Dietary practices and nutritional status of under-five children in rural and urban communities of Lagos State, Nigeria

Idowu O. Senbanjo, Ibiyemi O. Olayiwola[1], Wasiu A. O. Afolabi[1]

Department of Paediatrics and Child Health, Paediatrics Gastroenterology/Hepatology/Nutrition Unit, Lagos State University College of Medicine, Ikeja, Lagos, [1]Department of Nutrition and Dietetics, College of Food Science and Human Ecology, Federal University of Agriculture, Abeokuta, Nigeria

Address for correspondence:
Dr. Idowu O. Senbanjo,
Department of Paediatrics
and Child Health, Paediatrics
Gastroenterology/Hepatology/
Nutrition Unit, Lagos State
University College of Medicine,
PMB 21266, Ikeja, Lagos, Nigeria.
E-mail: senbanjo001@yahoo.com

ABSTRACT

Background: Evidence shows that urban children generally have a better nutritional status than their rural counterparts. However, data establishing whether this difference in prevalence of undernutrition could be ascribed to difference in dietary practices are few. **Objective:** The aim of this study was to compare dietary practices and nutritional status of children in rural and urban communities of Lagos State, Nigeria. **Methods:** This was a comparative–analytical study conducted using the multistage sampling technique to select the study cases. A total of 300 mother–child pairs were studied, including 150 each from rural and urban communities. Data collected include demographics, socioeconomic characteristics, feeding practices and anthropometric measurements of the participants. Food intake data were collected using 24-h dietary recall. Malnutrition in children was determined by calculating the prevalence of low height-for-age (stunting), low weight-for-age (underweight), and low weight-for-height (wasting) using the World Health Organization cutoff points. **Results:** The prevalence of exclusive breastfeeding for 6 months (25.3% vs. 28.7%; $P = 0.516$), use of formula feeds (48.7% vs. 44%; $P = 0.077$), and mean age of child at introduction of semisolid foods (7.54 ± 4.0 months vs. 8.51 ± 7.3 months; $P = 0.117$) were not significantly different between urban and rural communities. The diversity of food choices and frequencies of consumption were similar between urban and rural communities. However, prevalence levels of underweight and stunted children were significantly higher in rural than that of urban communities (19.4% vs. 9.3%, $P < 0.001$ and 43.3% vs. 12.6%, $P < 0.001$, respectively). **Conclusions:** Other risk factors besides inappropriate feeding practices need to be considered for higher prevalence of undernutrition among children in rural communities.

Key words: Children, dietary practices, Nigeria, nutritional status, rural, urban

INTRODUCTION

Undernutrition remains a significant health burden among children living in low- and middle-income countries.[1] According to the World Health Organization (WHO), approximately 45% of childhood deaths in 2011 were caused by undernutrition.[2] Apart from causing significant childhood mortality, undernutrition also leads to significant physical and functional deficits among survivors, including impaired cognitive development, fewer years of schooling, lower economic productivity, lower birth weight of offspring, and potentially increased risk of certain chronic disease in adult life.[3,4]

In Sub-Saharan Africa, progress made at reducing high prevalence of undernutrition has been limited unlike in

East Asia and the Pacific where there have been remarkable reductions in prevalence of stunting from 42% in 1990 to 12% in 2011.[5] This significant improvement in prevalence of undernutrition in Southeast Asia has been related largely to improvement in their socioeconomic indices.[5]

In Nigeria, the trends of stunting and underweight between 1990 and 2008 among under-five children have remained largely unchanged despite several approach and attempt at reducing it.[6-8] According to the National Demographic and Health Survey (NDHS) conducted in 2013, the prevalence of stunting, underweight, and wasting among the under-five children are 37%, 29%, and 18%, respectively.[6] An earlier study by the NDHS in 2003 shows that nationally, 38% of children below 5 years of age are stunted, 29% are underweight, and 9.2% are wasted.[7] Similar trend was reported by the Nigerian Food Consumption and Nutrition (NFCN) survey between 2001 and 2003 with 42% stunting, 25% underweight, and 9% wasting.[8] In these studies, the prevalence of undernutrition was higher in rural than that of urban areas.[6-8]

The persistence of child malnutrition in low-income countries appears to be due to multiple of factors that include uncertain access to enough food and inappropriate dietary practices.[9,10] Previous studies have suggested that the lower prevalence of undernutrition in urban area relative to rural area is due to a series of more favorable socioeconomic condition which, in turn, translate to provision of adequate and appropriate diet and better caring practices for children.[11] However, data establishing differences in dietary practices among under-five children in rural and urban communities in Nigeria are lacking.

This study was carried out to compare dietary practices and nutritional status of children in rural and urban communities in Lagos State, Nigeria.

METHODS

The study was carried out in the Epe Local Government Area (LGA) and the Alimosho LGA in Lagos State, Nigeria, which were randomly selected from the twenty local governments in Lagos State officially recognized by the Federal Government of Nigeria.

Lagos State is Nigeria's former capital city. The vegetation is that of the tropical rain forest. It has an annual rainfall of 180 cm and a mean temperature of 26°C. It is 200–500 m above sea level. Lagos has a very diverse and fast-growing population, resulting from heavy and ongoing migration to the city from all parts of Nigeria as well as neighboring countries. Although the Yoruba, an African people inhabiting Southwest Nigeria, constitute the city's principal ethnic group, there are a significant proportion of other ethnic groups, particularly the Ibos, Ibibio, and Hausa.

The study was a comparative–analytical study of children aged 0–59 months in rural and urban communities located in randomly selected LGAs of Lagos State, Nigeria.

Ethical clearance was obtained from the Lagos State University Teaching Hospital Research/Ethics Committee. The approval was also obtained from the local government authorities and the parents who were involved.

A multistage sampling technique was used to select study participants. The first stage involved random selection of Epe LGA and Alimosho LGA from the twenty LGAs in Lagos State. In the second stage, Epe and Agbowa were randomly selected from the Epe LGA, representing urban and rural communities, respectively, while Akowonjo and Orisunbare were selected from the Alimosho LGA, representing urban and rural communities, respectively. In the third stage, houses were selected randomly from each community using the table of random numbers. Finally, in each household, the parents of children aged 0–59 months were identified, and informed consent was obtained before collection of data.

The sample size: This study was part of a larger study on relationship between maternal and child nutritional status in rural and urban communities in Lagos State, Nigeria.

Therefore, the minimum number of the cases "*n*" required for the study was estimated from the formula:

$$n = \frac{z^2 \; p \, (1-p)}{d_2}$$

where,

"*z*" is the critical value and in a two-tailed test it is equal to 1.96.

"*p*" is the estimated prevalence of malnutrition in women, which was taken as 9%, based on an earlier report by NFCN survey for Southwestern part of Nigeria.[10]

"*d*" is the absolute sampling error that can be tolerated. In this study, it was fixed at 5%.

Therefore, the minimum sample size: $n = \frac{1.96^2 \times 0.09 \times (1-0.09)}{0.05^2}$ = 125.9 which is approximately 126. Taking into consideration a possible attrition rate of 10%, the minimum sample size for this study will be 137.

This was rounded up to 150 each for rural and urban communities.

Complete data were collected from 300 participants comprising 150 each for rural and urban communities.

Information was obtained on sociodemographic, characteristics, breastfeeding practices, and type of solid, semisolid or soft foods taken by children. The families were assigned a socioeconomic class using the method recommended by Ogunlesi *et al.*[12] The parents' occupations and highest education attained were scored from 1 (highest) to 5 (lowest). The mean score for both parents gave the social class, falling within the 1–5 range. Those with mean scores of 1 and 2 were further classified as upper class, those with mean score of 3 were classified as middle class, while those with mean scores of 4 and 5 were classified as falling in the lower social class.

A documentation of all dietary intakes including in-between meals was done using a conventional 24-h recall method which depends on correct recall of the type of foods consumed.

The children were weighed with light clothing using an electronic weighing scale calibrated in 100 g units (SECA/UNICEF, Australia). Children who were too scared to stand on the scale were weighed together with the mother, and the mother's weight automatically deducted to obtain the weight of the child. All children were weighed naked and to the nearest 0.1 kg.

Length of children aged <24 months was measured using an infantometer. This was done on a firm surface with assistance, usually by the mother. The knees were held down and the head held firmly against the headboard. These measurements were done to the nearest 0.1 cm. Height was measured using a height board for children aged 24–59 months. This was done with the children standing erect without shoes, with eyes facing forward and the feet together on the horizontal plane.

Standardization checks on the tools for anthropometric measurements were done periodically.

Malnutrition in children was calculated from the degree of stunting (height-for-age), underweight (weight-for-age), and wasting (weight-for-height) following WHO guidelines and cutoff points.[13] In this study, a child was said to be underweight, wasted, and stunted if the weight-for-age, weight-for-height, and height-for-age were <-2 standard deviation (SD) from the median of each international reference standard, respectively.

Statistical analysis
The WHO Anthro 2007 was used to generate Z-score values for weight-for-age, height-for-age, and weight-for-height. All data were entered into and analyzed using Statistical Package for Social Sciences (SPSS) software version 22 for Windows (IBM Corporation, Armonk, NY, USA). The means and SD were calculated for continuous variables while ratios and proportions were calculated for categorical variables. Independent *t*-test was used to calculate mean differences for continuous variables between urban and rural communities. Categorical variables were compared using the Pearson Chi-square (χ^2) test. $P < 0.05$ was considered statistically significant.

RESULTS

A total of 300 children were studied, consisting of 150 each from rural and urban communities, and the results obtained were analyzed. Table 1 shows the sociodemographic characteristics of the study population according to their place of residence. The mean age of children in rural community was significantly higher than those from the urban community (31.3 ± 16.4 months vs. 19.3 ± 16.4 months; $P < 0.001$). Gender distributions of the children were not statistically different with male:female ratio of 1:1.3 in rural areas and 1:1 in urban areas. About half of the children (52.7%) in urban areas were of the first birth order compared with 39 (26%) children in rural areas. This difference was statistically significant ($P < 0.001$). The educational level of both fathers and mothers was significantly better in urban than rural areas ($P < 0.001$). A statistically significant proportion of the children in the rural areas were from lower social class compared with children from urban areas (90% vs. 64%, $P < 0.001$).

Two hundred and ninety-eight children (99.3%) in this study were breastfed [Table 2]. One child each from urban and rural communities was not breastfed. The reason for not been breastfed at all was not given. There was no significant difference in time of initiation of breastfeeding between children from rural and urban areas ($P > 0.05$). Forty-three (28.7%) children from rural area and 38 (25.3%) children from urban area were exclusively breastfed for 6 months. There was no significant difference ($P > 0.05$). However, the mean of total duration of breastfeeding was significantly higher in rural area than urban area (16.0 ± 4.6 months vs. 14.1 ± 4.2 months, $P = 0.003$). Overall, 139 (46.3%) children were given formula feeds with no statistically significant difference between rural and urban children. More than one-half of the children in rural (58.9%) and urban area (56.1%) who received formula feed were introduced to it before the age of 6 months. The mean age of children at introduction of semi-solid food in rural area was 8.51 ± 7.3 months while in urban it was 7.54 ± 4.0 months and this was not statistically significant ($t = 1.3$, $P = 0.196$).

Table 3 shows that children from rural and urban communities consumed more cereals, legumes, and animal proteins than any other food group. For the cereal group, most popular food item consumed was rice, bread, spaghetti, and biscuit in both rural and urban communities. In urban community, there was also a high frequency of consumption of pap relative to rural community (45% vs. 6%) while in rural community there was a high frequency of consumption of eba compared to urban community (44% vs. 6%).

Among the plant and animal protein, the food items commonly consumed were beans, milk, and fish. The consumption of beans and fish was higher in rural community while consumption of milk was higher in urban community.

Table 1: Socio-demographic characteristics of study population according to place of residence

Parameters	Total (n=300)	Rural (n=150)	Urban (n=150)	P
Age (months)				0.001
0-11	61 (20.3)	11 (7.3)	50 (33.3)	
12-23	90 (30.0)	42 (28.0)	48 (32.0)	
24-35	61 (20.3)	34 (22.7)	27 (18.0)	
36-47	46 (15.3)	28 (18.7)	18 (12.0)	
48-59	42 (14.0)	35 (23.3)	7 (4.7)	
Sex				0.248
Male	142 (47.3)	66 (44.0)	76 (50.7)	
Female	158 (52.7)	84 (56.0)	74 (49.3)	
Religion				0.605
Christian	228 (76.0)	102 (68.0)	126 (84.0)	
Islam	71 (23.7)	47 (31.3)	24 (16.0)	
Traditional	1 (0.3)	1 (0.7)	0 (0.0)	
Marital status of parents				0.000
Not yet married	6 (2.0)	3 (2.0)	3 (2.0)	
Married	293 (97.7)	146 (97.3)	147 (98.0)	
Widow	1 (0.3)	1 (0.3)	0 (0.0)	
Family setting				0.000
Monogamy	265 (88.3)	119 (79.3)	146 (97.3))	
Polygamy	35 (11.7)	31 20.7)	4 (2.7)	
Tribe				0.000
Yoruba	201 (67.0)	132 (88.0)	69 (46.0)	
Ibo	42 (14.0)	2 (1.3)	40 (26.7)	
Hausa	5 (1.7)	0 (0.0)	5 (3.3)	
Others	52 (17.3)	16 (10.7)	36 (24.0)	
Birth order				0.000
1	118 (39.3)	39 (26.0)	79 (52.7)	
2-4	161 (53.6)	87 (64.7)	64 (42.7)	
5-7	21 (7.0)	14 (9.3)	7 (4.7)	
Educational level of mother				0.000
No formal education	4 (1.3)	3 (2.0)	1 (0.7)	
Primary	72 (24.0)	55 (36.7)	17 (11.3)	
Secondary	155 (51.7)	79 (52.7)	76 (50.7)	
Postsecondary	69 (23.0)	13 (8.7)	56 (37.3)	
Educational level of Father				0.000
No formal education	5 (1.7)	4 (2.7)	1 (0.7)	
Primary	20 (6.7)	13 (8.7)	7 (4.7)	
Secondary	168 (56.0)	99 (66.0)	69 (46.0)	
Postsecondary	107 (35.7)	34 (22.7)	73 (48.7)	
Social class				0.000
Upper	19 (6.3)	0 (0.0)	19 (12.7)	
Middle	50 (16.7)	15 (10.0)	35 (23.3)	
Lower	231 (77.0	135 (90.0)	96 (64.0)	

Table 2: Breastfeeding rates and dietary practices in children

Parameters	Rural no (%)	Urban no (%)	P
Ever breastfed	149 (99.3)	149 (99.3)	1.000
Initiation of breastfeeding*			0.535
<one hour	48 (32.2)	32 (21.5)	
one <6 hours	34 (22.8)	54 (36.2)	
> 6 hours	67 (45.0)	63 (42.3)	
Exclusive brestfeeding for six month	43 (28.7)	38 (25.3)	0.516
Formula fed			
Use formula feed	73 (48.7)	66 (44.0)	0.077
Introduced before 6 months	43 (58.9)	37 (56.1)	0.382
Age at introduction of semi-solid food†			0.117
Less than 6 months	22 (15.0)	27 (22.5)	
6-8 months	80 (54.4)	66 (55.0)	
Greater than 8 months	45 (30.6)	27 (22.5)	

Table 3: Types and frequency of feeds given to children according to place of residence

Parameter	Total (n=300) No (%)	Rural (n=150) No (%)	Urban (n=150) No (%)
Root and tubers			
Amala	39 (13)	20 (13.3)	19 (12.7)
Yam	33 (11.0)	18 (12.0)	15 (10.0)
Plantain	20 (6.7)	9 (6.0)	11 (7.3)
Eba	50 (16.7)	44 (29.3)	6 (4.0)
Porridge	2 (0.7)	0 (0.0)	2 (1.3)
Potato	1 (0.3)	0 (0.0)	1 (0.7)
Gari	25 (8.3)	25 (16.7)	0 (0.0)
Fufu	11 (3.7)	11 (7.3)	0 (0.0)
Ojojo	2 (0.7)	2 (1.3)	0 (0.0)
Cereal			
Rice	198 (66.0)	120 (80.0)	78 (52.0)
Bread	95 (31.7)	47 (31.3)	48 (32.0)
Pap	51 (17.0)	6 (4.0)	45 (30.0)
Indomie	86 (28.7)	44 (29.3)	42 (28.0)
Biscuit	93 (31.0)	61 (40.7)	32 (21.3)
Golden morn	28 (9.3)	10 (6.7)	18 (12.0)
Cheese-ball	27 (9.0)	16 (10.7)	11 (7.3)
Semovita	10 (3.3)	6 (4.0)	4 (2.7)
Poff-poff	2 (0.7)	0 (0.0)	2 (1.3)
Custard	3 (1.0)	1 (0.7)	2 (1.3)
Cornflakes	4 (1.3)	4 (2.7)	0 (0.0)
Gala	5 (1.7)	5 (3.3)	0 (0.0)
Legumes			
Beans	94 (31.3)	67 (44.7)	27 (18.0)
Groundnut	8 (2.7)	5 (3.3)	3 (2.0)
Akara	3 (1.0)	2 (1.3)	1 (0,7)
Peanut	1(0.3)	0 (0.0)	1 (0,7)
Animal protein			
Milk	84 (28.0)	33 (22.0)	51 (34.0)
Fish	116(38.7)	70 (46.7)	46 (30.7)
Egg	49 (16.3)	22 (14.7)	27 (18.0)
Meat	46 (15.3)	31 (20.7)	15 (10.0)
Fruit	45 (15.0)	19 (12.7)	26 (17.3)
Vegetable	36 (12.0)	25 (16.7)	11 (7.3)

The consumption of roots and tubers, fruits, and vegetable was generally low in both rural and urban communities.

The mean weight and height were significantly higher among children from rural than urban areas [Table 4]. Both weight and height increase with age in both sexes in children from rural and urban areas. However, the degree of association of weight and height with age were higher in urban children (r = 0.894 and 0.946, respectively) than rural children (r = 0.736 and 0.857, respectively). When weight and height of children were compared age-for-age with a reference standard, the mean weight-for-age Z-score and height-for-age Z-score were significantly lower for the rural children compared to those from urban area.

The prevalence levels of underweight and stunting were significantly higher in rural area than urban areas (19.4% vs. 9.3%, P = 0.025 and 43.3% vs. 12.6%, P < 0.001, respectively).

DISCUSSION

This study highlights differences in the feeding practices of under-five children in rural and urban communities in Lagos State, Nigeria. Even though almost all the mothers breastfed their children, the prevalence of exclusive breastfeeding for 6 months was very low in both rural and urban communities. However, the figures were higher than the national prevalence of 17%.[6] The lower prevalence of exclusive breastfeeding in urban area when compared with rural area may be due to career women or women in civil service jobs who have to resume for work after 3 months maternity leave. This could also explain the high rate of use of the formula feeds in urban areas. The higher rate of use of the formula feeds in rural areas could be due to lack of awareness about value of breastfeeding as noted some years ago[14] or demonstration of sophistication and false affluence by mothers.

It is important to note that the prevalence of exclusive breastfeeding continues to decline in Nigeria and urgent steps need to be taken by government to correct this trend. Recently, the Lagos State Government of Nigeria increased the duration of maternity leave for civil servants from 3 to 6 months and also introduced 10-working days paternity leave for male employees who may want to join their wives to achieve good parenting.[15] The effect of this on rate of exclusive breastfeeding and nutritional status of children will need to be determined.

Children are expected to be introduced to solid, semisolid, or soft foods at the age of 6 months and above to complement breastfeeding. In this study, more than half of the children both in rural and urban areas who were already commenced on semisolid feed had it introduced between age of 6 and 8 months. This was similar to 58.2% observed among infants in Kano,[16] Nigeria, higher than 40% in rural central Tanzania,[17] and lower than 65.5% among infants in rural Shaanxi province in China.[18] The implication is that the remaining children are likely to be at risk of malnutrition.

Restriction of food selection has also been identified as a major cause of undernutrition in young children in low-income countries.[11] To achieve optimal growth and development of children, there is a need to educate mothers on provision of food variety. According to WHO guidelines, consumption of foods from at least four or more food groups out of total seven food groups is regarded as appropriate and healthy.[19]

The high frequency of intake of cereals and low intake of proteins, fruits, and vegetable is common to both rural and urban children in this study. A similar study from a rural South African community reveals a high intake of carbohydrate-rich foods, and irregular intakes of foods of animal origin, fruit, and vegetables.[20] Recently, in Europe, there is public health concern about suboptimal micronutrient intakes.[21] Reduced intake of fruits and vegetables in children could lead to low micronutrient intake. The micronutrients such as Vitamin A help improve the immune system and thereby prevent infections which could tilt children to severe protein calorie malnutrition.

The national prevalence of undernutrition among Nigerian children has remained largely stable between the year 2003 and 2009 with the prevalence of underweight,

Table 4: Anthropometric characteristics and nutritional status of children by place of residence

Parameters	Total (n=300)	Rural (n=150)	Urban (n=150)	P
Weight (Kg)*	11.1 (3.6)	12.1 (3.7)	10.1 (3.3)	0.000
Height (cm)*	82.0 (0.1)	85.5 (0.1)	78.6 (0.1)	0.000
Weight-for-Age Z-score				0.025
Normal (>-2.00 SD)	257 (85.7)	121 (80.7)	136 (90.7)	
Underweight (−2.00-−2.99 SD)	31 (10.3)	19 (12.7)	12 (8.0)	
Severely underweight (−3.00 SD and above)	12 (4.0)	10 (6.7)	2 (1.3)	
Height-for-Age Z-score				0.000
Normal (>−2.00 SD)	216 (72.0)	85 (56.7)	131 (87.3)	
Stunted (−2.00-−2.99 SD)	44 (14.7)	33 (22.0)	11 (7.3)	
Severely Stunted (−3.00 SD and above)	40 (13.3)	32 (21.3)	8 (5.3)	
Weight-for-Height Z-score				0.103
Normal (>−2.00 SD)	269 (89.7)	132 (88.0)	137 (91.3)	
Wasted (−2.00-−2.99 SD)	16 (5.3)	7 (4.7)	9 (6.0)	
Severely Wasted (-3.00 SD and above)	15 (5.0)	11 (7.3)	4 (2.7)	

Values are number (%) unless otherwise stated; *values are mean±SD

wasting, and stunting been 23%, 18%, and 37%, respectively.[22] In this study, the values from rural areas were similar to these national figures while the values from urban area were lower than the national figures except prevalence of wasting. The higher prevalence of undernutrition in rural areas might be a reflection of the different socioeconomic situations in these communities. A previous study demonstrated that risk factors for child undernutrition in rural areas were mostly socioeconomic factors while in urban areas they were mostly biological factors.[22]

The limitations of this study include involvement of only two LGAs of Lagos State. However, the findings can be generalized to the broader community. We recommend that further cross-sectional research work involving other communities and a larger sample frame is needed to better understand rural-urban differences in dietary practices among under-five children. Information on dietary practices was based on self-report and this may lead to underestimation or overestimation resulting from mothers' incorrect recall.

CONCLUSIONS

This study has shown that there are no significant differences in rate of exclusive breastfeeding, use of formula feeds, and time of introduction of semisolid feeds among under-five children in rural and urban communities in Lagos, Nigeria. The diversity of solid, semisolid, or soft foods given to children and frequency of consumption are similar in rural and urban communities. However, the prevalence of undernutrition is higher in rural community. This implies that efforts at achieving effective control of undernutrition must be concentrated in rural areas with a focus on interventional measures that addresses socioeconomic gaps between rural and urban communities. There is also need for aggressive promotion of breastfeeding, appropriate time of introduction of semisolid food, and discouraging use of formula feeds. Mothers should be encouraged that diversity should be included in the choice of foods for their children, especially from animal protein, fruits, and vegetable groups in both rural and urban communities.

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Conflicts of interest
There are no conflicts of interest.

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