academicJournals

Vol. 10(10) pp. 203-212, October 2016
DOI: 10.5897/AJFS2016.1439
Article Number: 8B8A92E59901
ISSN 1996-0794

http://www.academicjournals.org/AJFS

African Journal of Food Science

Full Length Research Paper

Dietary pattern and nutritional status of primary school pupils in a South Western Nigerian state: A rural urban Comparison

Bamidele Bello[1], Oyenike Ekekezie[2] and Olusegun Temitope Afolabi[3*]

[1]Population and Reproductive Health Programme, Obafemi Awolowo University, Ile-Ife, Osun State, Nigeria.
[2]National Postgraduate Medical College, Ijanikin, Lagos, Nigeria.
[3]Department of Community Health, Obafemi Awolowo University, Ile-Ife, Nigeria.

Received 21 March 2016, Accepted 14 July 2016.

Nutrition may be defined as the process, act, or study of how living things use nutrients for energy, growth, and maintenance. Contrary to widely held notions, malnutrition may be caused by people choosing to eat the wrong types of food, rather than a lack of what to eat. The objectives of the study were to describe the dietary pattern of primary school pupils in an urban and rural local government area of Lagos State, Nigeria and to examine the relationship between dietary pattern and prevalence of malnutrition. This cross–sectional comparative study adopted a multistage random sampling which included all children aged between six and twelve years in primary schools in randomly selected urban and rural local government areas (LGAs) in Lagos State. Using interviewer-administered questionnaire, information on socio-demographics, dietary history/pattern, food frequency and anthropometric measurements of selected pupils was obtained. Obtained data were analysed with standardized nutritional indices, and treatment means were compared with bivariate analysis at 95% level of significance. While underweight (49.6% v 15%) and wasting (24.2% v 13.6%) pupils were more prevalent in the rural areas, overweight (15.1% v 13.2%) pupils were more prevalent in the urban areas. Eating patterns among pupils living in the rural areas were significantly different from those living in urban areas, especially with respect to vegetable, snack and fizzy drink consumption. Comprehensive nutritional education programme for pupils, their parents and teachers should be introduced to promote nutritional health.

Key words: Nutrition, nutritional status, rural, urban, nutritional pattern.

INTRODUCTION

Nutrition may be defined as the science of food and its relationship to health. It is concerned primarily with the part played by nutrients in body growth, development and maintenance (WHO, 1971). Undernutrition (nutrient

*Corresponding author. E-mail: temitopesegun@yahoo.com. Tel: +234-803-388-5447.

deficiency) is the prevalent type in tropical developing countries. Obesity (nutrient excess) and its co - morbidities are less widespread in developing countries but rates are increasing (Lucas and Giles, 2003; Afolabi et al, 2015). Community beliefs and family dietary practices have also been identified as important predisposing factor to malnutrition (Abubakar et al, 2011; Wong, 2014). It is believed that almost one third of children in developing countries are malnourished (FAO, 2015). Contrary to widely held notions that malnutrition is due to poverty, anecdotal evidence suggest that this may be caused by people choosing to eat the wrong types of food, rather than a lack of what to eat (Torpy, 2004). Infants and young children bear the brunt of undernutrition and suffer the highest risk of disability and death associated with it. Young children who are undernourished are more susceptible to diseases. Even feeding them later in life is too little, too expensive and too late to improve nutrition or future productivity (World Bank, 1998; Burgess and Danga, 2008). About 60% of children who die from common diseases like malaria and diarrhoea would not have died if they were not undernourished in the first place (WHO, 2016). In 2001, 54% of all childhood mortality was attributable, directly or indirectly, to malnutrition. The children who die represent only a small part of the total disease burden due to malnutrition (Salem and Hamza, 2005). Worldwide, more than 80% of deaths associated with childhood undernutrition involve mild or moderate undernutrition, though immediate cause of death may be other conditions (Ogbonna et al, 2003; Levinson and Bassett, 2007; Weisstaub et al 2014). Children living under conditions of poverty and deprivation are always at risk of becoming undernourished. This has been noticed to be true even if the overall image of the society is one of prosperity and general well – being (Lucas and Giles, 2003).

It is therefore imperative to find out the dietary pattern, and its role in nutritional status, of primary school children in rural and urban local government areas (LGAs) in Lagos State, a cosmopolitan setting with generally higher standards of living as well as influences from urbanization, westernization and globalization.

The objectives of the study were to describe the dietary pattern of primary school pupils in an urban and rural local government area of Lagos State, Nigeria and to examine the relationship between dietary pattern and prevalence of underweight, overweight, wasting and stunting among primary school pupils in the urban and rural local government area of Lagos State, Nigeria.

METHODOLOGY

This cross–sectional comparative study adopted a multistage random sampling which included children aged between six and twelve years in primary schools in randomly selected urban and rural LGAs in Lagos State. Sample size was determined using sample size formula for comparing proportions with confidence level set at 95%, power of 80% and to detect a difference of 11% between both arms of the study yielded a sample size of 240 per group.The 20 LGAs in Lagos State were stratified into urban and rural, giving 16 urban and four rural LGAs (Ukoli et al, 1993), from which one urban (Ikeja) and one rural (Ikorodu) LGA was randomly selected from each of the strata. Thereafter, one ward was selected by simple random sampling from each of the selected LGAs from which one public and one private primary school were randomly selected in each of the two selected wards from the list of approved public and private primary schools in Lagos State, previously obtained from the Ministry of Education, Lagos State Secretariat, Alausa, Ikeja. An arm of each of the six grades in each school was selected at random via ballot and all pupils in the selected arms were interviewed and examined. Thus, a total of 529 pupils were included in the study comprising of 265 pupils for the urban arm and 264 for the rural arm.

Ethical clearance was obtained from the Research and Ethics Committee of the Lagos University Teaching Hospital. In addition, approval was obtained from the Lagos State Local Government Education Authority (LGEA) as well as from the individual school authorities. Written consent to interview and examine each child was obtained from their parents/caregivers via letters sent through the children. Child assent was then obtained from children whose parent/caregiver gave consent for their participation.

Data was collected from each of the selected pupil with the use of an interviewer-administered questionnaire which obtained information of socio-demographics, dietary history/pattern, food frequency and anthropometric measurements of the pupils. Prior to the survey, a certified anthropometrist of the International Society for the Advancement of Kinanthropometry (ISAK) (Anwer and Awan, 2003) trained the research assistants in obtaining anthropometric measurements from children after which the questionnaire was pre – tested in one public and one private primary school each in Surulere LGA (urban) and Badagry LGA (rural) in Lagos state.

The weight or body mass of each pupil was measured using a Seca® electronic weighing scale while their heights were measured with the use of a customized stadiometer. Calibration of the Seca® electronic weighing scale was undertaken every morning, before data collection, using reference weights of known mass. The GPM® Anthropometer was used for the calibration of the customized stadiometer. Anthropometric measurements (weight and height) were obtained from each pupil according to the ISAK standard protocol. The measurements 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 recommended by the World Health Organization (WHO) as an international reference standard; age as at last birthday, as reported by each child, was verified from school's register of date of birth In obtaining their weight/body mass (Ivanovic et al, 1986) each pupil was measured privately, standing still and bare footed, lightly dressed in their underwear. Their weights were taken in the morning, as it is known that there are diurnal variations in weight (Julia et al, 2004), and was recorded to the nearest tenth of a kilogram. The height or stretch stature (Ivanovic et al, 1986) was taken as the maximum vertical distance from the feet to the vertex of the head, which technically is the highest point on the skull when the head is held in the Frankfort plane. In this position, the subject is looking straight, the line joining the inferior margin of the eye socket with the tragion (notch above tragus) of the ear is horizontal or at right angles to the long axis of the body, arms hanging naturally by the sides, heels together and both heels touching the base of the stadiometer. The heels, buttocks and upper part of the back and back of the head were in contact with the stadiometer. Each subject looked straight ahead and took a deep breathe. The headpiece was brought down firmly, 'crushing' the hair and making contact with the vertex. The measurement was read off before the

Table 1. Socio – demographic characteristics of pupils in rural compared with urban area.

Variable	Locationrural N (%) N = 264	Urban N (%) N=265	Statistic
Age (years)			
6	19 (7.2)	37 (14.0)	χ^2=11.83
7	40 (15.1)	45 (17.0)	P=0.07
8	37 (14.0)	30 (11.3)	-
9	37 (14.0)	38 (14.3)	-
10	51 (19.3)	36 (13.6)	-
11	37 (14.0)	46 (17.4)	-
12	43 (16.3)	33 (12.5)	-
Sex			
Female	147 (55.6)	139 (52.4)	χ^2=0.55
Male	117 (44.4)	126 (47.6)	P=0.46
Religion			
Christianity	177 (67.5)	232 (87.5)	χ^2=31.64
Islam	87 (32.5)	33 (12.5)	P<0.001
Ethnicity			
Igbo	30 (11.4)	76 (28.7)	χ^2=162.97
Yoruba	222 (84.1)	87 (32.8)	P<0.001
Others	12 (4.5)	102 (38.5)	-
School type			
Private	127 (48.1)	131 (49.4)	χ^2=0.09
Public	137 (51.9)	134 (50.6)	P=0.76

subject exhaled, and then stepped away from the stadiometer. Measurements were taken to the nearest tenth of a centimeter.

In order to ensure that precise measurement had been taken, it was essential to determine the quantity of measurement error intrinsic to this study, and to ensure that this was within internationally accepted limits. The technical error of measurement (TEM) was used as a measure of validity (Anwer and Awan, 2003; Julia et al, 2004).

Data analysis

Data entry, validation and analysis were done using the EPI INFO epidemiological software package (version 6.04) (WHO, 1997). Categorical variables were presented in frequency distribution tables and / or charts; Appropriate summary statistics were also generated for the discrete variables: the Student's t – test was used for comparison of means while the Chi Square test was used to compare rates, ratios and proportions. Yates correction of Chi Square was done for tables with cells having expected values less than five (Adamu et al, 2012). Underweight, overweight, stunting and wasting were classified using z scores.

RESULTS

Socio – demographic characteristics

Five hundred and twenty nine pupils participated in the study comprising of 264 (49.9%) pupils from Ikorodu local government area (rural); and 265 (50.1%) pupils from Ikeja local government area (urban). Over half, 289 (54.1%), of the respondents were females giving an overall male: female ratio of 1:1.2. Table 1 shows the socio – demographic characteristics of pupils in rural area compared with the urban. The pupils in the rural area were not significantly different from those in the urban area in sex, age and school type but were significantly different by religion and ethnicity. Respondents in rural area were of predominantly Yoruba extraction while the urban were more evenly distributed. There were more Christians in the urban schools (87.5%) than rural schools (67.5%).

Prevalence of underweight, stunting and wasting

Table 2 shows the weight for age of pupils in the rural and urban areas based on weight for age z scores (WAZ). Almost half (49.6%) of the pupils in the rural area were underweight compared with 15% pupils in the urban area. Thus, the prevalence of underweight was significantly higher in the rural area compared with the urban area. Conversely, the prevalence of overweight

Table 2. Weight for age of pupils in rural and urban areas.

WAZ	Rural frequency (%)	Urban frequency (%)	Statistic
<-2	131 (49.6)	40 (15.1)	χ^2=156.0
-2 to +2	133 (50.4)	150 (56.6)	P<0.001
> +2 to +3	0 (0.0)	40 (15.1)	-
> +3	0 (0.0)	35 (13.2)	-
Total	264 (100.0)	265 (100.0)	-

Table 3. Height for age of pupils in rural and urban areas.

HAZ	Ruralfrequency (%)	Urbanfrequency (%)	P-value
< -3	43 (16.3)	13 (4.9)	χ^2=71.6
-3 to < -2	91 (34.5)	31 (11.7)	P<0.001
-2 to +2	130 (49.2)	221 (83.4)	-
Total	264 (100.0)	265 (100.0)	-

Table 4. Weight for height of pupils rural and urban areas.

WHZ	Ruralfrequency (%)	Urbanfrequency (%)	P-value
< -3	12 (4.5)	6 (2.3)	χ^2=9.97
-3 to < -2	52 (19.7)	30 (11.3)	P=0.007
-2 to +2	200 (75.8)	229 (86.4)	-
Total	264 (100.0)	265 (100.0)	-

and obesity was significantly higher in the urban than the rural area with15.1% overweight and 13.2% obese pupils in the urban area, but none in the rural area. Table 3 shows the height for age of pupils in the rural and urban areas based on height for age z scores (HAZ). The overall prevalence of stunting in the rural area (50.8%) was significantly higher than that of the urban area (16.6%). The degree of stunting ranged from moderate (34.5% rural vs 11.7% urban) to severe (16.3% rural vs 4.9% urban). Table 4 shows the weight for height of pupils in the rural and urban areas based on weight for height z scores (WHZ). The prevalence of wasting was significantly higher in the rural area compared to the urban as almost a quarter (24.2%) of the rural pupils were found to be wasted as opposed 13.6% urban pupils. About a fifth (19.7%) of the pupils in the rural area were moderately wasted compared with about a tenth (11.3%) pupils in the urban area. In like manner, severe wasting in the rural LGA was found to be 4.5% compared to 2.3% in the urban area. In Table 5, all the mean nutritional indices (weight for age z scores, height for age z scores, and weight for height z scores) were significantly higher among pupils in the urban area compared with the rural area.

Dietary consumption

Table 6 shows the frequency of fruits, vegetables, bread, noodles, milk and egg consumption by pupils in rural and urban areas. Rural-urban comparisons were significantly different for the various food groups: Fruits 176 (66.7%) versus(vs) 90 (33.3%); vegetables 219 (83%) vs 167 (63.1%); noodles 215 (81.4%) vs 132 (49.8%); regularly consumed milk 150 (56.8%) vs 179 (68.5%); wheat bread 6 (2.7%) vs 54 (20.4%) and regular consumption of eggs 26 (9.9%) vs 191 (72%).

Table 7 shows the consumption of snacks, sweets and soft drinks among pupils in rural and urban areas. Regular consumption of snacks (4 to 7days a week) and sweets were not significantly different (206 (76.9%) and 5(1.9%) vs 7 (2.6%) respectively.vs205 (77.4%)). Regular consumption of soft drinks was significantly different (66 (25.0%) vs 162 (61.1%)).

Relationship between dietary patterns and nutritional status

Tables 8, 9 and 10 represent the regression of weight for age, height for age and weight for height respectively on frequency of dietary consumption (in days per week). The equations representing the association in the form $Y= a + b_1x_1+ b_2x_2…+b_nx_n$ are:

W/A=82.515-1.641 x freq. of wheat bread+0.729 x freq. of egg-1.96 x freq. of fruit+1.256 x freq. of noodles+1.180 x freq. of milk+0.312 x freq. of veg+0.701 x freq. of white

Table 5. Comparison of mean nutritional indices of pupils according to location.

Indices	Location		Statistic
	RuralN=264	Urbann=265	
WAZ mean (SD)	-1.1 (0±1.0)	0.2 (0±1.5)	t=12.038, p<0.001
HAZ mean (SD)	-1.1 (0±1.2)	0.2 (0±1.4)	t=11.525, p<0.001
WHZ mean (SD)	-1.2 (0±1.2)	0.3 (0±1.6)	t=6.58,p<0.001

Table 6. Frequency of consumption of fruits, vegetables, bread, noodles, milk and egg among pupils in rural and urban areas.

Frequency of fruit consumption	Rural	Urban	P-value
Regularly (4-7 / 7 days)	176 (66.7)	90 (33.9)	χ^2=56.5
Occasionally (1-3 / 7 days)	88 (33.3)	175 (66.1)	P<0.001
frequency of vegetable consumption			
Regularly (4-7 / 7 days)	219 (83.0)	167 (63.1)	χ^2=26.7
Occasionally (1-3 / 7 days)	45 (17.0)	98 (36.9)	P<0.001
Frequency of white bread consumption			
Regularly (4-7 / 7 days)	181 (68.6)	184 (69.5)	χ^2=0.27
Occasionally (1-3 / 7 days)	74 (28.0)	74 (27.9)	P=0.87
Never	9 (3.4)	7 (2.6)	-
Frequency of wheat bread consumption			
Occasionally (1-3 / 7 days)	6 (2.3)	54 (20.4)	χ^2=43.1
Never	258 (97.7)	211 (79.6)	P<0.001
Frequency of noodles consumption			
Regularly (4-7 / 7 days)	36 (13.7)	123 (46.4)	χ^2=67.9
Occasionally (1-3/ 7 days)	215 (81.4)	132 (49.8)	P<0.001
Never	13 (4.9)	10 (3.8)	-
Frequency of milk consumption			
Regularly (4-7 / 7 days)	150 (56.8)	179 (68.5)	χ^2=6.47
Occasionally (1-3 / 7 days)	114 (43.2)	86 (32.5)	P=0.01
Frequency of egg consumption			
Regularly (4-7 / 7 days)	26 (9.9)	191 (72.1)	χ^2=211.7
Occasionally (1-3 / 7 days)	156 (59.1)	49 (18.5)	P<0.001
Never	82 (31.0)	25 (9.4)	-

bread consumption W/A=118.880-2.806 x freq. of wheat bread+2.499 x freq. of egg+0.722 x freq. of fruit-2.052 x freq. of noodles-6.575 x freq. of milk+2.926 x freq. of veg+0.671 x freq. of white bread consumption (for rural and urban areas respectively).

H/A=94.969-0.929 x freq. of wheat bread+0.148 x freq. of egg-0.322 x freq. of fruit+0.786 x freq. of noodles +0.026 x freq. of milk+0.354 x freq. of veg+0.441x freq. of white bread consumption H/A=103.361-0.503 x freq. of wheat bread+0.701 x freq. of egg+0.299 x freq. of fruit-1.130 x freq. of noodles-1.193 x freq. of milk+0.90 x freq. of veg-0.032 x freq. of white bread consumption (for rural and urban areas respectively).

W/H=88.556-1.567 x freq. of wheat bread+0.344 x freq. of egg-1.587 x freq. of fruit +1.367 x freq. of noodles+1.456 x freq. of milk+0.560 x freq. of veg+0.943

Table 7. Frequency of consumption of snacks, sweets and soft drinks among pupils in rural and urban areas.

Frequency of snacks consumption	Rural	Urban	P-value
Regularly (4-7 / 7 days)	206 (76.9)	205 (77.4)	χ^2=4.5
Occasionally (1-3 / 7 days)	46 (17.4)	54 (20.3)	P=0.11
Never	15 (5.7)	6 (2.3)	-
Frequency of sweet consumption			
Regularly (4-7 / 7 days)	190 (71.9)	165 (62.3)	χ^2=5.7
Occasionally (1-3 / 7 days)	69 (26.2)	93 (35.1)	P=0.06
Never	5 (1.9)	7 (2.6)	-
Frequency of soft drink consumption			
Regularly (4-7 / 7 days)	66 (25.0)	162 (61.1)	χ^2=76.3
Occasionally (1-3 / 7 days)	166 (62.9)	97 (36.6)	P<0.001
Never	32 (12.1)	6 (2.3)	-

Table 8. Relationship between frequency of dietary consumption (in days per week) and weight for age (w/a) of pupils in rural and urban areas**.**

Frequency of consumption (in days per week)	Rural				Urban			
	Coefficient	Std Error	F-test	P-Value	Coefficient	Std Error	F-test	P-Value
Wheat bread	-1.641	2.275	0.5202	0.471404	-2.806	2.735	1.0522	0.305980
Egg	0.729	1.915	0.1447	0.703992	2.499	2.308	1.1716	0.280101
Fruit	-1.965	1.341	2.1479	0.143996	0.722	2.481	0.0846	0.771395
Noodles	1.256	2.085	0.3630	0.547364	-2.052	2.519	0.6635	0.416097
Milk	1.180	1.276	0.8554	0.355903	-6.575	1.970	11.1390	0.000971*
Vegetables	0.312	1.329	0.0552	0.814418	2.926	2.303	1.6141	0.205077
White bread	0.701	1.241	0.3194	0.572475	0.671	2.040	0.1082	0.742475
Constant	82.515	13.262	38.7131	0.000000	118.880	13.572	76.7261	0.000000

*Significant variations

x freq. of white bread consumption
W/H=109.868-2.786 x freq. of wheat bread+2.500 x freq. of egg+0.822 x freq. of fruit-2.001 x freq. of noodles-6.765 x freq. of milk+2.789 x freq. of veg+0.766 x freq. of white bread consumption (for the rural and urban areas respectively).

DISCUSSION

This study was carried out to determine the effects of dietary patterns on the nutritional status of primary school children.

Adequate nutrition promotes good nutritional status and thus satisfies the requirement for good physical health hence the risk of malnutrition is increased with unhealthy dietary habits and practices (Adamu et al., 2012). Nutritional status has a great impact on the learning capacity of children, on their productivity as adults as well as and on their quality of life in general (Flynn et al., 2006).

The food frequency questionnaire revealed that majority of the pupils consumes an adequate number of meals/day (average of four to five). However, more pupils in the urban area consume more of carbohydrate foods than fruits and vegetables relative to their rural counterparts. In like manner, the consumption of fizzy sugary drinks among the urban pupils (61.1%) was more than two-times that of the rural pupils (24%). This was contrary to the findings of Wang, 2001 obtained among African-Americans where he found low consumption of soft drinks. Egg and milk consumption by pupils in the rural area was poor as only a tenth of the pupils reportedly consume egg regularly (at least 4-7 days/week) and just a little over half consume milk regularly. This is not encouraging as these are protein of animal sources

Table 9. Relationship between frequency of dietary consumption (in days per week) and height for age (h/a) of pupils in rural and urban areas.

Frequency of consumption (in days per week)	Rural				Urban			
	Coefficient	Std error	F-test	P-Value	Coefficient	Std error	F-test	P-Value
Wheat bread	-0.929	0.916	1.0286	0.311444	-0.503	0.621	0.6563	0.418613
Egg	0.148	0.771	0.0370	0.847599	0.701	0.524	1.7890	0.182235
Fruit	-0.322	0.540	0.3559	0.551348	0.299	0.563	0.2820	0.595882
Noodles	0.786	0.840	0.8757	0.350265	-1.130	0.572	3.9063	0.051178
Milk	0.026	0.514	0.0026	0.959433	-1.193	0.447	7.1147	0.008133*
Vegetables	0.354	0.535	0.4376	0.508900	0.900	0.523	2.9633	0.086384
White bread	0.441	0.500	0.7781	0.378539	-0.032	0.463	0.0048	0.944903
Constant	94.969	5.340	316.2742	0.000000	103.361	3.080	1126.1431	0.000000

*Significant variations.

Table 10. Relationship between frequency of dietary consumption (in days per week) and weight for height (w/h) of pupils in rural and urban areas.

Frequency of consumption (in days per week)	Rural				Urban			
	Coefficient	Std error	F-test	P-Value	Coefficient	Std error	F-test	P-value
Wheat bread	-1.567	2.648	0.7775	0.367034	-2.786	2.305	1.0877	0.305670
Egg	0.344	1.467	0.3887	0.766783	2.500	2.178	1.1897	0.296655
Fruit	-1.587	1.356	2.7544	0.186543	0.822	2.456	0.1566	0.865543
Noodles	1.367	2.357	0.8658	0.678664	-2.001	2.751	0.7656	0.457899
Milk	1.456	1.678	0.7865	0.456803	-6.765	1.785	11.1366	0.000712*
Vegetables	0.560	1.778	0.0567	0.778538	2.789	2.454	1.6167	0.200087
White bread	0.943	1.468	0.4798	0.567865	0.766	2.056	0.1562	0.755678
Constant	88.556	12.267	36.6781	0.000000	109.868	11.597	75.7001	0.000000

*Significant variations.

which are readily available and essential for the growth and development of children. This result is in tandem with that obtained from the study in Nagpur, India by Vinod et al. (2006) where they found low consumption of protein among children of parents in the low socioeconomic class. The frequency of milk consumption may have contributed significantly to the variations in the nutritional status across the three indices (weight for age, height for age and weight for height) of the pupils in the urban area only.In this study, the mean weight and height of pupils in the urban area were significantly higher than those in the rural areas.

Undernutritio (underweight, stunting and wasting) was prominent among primary school children in Lagos State, Nigeria, especially in the rural area. This was in agreement to the report of

similar studies in Nigeria and other developing countries (Oninla et al., 2007; Abdul Azzez & Devi, 2012 Senbanjo et al., 2013; Duru et al., 2015; Tadesse and Alemu, 2015). This could be as a result of degenerating living conditions and poor socioeconomic standards in the rural area. Malnutrition, presenting as underweight, stunting and wasting was found to be significantly higher among primary school pupils in the rural area (49.6, 50.8 and 24.2%, respectively) compared with pupils in the urban area (15.1, 16.6 and 13.6%, respectively). Consequently, the mean z-score for weight for age, height for age and weight for height were each found to be significantly lower among the rural pupils than urban pupils ($p<0.001$). This finding was in agreement with a similar study carried out in Ile – Ife, Osun State which also found the prevalence of underweight, stunted and wasted to be consistently higher among pupils in the rural area compared to pupils in the urban area (Olumakaiye et al, 2010).

The emergence of overweight and obesity in the urban area may be attributable to the fact that Lagos State is more cosmopolitan compared with other states in the same region, with generally higher standards of living, and a lot of influences from urbanization, westernization and globalization resulting in change of diet and pattern of physical activity of children and adults alike (Ekekezie et al., 2012; Ajayi et al., 2015). In this study, pupils in the urban area also had high consumption of energy – dense soft drinks, snacks and sweets, which could be responsible for the overweight and obesity. The better nutritional status of the urban pupil relative to the rural pupil could be a reflection of the expected higher social class of the urban pupil which probably enabled them to have better nutrition because though the frequency of consumption of fruits, vegetables, white bread and noodles was significantly higher among pupils in the rural area, the quantity and quality consumed by pupils in the urban area was probably higher as a result of their higher socioeconomic status. Furthermore the consumption of protein – rich foods, milk and eggs, (which are relatively more expensive) was significantly more frequent among pupils in the urban area. Other studies have also shown that there is inadequate consumption of daily food in the rural area, coupled with children's diets being inadequate in quality as well as in quantity throughout the year (Rohlen, 2002; Berenson, 2005). There are more food-insecure households in rural areas, and reducing the portion size of food is a common coping-strategy (Adebayo and Abegunrin, 2013; Edeh and Gyimah-Brempong, 2015; Ezeama et al., 2015 Toriola, 1998). Some studies have also shown higher prevalence rate of intestinal parasites among the rural pupils. This could contribute to their lower nutritional status (Usfar et al., 2007; Ogbonna et al., 2004; Quihui et al., 2004).

Another probable reason for the disparity in nutritional status between the rural and urban areas may be due to inadequate food intake in the rural area, not only because of lower socioeconomic status, but also because most of the food produced is rendered even more inadequate as they are taken to the cities to sell and to earn relatively more money (Hadju et al., 1995; Chukwuma, 2014). Also, it is possible that due to urban – rural migration there are less people left in the rural areas to farm and produce food, as many have drifted to the urban areas in search of 'greener pastures'.

The pupils in the urban area accounted for all the over-nutrition observed probably because they could afford more nutritious food in addition to energy – dense drinks, snacks and sweets (Senbanjo et al., 2014). The pupils in the rural area accounted for most of the undernutrition observed, probably because the quality and quantity of food they consume was less (Oyemade et al., 1981). Also probably because they consumed energy – dense drinks and sweets as a substitute to balanced meal and not in addition to their inadequate meals (Rohlen, 2002). Though the pupils in the rural area ate carbohydrate foods such as bread and noodles more frequently than those in the urban area, they ate much less of protein - rich foods such as eggs and milk, which are more important for a child's growth and development (Osinusi and Oyejide, 1987). This is probably because protein – rich foods are more expensive and beyond the reach of those in the rural area. The form of bread consumed most in both rural and urban areas was the white bread which is less nutritious than the wheat bread (Berkey et al., 2005). Infact, 79.6% of pupils in the urban area and 97.7% in the rural area had never eaten wheat bread. Consumption of milk was found to be associated with nutritional status in the urban area in this study: 43.0% of pupils in the urban area consumed milk daily compared with only 8.3% in the rural area.

A study conducted on school-aged children in Nigeria (Afolabi et al., 2015) also revealed that children in the urban areas had poor eating habits coupled with sedentary life style as reflected in their practice of excessive media (TV and internet) exposure accounting for a 10 and 4% prevalence of overweight and obesity respectively. Majority of the pupils snack regularly, with over 66% snacking at least 4 to 5 days in a week. It is possible that snacking has a positive influence on the pupils' nutritional status as it has been observed in other studies with primary school children. Also, Adamu et al. (2012) observed that most of the upper primary school pupil who are underweight, snack just once in a day whereas those who are normal, overweight or are at risk of becoming overweight snack twice or more in a day.

CONCLUSION

This study found the prevalent rates of underweight, stunting and wasting in the rural area to be 49.6, 50.8 and 24.2% respectively; while in the urban area they were 15.1, 16.6 and 13.6% r espectively. In addition

however, there was over-nutrition in the urban area: 15.1% were overweight and 13.2% were obese. Dietary consumption of milk was found to be associated with nutritional status in the urban area. In the rural area, there were no significant variations across the food groups as all variables of interest were generally base, thus none was a significant determinant of nutritional status.

The study recommended comprehensive public health intervention measures, including a comprehensive nutritional education programme for pupils, their parents and teachers to promote nutritional health with the necessary political will of governments at all levels to ensure sustainability; establishment or improvement where it already exists, of adequately financed and well managed school health programmes including well supervised school meals that include milk drink daily especially in the rural areas.

Conflict of interests

The authors have not declared any conflict of interests.

REFERENCES

Abdul Aziz MF, Devi MN (2012). Nutritional Status and Eating Practices Among Children Aged 4-6 Years Old in Selected Urban and Rural Kindergarten in Selangor, Malaysia. Asian J. Clin. Nutr. 4:116-131.

Abubakar A, Holding P, Mwangome M, Maitland K (2011). Maternal perceptions of factors contributing to severe under-nutrition among children in a rural African setting. Rural Remote Health 11(1):1423.

Adamu A, Adjei NG, Kubuga CK (2012). Effects of Dietary Patterns on the Nutritional Status of Upper Primary School Children in Tamale Metropolis. Pakistan J. Nutr. 11(7):591-609.

Adebayo OO, Abegunrin OD (2013). Analysis of Food Insecurity and Coping Mechanisms among Rural Women in Boripe Local Government Area Of Osun State, Nigeria. Res. Humanit. Soc. Sci. 3(20):9.

Afolabi OT, Bello B, Ijadunola MY, Alabi CO, Akabueze CE, Alabi OA (2015). Media exposure in primary school pupils in South Western Nigeria: A weight concern? Int. J. Child Adolesc. Health 8(3):315-320.

Ajayi EO, Elechi HA, Alhaji MA (2015). Prevalence of overweight/obesity among primary school pupils in Urban Centre, Nigeria. Saudi J. Obes. 3:59-65

Anwer I, Awan J.A (2003). Nutritional status comparison of rural with urban school children in Faisalabad District, Pakistan. Rural Remote Health; 3(1):130.

Berenson GS (2005). Obesity–a critical issue in preventive cardiology: the Bogalusa Heart Study 1-4. http://www.berenson@tulane.edu accessed on 24/11/15.

Berkey C, Rockett H, Willett W, Colditz G (2005). Milk, dairy fat, dietary calcium, and weight gain: a longitudinal study of adolescents. Arch. Pediatr. Adolesc. Med. 159(6):543-50

Burgess A, Danga L (2008). Undernutrition in Adults and Children: causes, consequences and what we can do. South Sudan Med. J. 1(2):18-22.

Caribbean Food and Nutrition Institute. Childhood Obesity. Nyam News. 2005, April; Nos. 1 – 2. ISSN 0255 – 8203.

Chukwuma C (2014). Convergence of the Nigerian food and agricultural crisis on sustainable development. J. Agr. Extension Rural Dev. 6(2):61-68.

Duru CB, Oluoha UR, Uwakwe KA, Diwe KC, Merenu IA, Chigozie IO, Iwu AC (2015). Prevalence and Sociodemographic Determinants of Malnutrition among Under-Five Children in Rural Communities in Imo State, Nigeria. Am. J. Public Health Res. 3(6):199-206.

Edeh HO, Gyimah-Brempong K (2015).Determinants of change and household responses to food insecurity: Empirical evidence from Nigeria. Afr. J. Agric. Res. 10(5):423-433.

Ekekezie OO, Odeyemi KA, Ibeabuchi NM (2012). Nutritional status of urban and rural primary school pupils in Lagos State, Nigeria. West Afr. J. Med. 31(4):232-7.

Ezeama NN, Ibeh C, Adinma E, Emelumadu O, Adogu P (2015). Coping with Household Food Insecurity: Perspectives of Mothers in Anambra State, Nigeria. J. Food Secur. 3(6):145-154.

Food and Agriculture Organization, International Fund for Agricultural Development, World Food Program. 2015. "The State of Food Insecurity in the World 2014. Strengthening the enabling environment for food security and nutrition." Rome: FAO http://www.fao.org/3/a4ef2d16-70a7-460a-a9ac-2a65a533269a/i4646e.pdf

Flynn MA, McNeil DA, Maloff B, Mutasingwa D, Wu M, Ford C, Tough SC (2006). Reducing obesity and chronic disease risk in children and youth: a synthesis of evidence with 'best practice' recommendations. Obes. Rev. 7 Suppl 1:1-5.

Hadju V, Abadi K, Stephenson LS, Noor NN, Mohammed HO, Bowman DD (1995). Intestinal helminthiasis, nutritional status, and their relationship; a cross-sectional study in urban slum school children in Indonesia. Southeast Asian J Trop Med Public Health.;26(4):719-29

Ibrahim GJ 1983.Nutrition in Mother and Child. Macmillan Press, London.

Ivanovic D, Olivares M, Castro C, Ivanovic R (1995). Nutritional status of school children in poverty conditions from urban and rural areas. Metropolitan region. Chile. 1986-1987. Rev. Med. Child 123(4):509-25.

Julia M, van Weissenbruch MM, de Waal HA, Surjono A (2004). Influence of socioeconomic status on the prevalence of stunted growth and obesity in prepubertal Indonesian children. Food Nutr. Bull. 25(4):354-60.

Levinson FJ, Bassett L (2007). Malnutrition Is Still a Major Contributor to Child Deaths But Cost-Effective Interventions Can Reduce Global Impacts. Population Reference Bureau; Policy Brief 2007

Lucas AO, Giles HM (2003). Nutritional Disorders. Short textbook of Public Health Medicine for the Tropics. 4:261

Ogbonna C, Parakoyi DB, Okolo SN (2003). Determinants of Household Nutritional Status: A periurban cross sectional survey in Jos, Nig J Community Medicine and Primary Health Care 15(2):37- 41.

Ogbonna C, Okolo S, Okonji M (2004). Intestinal worms and nutritional status of under – fives in Jos, Nigeria: any relationship? Nig J Clin Pract; 7:79-81

Olumakaiye MF, Atinmo T, Olubayo-Fatiregun MA (2010). Food Consumption Patterns of Nigerian Adolescents and Effect on Body Weight. J. Nutr. Educ. Behav. 42:144-151

Onadeko MO (1980). Nutritional Status of Pre – school children in a rural community. Nig. J. Pediatr. 7(2):33-38.

Oninla SO, Owa JA, Onayade AA, Taiwo O (2007). Comparative Study of Nutritional Status of Urban and Rural Nigerian School Children. J Trop Pediatr; 53(1):39-43.

Osinusi K, Oyejide C (1987). Secular Trends in nutritional status of children from a low background. Nig. J. Pediatr. 14:7-12.

Oyemade A, Olugbile A, Janes M (1981). Health of Nigerian rural school children. J. Trop. Pediatr. 27:101-5.

Quihui-Cota L, Valencia ME, Crompton DW, Phillips S, Hagan P, Diaz-Camacho SP (2004). Prevalence and intensity of intestinal parasitic infections in relation to nutritional status in Mexican schoolchildren. Trans. R. Soc. Trop. Med. Hyg. 98(11):653-9.

Rohlen TP (2002). Cosmopolitan Cities and Nation States: Open Economics, Urban Dynamics and Government in East Asia; 1 - 4.

Saleem QS, Hamza HB (2005). Childhood Protein Energy Malnutrition in Developing Countries. Med. Today; 3(1):43-46.

Senbanjo IO, Olayiwola IO, Afolabi WA, Senbanjo OC (2013). Maternal and child under-nutrition in rural and urban communities of Lagos state, Nigeria: the relationship and risk factors. BMC Res. Notes. 6:286

Tadesse S, Alemu Y (2015). Urban-rural differentials in child undernutrition in Ethiopia. Int. J. Nutr. Metab. 7(1):15-23

Toriola AL (1998). Obesity in black women in Soweto. J. Recr. Soc.

Health 110:101-103.
Torpy JM, Lynm C, Glass RM (2004). Malnutrition in children. J. Am. Med. Assoc. 292(5):648.
Ukoli FA, Adams-Campbell LL, Ononu J, Nwankwo MU, Chanetsa F(1993). Nutritional status of urban Nigerian school children relative to the NCHS reference population. East Afr. Med. J. 70(7):409-13.
Usfar A, Fahmida U, Februhartanty J (2007). Household food security status measured by the US-Household Food Security/Hunger Survey Module (US-FSSM) is in line with coping strategy indicators found in urban and rural Indonesia. Asia Pac. J. Clin. Nutr. 16(2):368-74.
Wang Y (2001). Cross-national comparison of childhood obesity: the epidemic and the relationship between obesity and socioeconomic status. Int. J. Epidemiol. 30(5): 1129-1136.
Weisstaub G, Aguilar A, Uauy R (2014). Treatment and prevention of malnutrition in Latin America: Focus on Chile and Bolivia. Food and Nutrition Bulletin; 35(2s), The Nevin Scrimshaw International Nutrition Foundation.
WHO (1971). Nutrition and Health. Technical Report Series No. 477:1-2.
WHO (1997). Obesity: Preventing and Managing the Global Epidemic – Report of WHO Consultation on Obesity, Geneva. WHO / NUT / NCD / 98.1.
WHO (2016). Children: reducing mortality. Fact sheet. http://www.who.int/mediacentre/factsheets/fs178/en/
Wong HM, Foong M, Nair S (2014). Risk factors of malnutrition among preschool children in Terengganu, Malaysia: a case control study. BMC Public Health BMC series: 14:785
World Bank (1998). Nutrition: What is Malnutrition? http://www.youthink.worldbank.org/ accessed 3/12/2015.