Comparative Study of Nutritional Status of Urban and Rural Nigerian School Children

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Summary

Nutritional assessment in the community is essential for accurate planning and implementation of intervention programmes to reduce morbidity and mortality associated with under-nutrition. The study was, therefore, carried out to determine and compare the nutritional status of children attending urban and rural public primary schools in Ife Central Local Government Area (ICLGA) of Nigeria. The schools were stratified into urban and rural, and studied schools were selected by balloting. Information obtained on each pupil was entered into a pre-designed proforma. The weight and height were recorded for each pupil, and converted to nutritional indices (weight for age, weight for height, height for age). A total of 749 pupils (366 and 383 children from the rural and urban communities, respectively) were studied. The overall prevalent rates of underweight, wasting and stunting were 61.2, 16.8 and 27.6%, respectively. In the rural area these were 70.5, 17.8 and 35.8%, while in the urban they were 52.2, 15.9 and 19.8%, respectively. The mean nutritional indices (Weight for Age, Weight for Height and Height for Age) were found to be significantly lower among the rural pupils than urban pupils ($P < 0.001$ in each case). The present study shows that malnutrition (underweight, wasting and stunting) constituted major health problems among school children in Nigeria. This is particularly so in the rural areas. Therefore, prevention of malnutrition should be given a high priority in the implementation of the ongoing primary health care programmes with particular attention paid to the rural population.

Introduction

Nutritional status is defined as the nutritional state of an individual, or a population or a community [1]. Assessing the nutritional status of groups of children is an essential part of monitoring the health of a community [2]. Nutritional assessment in the community serves as appropriate data gathering processes to enable accurate planning and implementation of interventions to reduce morbidity and mortality associated with under-nutrition [1].

Anthropometric measurements remain the most practically useful means for the assessment of the nutritional status of a population [3]. The use of appropriate anthropometric indicators allows the identification of the nature and extent of protein energy malnutrition in the community. The objective of the present study was to determine and compare the nutritional status of primary school children in the rural and urban communities in Ife Central Local Government Area (ICLGA).

Materials and Methods

This study was conducted in selected public primary schools in rural and urban communities of ICLGA of Osun State, South-west Nigeria, with headquarters at Ile-Ife. The study was a cross-sectional comparative study. All pupils registered in public primary schools within the Local Government Area irrespective of age or sex, were eligible for inclusion in the study. Ethical clearance from the Ethical Committee of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Nigeria and approval from Ministry of Education, Osogbo, Osun State,

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Nigeria were obtained before the study commenced. Parents, teachers and the pupils in the selected schools were well-informed on the scope and extent of the survey, and consent of the parents was also obtained.

The list of schools in the LGA was obtained from the Ministry of Education. The schools in ICLGA were stratified into urban and rural schools with the assistance of the officials of the State Ministry of Education. The ICLGA has 59 primary schools consisting of 37 public schools and 22 owned by private individuals and organizations. Thus the list of 37 public schools with 22 and 15 schools in urban and rural communities, respectively was obtained. Based on available resources in terms of finance, logistics and time available for the study, two schools from the urban area and three schools from the rural area were selected by simple balloting. This decision, on the number of schools from each area, was based on the fact that schools within the urban area had higher pupil enrolment (average 490 per school) compared with those in the rural areas (average 312 per school). From each of the selected schools all grades (primaries 1–6) were studied. The arm studied from each grade was selected by balloting. All pupils in the selected arms were included in the study.

Data were collected from January to March 2000. Information was collected from all eligible pupils and entered into a pre-designed interview proforma. The information obtained included date of birth, age, sex, parents' educational and employment status. Every child was examined in the school by one of the authors (S.O.O.) with the aid of a clinical examination checklist vis a vis: hair condition, angular stomatitis, oral hygiene, pallor and skin condition.

The following anthropometric parameters were measured in all the subjects as described by Jelliffe [4].

(i) Weight in kilogram (kg) was recorded with only sport wear on
(ii) Height in centimeters (cm) using mobile stadiometer.

The weight and height were converted to nutritional indices: Weight for age (W//A), Weight for Height (W//H) and Height for Age (H//A), based on percentage of reference median using The United States National Centre for Health Statistics (NCHS) standard which has been recommended by WHO as an international reference standard. Welcome classification [5] was used to classify the nutritional state.

Data analyses were carried out in a personal computer using EPI-INFO epidemiological software package version 6.03. Differences in means were compared using Student's *t*-test while ratios, rates and proportions were compared using chi square (χ^2) test. Statistically significance level was taken as *P*-value <0.05.

TABLE 1
Comparisons of age, weight and height of rural and urban pupils

Parameters	Rural	Urban	P-value
Age (years)			
Range	3–18	2.5–18	
Mean (SD)	10.6 ± 2.56	9.8 ± 2.71	<0.001
Weight (kg)			
Range	11.8–49.3	12.0–52.0	
Mean (SD)	25.7 ± 6.3	25.1 ± 6.7	>0.14
Height (cm)			
Range	88–160	89–164	
Mean (SD)	130.4 ± 12.5	128.7 ± 13.1	>0.07

Results

A total of 749 children were studied. Of these, 366 (48.9%) and 383 (51.1%) were from the rural and urban communities, respectively. The 749 children consisted of 353 males (47.1%) and 396 females (52.9%) giving overall male: female ratio of 1: 1.1. Their ages ranged from 2.5 to 18 years (mean $\pm$ SD 10.2 ± 2.7 years). The age range for males was 3.5–17 years, mean 10.2 ± 5.7 years, while that of females were 2.5–18 years with a mean age of 10.2 ± 2.6 years. The weight range observed was 11.8–52.0 kg, with a mean weight of 25.5 ± 6.5 kg. The weight range for males was 12.1 to 50.6 kg with a mean of 24.7 ± 5.7 kg, while the weight range for females was 11.8–52.0 kg, with a mean of 26.1 ± 7.0 kg. The mean weight of females was significantly higher than that of males ($t = 3.01$ $P < 0.005$). Their overall height ranged from 88–164 cm with a mean of 129.5 ± 12.9 cm. The height range for males was 89–164 cm with a mean of 128.2 ± 12.2 cm, while the height range of females was 88–163 cm, with a mean of 130.7 ± 13.4 cm. The mean height of females was significantly higher than that of males ($t = 2.69$, $P < 0.001$).

Table 1 compares the age, weight and height of the rural and urban school children. It shows that in all the parameters (age, weight and height) the means in the rural children were higher than those of urban. Only the difference in age was however statistically significant ($t = 4.046$, $P < 0.0001$).

The overall prevalent rate of underweight was 61.1% (458 of 749 pupils) while the prevalent rate of severe under-weight was 10.0% (75 of 749 pupils). The prevalent rate of underweight was significantly higher among the rural pupils (70.5%) when compared with the urban (52.2%) ($Z = 4.94$, $P < 0.001$). Table 2 shows the nutritional status (W//A) of the pupils in relation to gender in rural and urban areas. The prevalent rates of underweight were higher in males than females in both rural and urban pupils. The differences were significant in both communities

TABLE 2
Nutritional status (W//A) of female and male pupils in rural and urban areas

W//A (%)	Rural[a]			Urban[b]		
	Female	Male	Total	Female	Male	Total
<60	22 (10.9)[c]	26 (15.8)	48 (13.1)	8 (4.1)	19 (10.1)	27 (7.0)
60–<80	110 (54.5)	100 (61.0)	210 (57.4)	84 (43.3)	89 (47.1)	173 (45.2)
80–120	70 (34.6)	38 (23.2)	108 (29.5)	102 (52.6)	81 (42.8)	183 (47.8)
Total	202 (100.0)	164 (100.0)	366 (100.0)	194 (100.0)	189 (100.0)	383 (100.0)

[a]$\chi^2 = 6.41$, df =2, $P = 0.04$; [b]$\chi^2 = 6.97$, df=2, $P = 0.03$.
[c]Figures in parenthesis are percentages of total in each column.

TABLE 3
Nutritional status (H//A) of female and male pupils in rural and urban areas

H//A (%)	Rural[a]			Urban[b]		
	Female	Male	Total	Female	Male	Total
<90	59 (29.2)[c]	72 (43.9)	131 (35.8)	26 (13.4)	50 (26.5)	72 (18.8)
≥90	143 (70.8)	92 (56.1)	235 (64.2)	168 (86.6)	139 (73.5)	307 (80.2)
Total	202 (100)	164 (100)	366 (100)	194 (100)	189 (100)	383 (100)

[a]$\chi^2 = 8.50$, df = 1, $P < 0.004$. [b]$\chi^2 = 10.255$, df = 1, $P < 0.001$.
[c]Figures in parenthesis are percentages of total in each column.

($P < 0.05$ for the rural area, and $P < 0.04$ for the urban area).

The comparison of the nutritional status (W//A) at different age groups in rural and urban areas revealed higher prevalence of under-weight among 10–19 years age groups than 0–9 years age groups. The differences were statistically significant ($P < 0.001$ for each area). In the rural area, the prevalence of severe underweight was 13.1%, and the highest prevalent rate of severe underweight of 41.2% was found among 15–19 years age group while mild-moderate underweight prevalent rate was 63.3% among 10–14 years age group. In the urban area, the prevalent rates of mild-moderate and severe underweight were 45.2 and 7.0%, respectively. The highest prevalence of 62.5% for mild-moderate underweight and 60% for severe underweight were found among 10–14 years and 15–19 years age groups, respectively.

The overall prevalence of wasting based on percentage weight for height of a reference median (WHM) was 16.8%. Sixty-five (17.8%) of the 366 pupils in the rural community and 61 (15.9%) of the 383 pupils in the urban community were wasted. The prevalence of wasting was higher among females (18.4%) than males (15.0%), though the difference was not statistically significant ($P > 0.2$). The prevalence of wasting was highest in the 15–19 years age group in both rural and urban communities, while it was lowest in age groups 0–4 years in the rural and 5–9 years in the urban. The prevalence of wasting was higher among 10–19 years age group when compared with 0–9 years age group in both communities. The differences were statistically significant in both areas (P-value for each area was <0.001).

The prevalence of stunting in the rural and the urban communities were 35.8 and 18.8%, respectively, giving an overall prevalence of stunting as 27.3%. The prevalence of stunting was significantly higher in rural than in urban community ($Z = 4.81$ $P < 0.0001$). Table 3 compares the prevalent rates of stunting between female and male pupils in the rural and urban schools. The prevalent rate of stunting was statistically significantly higher among males than females in both rural and urban communities ($P < 0.004$ for rural and $P < 0.001$ for urban). The prevalence of stunting was highest among the pupils in the 15–19 years age group in rural and urban, while the lowest prevalence of stunting was found among children in the 5–9 years age group in both communities. The prevalent rates of stunting in both areas were significantly higher in 10–19 years than 0–9 years age groups (for rural area $\chi^2 = 20.82$, df = 3 and $P < 0.001$ and for urban sector $\chi^2 = 41.02$, df = 3 and $P < 0.001$).

In Table 4, the means of various nutritional indices of the rural pupils are compared with those of the urban pupils. All the means of the nutritional indices were lower among the rural pupils than in the urban pupils. The differences were found to be statistically significant ($P < 0.001$ in each case).

TABLE 4
Comparisons of the means of nutritional indices between rural and urban pupils

Indices	Mean nutritional indices (SD)/location		
(%)	Rural, $n = 366$	Urban, $n = 383$	*P*-value
W//A	74.2 ± 13.0	79.0 ± 13.5	<0.001
W//H	86.8 ± 7.7	88.9 ± 9.0	<0.001
H//A	92.1 ± 5.7	94.1 ± 5.8	<0.001

W//A, weight for age; W//H, weight for height; H//A, height for age.

Discussion

The overall prevalent rates of under-nutrition among the school children studied were high. This is in agreement with the results of previous studies from other developing countries [6, 7]. These high rates are however distressing because in the last decade, Nigeria had promoted a number of child survival programmes that were expected to bring about significant improvement in child health and development. The observation of high prevalence of under-nutrition could be attributed to economic recession presently experienced in Nigeria, thus undermining the gains from the child survival programmes.

It is interesting to note that the prevalence of malnutrition increased with age in this study. This is similar to the finding of Shuenyane and Mashigo [8] in Soweto, South Africa. This progressive increase in the prevalence of malnutrition with age could have resulted from recent deterioration in socio-economic standards and living conditions in the country. Consequently, this might have led to a situation where older children are left to fend for themselves, thereby exposing them to other risks like child labour and poor feeding that is inimical to their total well-being [9]. During adolescence, children grow rapidly in preparation for adulthood. The lack of adequate nutrition and parasitic infections like intestinal helminthes could be inimical to this process, thereby worsening the already poor nutritional state.

Although the weight and height of the rural pupils were higher, probably because they were generally older, comparison of the nutritional indices of rural and urban pupils showed that the mean nutritional indices of the latter were significantly higher. The better nutritional status of pupils in urban community in the present study is in agreement with those of other studies among school children in Nigeria [10, 11] and other developing countries [7, 12]. This might be due to differences in the socio-economic status of the parents. In Nigeria there are more children from high socio-economic classes in the urban than in the rural community [13]. This probably accounted for the better nutrition of the pupils in the urban than rural area. In addition, the usual higher prevalent rates of intestinal parasites in the rural community compared with urban could contribute to the disparity in the nutritional status between the children in both communities [14].

Oyemade et al [11] attributed the disparity between urban and rural areas to inadequate food intake in the rural area. They observed that most food items that are produced in the rural areas were being taken to big cities to sell, because business is more lucrative there. Equally important factors that may adversely affect nutritional intake are traditional beliefs and practices that are more rooted in the rural area than urban [12]. For instance, it is believed that eating eggs may turn the child into a thief in later life and eating too much meat may give him worms.

The high prevalence of malnutrition observed in the present study calls for comprehensive public health intervention measures. A comprehensive health education programme with emphasis on good nutrition (targeting school children, their parents and teachers) should be carried out. Furthermore, efforts should be made by stakeholders in primary school management to introduce adequately financed and managed school health programme, whereby supervised school meals will be accorded a priority, especially in the rural areas.

References

1. Osibogun A. A handbook of public health nutrition for developing countries. Lagos: Akin Osibogun consultants, 1998;48–65.
2. Rabasa AI, Omatara BA, Padomu MKO. Assessment of nutritional status of children in a Sub-Saharan rural community with reference to anthropometry. Sahel Med J 1998;1:15–8.
3. Laditan AAO, Johnson AOK. Nutrition and Nutritional assessment in childhood. In: Azubuike JC, Nkanginieme KEO (eds). Paediatrics and Child Health in a Tropical Region. Owerri: African Educational Services, 1999;162–5.
4. Jelliffe DB. The assessment of the nutritional status of the community. World Health Organisation 1966 (WHO Monograph series No 53).
5. Hendrickse RG. Protein-energy malnutrition. In: Hendrickse RG, Barr DGD, Matthews TS (eds). Paediatrics in the Tropics, London: Blackwell Scientific Publications, 1991;119–31.
6. Anderson AJU. Nutrition of Iban Children of the Sut and Mujong rivers. J Trop Pediatr 1981;27:26–35.
7. de Onis A, Monteiro C, Akre J, *et al*. The worldwide magnitude of protein-energy malnutrition: an overview from the WHO Global Database on child growth. Bull Wld Hlth Org 1993;71:703–12.
8. Shuenyane E, Mashigo S. A socioeconomic health and cultural survey in Soweto. S Afr Med J 1977;51:495.
9. Laskar BI. Child labour and heath: an exploratory study of Aligarth lock industry in India. International child health; a digest of current information 1996;7: 85–98.

10. Nnanyelugo DO, Ngwu EK. Difference in growth patterns of children in five geographical sub-division of Anambra State, Nigeria. Nig J Nutr Sci 1985;6:1–14.
11. Oyemade A, Olugbile A, Janes MD. Health of Nigerian rural school children. J Trop Pediatr 1981;27:101–5.
12. Aurelius G, Khanh NC, Truc DB, *et al*. Height, weight, and body mass index (BMI) of Vietnamese (Hanoi) school children aged 7–11 years related to parents' occupation and education. J Trop Pediatr 1996;42:21–6.
13. Osinusi K, Oyejide CO. Secular trends in nutritional status of children from a low socio-economic background. Nig J Paediatr 1987;14:7–12.
14. Ogbonna C, Okolo SN, Okonji MC. Intestinal worms and nutritional status of under-fives in Jos, Nigeria: any relationship? Nig J Clin Pract 2004;7:79–81.