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Anthropometric Status of School aged children (6-12years) Aguata Local Government Area of Anambra State, Nigeria

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ABSTRACT

Proper nutrition is essential for sustaining optimum well-being. In children, proper nutrition ensures proper growth and physical development, along with enhanced learning capacity. The significance of attaining high standards of nutrition at school age cannot be overstated, as it lays the groundwork for subsequent health and mental vitality throughout life. The present study aimed at ascertaining the nutritional status of pupils in two rural communities of Anambra State in Nigeria. The design for this study was a cross-sectional survey. Random sampling was done within Aguata Local Government Area to select the towns. Then four public primary schools were randomly selected from the two towns. Height in centimeters and weight in kilograms of 604 school children were collected using well-established standard procedures. The nutritional status of the school children was measured using various anthropometric indices: weight-for-height/BMI-for-age, height-for-age, and weight-for-age. Based on the reference standards laid down by the World Health Organization in 2006, the prevalence of stunting, wasting, undernutrition, and overweight among the children was 30.63%, 2.30%, 14.24%, and 0.99%, respectively. There is a need to enhance the nutritional education of parents and caregivers, as well as reform and increase the quality and quantity of food provided by the existing school feeding program in Nigeria and Anambra State, particularly in rural communities.

Keywords: Nutritional status, Stunting, Wasting, Underweight, School children and overweight

INTRODUCTION

Proper nutrition is a basic human right. The nutritional status of every individual is reflected in the quality of life, well-being, and physical development. Childhood, which extends from birth to adolescence, includes the years from infancy to adulthood. Growth and development are terms that are often used together to describe the countless changes that occur during this critical phase of life. Growth is the measurable enlargement of the body's size its size, organs, and tissues which happens as a child approaches adulthood. Childhood growth is assessed by using physical growth [1], and also in terms of health status and nutritional status [2]. While nutrition in adults influences the aging process and how internal organs function, childhood nutrition has a longer-lasting impact, necessitating keen interest in its management. Proper nutrition plays a great role in the health, physical growth, development, and academic performance of school-aged children. For healthy growth and development, school-aged children need to have a good nutritional foundation early in their lives. Good nutrition throughout school age stage is very important because it is the foundation of life time health and mental energy [3]. Care and attention towards good nutrition is very important in school going age children because of effects of malnutrition on them. Malnutrition results in poor development and growth, poor

academic performance, weakness, fatigue, dizziness, low weight and dental caries [1]. Additional consequences of malnutrition have been documented to be childhood morbidity and mortality, impaired physical and mental development, poor school performance, along with reduced adult height and work capacity [4]. Malnutrition is among the most significant underlying factors for death in children in the developing world. It is the cause of 50% of child mortality [3]. Evidence also exists that obesity results in the onset of blood pressure changes among children and teenagers as well [5]. Individuals with excess deposits of abdominal fat tissue are more likely to develop hypertension as well as adult-onset diabetes mellitus, cardiovascular disease, gallstones, arthritis, and certain cancers. Anthropometry is a widely recognized technique utilized to evaluate the physical development and nutritional condition of an individual [6]. It is one of the most important aspects of nutritional status assessment in children and adults. Nutritional Status of children not only reflects the socio-economic status of the family and social well being of the community, but also the efficiency of the health care system and the influence of the surrounding environment[7]. Anthropometric indicators in children and infants reflect overall nutritional status and diet adequacy and are used to track trends in growth and development over a period of time. Three indicators that are used for classification based on comparison with a reference population (WHO International growth reference) are weight-for-height Zscore, weight-for-age Zscore and height-for-age Zscore.

Impairments in weight-for-height, weight-for-age, and height-for-age express wasting or acute malnutrition, underweight, and stunting or chronic malnutrition, respectively. Height-for-age, a measure of stunting, shows stronger long-term undernutrition and ultimately influences the height of the child. Children with a poor overall diet of food struggle to be tall enough and therefore are proportionally short relative to their age. Weight-for-height, a measure of wasting, is an excellent indicator of recent nutritional status. This is because undernutrition or malnutrition first impacts the weight of a child and then the height is also compromised [8]. The process of stunting, which is the result of chronic undernutrition, begins at birth or even earlier and goes on until three years of age. The stunting that occurs in early childhood can ultimately lead to a short-statured adult in the future. Childhood stunting not only predisposes an individual to obesity and its complications, but also to short adult height and lower working capacity. Decreasing the working capacity has a negative impact on the economy of any nation. Another issue from short stature is that short-statured women, due to smaller pelvic diameter, are at great risk of delivery complications. There are also chances for small women to deliver low birth weight infants. This can have an intergenerational impact since low birth weight infants will tend to achieve smaller size as adults. Malnutrition is a serious public health concern in Nigeria. Research has indicated issue of undernutrition and growth failure in Nigerian children [9], [10],[11]. Nigeria is among the six nations that contribute to half of all childhood deaths due to malnutrition globally [12]. There is limited information on the nutritional status of children between 7 to 11 years in Anambra State, and by extension, the entire Nigerian nation. The present study is interested in the application of anthropometry in assessing the nutritional status among such children in two rural communities in Anambra State, Nigeria.

MATERIALS AND METHODS

Study Area

Anambra State was created in 1991 with Awka as the capital. Anambra State covers an area of 4,416sq km made up of tropical rainforest vegetation, humid climate with temperature of 87°F and rainfall range of 152cm – 203cm. Its location co-ordinates are 6°20N, 7°.00E. It has population of 4,055,048 people, according to the 2006 census. Administratively, Anambra State is divided into 3 senatorial or geopolitical zones which are Anambra North, Anambra South and Anambra Central. Each of the listed senatorial zones is made up of 7 LGA. Aguata Local Government Area (made up of 15 communities) is located in Anambra South Senatorial Zone. Anambra State shares boundaries with Abia State, Delta State, Imo State and Kogi State. Most of the communities in Anambra State are rural in nature. Their major native language is Igbo.

Study Design

The study was a cross-sectional study with multistage sampling technique. It was carried out in Aguata Local Government Area of Anambra State, Nigeria using school aged children (6-12years). Electronic weighing scale and portable stadiometer were used to measure weights (kg) and heights (cm), respectively. All the measurements were done according to World Health Organization recommendations.

Study Population and Sample size

The population for the study was school children aged 6-12 years in Aguata LGA of Anambra State, Nigeria. Six hundred and four (604) school children participated in the study.

Sampling Method

Aguata Local Government Area was purposely selected for the study. Two communities were selected for the study using simple random sampling technique. Two public primary schools were randomly selected from each of the selected communities which gave total of 4 public primary schools used.

Informed consent

Permission was sought from the relevant Community leaders and school authorities. All study participants' parents/guardians gave verbal consent before their children/wards' participation. The register of each school was used to select randomly 151 pupils with due replacement of those that did not give their consent.

Data collection tool:Heights and weights of the children were measured using stadiometer and electronic weighing scale, respectively between September and October, 2022.

Data Analysis: Data from anthropometric measurements were coded into Excel Spread sheet and analyzed using WHO Anthroplus Software [13]. The anthropometric indices used were weight-for-height Zscores, height-for-age Zscores and weight-for-age Zscores (i.e WHZ, HAZ, and WAZ, respectively) which were calculated to assess wasting, stunting and underweight, respectively. Malnutrition and severe malnutrition were defined as anthropometric indices below minus two (-2) and minus three (-3) standard deviation (SD) from the median values of the standard WHO reference population, respectively.

Statistical analysis: Statistical Package for the Social Sciences (SPSS) version 22 software was used for the descriptive statistics (means ± standard deviation of the body mass index (BMI), height and weight measurements of the children, percentages of stunted, wasted, underweight and normal children).

RESULTS

Table 1 Mean weights, heights and BMI of the children by sex and age showed that the mean weight and mean height of 7 year old male children were 21.22± 3.52 Kg and 120.78± 6.33cm, respectively. The mean weight of the children ranged from 21.50± 2.89kg in 7 year old female children to 30.29± 4.12kg in 11year old female children. Also their mean heights ranged from 118.78± 6.41cm in 7 year old female children to 134.58± 6.29cm in 11 year old male children. The mean BMI ranged from 15.17±1.22 to 16.63±1.28 in 7year old female and 11 year old female children, respectively.

Table 1: Mean weights, Heights and BMI of the children by sex and age (n = 604)

Age	Sex	frequency	Mean weight (kg) ±SD	Mean height (cm) ±SD	Mean BMI (kg/m²) ±SD
7	M	84	21.72 ± 3.52	120.78 ±6.33	16.02 ±1.48
7	F	72	21.50 ± 2.89	118.78 ±6.41	15.17 ±1.22
8	M	44	22.55 ± 2.59	122.16 ±5.94	15.21 ±0.80
8	F	46	23.54 ± 3.29	122.98 ±3.50	15.48 ±1.30
9	M	60	24.75 ± 4.48	124.62 ±6.15	15.64 ±1.02
9	F	62	26.08 ± 4.51	128.05 ±5.48	15.18 ±1.48
10	M	80	27.70 ± 3.50	130.24 ±6.57	15.68 ±3.63
10	F	60	28.50 ± 3.54	132.67 ±5.46	16.23 ±1.28
11	M	60	29.62 ± 4.08	134.58 ±6.29	16.31 ±1.58
11	F	36	30.29 ± 4.12	134.36 ±5.59	16.63 ±1.28
Total		604			

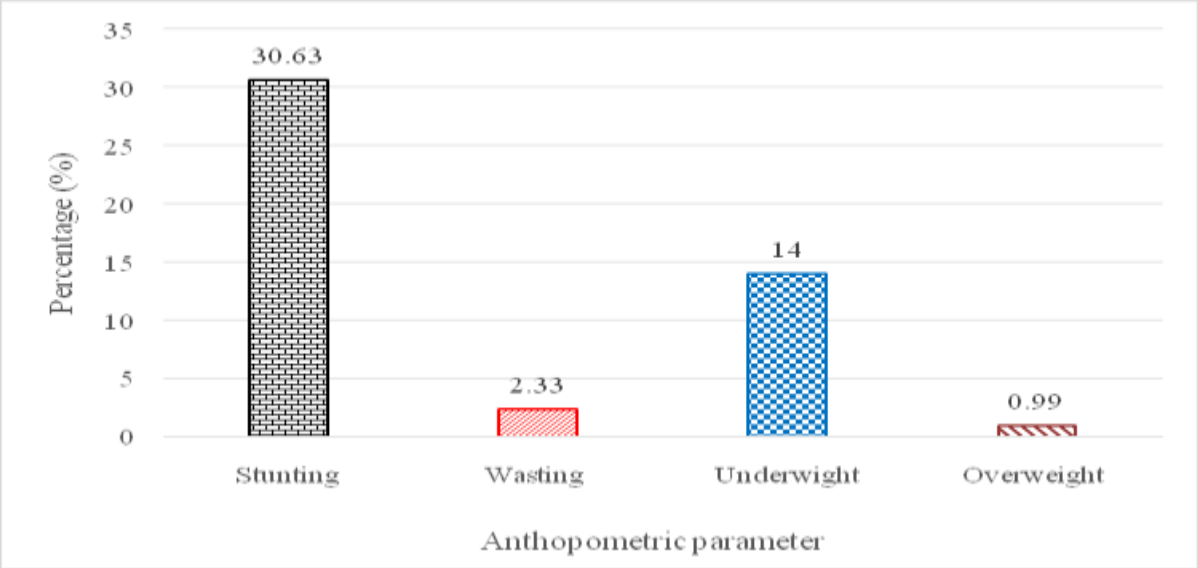
Table 2 Mean weights and heights of the children by gender and age group compared with Standard showed that for 7-9year old male children, the mean weight and height were 23.34±3.20kg and 121.7 ±6.8cm, respectively. The 10-11year old female children had mean height of 133.35±5.56cm. It also showed that the children met 73.1% to 87.1% of their WHO standard weight and 90.4% to 95.5% of their WHO standard height.

Table 2: Mean weights and heights of the children by gender and age group compared with Standard.

Age group	Sex	*Standard weight(kg)	*Standard height (cm)	% Mean weight to standard	% Mean height to standard
7 – 9	M	27.0	129.40	23.34 ±3.20(86.4)	121.70±6.80(94.0)
7 – 9	F	27.0	129.20	23.52 ±3.35(87.1)	123.40±6.13(95.5)
10 – 11	M	37.95	146.70	28.69 ±4.07(75.6)	132.68±6.70(90.4)
10 – 11	F	39.10	147.50	28.82 ±4.78(73.7)	133.35±5.56(90.4)

NB: Values in parenthesis represent the percentage of standards weights / heights met by the age groups. * WHO (2006) standards for height and weight.

Figure 1: Prevalence of stunting, wasting and underweight among the children.



DISCUSSION

The researcher observed in the current research that girls were heavier and taller than boys (Table 1). This is in line with the research conducted with the children aged 2 – 5 years in Nigeria where it was observed that girls were heavier and taller than boys [10]. These findings are in close accord with those of [7] and [14], where in Cameroon and Tanzania, male children were found to be more stunted than females. Male children have been found to be more active at the school age than females [7]. Thus, the FAO/WHO/UNU daily energy requirement is also higher at 2,100 kcal for male children compared to 1,800 kcal for females. The inadequate awareness of the mothers and / or caregivers about the daily energy needs of the male children may subject the male children to inadequate energy consumption, which would have affected their growth and development. Furthermore, the male school children engage more in outdoor activities / games compared to their female counterparts. The boys' wild hunting life during school age makes them miss more meals and in-between snacks compared to the girls. While the male children are away (outdoor plays, hunting for wild animals and plants), the female ones will be near the house or at home assisting in domestic work and looking after their younger siblings. This gives a girl child better chance of getting bigger quantity of food/snacks as a reward. Boys also are exposed to hard labour like – farm work, climbing of palm trees to cut the heads. In the study area, it is a taboo for a woman to climb palm tree. Where there is no grown-up male to ascend the palm trees every time there is a necessity, male kids are compelled to do so. This method of hard work puts more energy demand on the victims. Therefore undernourished kids are shorter and lighter in weight compared to their well-nourished equivalents and their mean weight and height (Table 2). It was reported in the current study that 14.23% (86) were underweight, 30.63% (185) were stunted, and 2.32% (14) were wasted, respectively. Regarding underweight, male children (10.6%) were found to be affected more compared to their female (3.64%) counterparts. Based on the WHO [15] cut-off value for public health significance, the prevalence of underweight among male children was at a medium level, whereas in female children, it was at a low level. Underweight was prevalent among 7-9 years old male boys (19.15% of 188 children). The least affected group with underweight was the female children in the age group 7-9 years (4.44% of 180 children). The overall prevalence of underweight observed among school children in the current study was 14.23%. This includes 1.32% of the children who were severely underweight. The underweight prevalence reported in the current study (14.2%) was greater than the one reported by [16], [17]and [18],who reported 10.8%, 3.3% and 7% underweight among Nigerian children, respectively. The work of [19] revealed a higher underweight prevalence of 21% in Ethiopian school children. On the other hand, the paper by [20] presented a similar result of 16% underweight among Nigerian children. This 85% normal weight-for-age in this work could be attributed to the concerted efforts of both the Federal Government of Nigeria and the Anambra State Government in containing and ultimately eradicating child malnutrition via an improved primary health care system and school lunch programme.

Stunting: The severe stunting was observed across all age groups of both sexes. The investigation discovered that the most significant rate of stunting was in the 7 to 9 year-old male children, representing 37.2% of 188 children, whereas the least were in the 7 to 9 year-old female children, representing 15.6% of 180 children. In the current study, the overall stunting prevalence was 30.63% (Figure 1), with a noteworthy 4.97% prevalence of severe stunting observed. The stunting prevalence observed in this study, 30.6%, approximates the report of [20] that presented 27.4% stunting prevalence among Anambra State school children in Nigeria. The high prevalence of stunting reported here is higher than the 10.34% prevalence of stunting reported among school

children in Plateau State, Nigeria [21]. It is also higher than reports [22] and [23] which indicated 25.5% and 17.1% stunting among school children in Pakistan and Eastern Ethiopia, respectively. In a situation where a child is malnourished, the child's weight will be affected first.

If the undernutrition is chronic, the height of the child will also be affected. Stunting therefore is a sign of long-term malnutrition. The stunting reported here affected more male children (19.54%) compared to female children (11.09%). This aligns with reports by [7], [14], and [24], which indicated that male children were more significantly impacted by stunting than their female counterparts in Cameroon, Tanzania, and Paucartambo, Peru, respectively. No incidences of severe wasting were observed in this study. Wasting, however, was observed in 10-11 year old male and female children. Surprisingly, a higher percentage of male children in the 10-11 year age group were victims of wasting (7.1%) compared to their female counterparts (4.17%). This suggests that children in the 10-11 year age group were more vulnerable to the etiological factors of wasting in school children. Wasting is an indicator of acute malnourishment [25]. Prevalence of wasting documented in this study (2.3% in Figure 1) is very low compared to reports from [11], [20] and [26],who documented 10%, 20.7% and 24.9% wasting among children in Nigeria. [22] and [27] reported wastage prevalence of 20% and 13.7% among Pakistani and Burkinabé school children, respectively. These findings are comparable with those of [17], who documented a low prevalence of wasting at 3.3% in Nigerian children. The reason for the lower prevalence in our study could be that there has been a greater number of nutrition and health awareness campaigns carried out by churches and Non-Governmental Organizations, and the steady school lunch program in Anambra State and across Nigeria. Overweight: The prevalence of overweight in the present study was 0.99% (Figure 1). This is consistent with report by [12] where it was demonstrated that 1.5% of children are overweight in Nigeria. The findings by [18] and [21] showed higher overweight/obesity prevalence in 20% and 4.47% of Nigeria's school children, respectively. This is also in agreement with findings from [28], [7], and [20], where it was indicated that within the Malaria Meso Endemic Area, stunting was the more common form of malnutrition compared to wasting and underweight in Cameroon and Nigeria, respectively. Furthermore, the studies by [11] and [9] also revealed a greater incidence of stunting compared to wasting among Nigerian children. On the other hand, the findings of this study differed from those of [29] and [16], where a higher prevalence of underweight than stunting was reported among Nigerian children. Wasting has also been reported to be more prevalent than stunting and underweight among Nigerian children [26]. Poor nutritional status, as indicated by stunting, wasting, and underweight rates, can be assumed to be a marker for micronutrient deficiency [30],[31]. It may thus point towards the presence of associated micronutrient deficiencies along with the nutrition problems discussed in this study. Further research is needed to ascertain the micronutrient status in children in order to design appropriate nutrition intervention programs.

CONCLUSION

Despite the efforts of both the Federal and State Governments, malnutrition in children in the rural parts of Anambra State, Nigeria remains an issue. It is not only a challenge to our present society but also to the future. It is crucial that more effort is directed towards ensuring the complete eradication of malnutrition in children of school age. There is therefore a pressing need for more nutrition education of parents/caregivers of school-age children. The present School lunch program in Anambra State and Nigeria is highly commended with upward revision of quality and quantity of food served.

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