/Obesity n (%)		
Public	444 (85.7)	74(14.3)	1	19.901(<0.001)
Private	386(74.7)	131(25.3)		

\*Statistically significant (p<0.05)

Table 2 shows that a significantly higher proportion of pupils in private schools were overweight/obese.



**Figure 1:** Socioeconomic class of pupils according to school type

Figure 1 shows that the majority of pupils from higher socioeconomic classes (38.5%) attended private schools compared with pupils from higher socioeconomic classes who attended public schools (10.8%). The figure also shows that there was a similar percentage of pupils in public and private schools who were from middle socioeconomic classes (50% and 48.5%). The majority of pupils from families of low socioeconomic classes attended public schools (39.2%) compared to pupils from low socioeconomic classes who attended private schools (13%).

### Discussion

In this study, a total of 205 pupils out of 1035 pupils were either overweight or obese. The overall prevalence of overweight and obesity is 19.8%, this prevalence is synonymous with a study by <sup>27</sup> which showed that the overall prevalence of overweight/obesity was 17.4%. The difference in this prevalence is most likely to be attributed to the socioeconomic class of the parent and the time difference in the two studies since this study was carried out four years later than the study by <sup>27</sup>.

The overall proportion of pupils who were obese in this study was 7.9%. This implies that 82 out of the 1035 pupils recruited for the study were obese. This prevalence is similar but lower than the prevalence of 8.6% in Port Harcourt, Nigeria.<sup>28</sup> However, a younger population with a mean age of  $3.2 \pm 1.0$  years was used compared to the mean age of  $8.94 \pm 1.98$  years used for this research. This also agrees with the findings which

shows that childhood overweight and obesity increases with age in children.<sup>7</sup>

The proportion of children who are overweight in this study is 11.9%. This proportion consists of all the pupils in the private and public schools recruited for the studies. The prevalence obtained from this study was similar to the prevalence obtained in a study in Khartoum which recorded a prevalence of 14.8%.<sup>29</sup> In the study carried out in Khartoum, a lower sample size of 304 children was used, hence, this could be the reason for the higher prevalence. <sup>4</sup> found a lower prevalence of overweight to be 7.3% and 10.3% in Benin City and Plateau states. The reason for the lower prevalence of overweight can most likely be attributed to the socioeconomic status of this region. This is because Obio/Akpor is one of the richest LGA in Nigeria. In this study, 66.8 % of the pupils had a normal weight.

In this study, the prevalence of overweight and obesity among pupils in public school was 7.9% and 6.4% respectively while the prevalence of overweight and obesity among pupils in private schools was 15.9% and 9.5% respectively. The difference in this prevalence was statistically significant ( $\chi^2 = 19.901$ ,  $P=0.001$ ). This prevalence was however higher than the prevalence obtained by <sup>[30]</sup>, in Ilorin, where the combined prevalence of overweight and obesity was 7.3% in private schools and 3.1% in public schools respectively. The higher prevalence seen was because of the food preference among the private school pupils which showed that the pupils predominantly consumed refined highly processed foods. Furthermore, the higher prevalence obtained from private school pupils in this study can be attributed to the study location in terms of the higher economic activity seen in Obio/Akpor compared to the study in Ilorin.

In a study carried out in Jos, Plateau State by <sup>4</sup> more children in private schools (11%, 2%) than in public schools (9.7%, 1.3%) were overweight and obese respectively. However, the difference in the nutritional status of the pupils was not statistically significant ( $p>0.05$ ). The study by <sup>4</sup>, also showed that 70% of children from the upper socioeconomic class were obese compared with 30% from the middle class and none (0%) from the lower class ( $p<0.0001$ ).

In this study, it was seen that the majority of pupils were from the family of middle socioeconomic status (49.3%), families of low socioeconomic status were 26.1% while families with high socioeconomic status were 24.6%. In this study, 39.2% %, 50% and 10.8 % of the pupils attending public schools where from low, middle and high socioeconomic classes respectively while 13%,

48.5% and 38.5% of pupils attending private schools are from low, middle and high socioeconomic classes respectively.

The strength of the study was that all the pupils were willing to participate in the study hence there was no limitation in the aspect of sample size.

#### **Implication of the findings**

Efforts should be geared towards prevention of overweight and obesity in order to reduce the risk of non-communicable diseases among children. Prevention should be targeted at families, schools, health workers, community, and government.

#### **Conclusion**

This study shows that a total of 82 and 49 (15.9% and 9.5%) pupils in private schools were overweight and obese compared to the total of 41 and 33 (7.9% and 6.4%) pupils in public schools who were overweight and obese. The difference between the type of school a pupil attends and the state of overweight and obesity among the pupils was statistically significant ( $\chi^2 = 19.901$ ,  $p < 0.001$ ).

Socioeconomic class of the pupils was significantly associated with their overweight and obesity status ( $P < 0.001$ ). The higher proportion of pupils from high socioeconomic classes who were mostly attending private schools (44.9%) were either overweight or obese compared to the lower proportion of pupils (20.8%) from families of low socioeconomic classes.

**Ethical consideration:** Ethical approval was obtained from the ethical review committee of the University of Port-Harcourt with reference number UPH/CEREMAD/REC/MM61/030. Permission was obtained from the Obio/Akpor Local Government Education Authority (OLGEA). In the various schools, the letter of authorization obtained from OLGEA was presented to the head teachers. All subjects gave their informed consent for inclusion before they participated in the study.

**Authors' contribution:** This work was carried out collaboratively by all authors. BMM and SIM wrote the proposal and designed the study, JNM performed the statistical analysis, wrote the protocol, and the first draft of the manuscript. All the authors read and approved the final manuscript, and they are responsible for the integrity of the work as a whole.

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