Comparative Study of Anthropometric Status of Children Aged 6-12 Years Attending Public and Private Schools in Umuahia North Local Government Area of Abia State.

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ABSTRACT

Background*: The determination of the nutritional status of children is important to the growth of a nation, hence nutritionists focus on childhood nutrition.*

Objective: *This study was conducted to determine the anthropometric status of children aged 6-12years and compare between children attending public and private schools in Umuahia North Local Government Area, Abia State.*

Materials and Methods: *A cross sectional comparative study was conducted among 356 children who were randomly selected from four public schools and four private schools in Umuahia North Local Goverment Area, Abia State using a validated questionnare. Descriptive statistics was used to sort the anthropometric characteristics and WHO anthropometry software was used for evaluation.*

Results: *Equal percentage (1.7%) of children had stunting in both public and private schools. Wasting was higher in private school (9.6%) than in public schools (5.1%). Overweight/obese was seen to be significantly higher (p=0.0006) in private schools than in public schools. The p value for BMI for age showed a significant association (p=0.002) with the age of the children in public schools.*

Conclusion*: There is no significant difference in stunting, wasting and underweight in children attending public or private schools.*

Keywords: Anthropometric status, aged 6-12years, public and private school

INTRODUCTION

Nutritionists have dedicated many years to child malnutrition and other related challenges of feeding the growing world particularly on feeding the children (1). World Health Organization in recent write-ups have shown the importance in handling the new problem of obesity and the non-communicable diseases that comes with obesity while still being aware of the non-ending problem of childhood malnutrition (1). Deficiency in macro and micronutrients has been the major problem among children in low-income countries for many years (2, 3, 4). Nevertheless, owing to progressive urbanization, economic growth and the associated changes in lifestyle, the energy balance is shifting (5).

Childhood overweight and obesity is becoming equally challenging, yet an unrecognized problem in many emerging countries (2, 6, 7, 8). Childhood overweight/obesity was previously a health problem for developed countries because of their high calorie foods, labor-saving devices and dwindling levels of physical activity, but it is now spreading to developing countries. These under developed countries are now reporting

unprecedented levels of childhood obesity with substantially rising trends every year (9). The problem of obesity exists alongside the problem of undernutrition in many developing countries which creates a double burden of nutrition-related ill health among children (10, 11) and this has been referred to as the "double burden of malnutrition (DBM) (12). Fatter children are more predisposed to becoming overweight or obese adults in spite of the findings that the correlation between body mass index (BMI) assessed at an age younger than 18 years and adult values is often only mild or moderate. There is a call for the surveillance of trends of the major risk factors for the double burden of mal-nutrition such as stunting, underweight, obesity, dietary patterns etc (13, 14, 15). Although several genetic factors have been associated with obesity and its comorbidities, environmental factors, have also been proposed as important determinants of obesity (16, 17). According to UNICEF (18), Nigeria is facing a problem of child malnutrition and ranks second behind India among all countries with the highest number of malnutrition cases. More than 19 percent of Nigerian children are underweight and when disaggregated by geo-political zones, the Northwest had the highest prevalence. Results from a survey conducted by WHO/UNICEF (19), showed that Nigeria has a stunting prevalence of 32 percent among children less than 5 years of age; while about 21 percent and 9 percent are underweight and wasted respectively. Overall, prevalence of malnutrition in the North West and East regions are higher than in the South (20). Nigeria's rates of severe wasting are among the highest in the world at 1.9 million children each year (20). The factors associated with these patterns of weight status among the school-age children included socio-demographic and socioeconomic factors, feeding patterns and activity patterns (20). The aim of this paper was to add to the already existing literature by comparing the anthropometric status of children aged 6-12year who are attending public and private school in Umuahia-North Local Government Area. Specifically, this study

- Determined the anthropometric status of children aged 6 to 12years.
- Compared the anthropometric status of children in public with those who are in private schools.
- Compared the prevalence of malnutrition (underweight, overweight, stunting, wasting and obesity) between males and females in both public and private schools.
- Compared the prevalence of malnutrition between age group

MATERIALS AND METHODS

AREA OF STUDY

This study was conducted in Umuahia North Local Government Area, Abia State, Nigeria. It is situated at southeastern part of Nigeria and is populated by business, academic and government workers. The Local Government area is one of the seventeen (17) Local Government Areas in Abia State. It has an area of 245 km^2 and a population of 220,660 at the 2006 census (21). It is made up of eleven wards, thirty-nine villages and ten autonomous communities, the communities includes. Christianity is the dominating religion being practiced by the inhabitants in umuahia north.

STUDY DESIGN

A cross sectional design was employed in this study.

STUDY POPULATION

The study population consists of children aged 6-12 years attending primary schools in Umuahia North Local Government Area.

SAMPLE SIZE AND SAMPLE SIZE DETERMINATION

The sample size (N) was determined using the formular:

$$N = \frac{Z^2 \times P\,(100-P)}{X^2}$$

Where N = sample size

Z = acceptable margin of error (1.96)

P= percentage of Nigerian children that are malnourished. P will be taken to be 32.9% as reported by WHO/UNICEF (2014) to be prevalence of malnutrition.

100 – P = percentage number of children not malnourished.

X = width of confidence interval or required precision level (5%)

$$N = \frac{1.96^2 \quad 32.9\ (100 - 32.9)}{5^2}$$

$$N = \frac{3.84 \times\times 32.9\ (100 - 32.9)}{5^2}$$

$$N = \frac{3.84 \times\times 32.9\ (67.1)}{25}$$

$$N = \frac{8477.1456}{25}$$

$$N = 339.1$$

This gave the sample size of 339.1, approximately 339. This figure was made up to 356 (5% of 339) to account for defaulters.

SAMPLING TECHNIQUE

A list of the primary schools in Umuahia North was obtained from the Umuahia Primary Education Board. The names of the private and public schools were written in different pieces of papers and folded into two containers (one for private schools while the other for public schools). Eight primary schools (4 public and 4 private primary schools) were selected by systematic random sampling by balloting without replacement. The main sample was selected using a multi-stage cluster random sampling technique. The first stage to identify and determine the numerical strength of children aged 6-12 years in each of the schools. The distribution of these pupils by age and sex was obtained from class registers. The second stage was calculating the sample size by simple proportion, percentage of the children (6-12 years) to obtain the study sample per school. This was done according to their ages and sexes. The third stage was the actual selection of the respondents according to their ages in their different classes. This was done using simple random sampling technique by balloting without replacement.

ETHICAL CLEARANCE AND INFORMED CONSENT

Ethical clearance and informed consent was obtained for this study from the principals of the selected schools. The nature, purpose and procedure of the study were explained to the participants in detail.

DATA COLLECTION

A structured and validated questionnaire was used to obtain information from the students. The questionnaire was divided into sections. Each questionnaire was numbered and section A was basically on child and parental data of the child e.g. age, sex, socio demographic status, etc. Section B was basically for anthropometric data.

Anthropometric measurements were conducted appropriately. Height was measured to the nearest 0.1cm with a portable stadiometer constructed with an upright wooden bar and non stretchable tape mounted on it. The base was flat and the upright wooden bar had a movable piece with which to access the child's height. Standing height was measured with subject standing erect, barefooted, heels together and touching the base. The buttocks, the back of the heels and the upper back were in contact with the measuring instrument. Weight was also taken to the nearest 0.1kg using a portable bathroom scale. The portable bathroom scale was placed on a level ground and the children were made to climb the scale standing erect, heels together, in minimal clothing and no shoes.

DATA ANALYSIS

The Anthropometric status was categorized using the WHO (2006) reference standards, z-scores was calculated using the WHO anthropometry software and values were compared with the reference standards to determine the weight status of the respondents. The reference standard were classified as height-for-age z score (1.10 to 1.30), weight-for-age z score (1.00 to 1.20) and weight for height z score (0.85 to 1.10).

STATISTICAL ANALYSIS

Data entry and analysis was done using SPSS version 20 software package. Descriptive

statistics was used to analyze anthropometry characteristics of the respondents Chi square statistics was used to measure association between anthropometric status of children in public and private school. The statistical tests were carried out at significance of probability (p) value less than 0.05.

RESULTS

Table 1 showed the socio-demographic characteristics of primary school children in public and private school studied. Equal number of children (178) participated from both public and private schools respectively. More males (51.1%) participated in the study from public school than females (48.9%), whereas more females (56.7%) than boys (43.3%) participated from the private schools. Generally, more females (52.8%) participated in the study than males (47.2%). Majority (94.4%) and (91.6%) of the children from public and private schools respectively were of Igbo ethnicity. More than half (76.4%) of the children from public school were between the ages 10-12 years while only 23.6% were between 6 - 9 years. In general higher percentages (55.9%) of the children in the study were between the ages of 10-12 years.

Table 2 gives the overall representation of the anthropometric status of all the children according to height for age (stunting), weight for height (wasting), weight for age (underweight) and BMI-for-age (overweight/obesity). The total percentage of stunted children were 1.7%, 7.3% of the respondents were wasted and 3.2% were underweight. The table also indicated that 7.6% of the children had possible risk of overweight, 3.9% was overweight and 0.8% was obese.

Table 3 shows the anthropometric status of the children by school type (public and private school). A greater percent (9.6%) of those wasted were observed to have attended private schools while in public schools, 1.7% of the children are wasted. On the other hand, equal percent (1.7%) of the children were seen to be stunted in both public and private schools. The general prevalence of underweight observed in this study was minimal (2.0%).

Table 1: Social Characteristics of the Children in Public and Private Schools

Variable	Classification	Public Schools Freq (%)	Private Schools Freq (%)	Total Freq (%)
Sex	Male	91(51.1)	77(43.3)	168(47.2)
	Female	87(48.9)	101(56.7)	188(52.8)
	Total	**178(100)**	**178(100)**	**356(100)**
Age (years)	6 – 9	42(23.6)	115(64.6)	157(44.1)
	10 – 12	136(76.4)	63(35.4)	199(55.9)
	Total	**178(100)**	**178(100)**	**356(100)**
Ethnicity	Igbo	168(94.4)	163(91.6)	331(93.3)
	Yoruba	1(0.5)	4(2.2)	5(1.4)
	Hausa	3(1.7)	-	3(0.8)
	Efik	3 (1.7)	7(3.9)	10(2.8)
	Others	3(1.7)	4(2.2)	7(2.0)
	Total	**178(100)**	**178(100)**	**356(100)**
Family Size	1-3	21(11.8)	29(16.3)	50(14.0)
	4-6	73(41.0)	76(42.7)	149(41.9)
	5-7	57(32.0)	52(29.2)	109(30.6)
	Others	27(15.2)	21(11.8)	48(13.4)
	Total	**178100**	**178(100)**	**356(100)**

Table 2: Anthropometric status of the children

Variables	Frequency	Percentage
Height –for- age		
Stunted	6	1.7
Normal	350	98.3
Total	**356**	**100.0**
Weight -for-height		
Wasted	26	7.3
Normal	330	92.7
Total	**356**	**100 .0**
Weight for age		
Underweight	9	3.2
Normal	347	97.5
Total	**356**	**100.0**
BMI-for-age		
Overweight	14	3.9
Obese	3	0.8
Possible risk of overweight	27	7.6
Not overweight	312	87.6
Total	**356**	**100.0**

Table 3: Prevalence of Stunting, Wasting, Underweight and BMI-for-age (Overweight) in Children in Public and Private Schools

Variables	Public	Private	Total	X^2	P-value
Height-for-age					
Stunted	3(1.7)	3(1.7)	6(1.7)	1.000	.000
Normal	175(98.3)	175(98.3)	350(98.3)		
Total	178(**100.0)**	178(**100.0)**	**356(100.0)**		
Weight -for-height					
Wasted	9 (5.1)	17(9.6)	26(7.3)	2.655	. 103
Normal	169 (94.9)	161(90.4)	330(92.7)		
Total	178(**100.0)**	178(**100.0)**	**356(100.0)**		
Weight for age					
Underweight	1 (1.2)	4(2.4)	5(2.0)	.423	0.515
Normal	82 (98.8)	160(97.6)	242(98.0)		
Total	83(**100.0)**	164**(100.0)**	**247(100.0)**		
BMI-for-age					
Overweight	3(1.7)	14(7.9)	17(4.8)	7.475	0.006
Normal	175(98.3)	164(92.1)	339 (95.2)		
Total	178(**100.0)**	178(**100.0)**	**356(100.0)**		

Table 4 shows the anthropometric status of the children in public and private schools by age group. In public school, a greater percentage (2.2%) of those stunted were aged 10-12years, More children from 10-12years were wasted (3.7%) compared to 9.5% of the children 6-9years of age. About 7.1% of the children aged 6-9years were overweight and 2.4% of the children aged 10-12years were underweight. In private school, a greater percentage (13.0%) of the children wasted were aged 6-9years and 7.8% of the children also aged 6-9years were overweight. 4.1% of the children aged 10-12years were underweight The chi-square analysis shows that there was a significant relationship between wasting (P= 0.032) and the age of the children in private school. Also, the analysis showed a significant relationship between BMI-for-age (P= 0.002) and the age of the children in public schools.

The anthropometric status of the children in public and private school by sex were presented on table 5. In public school, none of the male children was stunted when compared with their female counterparts whom 3.4% was stunted. About 3.3% of the male children were underweight while 2.3% of the female children studied were underweight.

In private schools, 9.9% of the females studied were overweight when compared to their male counterparts whom 0.8% were overweight. There was no significant relationship (P > 0.05) between the gender of the children and their anthropometric status.

DISCUSSION

According to the report from National Population Commission (21), the census statistics puts the State population of females (1,451,028) to be higher than that of males (1,430,298) and this is in line with the findings in this study which showed that more than half females (52.6%) participated in this study.

As reported in another study by Eme and Onuoha (22), which was also conducted in Abia State, greater percentage of the respondents surveyed, were between the ages of 10 – 14. This conforms with the findings of this study which showed that 55.9% of respondents were aged between 10-12years. Almost all the respondents (94.4%) were of igbo ethnicity, this could be because the research was carried out in an Igbo dominated State. Rim-Rukeh (23) in another study conducted in Port-Harcourt, reported the size of households to be >6 person just like in this study where about 41.0% and 42.7% of respondents from public and private schools respectively were from a family size of 4-6 persons.

Lower percentage of the children, were observed to be stunted (0.8), wasted (3.3) and also found to be underweight (3.3) in a study conducted in Enugu State among primary school children (23). This is closely related to this study where 1.7% of the respondents were stunted, 7.3% were wasted and 3.2% were underweight. Findings from another study reported a much lower prevalence which gave overweight to be 9.7% (23)

Low height-for-age is the best measure of child health inequalities as it is a multifaceted nutritional indicator which captures various aspects of child health development and environmental influence (25, 26, 27, 28). This study observed equal percent of the children being stunted in both public and private school, also a greater percent of the children were found to be wasted in private schools while few children were found to be wasted in public schools. This findings were in contrast with another study where stunting was recorded as 25.3% in public school and 17.1% in private school (29). This high prevalence of stunting in latter study may be attributed to large sample size, geographical location, foods available, nutrition knowledge, wars, draught, etc.

This study was in agreement with the findings with the works of Fazili *et al*. (30) who reported the lowest prevalence of stunting in children 7 years of age and the highest prevalence among those aged 12 years. This is in contrast with Oguizu (31) where children between 5 – 9years were more

Table 4: Prevalence of Stunting, BMI-for-age, Wasting and Underweight by Age

Variables	6 – 9years	10 – 12years	Total	X^2	P= value
Public	**Freq%**	**Freq %**	**Freq%**		
Height-for-age	-(-)	3(2.2)	3(1.7)	.942	.332
Normal	42(100)	133(97.8)	175(98.3)		
Total	**42(100)**	**136(100)**	**178(100)**		
Weight-for-height	4(9.5)	5(3.7)	9(5.1)	.2.286	.131
Normal	38(90.5)	131(96.3)	169(94.9)		
Total	**42(100)**	**136(100)**	**178(100)**		
Overweight	1(0.8)	-(-)	1(0.8)	9.881	.002
Obesity	-(-)	2(1.1)	2(0.9)		
Normal	39(92.9)	136(100)	175(98.3)		
Total	**42(100)**	**136(100)**	**178(100)**		
Weight-for-age	-(-)	5(3.7)	5(2.8)	1.037	.309
Normal	42(100)	131(96.3)	173(97.2)		
Total	**42(100)**	**136(100)**	**178(100)**		
Private					
Height-for-age	1(0.9)	2(3.2)	3(1.7)	1.305	.253
Normal	114(99.1)	61(96.8)	175(98.3)		
Total	**115(100)**	**63(100)**	**178(100)**		
Weight-for-height	15(13.0)	2(3.2)	17(9.6)	4.589	.032
Normal	100(87.0)	61(96.8)	161(90.4)		
Total	**115(100)**	**63(100)**	**178(100)**		
Overweight	8(2.2)	5(1.4)	13(7.6)	.001	.979.
Obesity	1(0.3)	-(-)	1(0.3)		
Normal	106(92.2)	58(92.1)	164(92.1)		
Total	**115(100)**	**63(100)**	**178(100)**		
Weight-for-age	2(1.7)	2(3.2)	4(2.2)	.792	.373
Normal	113(98.3)	61(96.8)	174(97.8)		
Total	**115(100)**	**63(100)**	**178(100)**		

Table 5: Prevalence of stunting, wasting, underweight and BMI-for-age among males and females in public and private schools.

Variables Public	Male Freq (%)	Female Freq (%)	Total Freq (%)	X^2	P= value
Height-for-age	-(-)	3(3.4)	3(1.7)	3.192	.074
Normal	91(100)	84(96.6)	175(98.3)		
Total	**91(100)**	**87(100)**	**178(100)**		
Weight-for-height	5(5.5)	4(4.6)	9(5.1)	.075	.785
Normal	86(94.5)	83(95.4)	169(94.9)		
Total	**91(100)**	**87(100)**	**178(100)**		
Weight-for-age	3(3.3)	2(2.3)	5(2.8)	.814	.367
Normal	88(96.7)	85(97.7)	173(97.2)		
Total	**91(100)**	**87(100)**	**178(100)**		
Overweight	-(-)	1(1.1)	1(0.8)	.295	.587
Obesity	2(1.1)	-(-)	2(0.9)		
Normal	89(97.8)	86(98.9)	175(98.3)		
Total	**91(100)**	**87(100)**	**178(100)**		
Private					
Height-for-age	2(2.6)	1(1.0)	3(1.7)	.681	.409
Normal	75(97.4)	100(99.0)	175(98.3)		
Total	**77(100)**	**101(100)**	**178(100)**		
Weight-for-height	8(10.4)	9(8.9)	17(9.6)	.111	.789
Normal	69(89.6)	92(91.1)	161(90.4)		
Total	**77(100)**	**101(100)**	**178(100)**		
Weight-for-age	3(3.9)	1(1.0)	4(2.2)	2.060	.151
Normal	74(96.1)	100(99.0)	174(97.8)		
Total	**77(100)**	**101(100)**	**178(100)**		
Overweight	3(8)	10(9.9)	13(7.6)	1.335	.248
Obesity	-(-)	1(0.3)	1(0.3)		
Normal	73(8)	91(90.1)	164(92.1)		
Total	**77(100)**	**101(100)**	**178(100)**		

wasted compared with children between 10 – 12years.

In private school, and this was in line with a study carried by Oguizu (31) which indicates that children between the ages of 10 – 12years were more underweight than children aged 5 – 9years. Studies have also shown that children who are underweight are at a high risk of obesity (32).

The study conducted by Akubugwo *et al.,* (33) reported that rates of stunting seemed to be higher amongst girls. These results were in agreement with the findings of Amuta *et al.*, (34) who reported a higher prevalence rate of under nutrition among girls (57.4%) than boys (44.7%) in school children in Benue state.

In private school, This conforms with Eme and Onuoha (22) who reported 6.7% of females overweight compared to 2.5% for males in another study.

CONCLUSION

This study was able to compare the anthropometric status among children aged 6 to 12years who were attending public and private schools in Umuahia-North Local Government Area of Abia State, Nigeria. The prevalence of stunting in private schools was similar among children in public schools. Prevalence of wasting was lower in public schools while in private schools, it was high. Prevalence of overweight in private schools was much higher when compared to overweight in public schools. Prevalence of underweight in both public and private schools was slightly similar with public school having a higher percentage. Besides that, the female children were the most affected by wasting and overweight than the male children in public schools.

The implication is that children are the most vulnerable members of the society in Nigeria and the nutritional status of these children should be a primary indicator of socioeconomic development.

Acknowledgment

Out of true appreciation, I would like to acknowledge Dr. Umeaku, Ugochukwu and also Mr. Olariwaju Isaac on their undiluted support through financial assistance and continuous directions towards the success of this publication.

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