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Prevalence of Childhood Overweight and Obesity in Enugu State Nigeria

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Abstract. ***Objectives;*** *The prevalence of childhood obesity is increasing in several traditional population especially in developing countries. This is not only of social concern but also of public health concern. The study assessed the prevalence of overweight and obesity in school children (6 -12 years), living in rural and urban communities of Enugu State, Nigeria.*

Methods: *A multistage stratified random sampling technique was used in selecting 10 schools and 2,000 children used for the study. One thousand subjects each were selected randomly from the urban and rural schools, respectively. This was done by picking two hundred subjects comprising of boys and girls within the ages 6-12 years from each of the ten schools, by way of balloting without replacement. Anthropometric measurements of weight, height and triceps were done in both the urban and rural schools, respectively. Statistical Package for Social Sciences (SPSS) version 15 was used to analyze the data. Information from the questionnaires, were analyzed using frequencies and percentages and categorized using World Health Organization (WHO) anthrooftware. Comparison was done using chi square test for categorized variables while ANOVA was used to analyze continuous variables.*

Result*: Anthropometric result showed that prevalence of childhood overweight and obesity in Enugu State was 10.3% and 6.0% respectively. The urban children had the highest obesity prevalence of 9.2% and the rural counterparts had 2.9%. Obesity was more among the male children (4.6%) than in the females (1.5%) and overweight was more among the male children (6.25%) in relation to the females (4.0%). The children who occupy the first position in the family had the highest prevalence of overweight (42.0%). Children whose parents monthly income was N46,000 and above, showed higher prevalence of overweight and obesity (31.2% and 22.3%) in relation to those whose parents monthly income was less than N7,500 (8.9% overweight and 13.2% obese) respectively.*

Conclusion*: The study showed prevalence of childhood overweight and obesity in both the rural and urban communities of Enugu State, Nigeria but higher prevalence in the urban areas.*

Keywords: *Prevalence, Childhood obesity, Anthropometry, Body mass index (BMI)*

1. INTRODUCTION

Clinical evidence of obesity can be dated as far back as Greece Roman times but little scientific progress was made towards understanding the condition until the 20th century [1].

Obesity, an accumulation of excess fat in the adipose tissue, is currently an escalating epidemic that affects many countries in the world including United States of America [2].It is not only affecting the adults but also the younger generation

Obesity in both adult and children is considered a disease and one of the key risk factors for many chronic non-communicable diseases such as. Type-2 diabetes mellitus,high blood pressure, heart disease and some cancers.

This condition is responsible for over 300,000 deaths, recorded annually in the developed world [3]and it is attributed to drastic changes in lifestyle, dietary habits, physical activity, social and economic evolvement associated with the occurrence of obesity.[4].

Children hardly engage in house chores and any strenuous activity that could burn off the accumulated fat. The glaring rise in childhood obesity forced the World Health Organisation (WHO) to include childhood obesity on the list of essential health problems worldwide, and proposed it as the most frequent cause of preventable deaths, after smoking [5]. The most important long term consequence is their persistence into adulthood, with all the associated health risks [6]. The rapid increase in childhood obesity predicts the future health consequences.

The detrimental health consequences of obesity are influenced to a greater extent by body weight, the location of body fat, the magnitude of weight gain during childhood and a sedentary lifestyle. Dyslipidemia, (Elevation of plasma cholesterol) hypertension and insulin resistance are frequently present in obese children [7] and dyshpidaemia appears to be related to increased abdominal fat distribution [8]. Caprio ad co-workers [9] suggest that insulin resistance in children may also be associated with abdominal obesity.

In Africa, initially obesity was not regarded as a health problem in view of the fact that the etiology of obesity revolves around overeating and most Africa nations are poverty stricken and cannot feed their citizens. There is alsolack of awareness in the society about the existence of childhood obesityand the health risks associated with overweight and obesity. Some major reasons for childhood obesity according to the [10]are:

1.Poor eating habits, especially when children are exposed to other children who promote sedentary behaviours.

2. Socio-economic stress and genetics

3. When a child has genetically obese background, the chances of becoming obese are greatly increased.

In Nigeria, like in most developing countries of Africa, the emphasis has been on under nutrition and food security rather than overweight, since obesity is viewed as a disease of affluence, but recent studies has proved otherwise. [11]. Childhood obesity is a serious medical condition that affects children and adolescents. It occurs when a child is well above the normal weight for his or her age and height.

2. MATERIALS AND METHODS

STUDY DESIGN;

The study used a cross sectional descriptive comparative design.

STUDY AREA; The study area is Enugu South Local Government Area (LGA) in Enugu State. Enugu South LGA is made up of Akwuke, Amechi, Ugwuaji, Obeagu and Uwani. Its headquarter is in the town of Uwani. It has an area of 67km^2 and a population of 198,723 at the 2006 census,

SAMPLING PROCEDURE;

The population of the study consisted of children 6-12 years from different ethnic groups and socio-economic background in private and government primary schools in Enugu State. There were a total of 54 schools (government and private) in Enugu South. A total number of 13,981 pupils were enrolled in them. Enugu State Census, [2009-2010]

A sample size of 2000 used was obtained from the formula below;

$$N = \frac{Z^2 P (1-P)}{D^2},$$ according to [13]

Where N = Sample size

Z = Statistics for a level of confidence (99.9 times, you are sure of your result)

For this work,

Z value is 3.29 for a confidence level of 99.9%

P = Expected prevalence of childhood obesity in Africa taken to be 13% [14]

D = Precision level (in this work, D = (0.025)

$$N = \frac{(3.29)^2 (0.13) (1- 0.13)}{(0.025)^2}$$

N = 1958.73

N = 2000 approximately

DATA COLLECTION

A letter of identification and introduction was obtained from the Head of the Department of Home Science, Nutrition and Dietetics of the University of Nigeria, Nsukka, Nigeria.Preliminary visits were made to the Headmistresses and the Headmasters of the sampled schools. The aim and the procedure of the study were made known to them. Their written consent and cooperation were obtained including that of the teachers. For questionnaire administration and verbal informed consent of the parents was sought and obtained.

Six research assistants comprising of four adult males and two adult females were trained by the researcher. The training was on the purpose and techniques of the survey. They were educated on how to record and do some basic calculations. They were taught how to use weighing scales for anthropometric measurements. This was demonstrated and pre-tested for 2 days.

Two rural towns were randomly selected by balloting without replacement and Uwani was used for the urban town in this study. The rural towns selected were Amechi and Ugwuaji that have a total of 18 primary schools comprising of ten (10) private and eight (8) public schools. The urban town (Uwani) has 23

primary schools made up of fifteen (15) private and eight (8) public schools.(Enugu State school census report, 2009-2010).

The second stage involved the compilation of all the 41 schools in the sampled urban and rural towns, respectively. A simple random sampling technique was used in the selection of 10 schools used for this study by way of balloting without replacement, the schools were comprised of 5 schools from the urban and 5 from the rural area respectively. The selection of 10 schools was done to have equal representation of the urban and the rural schools.

The third stage was identification and determination of the numerical strength of children aged 6 - 12 years in each of the schools. The distribution of these pupils by age and sex were obtained from class registers. List of the subjects aged 6 – 12 years in all the classes of the schools was compiled and a total number of 200 subjects were randomly selected by way of balloting without replacement. This action was repeated in all the 10 schools sampled in this study and that sums up to the 2000 subjects representing the sample size used for this study. Every school had equal representation of 200 subjects.

Questionnaire:

Two thousand validated and pretested questionnaires were used to gather information on the personal data, household/demographic information, family background, socio-economic status of parents, monthly income range, physical activity pattern of the children, nutritional knowledge of parents and family food habit.

The questionnaire was validated by lecturers in the Department of Home Science, Nutrition and Dietetics of the University of Nigeria, Nsukka, Nigeria. It was pretested on similar subjects other than the ones used for the study to ensure reliability.

ANTHROPOMETRIC MEASUREMENTS

Age and gender determination; The dates of birth as well as gender were obtained from the teachers' records.

Weight determination; The body weight of the children was determined using Salter Scale (CMS weight limited, London), graduated in kilograms up to 100kg. The children were weighed in light clothing with no shoes or other heavy items. They were asked to stand erect on the scale without touching or leaning on anything. Both arms were at the sides. The weight was recorded to the nearest 0.1kg.

Height determination; The children were measured using a microtoise height measure as recommended by [15] The children were asked to remove their shoes and stand erect on the flat surface by the scale, with the feet parallel to each other and pointing forward. The heels, buttocks, shoulders and back of the head were upright and against the wall. The head was held comfortably erect with the eye straight. The arms hung loosely at the sides and the headpiece of the measuring device was gently lowered, crushing the hair and making contact with the head. The length was recorded to the nearest 0.1cm.

Triceps skin fold measurement; The skin fold thickness of the children was measured using the Harpenden skin fold calipers [16]. Measurements were made at the triceps of each child, by making a vertical pinch halfway between the shoulder and the elbow. It was measured 3 times and the mean was recorded. The readings were taken tothe nearest 0.1cm.

Body Mass Index (BMI) calculation and classification in children; The body mass index of the children was calculated using the formula,

$$\frac{\text{Weight (kg)}}{\text{Height}(m^{2})}$$

And the classification was done using SPSS version 15, growth reference (5 – 19years),

BMI for age classification.

Cut offs is as follows; Severe thinness (< -3SD of the median value of the reference population), thinness (<-2SD of the median value of the reference population), normal (>-2SD and <2SD of the median value of the reference population), Overweight (>+1SD of the median value of the reference population) and Obesity (>+2SD of the median value of the reference population)

DATA ANALYSIS

The administered questionnaires were gathered and checked for completeness, accuracy and consistency. A database was created using statistical package for the social sciences (SPSS) version 15. The data was entered and corrections were made where necessary. Descriptive statistics: frequencies and percentages, means and standard deviation were used to present the data. Comparison was done using Chi-Square test for categorized variables. Analysis of variance (ANOVA), regression analysis and t-test were used for continuous variables. Significance was judged at ($P < 0.05$)

3. RESULTS

Table1 shows the Body Mass Index for age (BMI-for-age) of the respondents. Majority (82.0%) of the respondents had normal BMI- for-age, 10.3% were overweight, 6.0% were obese, 1.3% were thin and 0.4% were severely thin. Prevalence of overweight and obesity was higher among the urban children (15.3% and 9.2%) than the rural children (5.2% and 2.9).

Table 1: *Body Mass Index For Age Of Respondents*

BMI-for-age	Urban F %	Rural F %	Total F %
Severe thinness (<-3SD)	2 0.2	5 0.5	7 0.4
Thinness (<-2SD)	6 0.6	20 2.0	26 1.3
Normal (-2SD to +2SD)	747 74.7	894 89.4	1641 82.0
Overweight (>+1SD (equivalent to BMI 25kg/m² at 19 years)	153 15.3	52 5.2	205 10.3
Obesity (>+2SD (equivalent to BMI 30kg/m² at 30 years)	92 9.2	29 2.9	121 6.0
Total	1000 100.0	1000 100.0	2000 100.0

F ; frequency

% ; percentage

Table 2 shows the prevalence of overweight and obesity by sex and location. More than half (71.2%) of the males in the urban had normal BMI, 15.5% of them were overweight, 12.6% were obese while 0.7% were thin. For the females, about 79.5% of the females in the urban were normal, 15.0% were overweight, 4.5% were obese while 0.5% each was thin and severely thin respectively. In the rural area, majority (88.9%) of the males had normal BMI, 6.0% were overweight, 3.2% were obese, 1.4% were thin while 0.5% were severely thin. Majority (90.0%) of the females had normal BMI, 4.1% were overweight, 2.9% and 2.4% were obese and thin respectively while 0.5% were severely thin.

Table 2; *Prevalence of overweight and obesity by sex and location*

	Urban Male F (%)	Female F (%)	Total F (%)	Rural Male F (%)	Female F (%)	Total F (%)
Severe thinness	-	2(0.5)	2(0.2)	3(0.5)	2(0.5)	5(0.5)
Thinness	4(0.7)	2(0.5)	6(0.6)	8(1.4)	12(2.9)	20(2.0)
Normal	413(71.2)	334(79.5)	747(74.7)	521(88.9)	373(90.0)	894(89.4)
Overweight	90(15.5)	63(15.0)	153 (15.3)	35(6.0)	17(4.1)	52(5.2)
Obese	73(12.6)	19(4.5)	92(9.2)	19(3.2)	10(2.4)	29(2.9)
Total	580(100.0)	420(100.0)	1000(100.0)	586(100.0)	414(100.0)	1000(100.0)

F ; frequency
% ; percentage

Table 3 shows the prevalence of overweight and obesity by the income of respondents' parents. Most of the children who were overweight and obese (31.2% and 22.3%) had parents whose monthly income were N46,000 and above and from the urban schools. Those children whose parents' monthly income was less than N7,500 were 8.9% overweight and 13.2% obese. Prevalence of obesity was highest (26.5%) among children who gave no response. Similarly, overweight was highest among the urban schools than in the rural schools, (59.5% vs 40.5%) respectively. There were higher number (26.4%) of obese children among those in the urban schools whose parents receive N46,000 and above than their rural counterparts (11.8%).

Table 3: Prevalence of overweight and obesity by the income of respondents' parents.

Income	Overweight Urban F. %	Rural F. %	Total F. %	Obesity Urban F. %	Rural F. %	Total F. %
Less than 7,500	10 8.2	8 9.6	18 8.9	11 12.6	5 14.7	16 13.2
7,500-19,999	21 17.2	10 12.0	31 15.1	19 22.0	4 11.8	23 19.0
20,000-45,999	18 14.8	20 24.0	38 18.5	11 12.6	12 35.3	23 19.0
46,000-above	41 33.6	23 28.0	64 31.2	23 26.4	4 11.8	27 22.3
No response	32 26.2	22 26.5	54 26.3	23 26.4	9 26.5	32 26.5
Total	**122 100.0**	**83 100.0**	**205 100.0**	**87 100.0**	**34 100.0**	**121 100**

X^2 = 25.895, df =9, p= 0.210
F ; frequency
% ; percentage

Table 4 shows the prevalence of overweight and obesity by the position of child in the family. The children who occupy the first position in the family from the urban schools were 47.0% overweight and 30.6% obese. Also, those children that occupied the 5th to the last position in the family from the urban schools were 27.4% overweight and 38.9% obese while their rural counterparts were 38.0% overweight and 28.6% obese. Prevalence of overweight and obesity were more among the first (41.9% and 28.9%) and the last(32.2% and 34.7%) children in the family.

Table 4. *Prevalence of overweight and obesity by the position of child in the family*

Position of child	Overweight Urban F. %	Rural F. %	Total F. %	Obesity Urban F. %	Rural F. %	Total F. %
1st	53 47.0	33 36.0	86 41.9	22 30.6	13 26.5	35 28.9
2nd	4 3.5	8 8.7	12 5.9	6 8.3	4 8.2	10 8.3
3rd	5 4.4	4 4.3	9 4.4	7 9.7	5 10.2	12 9.9
4th	20 17.7	12 13.0	32 15.6	9 12.5	13 26.5	22 18.2
5th to last	31 27.4	35 38.0	66 32.2	28 38.9	14 28.6	42 34.7
Total	**113 100.0**	**92 100.0**	**205 100.0**	**72 100.0**	**49 100.0**	**121 100.0**

X^2 = 40.0005, df =9, p= 0.066

F ; frequency

% ; percentage

4. DISCUSSION

The anthropometric indicators were significantly higher (P<0.05) for children in the urban than in the rural. The children from the urban communities had significantly higher (P< 0.5) mean weight (35.82kg),

height (139.09cm), skin fold thickness (7.26cm) and BMI (18.22kg/m^2) than the rural children who had (30.17kg,) (134.92cm,) (3.77cm) and (16.44kg/m^2) respectively.This implies that neighborhood and residential area could influence overweight and obesity. This study suggested that maternal monthly income of (<N7, 500) was negatively related to childhood obesity. This was evidenced in the cross tabulation of mothers monthly income and the obesity/overweight prevalence. Luxurious lifestyle and rich food consumption could have contributed to childhood obesity and could as well be well managed by the parents.A good number of the urban boys (44.8%) were recorded to be obese in this study compared to their rural counterparts who recorded 35.2%. The mean weight (33.42kg) and height (137.62km) of male children were significantly higher (P <0.05) than that of the females. However, there was no significant difference (P< 0>05) in the BMI and triceps skin fold thickness of the male and female children.

The greater percentage of the respondents that were either first (30.5%) or last (31.0%) child in the family observed in this study suggest that most first and last children receive a lot of care from parents and caregiver. This characteristics is an essential determinant of care giver to a child. The greater prevalence of overweight (42.0%) and obesity (28.9) among the first child and among the last child (32.2% and 34.7%) showed that much care is often given to the first or last child while only male or female child is considered a great treasure. This supports the findings of [16] that parents influence obesity in children by remodeling their eating habit through undue pampering of their male or only child, which reflects in extra poundage in the child.

5. CONCLUSION

Childhood overweight and Obesity is prevalent in the urban communities of Enugu state. Location was a contributory factor in determining childhood obesity. The result of the study calls for a serious modification of lifestyle for the urban and improved dietary habit for both urban and rural children. Urban influence should be addressed to reduce obesity.

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