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# Weight And Height Status Of Primary School Children In Obio-Akpor Local Government Area Of River State, Nigeria.

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***Abstract***
***Background:***
***Prevelance of malnutrition and risk factors***
***Aim:***
*The objective of this study was to determine the prevalence of underweight, stunting and thinness among children in Obio-Akpor primary schools and identify risk factors for malnutrition.*
***Subjects and Methods:***
*It was a descriptive cross-sectional study of 367 children conducted in Obio/Akpor LGA of Rivers, south-south Nigeria between September and November 2016. The physical growth of the pupils was classified as stunting, underweight and thinness using height for age Z- score,*
*weight for age Z-score and BMI for age Z- score below 2 standard deviation of the reference median respectively, in the World Health Organization reference standard.*
*Data was analyzed using Statistical Software for Social Sciences version 17.0 (Chicago IL, USA). p value of 0.05 was regarded as statistically significant.*
***Results:***
*Fourteen out of 275 children (WAZ was not calculated for children >10) were underweight (5.1%), 42/367 were stunted (11.4%) and 38/367 were thin (10.4%). There was a positive correlation recorded between stunting, underweight and age.*
***Conclusion:***
*The high prevalence of thinness observed in this study requires comprehensive public health action. A comprehensive health education programme focusing on proper nutrition through the introduction of school meals should be carried out.*
***Keywords:*** *Nutritional status and Children.*

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## I. Introduction

Nutritional status is one of the indicators of the quality of the physical and mental development of the school-aged child[1] Physical growth assessment is one of the acceptable tools for assessing a child's nutritional state.[2] Physical growth not only illustrates the individual's nutritional status, but also directly reflects the socioeconomic status of the family, social well- being of the community as well as the efficiency of the healthcare system, and the influence of the surrounding environment.[3] One of the global health issues facing developing nations today is undernutrition.[4] Malnutrition accounts for over half of child deaths in many developing countries and affects a child's physical and mental development.[5] Stunting and anaemia indicate chronic malnutrition.

Anthropometric measurements remain the most practical means for the assessment of the nutritional status of school children. The use of appropriate anthropometric indicators helps identify the nature and extent of energy-related protein malnutrition in the community.[6]

In a study by Acham *et al* [7] in Uganda, an assessment of school children aged 9-15 years in 2006-2007 revealed that 8.7%, 13% and 10.1% were stunted, underweight and thin respectively. This is compared to a Nigeria study by Adefioye *et al*[8] among 304 pupils aged 1-15 year old; 17.0% of subjects were below the third percentile for weight (wasting) and 14.0% were below the third percentile for height (stunted).

This study would help determine the prevalence of underweight, stunting and thinness in children at Obio-Akpor elementary schools. In addition, it would identify risk factors for malnutrition. It would also draw

attention to the impact of malnutrition as an important aspect of school health, and to the corresponding importance of effective programs designed to improve the health, hygiene and nutrition of school-age children.

## II. Subjects And Methods

This was a cross-sectional study. The study was carried out in primary schools located in Obio/ Akpor Local Government Area of Rivers, South-south of Nigeria between September and November 2016.

The approval of the Ethics Committee of University of Port Harcourt Teaching Hospital was obtained before the commencement of the study. Notification and permission to carry out the study was obtained from the Rivers State Ministry of Education. Written consent was also obtained from the parents. The study population consisted of children attending private and public primary schools in Obio-Akpor LGA, Rivers state. The body weight and height of the pupils were determined using a weighing scale and height pole respectively.

Fifteen out of 142 and 4 out of 24 of government approved schools in the urban and rural areas of the community were randomly selected. A multi-stage sampling technique was used to select 367 pupils who were studied.

**Weight measurement**

Children were weighed using Health scale (Ocean Medical, England) and read off to the nearest 100g (0.1kg). The Scale was adjusted to zero prior to each measurement and calibrated using a known weight monthly. Pupils were weighed in their schools with minimal clothing.

**Height measurement**

For measurement of height, the subject had to stand straight on level floor, with buttocks, shoulders and back of the head touching the wall, with the heels flat and together, shoulder relaxed and arms hanging down, the head erect with eyes looking straight forward and the lower border of the orbit in line with the external auditory meatus (Frankfurt plane). The headpiece, a metal bar was lowered gently, pressing down the hair and height was measured.

**Anthropometric assessment**

The weight for age, height for age and body- mass index for age *Z*-scores of the subjects were determined using the World Health Organization (WHO) International Reference Standards.[9] Underweight, stunting and thinness were defined as *Z*-scores ≤2 SD of weight-for-age, height-for-age and BMI-for-age respectively.

The pupils were stratified into socio-economic classes (I-V) based on Oyedeji classification.[10]

**Data analysis**

Data was entered using the Microsoft Excel software and analyzed using version 17.0 of the Statistical Package for Social Scientific software package (SPSS Inc, Chicago, IL). Anthropometric indices, weight-for-age z scores, height for age Z score and Body-mass-index-for-age Z scores, were calculated using WHO Authro Plus software. The potential influence of place of residence and other socio- demographic variables on nutritional status were tested using multivariate logistic regression. A p-value of $< 0.05$ was considered as statistically significant.

## III. Results

**General characteristics**

Three hundred and eighty four pupils were recruited into the study; 374 (98.4%) completed their questionnaires. A total of 17 were excluded because of incomplete data while 367 questionnaires were analyzed.

The socio-demographic characteristic of the study population is shown in Table I.

Out of 367 children studied 138 (37.6%) were males and 229 (62.4%) were females giving male: female ratio of 1: 1.6. The children were aged 5 to 12 years with mean age of 8.95±1.96 years. One hundred and eighty four (50.1%) of them were in the 8-10 years age group, 92 (25.1%) were in the 11-12 years age group and 91(24.8%) were in the 5-7 years age group. The weights of the children were 12.0-58.0 kg with a mean weight of 25.0±7.13kg. Two hundred and eighty one of their parents (76.6%) were of the lower social class, 73 (19.9%) were middle class and 13 (3.5%) were of the upper class. Two hundred and six (56.1%) children lived with their parents in the rural area while 161 (43.9%) were urban dwellers (Table 1).

**Table I: Socio-demographic characteristics of the study population**

| Variables (N=367) | Frequency | Percentage (%) |
|---|---|---|
| **Age category** | | |
| 5-7 years | 91 | 24.8 |
| 8-10 years | 184 | 50.1 |
| 11-12 years | 92 | 25.1 |
| **Gender** | | |
| Male | 138 | 37.6 |
| Female | 229 | 62.4 |

| | | |
|---|---|---|
| **Social class** | | |
| Upper (I-II) | 13 | 3.5 |
| Middle(III) | 73 | 19.9 |
| Lower(IV-V) | 281 | 76.6 |
| **Place of residence** | | |
| Rural | 206 | 56.1 |
| Urban | 161 | 43.9 |

**Nutritional Status of the School Children**.

Whereas 14/275 (5.1%) children were underweight, 42/376 (11.4%) were stunted and 38/376 (10.4%) were thin.

Table II shows a comparison of mean age, height and weight by sex of school children

The mean age (9.12±1.92) of female children was significantly higher than 8.66±2.00 for males (t= -2.185, p=0.030). The mean weight of female children was 28.58±7.20 compared to 27.26±6.64 among the male children. There was no significant difference in the mean weight of the female and male children (t= -1.754, p=0.08).

The mean height of female children was 1.34±0.12 meters compared to 1.32±0.11 meters among the male children. There was no statistically significant difference in the mean height of the female and male pupils (t= -1.698, p=0.090).

**Table II**: **Comparison of mean age, height and weight by sex of school children**

| | **Sex** | | | |
|---|---|---|---|---|
| | **Male** | **Female** | | |
| **Variables** | **Mean ± SD** | **Mean ± SD** | **t-test** | **p-value** |
| Age (years) | 8.66±2.00 | 9.12±1.92 | -2.185 | 0.030* |
| Height (meters) | 1.32±0.11 | 1.34±0.12 | -1.698 | 0.090 |
| Weight (kg) | 27.26±6.64 | 28.58±7.20 | -1.754 | 0.080 |

*Statistically significant SD – Standard deviation

Table III shows that prevalence of underweight was higher in children aged 8-10 years (6.0%) than aged 5-7 years (3.3%) (Fisher's exact test = 6.528; P = 0.032). The prevalence of underweight was comparable among males (5.3%) and females (4.5%). The prevalence of underweight was comparable among children with parents in the lower socioeconomic class (5.6%) and middle socioeconomic status (4.8%). The prevalence of underweight was comparable among children's residences in rural areas (5.8%) and those in urban areas (3.5%).

**Table III: Socio-demographic characteristics by weight-for-age status of school children**

| | WAZ | | |
|---|---|---|---|
| | Underweight | Normal | Total |
| Variables | n (%) | n (%) | n (%) |
| **Age category** | | | |
| 5-7 years | 3 (3.3) | 88 (96.7) | 91 (100.0) |
| 8-10 years | 11 (6.0) | 186 (94.4) | 197 (100.0) |
| 11-12 years | 0 (0.0) | 92(100.0) | 92 (100.0) |
| | *Fisher's exact test 6.528, p-value = 0.032** | | |
| **Gender** | | | |
| Male | 6 (5.3) | 107 (94.7) | 113 (100.0) |
| Female | 8 (4.5) | 168 (95.5) | 176 (100.0) |
| | *Chi-square = 0.087; p-value = 0.768* | | |
| **Social class** | | | |
| Upper | 0 (0.0) | 14 (100.0) | 14 (100.0) |
| Middle | 2 (4.8) | 40 (95.2) | 42 (100.0) |
| Lower | 12 (5.6) | 203 (94.4) | 215 (100.0) |
| | *Fisher's exact test = 0.193; p-value = 0.807* | | |
| **Place of residence** | | | |
| Rural | 10 (5.8) | 163 (94.2) | 173 (100.0) |
| Urban | 4 (3.5) | 110 (96.5) | 114 (100.0) |
| | *Chi-square = 0.764; p-value = 0.382* | | |

Table IV shows that the prevalence of stunting was higher in children aged 11-12 years (17.4%) than in children aged 8-10 years (11.4%) and aged 5-7years (5.5%) (Chi-square = 3.689; p-value = 0.041**).** The prevalence of stunting of 13.0% among males was higher than (10.0%) recorded among females. There was no significant difference between prevalence of stunting and sex.(Chi-square = 0.558; p-value = 0.455). The prevalence of stunting was 23.1%, 11.0% and 11.0% among higher, middle and lower socioeconomic status respectively. There was no significant association between prevalence of stunting and socioeconomic status (Chi-square = 1.800; p-value = 0.407).

**Table IV: Socio-demographic characteristics by height-for-age status of school children**

| | HAZ | | |
|---|---|---|---|
| Variables | Stunted n (%) | Not stunted n (%) | Total n (%) |
| **Age category** | | | |
| 5-7 years | 5 (5.5) | 86 (94.5) | 91 (100.0) |
| 8-10 years | 21 (11.4) | 163 (88.6) | 184 (100.0) |
| 11-12 years | 16 (17.4) | 76 (82.6) | 92 (100.0) |
| | *Chi-square = 6.389; p-value = 0.041** | | |
| **Gender** | | | |
| Male | 18 (13.0) | 120 (87.0) | 138 (100.0) |
| Female | 24 (10.5) | 205 (89.5) | 229 (100.0) |
| | *Chi-square = 0.558; p-value = 0.455* | | |
| **Social class** | | | |
| Upper | 3 (23.1) | 10 (76.9) | 13 (100.0) |
| Middle | 8 (11.0) | 65 (89.0) | 73 (100.0) |
| Lower | 31 (11. 0) | 250 (89.0) | 281 (100.0) |
| | *Chi-square = 1.800; p-value = 0.407* | | |
| **Place of residence** | | | |
| Rural | 20 (9.7) | 186 (90.3) | 206 (100.0) |
| Urban | 22 (13.7) | 139 (86.3) | 161 (100.0) |
| | *Chi-square = 1.395; p-value = 0.237* | | |

*Statistically significant

Table V shows that prevalence of thinness was comparable among children aged 11-12 years (10.9%), 8-10 years (10.3%) and 5-7years (9.9%). The prevalence of thinness was comparable among males (11.6%) and females (9.6%). The prevalence of thinness was comparable among children with parents in upper socioeconomic status (7.7%), middle socioeconomic status (12.3%) and lower socioeconomic status (10.0%). Prevalence of thinness was comparable among the children's residences in urban areas (11.2%) and rural areas (9.7%).

**Table V: Socio-demographic characteristics by BMI-for-age category of school children**

| | BMI-for-age category | | |
|---|---|---|---|
| Variables | Thinness n (%) | No thinness n (%) | Total n (%) |
| **Age category** | | | |
| 5-7 years | 9 (9.9) | 82 (90.1) | 91 (100.0) |
| 8-10 years | 19 (10.3) | 165 (89.7) | 184 (100.0) |
| 11-12 years | 10 (10.9) | 82 (89.1) | 92 (100.0) |
| | *Chi-square = 0.048; p-value = 0.976* | | |
| **Gender** | | | |
| Male | 16 (11.6) | 122 (88.4) | 138 (100.0) |
| Female | 22 (9.6) | 207 (90.4) | 229 (100.0) |
| | *Chi-square = 0.366; p-value = 0.545* | | |
| **Social class** | | | |
| Upper | 1 (7.7) | 12 (92.3) | 13 (100.0) |
| Middle | 9 (12.3) | 64 (87.7) | 73 (100.0) |
| Lower | 28 (10.0) | 253 (90.0) | 281 (100.0) |
| | *Chi-square = 0.452; p-value = 0.798* | | |
| **Place of residence** | | | |
| Rural | 20 (9.7) | 186 (90.3) | 206 (100.0) |
| Urban | 18 (11.2) | 143 (88.8) | 161 (100.0) |
| | *Chi-square = 0.211; p-value = 0.646* | | |

Table VI shows there was a weak positive correlation between age group and prevalence of underweight and stunting, indicating that the prevalence of stunting and underweight should increased with increased in age ($r=0.109$) ($P<0.032$). There was no significant association between other socio-demographic variables and underweight and stunting ($p >0.05$).

**Table VI: Spearman's correlation coefficient between socio-demographic variables and nutritional status**

| | WAZ/HAZ | |
|---|---|---|
| Variables | Correlation coefficient (r) | p-value |
| Age group | 0.109 | 0.032 |
| Gender | -0.055 | 0.279 |
| Social class | 0.002 | 0.975 |

| | | |
|---|---|---|
| Place of residence | 0.040 | 0.432 |

WAZ= weight for age Z score; HAZ = height for age Z score.

Table VII shows there was a weak negative correlation between age and prevalence of thinness, indicating that the prevalence of thinness should decreased with increased in age (r=-0.119) (P=0.019). There was no significant correlation between thinness and social class r= (-0.020) (p=0.699) as well as place of residence ( r=0.088) (p=0.084).

**Table VII: Spearman's correlation coefficient between nutritional status and socio-demographic variables**

| | BMIAZ | |
|---|---|---|
| Variables | Correlation coefficient (r) | p-value |
| Age group | –0.119 | 0.019 |
| Social class | -0.020 | 0.699 |
| Place of residence | 0.088 | 0.084 |

## IV. Discussion

Overall prevalence rates of undernutrition among the school children studied was low, with the exception of thinness. These low rates could be explained by the number of child survival strategies that have significantly improved children's health and development.

The prevalence of underweight in this study was 5.1 %, which is less than the national average of 18%, according to the 2013 National Demographic and Health Survey (NDHS).[11] It was comparatively lower than the rate reported in a study done in Ile-Ife, Osun, [12] Nigeria. The reason could be that the Osun study involved a wider age group, ages (1–19 years) compared to 5–12 years in this present study.

The prevalence of stunting of 11.4% recorded in this study is similar to 10.3% reported in Jos.[13] It is much lower than the 30.7% reported in Ethiopia and 28.0% in Malaysia. [14, 15] This difference may arise from differential nutritional intakes, socioeconomic and cultural differences rather than differences in their genetic potential to reach a maximum height. The reasons for this disparity may also be related to the sample size, assessment methods and age of the participants in those studies compared to the index study.

The overall prevalence of thinness in this study was 10.4%. This is similar to 10.1% reported in Ugandan study, [7] but less than 22.2% reported in semi-urban primary school children in Sagamu, Nigeria[16] and 13.7% previously reported for school children in urban and peri-urban areas of Ouagadougou – Burkina Faso.[17] The prevalence reported among the school children in Burkina Faso was associated with global economic and food crisis that hit Burkina Faso and this was responsible for reduced access to food particularly among the vulnerable school children.[17] Therefore, the high prevalence recorded in this study may not be unconnected with global economic meltdown. Thinness was not significantly affected by gender differences in this study, a finding that is similar to a study done among Pakistani primary school children.[18]

Furthermore, the weak positive correlation between underweight and age in this study supports the findings of other workers.[15, 19] This trend in underweight and age could have resulted from the recent deterioration in socioeconomic standards and living conditions in the country[19]. This may lead to a situation where older children are left to fend for themselves and thereby exposing them to child labour and poor feeding.[20]

A weak positive correlation was also recorded between stunting and age. It has been established that stunted children continue to deviate from normal growth with increasing age. Hence, the risk of becoming stunted continues as children get older. In all countries,

there was a trend for height-for-age(stunting) to decrease with age, thus as children got older they became shorter [21].

**Limitation of the study**

The Weight-for-age Z scores (WAZ) was not calculated for children >10 as it is not recommended for the assessment of growth beyond childhood (10 years).

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**Conflict of Interests**

The authors declare that there is no conflict of interests regarding the publication of this paper.

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