

## **Nutrient Adequacy and Prevalence of Stunting Among School Aged Children in Three Local Government Areas of Oyo State**

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### **Abstract**

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**S**tunting is a condition of impaired growth experienced by children, primarily in developing countries, due to poor nutrition and micronutrient deficiencies. This condition has adverse effects on children's cognitive abilities and educational performance. The research aims to determine the nutrient adequacy and prevalence of stunting among primary school pupils in three local government areas of Oyo state. The study was descriptive and cross-sectional in design. A simple random sampling technique was used to select the sample size of 1,200 pupils (539 males and 661 females). Anthropometric measurements were done using standard procedures. Information on dietary intake was collected using 24-hours dietary recall and Nutrient intake was derived. The results show the prevalence of stunting (56.9%) was very high and most nutrients show a high percentage of inadequate intake. This indicates malnutrition in the study area, highlighting the need for targeted nutritional interventions by both governmental and non-governmental organisations.

**Keywords:** *Nutrient Adequacy, Prevalence, Stunting, School age children, Oyo-state*

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## **Background to the Study**

Nutrition is an important factor for child growth and lower mortality rates (WHO, 2020). It is often described as the provision of the materials necessary (in the form of food) to support life to cells and organisms. Many common health problems can be prevented through good nutrition. Nutrition is an important avenue through which the indicators of good health can be achieved. This is because proper nutrition promotes a good nutritional status, thus satisfying the requirements for good physical health (Adamu *et al.*, 2012). Malnutrition has been shown to be a significant concern for children. Undernutrition among children encompasses stunting, wasting, and deficiencies of essential vitamins and minerals (collectively referred to as micronutrients) as one form of the condition known as malnutrition (Black *et al.*, 2008). Malnutrition in Nigeria is progressing at alarming rate and its case has been consistently reported to be high among the primary school children; thus, whether the prevalence of malnutrition is similarly high among primary school children in this area or not is not clear (Adamu *et al.*, 2012). Poor dietary intake with some other factors has contributed to high prevalence of malnutrition among school children (Megersa *et al.*, 2021).

Research has revealed that nutritional deficiencies have a negative effect on learning behaviour in mice as far back as 1951. It has also been reported that malnutrition among pupils is associated with absenteeism and poor school performance (poor cognitive ability) (Barclay, 2008). Malnutrition has also been associated with poor immunity and therefore increased rate of infections and severity of other common infection which reduces resistance to susceptibility to illness (Adamu *et al.*, 2012). This study is therefore aimed at determining the nutrient adequacy and prevalence of stunting among primary school pupils in three local government areas of Oyo state.

## **Materials and Methods**

### **Study Area**

The study was carried out in three local governments: Iseyin, Itesiwaju and Kajola local government areas of Oyo state. The predominant occupation of the people includes farming, artisanship, trading and civil servants.

### **Study Design**

The study was a descriptive cross-sectional survey involving primary school children in three local government area of Oyo state,

### **Study Population**

The study population comprises of 1200 primary school children in the three local government area of Oyo state. Multistage Sampling techniques was used with first stage of sampling involved selection of the three local government areas by balloting and out of which four (4) wards were randomly picked from each local government area and two schools were selected from each ward. i.e. Eight schools were selected from each of the three Local Government which result to total of 24 schools. Simple random selection technique was used to select boys and girls of ages between 8 to 16 years from each school using table of random number from class four to six which gives us 400 respondents from each local government area.

### Sample Size and Sampling Techniques

The subjects were primary school boys and girls age, between 8 and 16 years.

The minimum sample size of 395 was derived using statistical sample size formular:

$$n = \frac{z^2 pq}{D^2}$$

$z$  is the  $z$  score value at 95% confidence interval (CI) = 1.96

$p$  is the prevalence of malnutrition among rural school age children in Ebonyi state, Nigeria (Ene-Obong *et al*, 2012)

$$q = 1 - p$$

$$D = \text{Desired Precision} = 0.05 \text{ (5\%)}$$

$$p = 43\% = 0.43$$

$$1 - p = 1 - 0.43 = 0.57$$

$$N = \frac{1.96^2(0.43)(0.57)}{(0.05^2)} = 376$$

Five percent non-response rate was added. Therefore, the minimum sample size was  $376 + 19 = 395$ . This was approximated to 400 respondents from each local government. Therefore, 1200 pupils from the three local governments were considered.

### Data Collection

A semi-structured questionnaire was used to collect information about the socio-demographic data and 24 hours dietary recall

### Anthropometric Measurements

The heights of the pupils were determined using a stadiometer. Each participant stood erect and barefooted against the wall, with the heels, buttocks and back touching the wall and the value was recorded to the nearest metre. The weights were measured to the nearest 0.5kg with a bathroom scale (Hana, Made in China) with children wearing only light clothing without shoe. height was measured to the nearest 0.5cm with a wooden stadiometer placed on a flat surface. The child stood erect without his or her shoes and his eyes looking horizontally and the feet together on horizontal level before reading was taking. The data on weight, height and age of the children were used to compute Z-score and compared with national centre for health statistics (NCHS) growth standards. Wasting was defined as weight for height Z-Score below -2 standard deviation (-2 SD) of the mean of NCHS standard. Stunting was defined as height-for-age Z-score below minus two standard deviation (-2SD) of the mean of NCHS, National Centre for Health Statistics standard. Underweight was defined as weight-for-age Z-score below minus two standard deviation (-2SD) of the mean of NCHS standard.

### Data Presentation and Analysis

The height and weight measurements were analyzed using the WHO Anthro-plus 2007 software to classify the results based on HAZ score, WAZ and BMI for age z scores (BAZ). This was used to classify the nutritional status of the children into stunting, underweight and

wasting, respectively. Data collected were analysed using the statistical package for social science (SPSS, version 16.0). Total Dietary Assessment (TDA) software was used to analyse the information obtained from the 24-hour dietary recall in order to access their nutrient intake and determine the adequacy of the nutrients of the subjects. The result was categorised into inadequate (<80%), adequate (between 80 and 120%) and excess (>120%) using goal percentile. Results were presented using descriptive statistics (mean, percentile, standard deviation) and inferential statistic (Chi-square test and student's-test).

## Results

### Bio-Data and Socio-Economic Characteristics of the Respondents:

This study included 1200 school aged children.

The bio-data and socio-economic characteristics of the respondents are presented in Table 1. Only 45% of the respondents were males, while females were (55%)

**Table 1:** Socio-Demographic Characteristics of the School Children

Variable	Frequency (n=1200)	Percentage (%)
<b>Gender</b>		
Male	539	45
Female	661	55
<b>Ethnic</b>		
Yoruba	1160	96.7
Hausa	16	1.3
Igbo	19	1.6
Others	4	4
<b>Class</b>		
Primary 4	435	36.3
Primary 5	432	36
Primary 6	333	27.8
<b>Fathers Occupation</b>		
Farming	239	19.9
Trading	359	29.9
civil servant	81	6.8
Artisan	446	37.2
Fisherman	5	0.4
others specify	70	5.9
<b>Mothers occupation</b>		
Farming	175	14.6
Trading	625	52.1
civil servant	37	3.1
Artisan	339	28.3
Fisherman	2	0.2
others specify	21	1.7
<b>Father's Educational Level</b>		
Primary	435	36.3
Secondary	534	44.5
Tertiary	75	6.2
None	156	13
<b>Mothers' Education Level</b>		
Primary	551	45.9
Secondary	327	27.3
Tertiary	33	2.8
None	289	24.1
<b>Source of Water</b>		
pond/lake	7	0.6
spring/river	28	2.3
Well	888	74
bore hole	207	17.3
pipe borne water	11	0.9
rain water harvest	59	5

The data from the Table 1 shows that 44.5% of the fathers have secondary education, while 36.3% have primary education, with only 6.2% attaining tertiary education. In contrast, mothers have a higher proportion of primary education at 45.9%, but only 27.3% have secondary education, and a mere 2.8% have tertiary education. Overall, fathers tend to have higher educational attainment compared to mothers.

**Table 2:** Respondent distribution by Height, Weight and Age

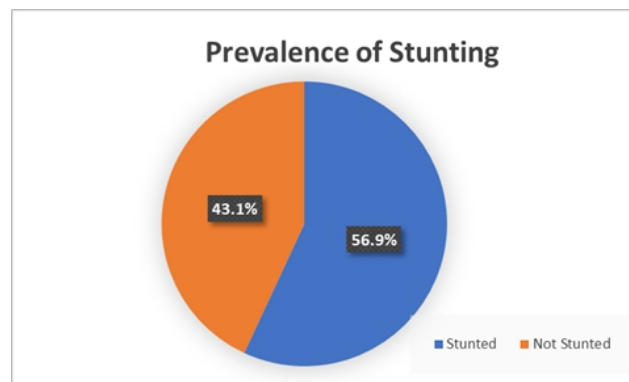
HEIGHT(cm)	Male		Female		Total	
	N (539)	(%)	N (661)	(%)	N (1200)	(%)
< 130	215	39.9	278	42.1	493	41.1
130 – 140	239	44.3	270	40.8	509	42.4
>140 – 150	70	13	101	15.3	171	14.3
> 150	15	2.8	12	1.8	27	2.3
Mean (SD)	<b>131.45 (±10.72)</b>		<b>131.6 (±9.59)</b>		<b>131.54 (±10.11)</b>	
<b>Weight(Kg)</b>						
< 20	0	0	4	0.6	4	0.3
20 – 30	415	77	506	76.6	921	76.8
>30 – 40	98	18.2	130	19.7	228	19
> 40	26	4.8	21	3.2	47	3.9
Mean (SD)	<b>29.23(±5.86)</b>		<b>28.62 (±5.56)</b>		<b>28.9 (±5.71)</b>	
<b>Age(Year)</b>						
8 - 10	200	37.1	291	44	491	40.9
>10 -12	151	28	161	24.4	312	26
>12 – 14	127	23.6	150	22.7	277	23.1
> 14	61	11.3	59	8.9	120	10
Mean(SD)	<b>11.57 (±2.13)</b>		<b>11.32 (±2.00)</b>		<b>11.44 (±2.07)</b>	

Table 2 above shows that the mean age, weight, and height of the respondents were 11.44 (± 2.09) year, 28.9 (±5.91) kilogram, and 131.54 (± 10.11) centimetre respectively.

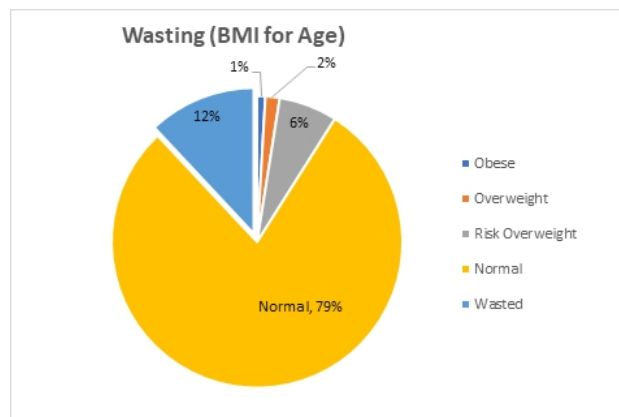
**Table 3:** Percentage of stunting, underweight and wasting among the school children

Classification (SD)	Male		Female		Total	
	N(539)	(%)	N(661)	(%)	N(1200)	(%)
<b>Wasting (BMI for Age)</b>						
Obese (>3)	8	1.5	3	0.5	11	0.9
Overweight (≥ 2 ≤ 3)	10	1.9	9	1.4	19	1.6
Risk Overweight(≥ 1 < 2)	41	7.6	37	5.6	78	6.5
Normal (≥ -2 < 1)	416	77.2	532	80.5	948	79
Wasted (≥ -3 < -2)	64	11.9	80	12.1	144	12
<b>Stunting (Height for Age)</b>						
Tall (> 3)	0	0	2	0.3	2	0.2
Normal (≥ -2 ≤ 3)	203	37.7	312	47.2	515	42.9
Stunted(≥ -3 < -2)	192	35.6	169	25.6	361	30.1
Severely Stunted (< -3)	144	26.7	178	26.9	322	26.8
<b>Underweight (Weight for Age)</b>						
Underweight (≥ -3 < -2)	8	4	19	6.5	27	5.5
Severely Underweight (< -3)	6	3	9	3.1	15	3.1
Normal (>-2)	186	93	263	90.4	449	91.4
	p>0.05		p>0.05		p>0.05	

The anthropometric results in Table 3 indicate that 26.8% of the respondents were severely stunted, and 30.1% were stunted according to the WHO growth standards. Thus, 56.9% of the sample was stunted, including those who were severely stunted, as shown in Fig. 1. The results further show that more girls (26.9%) than boys (26.7%) were severely stunted (WHO Growth Standard Module, 2008). The study analyzed the BMI-for-age data, as shown in Table 3, finding that 79% of respondents' weights were normal, with 12% wasted and the remaining 9% overweight (6% at risk of overweight, 2% overweight, and 1% obese). Using age-for-weight data in Table 3 above, 8.4% of the respondents were classified as low weight-for-age (underweight), and only 9.4% of the girls and 7.0% of the boys were underweight, including severely underweight pupils ( $p > 0.05$ ). This implies that there is a significant difference in the level of underweight between the two genders.



**Fig 1:** Prevalence of stunting among school-aged children



**Fig 2:** Wasting (BMI for Age) among School- Aged children

Figure 1 and 2 indicates the prevalence of stunting and wasting respectively among the school children. Analysis of the figure indicate that 8.4% were underweight.

**Table 4:** Nutrient intake among Respondents

Nutrient	Inadequate		Adequate		Excess	
	Frequency	%	Frequency	%	Frequency	%
Cal	1092	91	84	7	24	2
Prot (g)	780	65	300	25	120	10
Vit A (RE)	900	75	144	12	156	13
Vit C (mg)	1188	99	0	0	12	1
VitB12(mcg)	720	60	420	35	60	5
Rib B2 (mg)	1032	86	156	13	12	1
Calc (mg)	1200	100	0	0	0	0
Fat (g)	1200	100	0	0	0	0
Phos (mg)	1140	95	60	5	0	0
Iron (mg)	972	81	168	14	60	5

From the data gathered and analysed from the respondents using 24 hours dietary recall as shown in table 4 above, majority of the respondent had inadequate nutrient intake which implies that the 24 hours dietary recall data indicated inadequate intake of all the nutrients. Fewer percentages of the pupils had adequate Vitamin B12, protein and iron with 35%, 25% and 14% respectively. However, calcium, fat and vitamin C are the least nutrients took.

### Discussion of Findings

The 56.9% prevalence of stunting reported in this study is at variance with 27.7% reported by Ejekwu et al, (2012) in the study carried out in Enugu. However, there is a higher prevalence of stunting among male pupils than female pupils who participated in this study, which is consistent with the results obtained by Fetuga et al. (2011) in a study conducted to determine the nutritional status of primary school children in Shagamu local government area. This finding supports Fetuga et al. (2011) and Olanipekun et al. (2012), as well as the study carried out in Ibadan among pupils aged 5-10 years attending private and public schools in Ibadan South West local government areas.

However, it contradicts findings that indicated female respondents had a higher prevalence of underweight and wasting, where thinness was reported to be higher among boys (Olanipekun et al., 2012). Only a few pupils were overweight and obese (1.9% and 1.4% for males; 1.5% and 0.5% for females, respectively). Overweight and obesity rates were also found to be similar in Mangalore City, India, and rural QwaQwa, South Africa (Oldewage-Theron et al., 2010). Moreover, the prevalence of overweight is lower in the study area (1.6%) compared with that of rural QwaQwa, which contradicts the result that indicates a higher prevalence of overweight among girls (15.7%) than boys (8.3%). However, it correlates with findings indicating that malnutrition was found in both sexes. The study in QwaQwa also revealed that the prevalence of stunting was 4.1%, which is lower compared with the result here that showed 56.9% of the pupils were stunted. The prevalence of wasting in QwaQwa was lower (7.0%) than the result from this study (12.0%).



From the study carried out by Ijarotimi and Odeyemi (2005), the BMI-for-age Z-score showed that 13.9% of the children were obese, which is higher than the result of the present study that revealed a prevalence of obesity at 0.9%. Additionally, pupils with normal nutritional status constituted 39.6%, which is lower than the result from the study carried out in Oke Ogun, Oyo State, which showed that 42.9% of the pupils were normal. In Ijarotimi and Odeyemi's study, 46.5% of the pupils were underweight, which is higher than the result of the present study. In a study carried out among school children aged 5-14 years in Nairobi, it was recorded that the prevalence of stunting among these children was 35%, which is lower than the 56.9% prevalence reported in this study. The nutrient intake of the respondents is very low. The findings from this study show that 7% and 25% of the respondents have adequate nutrient intake in calories and protein, respectively, which contradicts the findings of the study carried out by Akinlade et al. (2020) in Lagos State. This study shows that the pupils have inadequate intakes of some micronutrients such as vitamin A, vitamin C, calcium, phosphorus, and fat, which aligns with the study conducted by Obichukwu et al. (2024) in an urban community in Southeast Nigeria.

### **Conclusion**

The study shows that malnutrition persists among school-age children in the study area. Despite past research and relevant recommendations on the need to improve the nutritional status of children, who form a major proportion of the world population, the prevalence of stunting is increasing. It was also discovered that most of the respondents' parents were not educated, which could have affected their nutritional knowledge and, consequently, impacted the nutritional status of the children. Our research identifies several areas for improvement; nutrition and health education programs should be carried out periodically in various basic schools in this area, and these should be incorporated into the educational curricula.

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