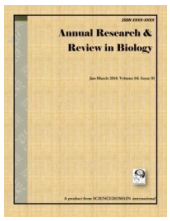

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Nutritional Status of Primary School Children in Kawo District of Kaduna Metropolis, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author SEA designed the study, wrote the protocol and interpreted the data. Author BA anchored the field study, gathered the initial data and performed preliminary data analysis. Authors while OA and LEI managed the literature searches and produced the initial draft. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study was designed to assess the nutritional status of school children aged 5-12 years in Kawo District, Kaduna State, Nigeria in relation to gender and school background.
Study Design: One hundred and forty one (141) school children were randomly selected from two public and two private schools. Anthropometric indices of weight-for-age (WA) and height-for-age (HA) were used to estimate the children's nutritional status.
Place and Duration of Study: Kawo district Kaduna state North central Nigeria, between October 2009 and December 2009.
Methodology: Using a structured questionnaire, anthropometric parameters of sex, age, weight, height and class were obtained on the children randomly selected from two public and private schools, respectively. Data were subjected to descriptive statistics using sample size and frequency, while nutritional and growth status were determined using z-scores for weight for age

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(WA) and height for age (HA). The prevalence of wasting and stunting were determined using the WHO new reference values for school boys and girls.
Results: Sex distribution of children studied was 51.8% male and 48.2% female, while severe underweight and stunting occurred in 35% and 26.4% of the children respectively. Significant difference ($p<0.05$) was not observed between severely underweight or stunted boys and girls, while normal WAZ and HAZ occurred in 20% and 17.1% of the children, respectively. About 5% and 12.9% of the severely underweight and stunted children were respectively from private schools, while 30.7% and 13.6% were from public schools. Severe stunting was found to progress with age as 8.5% of severe stunting was observed in children 5 – 8 years, while 17.9% was observed in the 9 – 12 years age bracket. Severe under-weight was however found to be higher in children 5 – 8 years (20.7%) compared to children 9 – 12years (15.0%).
Conclusion: Based on WHO classifications and the low values for anthropometry obtained from this study, there is high prevalence of underweight and stunting in Kawo district of Kaduna state, Nigeria, suggesting a need for improvement in the nutritional status of these and other children in similar circumstances in many parts of Kaduna State and the country through sustainable public health strategies.

Keywords: Nutritional status; anthropometry; school children; Kawo District; Kaduna State; Nigeria.

1. INTRODUCTION

Nutritional status is defined as the evident state of nutrition of an individual. A person is said to have a good nutritional status if he shows no evidence of malnutrition [1]. Despite the economic growth observed in developing countries, malnutrition and particularly under nutrition is still highly prevalent [2]. Reports show that there exist problem of `malnutrition among Nigerian children [3]. Nutritional status is the best indicator of the global well-being of children and one of the major global health problem faced by the developing countries, today is malnutrition [4,5]. Recent nationwide survey showed that 42.5%, 48.0% and 19.8% of children still suffer underweight (low weight-for-age), chronic (low height for age) and acute (low weight for height) form of malnutrition, and many found in socially and economically vulnerable communities [5].

Nigeria is not an exempted from to the problem of malnutrition [6,7], the primary cause of ill-health and premature mortality among children in many developing countries [8], resulting from poverty and ignorance, and consequently, faulty weaning practices, poor sanitary conditions, minimal medical attention and endemic childhood infections [6]. There are several reports [7,9,10] on the problem of under-nutrition among children in different parts of Nigeria which suggest that nutritional deficiencies have critically contributed to the high rates of disability, morbidity and mortality in Nigeria, especially among infants and young children. Although numerous regional surveys portray a sorry state of nutrition in Nigeria, only scanty information exists regarding the nutritional status of semi-urban children in many parts of Nigeria, including Kaduna State.

Furthermore, earlier studies predominantly focused on children under five years old, while neglecting the pre-adolescent group, although it is widely known that understanding the nutritional status of children has far-reaching implications for promoting the health of future generations [11]. Therefore, using anthropometric index, a practical tool for evaluating the nutritional status of populations, particularly of children in developing countries [3], the present study was designed to evaluate the prevalence of under-nutrition among pre-adolescent urban school children (aged 5-12 years old) living in Kawo District of Kaduna metropolis, Nigeria. The result of this study should be important from public health standpoint as they would provide reliable basis for instituting appropriate strategies to identify and combat factors associated with nutritional abnormalities in children in this part of Nigeria.

2. MATERIALS AND METHODS

2.1 Data Collection

Malnutrition/under nutrition were assessed by measuring height and weight and screening for clinical manifestations and biochemical markers. Indicators based on weight, height and age are compared to international standards as commonly used to assess the nutritional status of a population. Stunting (inadequate length/height for age) captures early chronic exposure to under nutrition; wasting (inadequate weight for height)

captures acute under nutrition; underweight (inadequate weight for age) is a composite indicator that includes elements of stunting and wasting.

Thus in this study, anthropometric measurements of 141 children between the ages of five to twelve from four primary schools consisting of two private and two public schools in Kawo district of Kaduna State were obtained on children that were each randomly selected from two public and two private schools, respectively. Demographic data, including gender age, weight, height and class (level of study) were obtained using a structured questionnaire. To establish the nutritional status of pupils, weight and height were used in accordance with standard procedures described by the World Health Organization, WHO [12]. Weight was measured to the nearest 0.1kg with an electronic scale (SECA 803) with children wearing only light clothing and without shoes. Weight was recorded twice and the mean value was calculated and used in the analyses. However, if the difference between the two measures exceeded 0.2kg, the subject was weighed again [13], while the scale was checked for accuracy with standard weights after about every twenty measurements.

Individual height was measured with a wooden stadiometer placed on a flat surface. The subject stood on the basal part of the device with feet together (without shoes). The shoulders, the buttocks and the heels had to touch the vertical measuring board. The children standing with their eyes in the Frankfort horizontal plane, the height was measured to the nearest 0.1 cm and recorded twice. Similarly, when the difference between the two measurements was higher than 0.5cm, a third measurement was taken and the mean of the two closest values was used in the analyses.

Nutritional status is defined as the evident state of nutrition of an individual. A person is said to have a good nutritional status if he shows no evidence of malnutrition [1]. Nutritional and growth status were established using z-scores on weight for age (WA) and height for age (HA), which were subsequently used to identify the prevalence of wasting and stunting respectively, using the WHO new reference values for school boys and girls [12]. The center for disease control and prevention's Epi Info™ software package 3.5.4 was use to determine the z-scores.

$$\text{Z- Score} = \frac{\text{Observed value} - \text{median value}}{\text{Standard deviation of reference population}}$$

The following WHO categories of WA and HA were used to determine growth status of the children;

Cut off points	Classification of malnutrition
Median	Normal
<-1 to > - 2 Z score	Mild
< -2 to > - 3 Z score	Moderate
-3 Z score	Severe

2.2 Statistical Analysis

Data were subjected to descriptive statistics where the sample size and frequency were calculated.

3. RESULTS AND DISCUSSION

3.1 Results

The anthropometric results obtained were from 141 respondents according to sex, age, and school (public and private schools). The population studied was found to be 51.8% (n =73) boys and 48.7% (n = 68) girls, respectively. The weights and heights of the children were not significantly different between the ages of 5 and 8 years ($p<0.05$). However, a significant difference was observed between the ages of 9 and 12 years old as they got older.

Table 1 shows the classification of nutritional status of children as percentage weight for age following computation of Z- scores according to the reference WHO standard. Classification by age showed that only 20% of the children had have normal growth in terms of their weight, 45% were moderately or slightly underweight while 35% were found to be severely underweight in growth. Among the normal children, 12.5% were found to be within the ages of 5 – 8years, while 7.1% were within 9 – 12 years old. Only 10% of children with normal nutritional status were found to be boys while 10% were girls. Children with normal nutritional status in public schools were found to be 4.3% and 15.7% in private schools. Among the moderately to mildly underweight children, about 23.2% were within the ages of 5-8 years old while 22.9% were within 9-12 years old. In terms of gender, 25% of the boys could be considered to be within the moderately to mildly underweight category, while only 20.0% of girls were in that category, but only 15% were also

found in public schools, while 30% were found in private schools. The severely underweight group which consists of a total of 35% underweight has 20.7% within the ages of 5-8 years old and 15% within 9-12 years old, while 17.1% were boys and 18.6% were girls. Whereas 30.7% of the underweight were found to be in public schools, while 5% were found to be in private schools.

Table 2 shows the classification of nutritional status of children as percentage height for age following computation of Z- scores in accordance with the WHO reference standard. Classification by age showed that only 25% of the children have normal growth in terms of their height, 49.2% were moderately or slightly stunted while 26.4% were found to be severely stunted in growth. Among the children experiencing normal growth, 17.1% were found to be within the ages of 5 – 8 years, while 7.9% were within 9 – 12 years old age group, but only 12.5% of these children were also found to be boys, while the rest 14.3% were girls. In public and private schools, 12.5% and 12.9% of pupils, respectively experienced normal growth. Whereas, among the moderately to mildly stunted children, 31.1% were within the ages of 5-8 years old, while 18.5% were within 9-12 years old, the proportion of boys in this category was 27.9% while only girls 20.0% were in this category. 22.8% were also found in public schools while 26.4% were found in private schools. The severely stunted group which consisted of a total of 37% had 8.5% within the age group of 5-8years and 17.9% within 9-12years old. However, only12.5% were boys while 14.3% were girls, and13.6% were found to be in public schools, while 12.9% were in private schools.

4. DISCUSSION

Stunting and wasting are widespread among school-age children in developing countries [14,15]. Wasting refers to a low weight – for – height that is below 2SD of the median value of the NCHS/WHO International weight – for – height reference. A prevalence of wasting or acute malnutrition between 5–8% indicates a disturbing nutritional situation, while prevalence greater than 10% corresponds to a serious nutritional emergency (SCN, 1995). Underweight is defined as low weight-for-age at below 2SD of the median value of the NCHS/WHO International reference for weight-for-age. Stunting refers to shortness that is a deficit or a linear growth that has failed to reach an individual's genetic potential, and it is technically defined as low height for age at below 2SD of the median value of the NCHS/WHO International Growth Reference [13].

Many reports have shown that the problem of malnutrition among Nigerian children is real. Report by WHO in [12], showed that 37.7% and 39.1% of preschool children were respectively, stunted and underweight in Nigeria. According to the report of National Micronutrient Survey (1993), there exist problem of stunting (24%) and wasting (22%) in South Eastern Nigeria. The findings of this present study reflect a seemingly high prevalence of malnutrition among the school children living in Kawo district of Kaduna metropolis. With about 35% severely wasted and 26.4% severely stunted (Tables 1 and 2), although, stunting was found to be higher than underweight. However, consistent with previous studies [16], the prevalence of stunting (21.7%) and wasting (35.8%) were higher in girls compared to boys (13.8% stunting and 22.7% wasting), but no significant difference was observed between stunting in private schools and public schools (13.6% and 12.9% respectively). Also that 17.9% of the stunted children were found between the ages of 9-12years old, while about 8.5% were found in ages 5-8years, suggests manifestation of malnutrition as ages progresses [17]. This is in line with studies by Druckin [18]. Underweight is used as a composite indicator to reflect both acute and chronic under-nutrition, although it cannot distinguish between them [19].

Table 1. Nutritional status of school children weight for age (indicator for wasting) in Kawo District of Kaduna Metropolis, Nigeria

	Total		5 - 8 yrs		9 – 12 yrs		Boys		Girls		Public schools		Private schools	
	n	%	n	%	n	%	N	%	n	%	n	%	n	%
Normal	28	20	17	12.5		7.1	14	10	14	10	6	4.3	22	15.7
Moderate	28	20	17	12.5	11	7.9	13	9.3	15	10.7	6	4.3	22	15.7
Mild	35	25	15	10.7	21	15	22	15.7	13	9.3	15	10.7	20	14.3
Severe	50	35	29	20.7	21	15	24	17.1	26	18.6	43	30.7	7	5

Table 2 . Nutritional status of school children height for Age (indicator for stunting) in Kawo District of Kaduna Metropolis, Nigeria

	Total		5 - 8 yrs		9 - 12 yrs		Boys		girls		public schools		private schools	
	n	%	N	%	n	%	n	%	n	%	n	%	N	%
Normal	35	25	24	17.1	11	7.9	17	12.5	20	14.3	17	12.5	18	12.9
Moderate	38	27.1	26	18.6	12	8.5	18	12.9	18	12.9	16	11.4	22	15.7
Mild	31	22.1	17	12.5	14	10	21	15	10	7.1	16	11.4	15	10.7
Severe	37	26.4	12	8.5	25	17.9	17	12.5	20	14.3	19	13.6	18	12.9

The results of the present study indicated that about 80% of the children are underweight with 35% severely underweight while 45% are mildly to moderately underweight, and boys are slightly more underweight (17.1%) compared to girls (18.6%), suggesting that growth retardation in early childhood was slightly higher in males than in females, although this tendency appear to decrease adolescence. However, a remarkable difference was observed in the stunting in public schools (30.7%) compared to private schools (5%), suggesting that financial and socioeconomic background of the children may be responsible.

Although the sample population studied was relatively small, the prevalence of underweight found in this study is relatively high compared to other studies among Nigerian children, elsewhere in the country [9,20] and other parts of the world [21-24]. The reasons for the variation in the level of underweight between boys and girls are unclear, but studies by Samiran in [24] indicated that usually, both sexes are subjected to different conditions of nutrition and dietary intake. The high prevalence of both chronic and acute malnutrition observed in the present study was unexpected in sub- urban settlements; it was not surprising considering that most of the children attending primary schools in this location are from relatively low socio-economic backgrounds. Hence, factors such as education, occupation and economic status of parents may account for the appalling nutritional situation among the study population.

The rate of malnutrition among children is an index of development, because it represents the socio-economic status of populations. Malnourished children are at high risk of mortality and morbidity, and may experience adverse health and mental consequences in their lives [25]. Programmes by Nigerian government such as the School Meal Programme (SMP), targeted towards heads of households; The Family Support Programme (FSP); and Women Empowerment Programmes (WEP) have proved not to be sustainable over time, and some have limited effects [9]. Therefore, making these programmes viable and result-oriented would positively improve the children's nutritional status. The major staple foods of the people in this region are yam, rice and cassava [13]. These food items are basically carbohydrates in content. It is possible that in view of the low socio-economic status of the children's parents, many cannot afford to buy meat or protein-rich foods. Such scenario could impact on the children's nutritional status. It is therefore imperative, that efforts must be geared up at improving the nutritional status of children, by incorporating them into the existing school feeding program or enriching their staple foods with essential nutrients through biological fortification.

5. CONCLUSION

Severe malnutrition exists among the school children living in Kawo district of Kaduna metropolis, Nigeria, as significant percentage of the children are underweight (35%) or stunted (26.4%) with normal WAZ and HAZ occurring only in 20% and 17.1% of the children, respectively, but the problems were more serious in children attending public than those attending private schools. Therefore, there is a need for improvement in the nutritional status of these and other children in similar circumstances in many parts of Kaduna State, and the country in general, through appropriate sustainable public health strategies.

ETHICAL APPROVAL

All authors hereby declare that this study has been examined and approved by the ethics committee of Ahmadu Bello University and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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