



## The Multi-Factorial Link of Childhood Overweight and Obesity Among Urban and Rural School Age Children (6-9 years) of Osun State, Nigeria.

Nnoka Kingsley O.(RD)<sup>1</sup>, Akinola O.O.<sup>1</sup>, Mosimabale M.M.<sup>1</sup>; Orji I.G.<sup>1</sup>, Oyinloye O.D.<sup>1</sup>; Lawrence I.G.<sup>2</sup>

<sup>1</sup>Department of Nutrition and Dietetics, School of Applied Sciences,  
The Federal Polytechnic Ede, Osun State, Nigeria.

<sup>2</sup>Department of Food Technology,  
The Federal Polytechnic, Offa, Ogun State, Nigeria.  
e-mail address: talk2kingsleyn@yahoo.com

**ABSTRACT-**Childhood obesity is a public health problem with adverse outcomes and the prevalence appears to be increasing worldwide including developing countries. This cross-sectional study was conducted to assess the prevalence of overweight and obesity among school children age 6-9 years in Urban and Rural areas of Osun State. A simple random sampling method was used in selecting respondents. Data was collected using a pre-tested, self-administered questionnaire. Anthropometric measurements were taken and the Centre for Disease Control age and sex specific BMI was used to define overweight and obesity in children. Prevalence of overweight and obesity were found to be 29(32.2%) and 14(15.5%) respectively in the urban area, and 11(12.2%) and 0(0.0%) respectively in the rural area respectively. Obesity prevalence was seen more 7(50.0%), 8(57.1%), 6(42.9%) and 6(42.9%) in children whose parents have poor nutritional knowledge, children whose parents are super-rich, children whose both parents are obese and children who visit fast food eateries at least three times in a week respectively. Significant differences exist ( $p>0.05$ ) between the mean weights ( $24.8\pm 5.2$ ) and ( $23.05\pm 3.11$ ), mean heights ( $1.19\pm 0.09$ ) and ( $1.22\pm 0.11$ ), and mean BMI ( $17.44\pm 2.39$ ) and ( $15.45\pm 1.49$ ) of the urban and rural respondents respectively. To prevent obesity in children, a radical nutrition education should be periodically given to the parents on healthy food selections and consumption for their families and to reduce the frequency of their visit to fast food eateries. There is need for obesity management programme for the parents since an obese parent has the tendency to beget obese offspring.

*Keywords: overweight, obesity, school children, urban and rural.*

### 1. Introduction

Overweight and obesity are public health problems all over the world because of their devastating socio-economic, and health consequences in developing countries, yet, there are few data on the magnitude of these problems in Nigeria<sup>1</sup>. Nowadays, obesity is a major serious public health problem and a big challenge, since its prevalence is accelerating rapidly not only in developed countries but also in developing countries. The widespread of obesity is not restricted to adults but is also rampant among children.

According to the World Health Organization<sup>2</sup>, Overweight and obesity are global plagues, with 1 billion overweight people, of whom 300 million are obese, and at least 2.6 million die each year as a result of being overweight or obese, and called for specific action to halt the plague that is now penetrating the poorest nations in the world, especially amongst the urban. Children and adolescents are worst affected with an estimated 10% of the world's school-going children being overweight and one quarter of these being obese<sup>3</sup>. Childhood obesity adversely affects physiological and psychosocial well-being; significantly increases the likelihood for adult obesity; results in non-communicable diseases (NCDs) such as Diabetes mellitus, cardiovascular diseases and cancer; and leads to increased mortality and morbidity, heavy health expenditures and reduced social status<sup>4</sup>.

Childhood obesity is becoming an equally challenging, yet under-recognized problem in the developing countries including Nigeria<sup>5</sup>. Globally, prevalence of childhood overweight and obesity among school-going children has been extensively explored<sup>6</sup>, and many interventions have been implemented for the prevention of childhood obesity in early school years<sup>7</sup>. In Nigeria, however, it has been neglected. Routine surveillance on prevalence of childhood overweight and obesity has not been conducted in Nigeria. Statistics also show that, prevalence of overweight continues to increase during the school age and adolescent stages, and lack of health awareness to both parents and children may also be linked to the high prevalence of obesity<sup>8</sup>. Published data regarding prevalence of overweight and obesity among children aged 6–12 years in Nigeria is limited. This study was therefore conducted to ascertain the prevalence of overweight and obesity among School children aged 6-9 years in Urban and Rural Areas of Osun State, Nigeria.

## 2. Methodology

### Study Area

This study was conducted in three (3) Local Government Areas of Osun State, Southwest Nigeria and three (3) schools each representing the Urban and the Rural areas. Urban respondents were drawn from Union Baptist Primary School, Osogbo; Glorious Heritage Nursery and Primary School, Osogbo and Modakeke Primary School, Ile-Ife. The following schools represented the Rural Schools: Sekona Primary School, Ede; Hepzibah Nursery and Primary School, Ede and CAC Primary School, Ede.

### Study Population

A total number of one hundred and eighty (180) primary school Children participated on this study and this comprises of BOTH MALES AND FEMALES WHOSE AGE RANGES BETWEEN 6-9 YEARS.

### Study Design

This cross-sectional study was carried out among primary school children of age 6-9 years in Osun State Urban and Rural areas, between November and December, 2013.

### Preliminary Visit

Preliminary visit was made to the Osun State Ministry of Education, where the list of all the primary schools (both private and public) was obtained from the Directorate of schools. And a simple random sampling was used to select schools used for the study. Preliminary visit was also made to the Headmasters and Headmistresses of the selected schools. The purpose and methods of the study were explained and consent of the parents and teachers were obtained.

- Sample Size determination:

$$n = p(1-p) \times (z_{\alpha/2}/d)^2 \quad (\text{CDC, 2004})$$

Where n = sample size, p = proportion of obese children in Nigeria (0.13), d = level of significance (0.05),  $z_{\alpha/2}$  = probability of type 1 error (1.96).

Therefore, n = 173.

5% was added to cater for attrition and that brings total sample size to approximately 180

## 3. Sampling Techniques

A simple random sampling technique was employed in selecting respondent for this study. The first stage involved the collection of the individual class registers of the school. Then ninety (90) students each were sampled from urban and rural areas. Three (3) schools each from urban and rural areas were randomly selected and thirty (30) pupils were randomly selected from each school. In using the student class register, the 5<sup>th</sup> name from each grade (such grade as primary one, primary two and primary three) were selected because within these class groups the children aged 6-9 years are found in large number. As such ten (10) pupils were selected randomly from each class from the class registers making a total of ninety (90) pupils each from urban and rural areas, and a total of one hundred and eighty (180) sampled children. This was done in such a manner to give each pupil equal opportunity to be selected.

#### **4. Data Collection**

In the course of this study, the following instruments were used for data collection.

##### ❖ **Questionnaire**

A pretested and Structured questionnaire was designed to collect information on the anthropometric parameters of both the parents and their children, family background, socio-economic status of parent's, nutritional knowledge of the parent's as well as the children's lifestyle.

##### ❖ **Anthropometry**

The anthropometric measurement was carried out using weighing scale and height meter, to measure body weight and height respectively. Body Mass Index was calculated using the ratio of weight in kilogram against the height in meter squared

##### ❖ **Weight Measurement**

The weights of children and their parents were measured using a bathroom weighing scale (HANA Model), and the subjects were made to wear minimum light cloths and without shoes on them, reading was taken to the nearest 0.1kg.

##### ❖ **Height Measurement**

The heights were also measured while the subjects were barefooted, standing upright and erect, with the feet parallel and heels, buttocks, shoulders and back of the head upright, the head being held comfortably erect with both hands hanging by the side. Readings were taken to the nearest 0.01m, using a standard calibrated vertical meter rule.

BMI was calculated by dividing weight of the subjects (kg) by the square of their height (m<sup>2</sup>).

##### **Parents Questionnaire**

This section of the questionnaire was used to obtain information on the anthropometric parameters (weight in kilograms, height in meters and BMI in meter squared) and Socio-demographic data of the parents among which are; household income, average income spent on food, marital status, level of education qualification, occupation, and some nutritional questions to test their nutritional knowledge.

Nutritional Knowledge was accessed by asking the parents five nutritional questions and was classified as follows: 5 correct answers - excellent nutritional knowledge

4 correct answers - fair nutritional knowledge. 3 correct answers - good nutritional knowledge

≤ 2 correct answers poor nutritional knowledge

#### **5. Data Analysis**

The data were collected, compiled and presented using descriptive statistics such as; frequency and percentages, mean ± standard deviation, and analysis was carried-out by the use of scientific statistical calculator (Casio fx-991MS model). Z-score test was used to show Significance differences among the parameters. Childhood obesity was classified using The World Health Organization (WHO) Specific BMI-for-age for sex growth chart<sup>9</sup> and categorized as Underweight, Normal, Overweight and Obesity.

#### **6. Results and Discussion**

The study shows that a good number of rural children 24.4% and 21.1% were underweight for boys and girls respectively higher than 8.9% and 12.2% of urban underweight boys and girls children respectively. Overweight prevalence was higher in the urban (32.2%) than in the rural (11.2%) children, there was no prevalence (0.0%) of obesity in the rural children, however, the urban children recorded high prevalence (15.6%) for both sexes (table 2). This is in agreement with the study conducted by Unnithan and Syamakumari<sup>10</sup> which showed a higher prevalence of overweight and obesity among urban children and a higher prevalence of underweight and severe underweight among rural children. Mean BMI showed no significance difference ( $p > 0.05$ ) between rural and urban children in both sexes (table 4).

Socio economic status of the parents such as education background, economic status and other factors greatly contribute to and also have direct effect of dietary habit of children. The level of education and nutrition awareness of the parents in this study has a strong correlation with nutritional status of their children (table 5), 48.3% underweight children were from parents with poor nutritional knowledge and 50.0% were obese compare with parents of excellent nutritional status in which 10.0% were underweight and none were obese. Abidoye<sup>11</sup> reported that correlation exist between educational level of the parents and feeding habit of their wards. It has been also detected that there is possible impact of women's education in the less developed countries over the last 50 years is complicated by the fact that it is usually associated with other socio economic advantages, this finding also proved that education change the ways mother act in response to their children health<sup>12</sup>.

Economic status is another elegant factor, the study revealed that the respondents from parents of low income status has a highest percentage of underweight 56.7%, and none of the children from this class was obese whereas 57.1% of children from high economic status were obese and 3.3% were underweight (table 6). Majority (42.9%) of obese respondents visited fast food eateries at least three times in a week (table 8), this is in agreement with the study done by Jeffrey et al.,<sup>13</sup>, where they found a significant positive association between BMI and frequency of reported eating at 'fast food' restaurants. Osibogun<sup>14</sup> also confirmed that most mal-nourished children live in the developing nation and vast majority of them are rural dwellers. Laitan<sup>15</sup> reported that worldwide, an estimated 925 million people were undernourished and 835.2 million living in developing countries. Michael<sup>16</sup> also found that growth differences among groups are related to nutritional status, socio economic and other factors.

Obesity in children is often influenced by genetic factor. There was direct proportional relationship between family history of obesity and childhood obesity prevalence (table 7). This is supported by Wardlaw and Smith<sup>17</sup> that a child with no obese parents has only a 10% chance of becoming obese, one with an obese parent has 40% risk and one with both parents obese has 80% risk of getting obese. Thus, in trying to explain this relationship between genetics and childhood obesity, they obtained a perfect positive correlation ( $r=1$ ) between these two variables.

## 7. Conclusion and Recommendations

Factors such as parents' level of Nutritional Knowledge, parents' socio-economic status, and frequency of fast food patronage by the children showed strong relationship with obesity prevalence among the children. The result of the study exposed the fact that the percentage of overweight and obese children are growing in Osun State also like some other states of Nigeria and other parts of the world. In urban areas obesity and overweight predominated with higher prevalence than underweight in both boys and girls. In rural areas also obesity was not recorded, however, overweight was seen although underweight children are still prominent. Interestingly, there was no record of obesity among the rural children, however, there was a high prevalence rate of overweight, which suggests that in the future, these overweight rural children could become obese if appropriate measures and precautions are not taken. There was a strong genetic relationship of childhood obesity as children whose both parents were obese had the highest obesity prevalence.

The findings of this study therefore calls for immediate action in both rural and urban areas to reduce the incidence of malnutrition (double-burden) through appropriate nutritional intervention programmes involving school children, their parents and school authorities. There is also a need for a national nutrition survey to be conducted in all the 36 states and the Federal Capital Territory, to assess the prevalence of childhood overweight and obesity in the nation and also to ascertain the state with the highest prevalence rate for better national policy making. If immediate measures are not taken the condition can result to serious health problems beyond control. The present school feeding programme of the present administration should be designed in such a manner that Nutritionists are fully involved.

**Table I: AGE AND SEX DISTRIBUTION OF THE CHILDREN**

		Urban		Rural	
Male	Female	Male	Female	Male	Female

<b>Age(years)</b>	<b>freq.(%)</b>	<b>freq.(%)</b>	<b>freq. (%)</b>	<b>freq. (%)</b>
<b>6</b>	8(22.2)	11(20.4)	9(18.4)	13(31.7)
<b>7</b>	10(27.8)	15(27.8)	6(12.2)	9(22.0)
<b>8</b>	9(25.0)	13(24.1)	12 (24.5)	15(36.5)
<b>9</b>	9(25.0)	15(27.8)	22(44.9)	4(9.8)
<b>TOTAL</b>	<b>36.0(100)</b>	<b>54.0(100)</b>	<b>49.0(100)</b>	<b>41(100)</b>

**TABLE 2: CLASSIFICATION OF CHILDHOOD OBESITY**

<i>Classification</i>	<i>URBAN</i>		<i>RURAL</i>	
	<i>FREQUENCY</i>	<i>%</i>	<i>FREQUENCY</i>	<i>%</i>
<i>Under weight (boys)</i>	8	8.9	22	24.4
<i>Under Weight (girls)</i>	11	12.2	19	21.1
<i>Normal (Boys)</i>	10	11.1	19	21.1
<i>Normal (Girls)</i>	18	20.0	20	22.2
<i>Overweight (Boys)</i>	13	14.4	8	9.0
<i>Over weight (Girls)</i>	16	17.8	2	2.2
<i>Obese (boys)</i>	5	5.6	0	0.0
<i>Obese (girls)</i>	9	10.0	0	0.0

Source: CENTRE FOR DISEASE CONTROL (CDC) GROWT H CHART (2007)

**TABLE 3: Anthropometric measurement of the children**

	<i>Urban</i>		<i>Rural</i>	
	<i>Boys</i> <i>X± SD</i>	<i>Girls</i> <i>X± SD</i>	<i>Boys</i> <i>X± SD</i>	<i>Girls</i> <i>X± SD</i>
<i>Weight</i>	23.9±5.8	25.7±4.6	23.68±2.78	22.41±3.43
<i>Height</i>	1.18±0.10	1.20±0.08	1.24±0.06	1.19±0.15
<i>BMI</i>	17.16±2.28	17.85±2.49	15.40±1.49	15.83±1.49

**Table 4: MEAN ANTHROPOMETRIC PARAMETERS OF THE SUBJECTS IN RELATION TO Z-SCORE**

<u>Anthropometric Parameter</u>	<u>Urban</u>	<u>Rural</u>	<u>Z-score</u>	<u>Critical value</u>
<b>Weight(kg)</b>	24.80±5.20	23.05±3.11	2.74	±1.96 <sup>x</sup>
<b>Height(m)</b>	1.19±0.09	1.22±0.11	-0.19	±1.96 <sup>x</sup>
<b>BMI(kg/m<sup>2</sup>)</b>	17.44±2.39	15.45±1.49	6.70	±1.96 <sup>x</sup>

Key: Superscript 'x' shows significant difference(p<0.05)

**Table 5: PARENTS LEVEL OF NUTRITIONAL KNOWLEDGE IN RELATION TO CHILDHOOD OBESITY**

<b>Nutritional Knowledge:</b>	<b>Underweight</b>	<b>Normal</b>	<b>Overweight</b>	<b>Obese</b>
	<b>Freq. (%)</b>	<b>Freq. (%)</b>	<b>Freq. (%)</b>	<b>Freq. (%)</b>
<b>POOR</b>	29(48.3)	9(13.4)	2(5.1)	7(50.0)
<b>FAIR</b>	16(26.7)	12(18.0)	11(28.2)	2(14.3)
<b>GOOD</b>	9(15.0)	35(52.2)	20(51.3)	5(35.7)
<b>EXCELLENT</b>	6(10.0)	11(16.4)	6(15.0)	0(0.0)
<b>TOTAL</b>	<b>60(100)</b>	<b>67(100)</b>	<b>39(100)</b>	<b>14(100)</b>

**Table 6: PARENTS ECONOMIC STATUS IN RELATION TO CHILDHOOD OBESITY**

<b>Underweight</b>	<b>Normal</b>	<b>Overweight</b>	<b>Obese</b>
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<b>Average monthly income:</b>	Freq. (%)	Freq. (%)	Freq. (%)	Freq. (%)
<b>Poor</b>	34(56.7)	10(14.9)	2(5.1)	0(0.0)
<b>Average</b>	17(28.3)	19(28.4)	10(25.6)	1(7.1)
<b>Rich</b>	7(11.7)	35(52.2)	20(51.3)	5(35.7)
<b>Super-rich</b>	2(3.3)	3(4.5)	7(18.0)	8(57.1)
<b>TOTAL</b>	<b>60(100)</b>	<b>67(100)</b>	<b>39(100)</b>	<b>14(100)</b>

**Table 7: ASSOCIATION BETWEEN PARENTS OBESITY PREVALENCE AND CHILDHOOD OBESITY:**

<b>Underweight</b>	<b>Normal</b>	<b>Overweight</b>	<b>Obese</b>
Freq.(%)	freq.(%)	freq.(%)	freq.(%)
<b>Both Parents lean:</b>	35(58.3)	21(31.3)	3(7.7) 1(7.1)
<b>1 lean, 1 obese parent:</b>	17(28.3)	38(56.7)	16(41.0) 4(28.6)
<b>Both parents obese:</b>	8(13.3)	8(11.9)	20(51.3) 9(64.3)
<b>TOTAL</b>	<b>60(100)</b>	<b>67(100)</b>	<b>39(100) 14(100)</b>

**Table 8: FREQUENCY OF VISIT TO FAST FOOD EATRIES IN RELATION TO CHILDHOOD OBESITY**

<b>Underweight</b>	<b>Normal</b>	<b>Overweight</b>	<b>Obese</b>
Freq.(%)	freq.(%)	freq.(%)	freq.(%)
≥3 times in a week	7(11.7)	16(23.9)	19(48.7) 6(42.9)
Once in a week	0(0.0)	0(0.0)	2(5.1) 2(14.3)
Occasionally	3(5.0)	11(16.4)	5(12.8) 5(35.7)
Feast Period	2(3.3)	2(3.0)	0(0.0) 1(7.1)
None	48(80.0)	38(56.7)	13(33.3) 0(0.0)
<b>TOTAL</b>	<b>60(100)</b>	<b>67(100)</b>	<b>39(100) 14(100)</b>

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