NIGERIAN JOURNAL OF PAEDIATRICS

VOLUME 53 | NUMBER 1 | JANUARY - MARCH 2026

https://www.njpaediatrics.com

PRINT: ISSN 0302-4660

ONLINE: ISSN 2814-2985

OFFICIAL JOURNAL OF THE PAEDIATRIC ASSOCIATION OF NIGERIA

ORIGINAL RESEARCH

Nigerian Journal of Paediatrics 2026 (March); Volume 53(1):28-38.
https://dx.doi.org/10.63270/njp.v53i1.2000046.

Pattern of Malnutrition and the Associated Factors Among Primary School Pupils in Ikenne Local Government Area, Ogun State, Nigeria

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Abstract

Background: Malnutrition is currently a major problem among school-age children in Nigeria, with studies reporting prevalences of over 20% and almost 10% for stunting and obesity, respectively. Adequate facts are required for evidence-based solutions to address this problem.

Objective: To determine the prevalence of malnutrition and its associated factors among primary school pupils in Ikenne Local Government Area (LGA), Ogun State, Nigeria.

Methods: This was a descriptive, cross-sectional study among 320 primary school pupils aged 6-12 years, selected through a multistage sampling technique. The study instrument was a purpose-developed, pretested, interviewer-administered questionnaire, while body weight and height were measured using a *Desco* weighing scale and stadiometer.

Results: The mean age of the participants was 8.6 ± 1.9 years, while 50.9% (163/320) were female. The study showed that 28.4%, 12.2%, 7.5%, 20.0% and 8.4% of the children were stunted, wasted, underweight, overweight and obese, respectively. Age (p = 0.016) and gender (p = 0.005) were significantly associated with underweight, while age was significantly associated with wasting, stunting, overweight and obesity (p = 0.001). Age was also a significant predictor of stunting (AOR = 0.538, 95% CI = 0.300-0.963 and 0.417, 0.203-0.859, respectively) and overweight (AOR = 0.357, 95% CI = 0.195-0.655 and 0.295, 0.121-0.720, respectively).

Conclusion: Malnutrition is common among pupils in Ikenne LGA of Nigeria and needs to be addressed. School-age children should be fed appropriately and encouraged to maintain regular physical activity to ensure a good nutritional status.

Keywords: Macronutrient deficiency, Obesity, Overnutrition, School-age, Stunting, Wasting.

Introduction

Malnutrition is the deficiency or excess, as well as the imbalance, in an individual's intake of nutrients.[1] In other words, malnutrition involves undernutrition and overnutrition.[1] This deficiency or excess of nutrients can be in terms of the macronutrients (carbohydrates, proteins and lipids), and/or the micronutrients (vitamins and minerals).[1,2] The categories of undernutrition include underweight (low weight for age), wasting (low weight for height), stunting (low height for age), and micronutrient deficiencies,[1]. In contrast, the categories of overnutrition include overweight and obesity.[1] Wasting usually represents acute malnutrition,[3] while stunting represents chronic malnutrition.[4] Underweight, on the other hand, can be a manifestation of acute and chronic malnutrition.[5]

Globally, about 45 million and 150 million children below five years were estimated to be wasted and stunted, respectively,[1] while about 37 million children below five years are either overweight or obese.[1] Low and middle-income countries (LMICs), especially in sub-Saharan Africa and South Asia, bear the greatest global burden of malnutrition.[5,6] Presently, most developed countries have controlled childhood undernutrition, while grappling with overnutrition. For instance, a study done among school-age children in Spain reported prevalences of 0.7%, 1% and 14.8% for underweight, stunting and obesity, respectively.[7] However, this is not the case in most LMICs. A study on malnutrition among school-age children in South Africa reported prevalences of 10%, 12% 18% and 24% for underweight, stunting, wasting/thinness, and overweight/obesity, respectively.[8] According to the Nigeria Demographic and Health Survey (2023-2024), about 40%, 27%, 8% and 1% of children under five years are stunted, underweight, wasted and overweight, respectively.[9] In fact, Nigeria currently has the second-highest burden of stunted children globally. [10]

Studies on malnutrition among primary school pupils in Nigeria have reported various prevalences for the different categories of malnutrition. A meta-analysis on undernutrition among school-age children in Nigeria revealed that the northwest region of the country recorded prevalences as high as 53.2% for stunting, and 36.9% for overweight.[11] A similar study carried out in Ondo State in southwest Nigeria reported prevalences of 20.7%, 19.4%, 5%, 11.4% and 0.4% for stunting, wasting, underweight, overweight, and obesity, respectively.[12] Also, another study in Ekiti State in southwest Nigeria, reported prevalences of 21.1%, 12.1%, 6.4%, 4.9% and 7.6% for stunting, wasting, underweight, overweight and obesity, respectively.[13] These figures highlight the "double burden of malnutrition", a situation existing in Nigeria and other LMICs in which the prevalence of overnutrition is on the rise even while undernutrition remains a major public health problem yet to be tackled.[14]

Malnutrition in children impairs physical and mental growth and development, which may be permanent depending on the age of the child, the duration, and severity of the malnutrition.[15–17] Malnutrition in children may also reduce immunity, making them more susceptible to recurrent preventable infections.[16] In addition, malnutrition has been identified as a direct or an underlying cause of about 45% of under-five mortality globally in LMICs.[6,18] Children require nutritious food for adequate growth and development.[19] Nutrition is also an integral part of the Sustainable Development Goals (SDGs), especially SDGs 2 and 3, which focus on zero hunger and health and well-being, respectively.[20] To address malnutrition among school children, data on the burden of this problem are required to proffer evidence-based solutions and

recommendations. A thorough literature search revealed little information on malnutrition among school-age children in Ogun State, Nigeria. Consequently, this study aimed to determine the prevalence of malnutrition and the associated factors of malnutrition among primary school pupils in Ikenne Local Government Area (LGA), Ogun State, Nigeria.

Methods

Study area and design

This study was carried out at Ikenne Local Government Area (LGA), in Ogun State, southwest Nigeria. It was a descriptive, cross-sectional study done between January and February 2025. Ikenne LGA is a semi-urban area made up of five towns, namely: Ikenne, Ilishan, Iperu, Irolu and Ogere. Ikenne LGA had an estimated population of 202,600 as of 2022. [21] There were 20 public and 25 private primary schools, making a total of 45 primary schools in the LGA.[22]

Ethical considerations

Ethical approval for the study was obtained from the Babcock University Health Research Ethics Committee (BUHREC), with approval number BUHREC 935/24. Informed consent was obtained from the parents of the pupils, and assent was obtained from the pupils before they were included in the study.

Inclusion and exclusion criteria

Pupils between the ages of 6 and 12 years who gave assent, and whose parents gave consent, were included in the study, while pupils who were sick during the period of data collection were excluded from the study.

Sample size determination

The sample size was calculated using Cochran's formula, with a confidence level of 95% and a 5% margin of error. A meta-analysis on undernutrition among school-age children in Nigeria reported an overall prevalence of 24.4% for underweight.[11] This was used as the prevalence to calculate the sample size for this study, yielding a sample of 284. A 10% margin was added, increasing the sample size to 316, but it was increased to 320 in the field.

Sampling technique

A multistage sampling technique was used to select the study participants, with simple random sampling (balloting) used to select 10 public and 10 private primary schools, for a total of 20 schools. In each of the schools, stratification was performed according to the classes (primary one to primary six). Then, stratified random sampling was used to select 16 pupils from each of the 20 schools. The 16 pupils in each school were selected by balloting: four classes were chosen, with three pupils each, while the other two classes had two pupils each.

Study instruments and the method of data collection

The study instrument was a pretested questionnaire that was purpose-developed for the study. The instrument was interviewer-administered and used to record participants' socio-demographic characteristics and anthropometric measurements (weight in kilograms and height in centimetres, measured with a stadiometer). The measuring instrument was a *Desco* mechanical weighing scale and stadiometer (manufactured by *Desco* Medicals, India; model number: MHS HSHA 141). The measuring instrument was standardised daily before the commencement of data collection to eliminate errors. The weight was measured to the nearest kg, while the height was measured to the nearest cm.

Data management

The outcome variables for this study were the prevalence of underweight, wasting, stunting, overweight, and obesity among the respondents.

The WHO AnthroPlus software was used to determine Z-scores for weight-for-age (WAZ) for underweight, height-for-age (HAZ) for stunting, and BMI-for-age (BAZ) for wasting, overweight, and obesity. The Z scores were interpreted as follows:

Underweight = WAZ < -2, Wasting/Thinness = BAZ < -2, Stunting = HAZ < -2, Overweight = BAZ > +1, and Obesity = BAZ > +2.

The data collected were analysed using IBM SPSS version 25. Univariate analysis was used to report the prevalence of the various indices of malnutrition (underweight, wasting, stunting, overweight, and obesity) among participants. Bivariate analysis (using the Chi-Square test) was used to assess associations with indices of malnutrition. The chosen confidence level was 95%, while p-values less than 5% (0.05) were considered statistically significant.

Results

Table I shows that almost half of the respondents were aged 8-10 years, while slightly more than half were female. Also, almost half of the respondents were from families with 1–3 children, while more than one-third were second-born children in their families.

Table I: Socio-demographic characteristics

Variable	Frequency (N = 320)	Percentage
Age (Years)		
6-7	109	34.1
8-10	153	47.8
11-12	58	18.1
Gender		
Male	157	49.1
Female	163	50.9
Class/Grade		
Primary 1	91	28.4
Primary 2	56	17.5
Primary 3	45	14
Primary 4	52	16.3
Primary 5	54	16.9
Primary 6	22	6.9
Number of children in the family		
1 - 3	151	47.2
4 - 6	143	44.7
7 - 9	26	8.1
Birth order		
1st	69	21.6
2nd	116	36.2
3rd	73	22.8
4th	16	5
≥5th	46	14.4

Table II shows that almost one-tenth of the respondents were underweight, more than a quarter were stunted, while more than one-tenth, one-fifth, and almost one-tenth were wasted/thin, overweight, and obese, respectively. In Table III, the pupils within the ages of 8 – 10 years had the highest percentage of underweight compared to the other age categories, and the association was statistically significant. Females had a statistically significantly higher percentage of underweight than males. The highest percentage of stunting was observed among participants within the ages of 11 – 12 years, and the association was statistically significant. In terms of the BMI for age, participants within the ages of 11 – 12 years had the highest percentage of wasting; participants within the ages of 6 – 7 years had the highest percentage of overweight; while participants within the ages of 8 – 10 years had the highest percentage of obesity, and the association was also statistically significant.

Table II: Distribution of children by Weight for Age, Height for Age and BMI for Age

Z Score	Frequency (n = 320)	Percentage	Interpretation
Weight for Age			
< -2	24	7.5	Underweight
-2 to +2	287	89.7	Normal
> +2	9	2.8	Overweight
Total	320	100	Total
Height for Age			
< -2	91	28.4	Stunted
-2 to 2	208	65	Normal
> +2	21	6.6	Taller than expected
Total	320	100	Total
BMI for Age			
< -2	39	12.2	Wasted/thin
-2 to +1	190	59.4	Normal
+1 to +2	64	20	Overweight
> +2	27	8.4	Obese
Total	320	100	Total

Table IV shows that age was a significant predictor of stunting and overweight among the study participants. Using children within the 6-7 years age group as the reference, children within the 8-10 years age group had 46.2% less the odds of stunting (AOR = 0.538) and 64.3% less the odds of overweight (AOR = 0.357); while participants within the 11 – 12 years age group had 58.3% less the odds of stunting (AOR = 0.417) and 70.5% less the odds of overweight (AOR = 0.295).

Discussion

This study revealed that the majority of pupils in Ikenne LGA (89.7%) had a normal weight for age. In comparison, 7.5% were underweight, showing the existence of underweight as an index of malnutrition among the participants. The

prevalence of underweight in this study was close to the prevalence of underweight reported by similar Nigerian studies done in Ondo and Ekiti States (5% and 6.4%, respectively), also in southwest Nigeria.[12,13] The similarity may be because all the states involved in these studies (Ogun, Ondo, and Ekiti) are in the same geopolitical zones in Nigeria.

Table III: Factors associated with malnutrition

Weight for Age

Variable	Underweight	Normal	Overweight	Total f (%)	X^2 value	d.f	p-value
	f (%)	f (%)	f (%)				
Age (Years)							
6-7	6 (5.5)	100 (91.7)	3 (2.8)	109 (100)	12.172	4	0.016
8-10	18 (11.8)	129 (84.3)	6 (3.9)	153 (100)			
11-12	0 (0.0)	58 (100.0)	0 (0.0)	58 (100)			
Total	24 (7.5)	287 (89.7)	9 (2.8)	320 (100)			
Gender							
Male	9 (5.7)	148 (94.3)	0 (0.0)	157 (100)	10.673	2	0.005
Female	15 (9.2)	139 (85.3)	9 (5.5)	163 (100)			
Total	24 (7.5)	287 (89.7)	9 (2.8)	320 (100)			

Height for Age

Variable	Stunted	Normal	Taller than expected	Total f (%)	X^2 value	d.f	p-value
	f (%)	f (%)	f (%)				
Age (Years)							
6-7	22 (20.2)	72 (66.1)	15 (13.8)	109 (100)	18.38	4	0.001
8-10	48 (31.4)	99 (64.7)	6 (3.9)	153 (100)			
11-12	21 (36.2)	37 (63.8)	0 (0.0)	58 (100)			
Total	91 (28.4)	208 (65.0)	21 (6.6)	320 (100)			

BMI for Age

Variable	Normal	Overweight	Obese	Wasted or Thin	Total f (%)	d.f	p-value
	f (%)	f (%)	f (%)	f (%)			
Age (Years)							
6-7	55 (50.5)	35 (32.1)	10 (9.2)	9 (8.3)	109 (100.0)	6	0.001
8-10	93 (60.8)	22 (14.4)	17 (11.1)	21 (13.7)	153 (100.0)		
11-12	42 (72.4)	7 (12.1)	0 (0.0)	9 (15.5)	58 (100.0)		
Total	190 (59.4)	64 (20.0)	27 (8.4)	39 (12.2)	320 (100.0)		

Table IV: Predictors of malnutrition

Age Category	Adjusted Odds Ratio (AOR)	95% Confidence Interval		p-value
		Lower limit	Upper Limit	
Height for Age (Stunting)				
6 – 7 years (ref)	1			
8 – 10 years	0.538	0.3	0.963	0.037
11 – 12 years	0.417	0.203	0.859	0.018
BMI for Age (Overweight)				
6 – 7 years (ref)	1			
8 – 10 years	0.357	0.195	0.655	< 0.001
11 – 12 years	0.295	0.121	0.72	0.007

However, the prevalence of underweight in this study was much lower than the prevalence of underweight in the NDHS 2023-24 report (27%);[9] a difference that may have occurred because the NDHS was a nationwide study, while this study was carried out in only one local government area (LGA). The prevalence of underweight in this study was much lower than the prevalence of underweight reported in northwest Nigeria (36.9%),[11]. In comparison, it was similar to the prevalence of underweight reported in a South African study (10%).[8] Northern Nigeria currently bears a higher burden of malnutrition than southern Nigeria, while Nigeria and South Africa are both LMICs. On the other hand, the prevalence of underweight in this study was much higher than the prevalence of underweight reported in the Spanish study (0.7%). [7] It is important to note that Spain is a high-income country (HIC) with a higher level of affluence.

The present study reported a prevalence of 28.4% for stunting, with the highest prevalence among older participants (11–12 years). This prevalence reflects the burden of stunting in Nigeria and most other LMICs. Stunting is a manifestation of chronic malnutrition that affects an individual's height. Stunting may also be irreversible if it is severe or occurs in such a way that, even if the individual grows taller after the episode, the optimal height that would have been attained if there had been no stunting at all may not be reached. Of all the indices of malnutrition, stunting in particular has long-term complications, including a narrow pelvis, which may result in obstructed labour in females.[23]

The prevalence of stunting in this study is slightly higher than the rates reported in Ondo State (20.7%) [12] and Ekiti State (21.1%) [13], probably due to differences in the magnitude of the study areas (LGA vs State). Expectedly, the prevalence of stunting in the present study is much lower than the figure reported in the NDHS 2023-24 (40%), probably because NDHS is a national study and because the burden of stunting varies across Nigeria's various geopolitical zones. This difference also manifested in the northern Nigeria study, where the prevalence of stunting was 53.2%.[11] Furthermore, the stunting prevalence in this study is higher than the prevalence of 12% reported in South Africa,[8] but much lower than the stunting prevalence in the Spanish study (1%).[7]

The present study also found a prevalence of wasting of 12.2%. This implies that more than one-tenth of the participants were acutely malnourished. In malnutrition, body weight is usually affected before height. The effect of the body weight before the height may explain why the pupils in the 11-12 years age group had the

highest prevalence of wasting in this study, because they are expected to be taller than the pupils in the younger age groups (a low body weight in an individual with a normal height increases the risk of wasting). The prevalence of wasting in this study was very similar to the prevalence of wasting in the Ekiti State study (12.1%),[12] possibly due to similarities in the socio-demographic characteristics of the participants in both studies. The prevalence of wasting in the present study is lower than the figure reported in Ondo State (19.4%), [12] probably due to the time difference between the studies. However, the prevalence of wasting in this study is slightly higher than the prevalence of wasting in the NDHS 2023-24 report (8%).[9] The prevalence of wasting in this study is lower than the prevalence reported in the South African study (18%).[8]

One-fifth of the children in the present study were overweight, while almost one-tenth were obese. This is a cause for concern. In recent times, the prevalence of overweight and obesity in most LMICs has gradually been on the rise among children and adults, even while malnutrition remains a major challenge, especially among children, buttressing the "double burden of malnutrition being experienced in most LMICs". This trend has been attributed to a shift from the consumption of natural, nutrient-dense foods to the consumption of processed, energy-dense foods containing high amounts of sugar and fat, as well as to less physical activity (sedentariness).[24,25] Childhood obesity may also result in long-term complications like hypertension, type 2 diabetes mellitus, fatty liver disease, dyslipidaemia, joint problems, and respiratory and reproductive system disorders.[26,27]

The prevalence of overweight in this study differed from that reported in the study conducted in Ekiti State (4.9%). [13] However, the prevalence of obesity in the present study is similar to the prevalence of obesity reported by the same comparison study (7.6%).[13] The prevalences of overweight and obesity in the present study are higher than the reports in Ondo State (11.4% and 0.4%, respectively). 12 In comparison, the prevalence of overweight in this study is much higher than the prevalence of overweight reported in the NDHS 2023-24 report (1%).[9] The combined prevalence of overweight and obesity in this study (28.4%) is similar to the combined prevalence of overweight and obesity in the South African study (24%). 8 In comparison, the prevalence of obesity in this study was less than the prevalence of obesity in the Spanish study (14.8%).[7]

The age and gender of the participants in this study were significantly associated with underweight (weight-for-age). Similarly, age was significantly associated with stunting (height-for-age). In addition, the age of the respondents was also significantly associated with wasting (BMI for age), overweight (BMI for age) and obesity (BMI for age). Furthermore, the age of the respondents was a significant predictor of stunting (height-for-age) and overweight (BMI-for-age). These results are similar to findings from related studies on the factors contributing to malnutrition among primary school pupils conducted in Nigeria, [28,29] Ethiopia, [30] and Afghanistan. [31]

Strengths and limitations

This study provides reliable and valuable data on the prevalence, associated factors and predictors of all the indices of malnutrition among school-age children in Ikenne LGA of Ogun State. However, it may have limited generalizability, as it was conducted in a single LGA. Also, it was a cross-sectional study; hence, temporality may not be reliably established.

Conclusion

This study shows that undernutrition, coexisting with overnutrition, is a current problem among primary school pupils in Ikenne LGA of Ogun State. These findings corroborate the suspicion of a double burden of malnutrition among school-age children in Nigeria, just like in most other LMICs. All efforts should be made to nip these problems in the bud and ensure that school-age children grow and develop into healthy, productive adults. School-age children need to be fed appropriately to achieve and maintain proper nutritional indices for growth and development. Also, pupils should regularly engage in appropriate physical activities for their age, while reducing sedentary activities to avoid overweight and obesity.

Acknowledgement: The authors acknowledge the pupils who participated in this study and their parents, as well as the school heads and the teachers in the participating schools.

Authors' Contributions: NEO, EHN, SA, KO, EI and JO conceived and designed the study. EHN, SA, KO, EI and JO did the literature review and data collection while NEO, EHN, SA, KO, EI and JO did the data analysis and interpretation. NEO drafted the manuscript. All authors revised the draft for sound intellectual content and approved the final version.

Conflicts of Interest: None declared.

Funding support: The authors did not receive any financial support for the research or for the preparation of the manuscript.

Accepted for publication: 16th March 2026.

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