Assessment of the Nutritional Status of School-Aged Children in internally displaced Persons' Camps in Plateau State, Nigeria

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ABSTRACT

Background: *Nutritional status is one of the most important public health indicators among the displaced populations. High death rate of children in IDP camps in Nigeria have been attributed to poor nutritional status.*

Objective: *The study investigated the nutritional status of school-aged children in IDPs' camps in Plateau State.*

Methods: *The study adopted a cross-sectional survey research design with a population of 948 school-aged children in the two IDPs' camps in Plateau State. Simple random sampling was used to select 474 children who served as sample for the study and forty-seven children as sub-sample for the biochemical analysis. Instruments for data collection were structured questionnaire, microtoise meter, Hanson's bathroom scale and non-stretchable tape. Descriptive statistics such as frequency, percentage, mean and standard deviation were used for data analysis.*

Results: *Findings showed that there was high prevalence of stunting (74.50%), wasting (61.70%) and 28.1% of the children were underweight. Severe and moderate acute malnutrition were seen in 9.70% and 31.20% of the children respectively. Majority (79.10%) of the children skipped meals especially due unavailability of food to eat. Vitamin A deficiency was seen in 66.00% of the children, 21.30% were iodine deficient, 70.20% were calcium deficient, 40.40% and 70.20% were zinc and iron deficient respectively while 85.10% were anemic.*

Conclusion: *There was high prevalence of stunting, wasting and underweight amongst the children. The poor nutritional status of the children was attributed to the fact that majority of the children skipped meals especially due to unavailability of food to eat.*

Keywords: School-aged children, Nutritional status, Internal displacement

Introduction

Conflict, especially in form of ethno-religious clashes inevitably causes loss of lives and internal displacement of people due to destruction of homes and properties. Internally displaced persons (IDPs) are persons who have been displaced by natural disaster or conflicts from their homes and traditional support structure and who have not crossed the borders of their countries (1). IDPs according to United Nations High Commissioner for Refugees – UNHCR, are the largest group of vulnerable people in the world because they are subjected to situations of extreme poverty, human right abuses, dependency and usually lack of choice. One

feature of internal displacement is that it occurs on a massive scale(2).

In recent times, the rate of displacement has increased globally with the greater percentage of the displaced persons found in Africa and Asia. Internal Displacement Monitoring Center (IDMC) in 2014 revealed that Nigeria has Africa's highest number of persons displaced by conflict ranking (3). This increase in IDPs' population has been attributed to the violent operation of Boko Haram sect and Fulani herdsmen in the North Eastern and middle-belt parts of Nigeria respectively.

Internal displacement always leaves socio-economic, political and physical assaults on millions of people worldwide. It reduces people's personal security and restrict their access to food, medicines and medical supplies, clean water, sanitation, shelter and health services (4). Children, on account of their young age, are more exposed to the difficulties and risks associated with internal displacement. Their health needs are not fully addressed particularly as it concerns nutrition, which is essential for optimum growth and development of every child according to World Health Organisation (WHO) (5). Adequate nutrition of school-aged children will ensure they grow to their full potential, and it also provides the stepping stone to a healthy life (6).

School-aged children are children between the ages of six and twelve. They grow significantly, but at slower rate, whilst being very physically active in general (6). School age is a dynamic period of physical growth as well as of mental development of the child (7, 8); and child growth is internationally recognized as an important indicator of nutritional status in populations (9). When children have access to affordable, diverse, nutrient-rich food; appropriate maternal and child-care practices; adequate health services; and a healthy environment, they achieve optimal nutritional status results(10).

Nutritional status is the extent to which the customary diet of any population group has been able to meet their nutritional requirements. It is mainly measured by growth in height and weight and is affected by food intake and incidence of childhood infections (11). Nutritional status is the best indicator of the global wellbeing of children (12); and could indicate adequate nutrition or malnutrition. Malnutrition is a serious medical condition marked by a deficiency of energy, essential proteins, fats, vitamins, and minerals in a diet (13). According to WHO, a malnourished child is one who has failed to attain the expected values for any of the nutritional indicators (e.g. length-for-age, weight-for-height or weight-for-age) as compared with a healthy child of the same sex and age in the reference population (15).

Siddique, Ayub, Shore, Tariq, and Zamanopined that malnourished children face nutritional problems such as wasting, stunting, underweight, anemia, iodine and vitamin A deficiency(16). They also have lowered resistance to infection, and early death from common childhood ailments such as diarrheal diseases and Respiratory Tract Infections (16). Malnutrition is widespread in the developing world, and it carries significant increased risks of short-term and long-term mortality and morbidity(17).

Malnutrition is a significant problem in school aged children as it leads to stunting, wasting, and deficiencies of essential vitamins and minerals that provide nutrients(16). The result of a study (1) showed that all the 450 death of children recorded in 28 IDPs' camps in Borno state in 2015 was caused by malnutrition (1). Additionally, out of the 209,577 children that were screened for various illnesses, about 6,444 severe cases of malnutrition were recorded in the camps and about 25,511 have mild to moderate symptoms of malnutrition (1). Much is not known about the nutritional status of IDP children in Plateau state. This study therefore assessed the anthropometric indices of the children using their weight, height, BMI and MUAC; the micronutrients (iron, zinc, iodine, calcium and vitamin A) status of the children; and their dietary pattern. This study is important to make data available, on the basis of which relevant bodies organizations can plan intervention programs.

Materials and method
Study design
The study adopted a cross-sectional survey research design. Cross-sectional survey studies are studies carried out over a short period of time which is used to analyze data collected from a population (18).

Study area
The area of study is Plateau State. Plateau State has been a venue of clashes between the predominantly Muslim Hausa-Fulani herders and Christian farmers like the other states of middle belt area (37), and hence, home for up to 32,971 internally displaced persons in about 20 camps as at 2018 (19).

Study population
The population comprised of 948 six to twelve-year-old children in the two IDPs' camps in Plateau State, according to the information obtained from State Emergency Management Agency (SEMA), Plateau State (19).

Sample size and sampling technique

The sample size for the study was 474, that is, 50% of all the IDP children in the state. According to (20) for a descriptive survey with a population less than 10,000, a sample size of 50% is acceptable (20). The biochemical analysis was conducted on 10% (47children) of the sample size. Simple random sampling technique without replacement was used to select the required number of children from the population and the sub-sample from the sample. Inclusion criteria were children who had at least one adult guardian and lived in some form of household in the camps.

DATA COLLECTION METHOD

Questionnaire

The data collection method for the study was structured interview. Questionnaires were administered verbally to the respondents using Hausa language for ease of comprehension. The structured questionnaire was made up of sections A – D. Section A elicited information on the children's socio-economic/demographic characteristics; section B was to elicit information on their dietary pattern; section C was for anthropometric measurements; and section D was for the micronutrients status of the children. The questionnaire was validated by three lecturers in the Department of Home Science and Management, and the Department of Nutrition and Dietetics, University of Nigeria, Nsukka.

Anthropometry measurements

The respondents' heights were measured using a microtoise meter calibrated in centimeters (cm). The respondents were asked to stand on the base of the height rod barefooted, with their feet parallel to each other, arms hanging at their sides with shoulders relaxed and head held comfortably erect. A flat board attached to the rod was used to make contact with a subject's head. The height was read from the tape to the nearest 0.1cm. Heights were related to age and compared with WHO (2007) standard for height-for-age (21).

The weight was measured using Hanson's bathroom scale of 120kilogram (kg) capacity. Each child was weighed barefooted with minimum clothing. The respondents were asked to stand erect on the center of the scale with arms hanging at the sides naturally. The measurement was taken to the nearest 0.1kg. Values were related to age and compared with WHO (2007) standard for weight-for-age (21).

The mid-upper arm circumference was determined using a non-stretchable tape and measurement was taken to the nearest 0.1cm. The left arm was used, it hanged freely down by the side of the child, the arm half way between the point of the shoulder and the tip of the elbow was marked and the strip went round the marked point for measurement. Values were related to age and compared with the growth reference for mid upper arm circumference for age developed by (22).

BMI was determined using the formula shown below.

$$BMI\,(Kg/m^2) \quad = \quad \frac{\text{Weight (Kg)}}{\text{Height}^2\,(m^2)}$$

BMI was related to age and compared with WHO (2007) standard for BMI-for-age (21).

The WHO (2007) reference data for school-aged children was used as a standard to determine the Z score for height-for-age, BMI for age and weight-for-age. Z scores of $\leq$ - 2 standard deviation (SD) for height-for-age, BMI for age and weight-for-age was used to determine the prevalence of stunting, wasting and underweight (21). A growth reference for mid upper arm circumference for age developed by (22) was used as a standard to determine the Z score for MUAC for age. Z scores of $\leq$ -2 standard deviation (SD) for MUAC for age was used to determine the prevalence of severe and moderate acute malnutrition (22).

Biochemical analysis

Urine samples were collected from the sub-sample of 47 children in 10ml plastic containers. The urine samples were analyzed for iodine concentration using ammonium persulphate to digest the samples (23), followed by the Sandell-Kolthoff reaction for assessing the severity of iodine deficiency disorders. The results were expressed as microgram per liter (μg/L). The cut-off point for iodine deficiency was < 100μg/L (24). Serum zinc was determined using atomic absorption spectrometer (model No. Buck 210/11) (25). A reading between 80-120μg/dl was recorded as normal, zinc deficiency was defined as a reading below 80μg/dl (26). Vitamin A deficiency was defined as serum retinol of <10g/dl while <20g/dl was taken to be marginal deficiency (27). Data on serum retinol level was interpreted using means for normal, mild, moderate and severely low as 1.05μmol/1.07 to <1.05 μmol/l to 0.70 and 0.35 μmol/l respectively (28). Blood samples were drawn into heparin and EDTA tubes for determination of

Haemoglobin and serum ferritin concentration. Anaemia was defined as follows; severe < 8.0g/dl, moderate 8.0-9.9g/dl, mild 10.0-10.9g/dl, while normal was 11.0g/dl and above (29). Iron deficiency (ID) was defined as serum ferritin below 12mg/dl (29). Serum calcium determination was done by the method of (30). A reading of less than 8.00mg/dl was regarded as calcium deficiency.

Ethical approval and informed consent
Ethical approval certificate with the reference number JUTH/DCS/IREC/127/XXX/2162 was sought and obtained from Jos University Teaching Hospital (JUTH), Lamingo, Jos, Plateau State. The parents/guardians of the children were duly informed of the details of the study, after which they signed the consent forms.

Statistical analysis
The data collected were coded into Statistical Package and Service Solution (IBM-SPSS), version 22 for analysis. Descriptive statistics such as frequencies and percentages were used for data analysis.

RESULTS
Demographic characteristics of the children
Table 1 shows the demographic data of the children. From the table, 55.30% of the children were males while 44.70% were females. A greater proportion (51.30%) of the children were aged between 6-9years. The main source of income for majority of children's households was farming (52.60%). More than a third (34.60%) of the children's parent/guardian had no formal education. Majority of the children (85.90%) had less than ₦10,000 as their household monthly income and food was obtained in the children's households majorly through food aid/donation (39.50%). A greater proportion of the children (71.50%) had household size between 5-8persons.

Anthropometric indices of the children
Table 2 presents the anthropometric indices of the children according to age (years). More than a third of the children were severely (35.70%) and moderately (38.80%) stunted. The mid-upper arm circumference category showed that more than a third of the children (42.80%) were mildly malnourished and 9.70% of the children were severely malnourished.

Micronutrient status of the children
Table 3a presents the micronutrient (vitamin A, iodine, calcium and zinc) status of the children. Data for Vitamin A status of the children showed that 25.50% of them had severely low vitamin A. Deficiency of iodine was recorded in 21.30% of the children, calcium deficiency was recorded in 70.20% and zinc deficiency was recorded in 40.40% of them.

Table 3b presents the hemoglobin and serum ferritin status of the children. From the data, 21.30% had severely low, 40.40%; moderate, 23.40%; mild and 14.90%; normal hemoglobin status. Male children (41.40%) were more moderately anemic than female children (38.90%). Serum ferritin was deficient in 70.20% of the children while 29.80% of them had normal serum ferritin level.

Figure 1 shows the prevalence of stunting, underweight and wasting according to gender. Seventy-five percent of the female and 74.00% of the male children were stunted. The percentage of male and female children that were underweight was 40.50% and 36.80% respectively. Up to 34.40% of the female children were wasted and 22.90% of the male children wasted.

Figure 2 shows the prevalence of severe and moderate acute malnutrition among the children. Moderate acute malnutrition was suffered by 31.20% of them while 9.70% of them suffered from severe acute malnutrition.

Dietary pattern of the children
Table 3 shows the dietary pattern of the children. More than a quarter (27.60%) of the children skipped meals daily and up to 4-6 times/week; only 20.90% never skipped meals. Many (58.00%) of the children skipped lunch, mostly due to unavailability of food (74.70%).

Table 1: Demographic characteristics of the children

Variables	Frequency	Percentage
Sex distribution of the children		
Male	262	55.30
Female	212	44.70
Total	**474**	**100.00**
Age (years)		
6-9	243	51.30
>9-12	231	48.70
Total	**474**	**100.00**
Education level of parent/guardian		
No formal education	164	34.60
Primary school attempted	89	18.80
Primary school completed	115	24.30
Secondary school attempted	71	15.00
Secondary school completed	35	7.30
Post-secondary qualification	0	0.00
Total	**474**	**100.00**
Household monthly income		
Less than ₦10,000	407	85.90
₦10,000 - ₦30,000	60	12.70
₦40,000 - ₦60,000	7	1.40
Total	**474**	**100.00**
Main source of income for the household		
Farming	249	52.60
Trading	6	1.30
Casual labor	22	4.60
Support from governmental and non governmental organizations	196	41.50
Total	**474**	**100.00**
Major source of food for the household		
Farming	82	17.30
Buying	26	5.50
Food aid/donation	187	39.50
Farming and buying	179	37.80
Total	**474**	**100.00**
Household size		
Less than 5	6	1.30
5-8	339	71.50
9-12	129	27.20
Total	**474**	**100.00**

Table 2: Anthropometric indices (height-for-age, weight-for-age, BMI-for-age and MUAC-for-age) of the children according to age (years)

Indices of nutritional status	6-9years F (%)	>9-12years F (%)	Total F (%)
Height-for-age/stunting			
Severe (-3SD)	73 (30.00)	96 (41.60)	169 (35.70)
Moderate (-2SD)	90 (37.00)	94 (40.70)	184 (38.80)
Mild (-1SD)	53 (21.80)	33 (14.20)	86 (18.10)
Normal	27 (11.20)	8 (3.50)	35 (7.40)
Total	**243 (100.00)**	**231 (100.00)**	**474 (100.00)**
Weight-for-age/underweight			
Severe (-3SD)	65 (27.00)	12 (21.80)	77 (25.80)
Moderate (-2SD)	82 (34.00)	25 (43.90)	107 (35.90)
Mild (-1SD)	65 (27.00)	12 (21.10)	77 (25.80)
Normal	29 (12.00)	8 (14.00)	37 (12.40)
Total	**241 (100.00)**	**57 (100.00)**	**298 (100.00)**
BMI-for-age/wasting			
Severe (-3SD)	9 (3.70)	0 (0.00)	9 (1.90)
Moderate (-2SD)	11 (4.50)	15 (6.40)	26 (5.50)
Mild (-1SD)	57 (24.10)	41 (17.80)	98 (20.70)
Normal	125 (51.40)	145 (62.80)	270 (57.00)
Overweight (+2SD)	41 (16.90)	30 (13.00)	71 (15.00)
Total	**243 (100.00)**	**231 (100.00)**	**474 (100.00)**
MUAC			
Severe (-3SD)	17 (7.00)	29 (12.60)	46 (9.70)
Moderate (-2SD)	67 (27.60))	81 (35.00)	148 (31.20)
Mild (-1SD)	112 (46.10)	91 (39.40)	203 (42.80)
Normal	47 (19.30)	30 (13.00)	77 (16.20)
Total	**243 (100.00)**	**231 (100.00)**	**474 (100.00)**

F = frequency, % = percentage, BMI = Body mass index, MUAC = mid upper arm circumference, SD = Standard deviation

Table 3a: Micronutrient (vitamin A, iodine, calcium and zinc) status of the children according to gender

Micronutrients	Male F (%)	Female F (%)	Total F (%)
Serum retinol (μmol/l)			
Severely low (≤0.35)	7 (24.10)	5 (27.80)	12 (25.50)
Moderate (>0.35 – 0.70)	6 (20.70)	3 (16.70)	9 (19.10)
Mild (>0.70 – 1.05)	8 (27.60)	2 (11.10)	10 (21.30)
Normal (>1.05)	8 (27.60)	8 (44.40)	16 (34.00)
Total	**29 (100.00)**	**18 (100.00)**	**47 (100.00)**
Urine Iodine (μg/l)			
Deficient (<100)	6 (20.70)	4 (22.20)	10 (21.30)
Normal (≥100)	23 (79.30)	14 (77.80)	37 (78.70)
Total	**29 (100.00)**	**18 (100.00)**	**47 (100.00)**
Serum Calcium (mg/dl)			
Deficient (<8.0)	19 (65.50)	14 (77.80)	33 (70.20)
Normal (≥8.0)	10 (34.50)	4 (22.20)	14 (29.80)
Total	**29 (100.00)**	**18 (100.0)**	**47 (100.00)**
Serum Zinc (μg/dl)			
Deficient (<80.0)	10 (34.50)	9 (50.00)	19 (40.40)
Normal (≥80.0)	19 (65.50)	9 (50.00)	28 (59.60)
Total	**29 (100.00)**	**18 (100.00)**	**47 (100.00)**

F = frequency,% = percentage

Table 3b: Hemoglobin and serum ferritin status of the children according to gender

Variables	Male F (%)	Female F (%)	Total F (%)
Hemoglobin (g/dl)			
Severe (<8.0)	5 (17.20)	5 (27.80)	10 (21.30)
Moderate (8.0-9.9)	12 (41.40)	7 (38.90)	19 (40.40)
Mild (10.0-10.9)	8 (27.60)	3 (16.70)	11 (23.40)
Normal (≥11.0)	4 (13.80)	3 (16.70)	7 (14.90)
Total	**29 (100.00)**	**18 (100.00)**	**47 (100.00)**
Serum ferritin (µg/l)			
Deficient (<15)	20 (69.00)	13 (72.20)	33 (70.20)
Normal (≥15)	9 (31.00)	5 (27.80)	14 (29.80)
Total	**29 (100.00)**	**18 (100.00)**	**47 (100.00)**

F = frequency,% = percentage
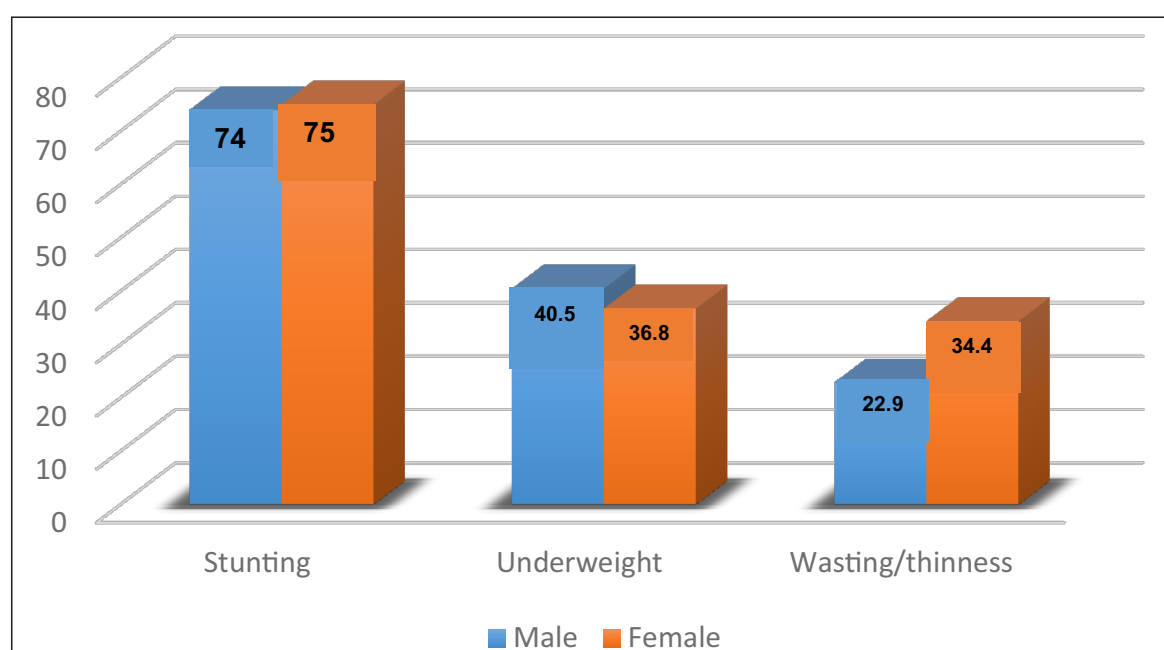
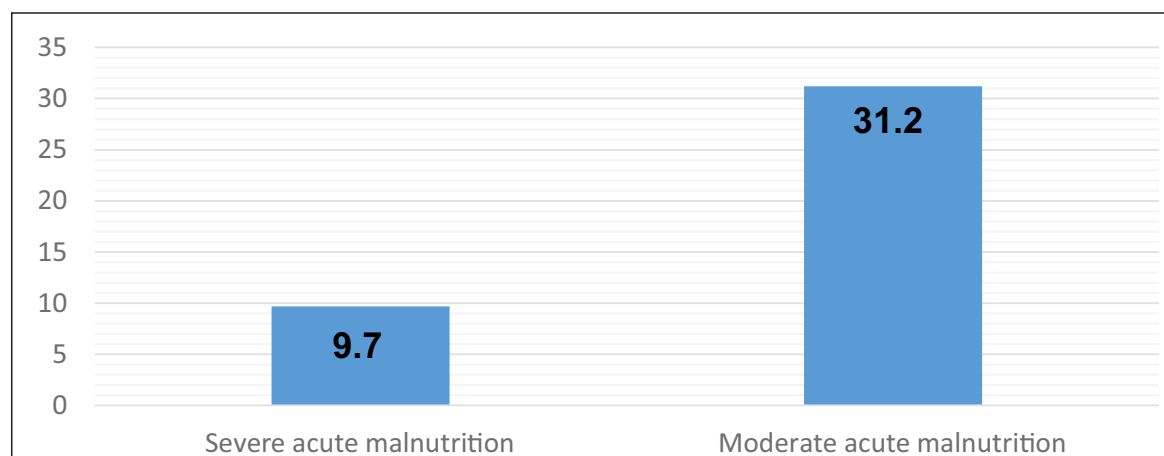**Fig 1:** Prevalence of stunting, underweight and wasting according to gender

Fig 2: Prevalence of severe and moderate acute malnutrition among the children

Table 3: Dietary pattern of the children

Variables	Frequency	Percentage
Frequency of skipped meals		
Daily	131	27.60
4-6 times/week	131	27.60
1-3 times/week	113	23.80
Never	99	20.90
Total	**474**	**100.00**
Meal a child usually skips		
Breakfast	71	15.00
Lunch	275	58.00
Dinner	29	6.10
None	99	20.90
Total	**474**	**100.00**
Reasons for skipping meals		
Not hungry at the moment	21	4.40
No food available	354	74.70
Not applicable	99	20.90
Total	**474**	**100.00**

DISCUSSION

This study assessed nutritional status of children (6-12years) in IDPs' camps in Plateau State, Nigeria. Displacement leaves negative socio economic footprints in millions of people worldwide and malnutrition is one of the major public health challenges especially those experiencing social crises (4). Findings showed a high prevalence of stunting, wasting and underweight among the IDP children. Moderate and severe acute malnutrition were also observed in a good number of the children. This corroborates with the result of a survey by (31) which showed a high prevalence of malnutrition among refugees and displaced children where 45.00% of children were underweight, 8.17% were severely wasted, and 45.00% suffered from stunting, indicating a chronic state of under-nutrition. Supporting this, study by (38) on displaced children in Edo State, Nigeria, showed malnutrition prevalence of 41.20% with wasting, underweight and stunting occurring in 0.04%, 11.20% and 39.20% of them respectively. Similarly, a study conducted by (17) showed that majority of the children in displacement camps in Sierra-Leone were severely stunted and underweight. A study (39) and (4) showed high prevalence of malnutrition (stunting and acute malnutrition) among children living in IDPs' camps in Uganda and Iraq respectively. According to WHO, malnutrition levels are often high among internally displaced children (32). It can therefore be deduced that malnutrition is a major problem among children in IDPs' camp all over the world, particularly in Africa.

Malnutrition can also be in form of a condition whereby insufficient micronutrients in individuals result in micronutrient deficiencies such as lack of important vitamins and minerals. High prevalence of anemia, vitamin A, calcium, zinc and iron deficiency were found among the children. This corroborates with the report of (33) which stated that anemia and deficiency of vitamin A were found among children in IDPs' camps in Ethiopia, Sudan, Bangladesh, Kenya, Nepal, Afghanistan, Tanzania and Iraq. According to Adedeji, Adebayo and Udo, children in IDPs' camps are exposed to poor feeding practices such as inadequate breastfeeding, offering the wrong food and not ensuring that the child gets adequate nutritious food (34). The food mostly served in IDPs' camps are usually more suitable for adults thereby denying children access to adequate and appropriate foods. Furthermore, children most times do not have access to the required micronutrients, vitamins and minerals required to meet their daily required nutritional intake (34). Supporting this, RNIS stated that even when general rations are distributed regularly to the IDPs, protein-energy malnutrition, micronutrient malnutrition or both may still appear (33).

Under a state of insecurity, parents of internally displaced children cannot work for a living. They, therefore, depend on food provided by the government and donor agencies which are usually insufficient and most of the time diverted by corrupt officials (1). Over seventy percent of the

children skipped meals, mostly lunch due to unavailability of food. Supporting this, a survey by (40) showed that eighty-eight percent of IDPs in Iraq reported skipping meals as a result of having food shortage in the previous six weeks. Additionally, (38) reported that in most internally displaced persons' camps in Borno Sate, there is hunger because food items meant for their feeding continuously disappear, leaving the IDPs helpless and hungry. Ignorance and difficult conditions of life in the camps were also likely to result in improper food habits by IDPs (36).

CONCLUSION

The study assessed the nutritional status of school-aged children in IDPs' camps in Plateau State. There was high prevalence of stunting, wasting and underweight amongst the children. High prevalence of severe and moderate acute malnutrition were recorded. Deficiency of micronutrients was recorded among a large proportion of the children. The poor nutritional status was attributed to the fact that majority (79.10%) of the children skipped meals especially due to unavailability of food to eat. These information from this study are needed to develop and carry out relevant interventions that will help to prevent and reduce the risks of malnutrition among the children.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made.
1. Nutrition education and introduction of fortified foods should be made available to IDPs by relevant bodies in order to decrease malnutrition among children.
2. State Emergency Management Agency and camp leaders should ensure that relief materials, especially food items, meant for IDPs are given to them so that they consume enough food to maintain proper nutritional status.

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