

Nutrition Knowledge, Dietary Diversity and Nutritional Status of Adolescents in Three Selected Local Government Areas of Ibadan Municipality, Nigeria

Adepoju*, Oladejo Thomas and BRIGHT Oluronke Abike

Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria



*Corresponding author: Adepoju, Department of Human Nutrition and Dietetics, Faculty of Public Health, College of Medicine, University of Ibadan, Ibadan, Nigeria

ARTICLE INFO

Received: 📅 July 09, 2021

Published: 📅 July 23, 2021

Citation: Adepoju, Oladejo Thomas, BRIGHT Oluronke Abike. Nutrition Knowledge, Dietary Diversity and Nutritional Status of Adolescents in Three Selected Local Government Areas of Ibadan Municipality, Nigeria. Biomed J Sci & Tech Res 37(3)-2021. BJSTR. MS.ID.005999.

Keywords: Adolescents; Nutritional Status; Dietary Diversity; Nutrition Knowledge

ABSTRACT

Increased nutritional needs in adolescence due to increased growth rate and body composition changes associated with puberty coincides with other factors that affect adolescents' food choices, nutrient intake, and consequently, nutritional status. Improper food choice results in malnutrition with its grave consequences. This study was carried out to assess the nutrition knowledge, dietary diversity and nutritional status of adolescents in three Local Government Areas (LGAs) of Ibadan municipality, Oyo State; Nigeria. The descriptive cross-sectional study was carried out among 450 In-school (ISA, 225) and Out-school (OSA, 225) adolescents aged 10-19 years randomly selected from three out of five LGAs. Fifteen secondary schools were randomly selected from the three LGAs. The ISA were selected through systematic random sampling technique, while OSA were recruited from markets, motor parks, mechanic workshops, and shops with adolescent apprentices through snowball technique. Semi-structured, interviewer-administered questionnaire was used to collect data from the respondents. Data were analyzed using descriptive statistics, ANOVA and Chi-square test at $p = 0.05$. More than half (58.7%) of respondents had poor nutrition knowledge, 70.0%, 28.7% and 1.3% had high, average and low dietary diversity score, respectively, 92.8% had normal height-for-age, 5.7% were mildly stunted and 1.5% severely stunted. Majority (87.3%) of the respondents had normal BMI-for-age, 7.3% were underweight and 4.9% were overweight. No significant correlation was found between BMI-for-age and nutrition knowledge of respondents. The BMI-for-age of In-school adolescents was negatively correlated with dietary diversity scores. In-school respondents had good nutrition knowledge which did not translate to good food habit, while out-of-school respondents had poor nutrition knowledge and good food habit. There is need for nutrition education in the nation's secondary schools and enlightenment programme for out-of-school adolescents about importance of good nutrition to growth and development.

Introduction

Adolescence is a transitional period from childhood to adulthood which normally begins with the onset of signs of puberty, physical and mental development, involving biological, social and psychological changes occurring between 10-19 years of age [1]. Of the 7.2 billion people in the world, about 1.2 billion are adolescents aged 10-19 years, making up 16 per cent of the world population

[2]. They constitute about 25 per cent of Nigeria's population [3] and are critical target population with regard to influencing global public health outcomes. Nutritional needs during adolescence are increased because of increased growth rate and changes in body composition associated with puberty [4,5]. The dramatic increase in energy and nutrient requirements coincides with other factors such

as the quest for independence and acceptance by peers, increased mobility, greater time spent at school and/or work activities, and preoccupation with self-image, that may affect adolescents' food choices and nutrient intake [4]. Due to urbanization, globalization and technological advancement, most adolescents in the urban regions are gradually moving from the traditional diets that are primarily derived from plant-based food sources which are low in fat and high in fibre, to more western diets that are energy dense, high in fats and sugars, and low in fibre; coupled with little or no physical activity. Population-based surveys have found that adolescents often fail to meet dietary recommendations for overall nutritional status and for specific nutrient intakes [6,7].

According to the report of Abdulkarim, et al. [8], 28.8% of adolescents are malnourished in Nigeria (13.2% overweight, 11.3% stunted, 2.6% obese, and 1.7% wasted) [8]. Adequate nutrition can play significant role in prevention of several chronic diseases, including obesity, coronary heart disease, and certain types of cancer, stroke, and type-2 diabetes [9]. To help prevent diet-related chronic diseases, researchers have proposed that healthy eating behaviours should be established in childhood and maintained during adolescence [10-13]. However, the relationship between nutrition knowledge, food habit, dietary diversity and nutritional status of in-school and out-of-school adolescents has not been adequately researched in Nigeria. This study therefore, seeks to provide information on in- and out-of-school adolescents' nutrition knowledge, food habit, and dietary diversity in relation to their nutritional status.

Methodology

The descriptive cross-sectional study was carried out in three randomly selected urban Local Government Areas (LGAs) namely Ibadan North, Ibadan Northeast and Ibadan Northwest among the five LGAs in Ibadan municipality. A total of 450 (225 In-school and 225 Out-of-school) adolescents were recruited for the study. A Five-section pre-tested interviewer-administered, semi-structured questionnaire was used to collect data on socio-economic, demographic and household characteristics, nutrition

knowledge, dietary diversity and anthropometric indices of the respondents. Nutrition knowledge was measured on a twelve-point knowledge scale which was rated as ≤ 8 – poor knowledge, and ≥ 8 – good knowledge. Dietary diversity questionnaire was used to gather information on individual dietary diversity score (IDDS) of the adolescents using the FAO recommendations [14], by scoring the number of foods consumed from each of the 14 food groups. Anthropometric measurements were done using a stadiometer to measure height and weighing scale to measure weight.

Data were analysed using descriptive statistics, Chi-square test, t-test, ANOVA and correlation at $p < 0.05$. Anthropometric data was analysed using WHO Anthroplus to obtain BMI-for-age according to the World Health Organisation (WHO) cut-off points [1]. Ethical approval for the study was obtained from the University of Ibadan/ UCH Ethical Review Committee. Permission to collect data was obtained from the Chairmen of the LGAs, LGA Education Inspector, School Principals, Heads of Motor Parks and Market Leaders. Additionally, informed consent was obtained from the respondents before the data collection.

Results

Socio-Demographic Characteristics of the Respondents

Table 1 shows the socio-demographic characteristics of the respondents. More than half (52.2%) of thee were male (46.2% in-school, 58.2% out-of-school) while female respondents were 47.8% (53.8% in-school, 41.8% out-of-school). Mean age of in-school respondents was 15.2 ± 1.3 years, while that of out-of-school was 16.9 ± 1.7 years. Majority (83.8%) of the respondents fell within 15-19 years age category (76.4% in-school, 91.1% out-of-school) while only 16.2% were within the ages of 10-14 years. Majority (85.4%) also were Yoruba, 8.9% Igbo, 1.3% Hausa and 4.4% other ethnic groups; with 56.2% being Christians, 43.8% Muslims, and 74.2% were from monogamous family with 56.2% having less than five siblings in the family. Socio-demographic characteristics were significantly associated with adolescent's sex, age category, ethnicity, religion, family type and number of siblings for both in- and out-of-school adolescents ($p < 0.05$).

Table 1: Socio-demographic Characteristics of Respondents.

Variable	Category of Adolescent		Total	χ^2	p-value
	In School n (%)	Out School n (%)			
Sex					
Male	104(46.2%)	131(58.2%)	235(52.2%)	6.5	0.014*
Female	121(53.8%)	94(41.8%)	215(47.8%)		
Age (years)					
10 – 14	54(24.0%)	20(8.9%)	74(16.4%)	17.4	0.000*
15 – 19	171(76.0%)	205(91.1%)	376(83.6%)		
Mean age	15.2 \pm 1.3	16.9 \pm 1.7			

Ethnicity					
Yoruba	178(79.1%)	206(91.6%)	384(85.4%)	16.2	0.001*
Igbo	32(14.2%)	8(3.6%)	40(8.9%)		
Hausa	4(66.7%)	2(0.9%)	6(1.3%)		
Others	11(1.8%)	9(4.0%)	20(4.4%)		
Religion					
Christian	172(76.4%)	81(36.0%)	253(56.2%)	80.7	0.000*
Islam	53(23.6%)	144(64.0%)	197(43.8%)		
Family Type					
Monogamy	204(90.7%)	130(57.8%)	334(74.2%)	66.3	0.000*
Polygamy	21(9.3%)	95(42.2%)	116(25.8%)		
Number of Siblings in the family					
< 5	160(71.1%)	93(41.3%)	253(56.2%)	37.1	0.000*
5-10	63(28.0%)	122(54.2%)	185(41.1%)		
>10	2(0.9%)	10(4.5%)	12(2.7%)		

Note: * - Values are significantly different at $p < 0.05$;

n = number of respondents

Socio-Economic Characteristics of the Respondents

For the socio-economic characteristics of the respondents, 40.5% (69.3% and 11.6% in-school and out-of-school) of respondents' fathers had tertiary education, 38.2% (22.2% and 54.2% in-school and out-of-school) had secondary education, 13.3% (7.6%, and 19.1% in-school and out-of-school) had primary education, while 8.0% (0.9% and 15.1% in-school and out-of-school) had no formal education, respectively (Table 2). The proportion of in-school respondents' fathers and mothers who had tertiary education were significantly higher than that of out-of-school respondents' parents ($p < 0.05$). Majority of the out-of-school respondents' fathers were artisans (83.3%), or farmers

(65%) or traders (50.9%), compared with 4.5%, 3.1%, and 23.5% for in-school respondents, respectively ($p < 0.05$). Majority (61.3%) of the respondents' mothers were traders (48.9% in-school, 73.8% out-of-school), 13.1% teachers (22.2% in-school, 4.0% out-of-school), 7.1% artisans (3.1% in-school, 11.1% out-of-school), while 9.2% (14.7% in-school, and 3.6% out-of-school) were classified as others ($p < 0.05$). Many (46.0%) of the respondents resided in 2 or 3-bedroom flats, 28.0% resided in room and parlour, while 12.9% and 12.4% resided in duplex building and single rooms, respectively. More of the in-school respondents resided in 2 or 3-bedroom flats and duplex ($p < 0.05$), while more of out-of-school respondents resided in single rooms and room and parlour compared with in-school adolescents ($p < 0.05$).

Table 2: Socio-economic Characteristics of Respondents.

Variable	Category of Adolescent		Total	χ^2	p-value
	In School n(%)	Out School n(%)			
Father's Level of Education					
None	2(0.9%)	34(15.1%)	36(8.0%)	169.0	0.000*
Primary	17(7.6%)	43(19.1%)	60(13.3%)		
Secondary	50(22.2%)	122(54.2%)	172(38.2%)		
Tertiary	156(69.3%)	26(11.6%)	182(40.5%)		
Mother's Level of Education					
None	5(2.2%)	43(19.1%)	48(10.7%)	161.1	0.000*
Primary	13(5.8%)	42(18.7%)	55(12.2%)		
Secondary	71(31.6%)	124(55.1%)	195(43.3%)		
Tertiary	136(60.4%)	16(7.1%)	152(33.8%)		
Father's Occupation					
Teacher	13(5.8%)	4(23.5%)	17(3.8%)		
Doctor	12(5.3%)	0(0.0%)	12(2.7%)		

Farmer	7(3.1%)	13(65.0%)	20(4.4%)		
Trader	53(23.5%)	55(50.9%)	108(24%)	69.9	0.000*
Artisan	10(4.5%)	50(83.3%)	60(13.3%)		
Engineer	51(22.7%)	13(20.3%)	64(14.2%)		
Lawyer	2(0.9%)	0(0.0)	2(0.4%)		
Others	77(34.2%)	90(51.7%)	167(37.2%)		
Mother's Occupation					
Teacher	50(22.2%)	9(4.0%)	59(13.1%)		
Nurse	13(5.8%)	10(4.4%)	23(5.1%)		
Doctor	4(1.8%)	0(0.0)	4(0.9%)		
Farmer	3(1.3%)	7(3.1%)	10(2.2%)	95.5	0.000*
Trader	110(48.9%)	166(73.8%)	276(61.3%)		
Artisan	7(3.1%)	25(11.1%)	32(7.1%)		
Engineer	1(0.4%)	0(0.0%)	1(0.2%)		
Lawyer	4(1.8%)	0(0.0%)	4(0.9%)		
Others	33(14.7%)	8(3.6%)	41(9.2%)		
Type of House					
Single room	10(4.4%)	46(20.4%)	56(12.4%)		
Room and Parlour	44(19.6%)	82(36.4%)	126(28.0%)		
2-3 Bed room	120(53.3%)	87(38.7%)	207(46.0%)	82.7	0.000*
Duplex	51(22.7%)	7(3.1%)	58(12.9%)		
Mud house	0(0.0)	3(1.4%)	3(0.7%)		

Note: * - Values are significantly different at $p < 0.05$;

n = number of respondents

Household Characteristics of Respondents

Table 3 describes the household characteristics of the respondents. Primary source of water of the respondents was mainly tap water (44.2%), followed by borehole ((31.6%), well water (20.4%) and rain water; with a higher percentage of families of in-school respondents using tap water and borehole ($p < 0.05$), and higher percentage of out-of-school respondents using well and rain water ($p < 0.05$). Almost half (46.4%) of the respondents made use of the city service as means of refuse disposal, while a higher percentage of the respondents (56.4%) from out-of-school compared to the in-school respondents (36.4%) ($p < 0.05$); 39.1%

(55.1% in-school, 23.1% out-of-school) made use of refuse dumps ($p < 0.05$). Majority (74.4%) of the respondents made use of water closet, with a higher percentage from in-school respondents ($p < 0.05$) while 23.6% made use of pit toilet, the out-of-school having higher percentage ($p < 0.05$). Majority (72.4%) of the respondents depended on government source of electricity supply (PHCN) as the main source of energy, with no significant difference ($p > 0.05$) between the in-school and out-of-school adolescents. Also, kerosene stove was the primary source of cooking energy for 74.0% of respondents with 90.2% coming from out-of-school while 57.8% was from the in-school respondents; while 22.9% used gas cooker, with higher percentage from in-school respondents ($p < 0.05$).

Table 3: Respondents' Household Characteristics.

Variable	Category of Adolescent		Total	χ^2	p-value
	In School n(%)	Out School n(%)			
Source of drinking Water					
Tap Water	104(46.2%)	95(42.2%)	199(44.2%)		
Bore hole	82(36.4%)	60(26.7%)	142(31.6%)		
Well	34(15.1%)	58(25.8%)	92(20.4%)	10.3	0.035*
Stream Water	1(0.4%)	2(0.9%)	3(0.7%)		
Rain Water	4(1.9%)	10(4.4%)	14(3.1%)		
Refuse Disposal Method					
Bush	17(7.6%)	19(8.4%)	36(16.0%)		

Refuse dump	124(55.1%)	52(23.1%)	176(39.1%)	48.1	0.000*
City service	82(36.4%)	127(56.4%)	209(46.4%)		
Others	2(0.9%)	27(12.0%)	29(6.44%)		
Type of Toilet					
Bush	2(0.9%)	5(2.2%)	7(1.6%)	55.8	0.000*
Pit latrine	21(9.3%)	85(37.8%)	106(23.6%)		
Water Closet	201(89.3%)	134(59.6%)	335(74.4%)		
River	1(0.5%)	1(0.4%)	2(0.4%)		
Primary Source of Energy in the House					
None	2(0.9)	0	2(0.4%)		
Generator	55(24.4%)	42(18.7%)	97(21.6%)		
Lantern	5(2.2%)	9(4.0%)	14(3.1%)	5.9	0.311
PHCN	158(70.2%)	168(74.7%)	326(72.4%)		
Solar energy	4(1.8%)	3(1.3%)	7(1.6%)		
Candle	1(0.5%)	3(1.3%)	4(0.9%)		
Primary Source of cooking energy					
Kerosene stove	130(57.8%)	203(90.2%)	333(74.0%)	67.9	0.000*
Firewood	2(0.9%)	5(2.2%)	7(1.6%)		
Charcoal	3(1.3%)	2(0.9%)	5(1.1%)		
Gas	88(39.1%)	15(6.7%)	103(22.9%)		
Others	2(0.9%)	0(0.0)	2(0.4%)		

Note: * - Values are significantly different at $p < 0.05$; n = number of respondents

Nutrition Knowledge and Status of Respondents

In Table 4, 58.7% of respondents had poor nutrition knowledge with majority coming from the out-of-school respondents ($p < 0.05$), while 41.3% had good nutrition knowledge, with higher proportion from in-school respondents ($p < 0.05$). Significant association existed between nutrition knowledge and the sex, age, religion, type of family and number of siblings of the respondents. However, no significant difference was observed between nutrition knowledge and ethnicity of the respondents ($p > 0.05$) (Table 5).

Almost all (92.8%) of the respondents had normal height-for-age, 5.7% were mildly stunted and 1.5% were severely stunted (Table 6). More of in-school respondents had normal height-for-age, while more of out-of-school respondents were mildly and severely stunted ($p < 0.05$). Most (87.3%) of the respondents had a normal BMI for age, 7.3% were underweight and 4.9% were overweight. The prevalence of underweight and overweight was higher among the in-school adolescents (8.0%, 6.7% respectively) compared with out-of-school respondents, with no significant difference in the prevalence level ($p > 0.05$).

Table 4: Nutrition Knowledge of Respondents.

Nutrition knowledge	Category of Adolescent		Total	χ^2	p-value
	In School	Out School			
Poor	60(26.7%)	204(90.7%)	264(58.7%)	190.0	0.000*
Good	165(73.3%)	21(9.3%)	186(41.3%)		

Note: * - Values are significantly different at $p < 0.05$

Table 5: Association between Nutrition Knowledge and Socio-demographic factors.

Variable	Mean knowledge score	Test Statistics	p-value
Sex			
Male	12.35±3.28	4.64	0.000*
Female	13.79±3.35		
Age			
10-14	14.28±3.24	3.63	0.000*
15-19	12.78±3.37		

Ethnicity			
Yoruba	12.88±3.41		
Igbo	14.08±3.13	1.86	0.135
Hausa	14.17±3.66		
Others	13.45±3.27		
Religion			
Christian	13.98±3.22	7.27	0.000*
Islam	11.78±3.20		
Type of Family			
Monogamy	13.67±3.33	7.89	0.000*
Polygamy	11.15±2.84		
Number of Siblings in the family			
Less than Five	13.89±3.33	4.52	0.000*
Between 5-10	11.99±3.22		
10 and Above	11.25±1.86		

Note: * - Values are significantly different at p < 0.05

Table 6: Nutritional Status of Respondents.

Variable	Category of Adolescent		Total	χ ²	p-value
	In School	Out School			
Stunting					
Severe	0(0)	7(3.1)	7(1.5)	9.2	0.01*
Mild	10(4.4)	16(7.1)	26(5.8)		
Normal	215(95.6)	202(89.8)	417(92.7)		
BMI for age					
Underweight	18(8.0)	15(6.7)	33(7.3)	5.6	0.13
Normal	190(84.4)	203(90.2)	393(87.3)		
Overweight	15(6.7)	7(3.1)	22(4.9)		
Obese	2(0.9)	0(0)	2(0.5)		

Note: * - Values are significant at p < 0.05dx

Dietary Diversity of Respondents

In Table 7, majority of the respondents had high dietary diversity, with no significant difference between the in- and out-of school respondents. None of the out-of-school respondents had low dietary diversity while 2.7% of in-school respondents had low dietary diversity. Higher percentage of out-of-school adolescents had average dietary diversity (p<0.05) compared with the in-school respondents. The dietary diversity score of the in-school respondents was slightly higher than that of out-of-school

respondents (p<0.05). Table 8 shows the association between frequency of food consumption and the category of adolescent. A higher percentage of out-of-school respondents consumed more cereals and grains, roots and tubers, legumes, animal products, and snacks daily compared to the in-school respondents, while greater percentage of the in-school respondents consumed more dairy products and beverages on daily basis (p<0.05). There were significant differences in frequency of food consumption in all the classes of food groups among the respondents (p<0.05) with no regular pattern of differences.

Table 7: Dietary Diversity of Respondents.

Variable	Category of Adolescent		Total	χ ²	p-value
	In School	Out School			
Low	6(2.7)	0(0.0)	6(1.3)	6.01	0.049*
Average	60(26.6)	69(30.7)	129(28.7)		
High	159(70.7)	156(69.3)	315(70.0)		
Mean DDS	10.6±2.5	10.3±1.8			

Note: * - Values are significant at p < 0.05

Table 8: Frequency of food consumption weekly and category of adolescents.

Classes of food	Adolescents	Rarely	Once	2-3 times	4-5 times	6 times	Everyday	Total (%)	(χ ²)	p-value
Grains & cereals	In school	0%	0.4%	17.8%	23.1%	13.3%	45.3%	100.0	49.4	0.000*
	Out-of-school	0%	1.3%	6.2%	12.4%	3.1%	76.9%	100.0		
Roots & tubers	In school	0.4%	3.9%	15.1%	22.4%	17.7%	40.5%	100.0	61.9	0.000*
	Out-of-school	0%	2.2%	6.2%	9.8%	5.3%	76.5%	100.0		
Legumes	In school	5.3%	16.9%	36.4%	18.7%	8.4%	14.3%	100.0	70.0	0.000*
	Out-of-school	0.4%	10.7%	24.0%	10.3%	2.2%	52.4%	100.0		
Fruits	In school	4.9%	9.3%	26.7%	23.6%	8.0%	27.5%	100.0	35.5	0.000*
	Out-of-school	1.3%	23.6%	33.3%	11.6%	2.7%	27.5%	100.0		
Vegetables	In school	3.6%	8.9%	27.1%	21.8%	10.2%	28.4%	100.0	21.9	0.001*
	Out-of-school	1.3%	10.7%	21.8%	15.6%	3.1%	47.5%	100.0		
Dairy products	In school	4.4%	10.2%	20.0%	18.3%	12.4%	34.7%	100.0	35.6	0.000*
	Out-of-school	5.8%	22.7%	27.1%	13.3%	1.8%	29.3%	100.0		
Animal products	In school	0%	5.3%	14.7%	20.4%	8.4%	51.2%	100.0	30.38	0.000*
	Out-of-school	0.4%	4.0%	8.9%	8.4%	2.7%	75.6%	100.0		
Beverages	In school	4.9%	12.4%	21.3%	21.8%	9.3%	30.3%	100.0	37.15	0.000*
	Out-of-school	11.1%	26.7%	24.9%	11.6%	2.7%	23.0%	100.0		
Snacks	In school	2.7%	6.7%	17.8%	20.0%	11.0%	41.8%	100.0	42.47	0.000*
	Out-of-school	10.7%	16.4%	14.2%	7.6%	3.6%	47.5%	100.0		
Drinks	In school	10.7%	16.0%	25.3%	23.0%	8.0%	16.8%	100.0	38.26	0.000*
	Out-of-school	10.2%	35.6%	25.3%	8.0%	3.1%	17.8%	100.0		

Note: * - Values are significant at p < 0.05.

In Table 9, higher percentage of in-school respondents consumed vegetables, tubers, fruits, milk and milk products, and oils and fats compared with out-of-school respondents (p<0.05); while higher percentage of out-of-school respondents consumed cereals, dark green leafy vegetables, organ meat, flesh meat, egg, fish and legumes compared with the in-school respondents (p<0.05). Table 10 shows the correlation between BMI-for-age and dietary diversity scores of in- and out-of-school respondents. The

BMI-for-age of the in-school respondents had a significant negative correlation with dietary diversity scores (p<0.05), while the out-of-school respondents also had negative correlation with dietary diversity scores which was not significant. In Table 11, there was positive correlation between BMI-for-age and nutrition knowledge of in- and out-of-school respondents with no significant difference between both groups.

Table 9: Relationship between dietary diversity of respondents.

Food groups	Category of Adolescent		Total (%)	(χ ²)	P-Value
	In School (%)	Out School (%)			
Cereals	49.9	50.1	100.0	4.47	0.035*
Vitamin A rich Vegetables& tubers	57.1	42.9	100.0	7.15	0.008*
White Tubers	50.9	49.1	100.0	0.02	0.884
Dark green leafy Vegetables	46.1	53.9	100.0	12.3	0.000*
Other Vegetables	80.8	19.2	100.0	65.4	0.000*
Vitamin A rich fruits	60.2	39.8	100.0	21.5	0.000*
Other fruits	50.7	49.3	100.0	0.010	0.922
Organ Meat	49.7	50.3	100.0	0.403	0.525
Flesh Meat	49.8	50.2	100.0	3.14	0.076
Eggs	47.4	52.6	100.0	14.52	0.000*
Fish	47.7	52.3	100.0	14.3	0.000*

Legumes	47.8	52.2	100.0	16.6	0.000*
Milk & Milk Products	51.7	48.3	100.0	1.27	0.259
Oils and Fats	56.4	43.6	100.0	5.32	0.021*

Note: * - Values are significant at $p < 0.05$.

Table 10: Correlation between BMI for Age and individual dietary diversity score.

	BMI for Age	IDDS (r value)	p-value
In school			
BMI for Age	1	-0.3*	0.046*
Individual dietary score		1	
Out school			
BMI for Age	1	-0.04	0.578
Individual dietary score		1	

Note: * - Value is significant at $p < 0.05$. IDDS = Individual dietary diversity score

Table 11: Correlation between BMI for Age and Nutrition Knowledge.

In school	BMI for Age	Nutrition Knowledge	p-value
BMI for Age	1	0.6	0.46
Nutrition Knowledge		1	
Out school			
BMI for Age	1	0.6	0.98
Nutrition Knowledge		1	

Discussion

Socio-Demographic Characteristics of Respondents

The mean age of in-school respondents recruited for this study is similar to the mean age of the in-school respondents (15.5 ± 2.5 years) reported by Sidiga, et al. [15]. Most of the respondents were within the age range of 15-19 years (especially the out-of-school respondents), and were Yoruba. This is similar to the findings of Omobuwa, et al. [16]; and is believed to be due to the geographic location of the study where Yoruba ethnic group is dominant in the South-western Nigeria. Most of the in-school respondents were from the monogamous family. This is also similar to the report of Omobuwa, et al. [16]. About half of the out-of-school respondents were from polygamous family and more than half of them reportedly had five or more siblings. The large family size among these out-of-school respondents could have led to inability to achieve optimum care due to possible sharing of available resources among larger number of people compared with monogamous families with lesser siblings. This could have resulted in some of the respondents not being enrolled in secondary school, or dropping half way.

The parents' level of education was observed to be associated with the adolescent type. Majority of the out-of-school respondents' parents either had no formal education or had maximum of secondary school education compared with their in-school adolescents' counterpart parents where either secondary or

tertiary level of education were the educational level of majority of them. Educated parents can make more informed choices and have better socio-economic status to ensure their children get sound education in schools. Overall, the in-school respondents had significantly better socio-economic and socio-demographic characteristics than the out-of-school respondents.

Nutrition Knowledge and Status of Respondents

Most of the out-of-school respondents had poor nutrition knowledge while majority of the in-school respondents had good nutrition knowledge. This finding is similar to that of Nurul, et al. [17]. Knowledge directly impacts health and nutrition, and this study revealed that the respondents were not aware of the importance of good nutrition to supporting growth and development at adolescent stage. Nutrition knowledge score for in-school respondents was significantly higher compared with that of out-of-school respondents. This finding is different from the result of the study by Manijeh, et al. [18]. The observed difference between the two classes of respondents in this study may be due to the fact that the in-school respondents were exposed to/or enlightened with basic nutrition knowledge in school, as compared to their out-of-school counterparts who may not have access to such information. The prevalence of underweight, overweight and obesity were higher among in-school respondents compared to their out-school counterpart. This finding is in line with that of Ejike, et al. [19].

The prevalence of underweight in this study is higher compared with the study of Adesina, et al. [20], but lower than that of the studies of Alabi [21] and Adegoke, et al. [22]. The Prevalence of overweight in this study is higher than the ones reported by Olumakaiye, et al. [20,23,24]; while it is lower compared with findings of Omuemu and Omuemu [25], Ejike and Ijeh [26]; and much lower than the value reported by Abdulkarim, et al. [8]. The result obtained in this study is an indication of the rise in the level of overweight and obesity among adolescents, which can be linked to the level of their physical inactivity [2] and exposure to snacking, as confirmed from Table 8. The result of the respondents where most of them had normal BMI-for-age is similar to the one reported by Adamu, et al. [27]. There was no significant correlation between BMI-for-age and nutrition knowledge in both groups; and this observation is similar to that of Esfarjani, et al. [28]. The BMI-for-age of the in-school respondents was negatively correlated with their dietary diversity scores. This finding is similar to that of Olumakaiye [29].

Dietary Diversity of Respondents

Majority of the respondents had high dietary diversity scores, the in-school respondents having slightly higher mean score than out-of-school respondents. This is however different from the work of Mahdis, et al. [30] who reported a lower dietary diversity score for out-of-school adolescents compared with in-school adolescents. Dietary diversification is one of the four main strategies advocated internationally for improvement of micronutrients intake and nutritional status, especially in undernourished individuals [31]. Many studies among several age groups have shown that an increase in individual dietary diversity score is related to increased nutrient adequacy of the diet. Dietary diversity scores have been positively correlated with increased mean micronutrient adequacy of complementary foods [32], and micronutrient adequacy of the diet in adolescents [33] and adults [34,35]. The dietary diversity score improved when consumption of healthy food groups increased. Higher dietary diversity score is not always associated with increased weight gain, because it may be due to increase in consumption of low-calorie foods such as vegetables, whole grains and fruits [33].

Conclusion

Majority of the in-school adolescents in this study had better nutrition knowledge compared with the out-of-school adolescents, and the socio-demographic characteristics of adolescents had significant influence on their nutrition knowledge. In-school adolescents had higher dietary diversity score as well as higher prevalence of both underweight and overweight compared with the out-of-school adolescents. There is therefore, the need for nutrition education targeted at the in-school and out-of-school adolescents to increase their nutrition knowledge and dietary diversity; especially the right choice of meals and adequate, healthy diet. There is also the need for increased awareness of the benefits of healthy eating

habits and importance of good nutrition to growth and development to prevent the upward trend in prevalence of malnutrition among the adolescents, who are would-be future adults.

Conflict of Interest

The authors declare that this work has not been presented elsewhere for publication, and there is no conflict of interest, as the research was self-sponsored.

References

- (2001) World Health Organization. The second decade: improving adolescent health and development. World Health Organization Geneva.
- (2019) United Nations International Children's Emergency Fund. Investing in a safe, healthy and productive transition from childhood to adulthood is critical. Adolescents statistics-UNICEF Data.
- Odo AN, Samuel ES, Nwagu EN, Nnamani PO, Atama CS (2018) Sexual and reproductive health services (SRHS) for adolescents in Enugu State, Nigeria: a mixed methods approach. BMC Health Services Research 18(1): 92.
- Spear BA (2002) Adolescent growth and development. J Am Diet Assoc 102(3): S23.
- Jenkins S, Horner SD (2005) Barriers that influence eating behaviours in adolescents. Journal of Paediatrics Nursing 20(4): 258-267.
- Patton GC, Sawyer JS, Santelli, Ross DA, Afifi R, et al. (2016) Our future: a Lancet commission on adolescent health and wellbeing. Lancet 387(10036): 2423-2478.
- Akseer A, Al-Gashm, Mehta S, Mokdad A, Bhutta ZA (2017) Global and regional trends in the nutritional status of young people: a critical and neglected age group. Annals of the New York Academy of Sciences 1393(1): 3 -20.
- Abdulkarim AA, Otuneye AT, Ahmed P, Shattima DR (2016) Factors associated with adolescent malnutrition among Nigerian students. Bangladesh Journal of Medical Science 15(02): 243 -248.
- Botero D, Wolfsdorf JI (2005) Diabetes mellitus in children and adolescents. Arch Med Res 36(3): 281.
- Nicklas TA, Demory-Luce D, Yang SJ (2004) Children's food consumption patterns have changed over two decades (1973-1994): The Bogalusa heart study. J Am Diet Assoc 104(7): 1127.
- Uauy R, Solomons N (2005) Diet, nutrition, and the life-course approach to cancer prevention. J Nutr 135 (12): 2934S.
- Whincup PH, Gilg JA, Donald AE, M Katterhorn, C Oliver, et al. (2005) Arterial distensibility in adolescents: the influence of adiposity, the metabolic syndrome, and classic risk factors. Circulation 112(12): 1789-1797.
- McNaughton SA, Ball K, Mishra GD, Crawford DA (2008) Dietary patterns of adolescents and risk of obesity and hypertension. Journal of Nutrition 138(2): 364-370.
- (2010) Food and Agricultural Organisation. Guidelines for measuring household and individual dietary diversity; Nutrition and Consumer Protection Division, Food and Agriculture Organization of the United Nations.
- Sidiga AW, Maha BA (2010) Poor diet quality and food habits are related to impaired nutritional status in 13- to 18-year-old adolescents in Jeddah. Nutrition Research 30(8): 527-534.
- Omobuwa O, CO Alebiosu, FO Olajide, WO Adebimpe (2014) Assessment of nutritional status of in-school adolescents in Ibadan, Nigeria. South African Family Practice 56(4): 246-250.

17. Nurul A, Swapan KR, Tahmeed A, Shamsir AM (2010) Nutritional status, dietary intake, and relevant knowledge of adolescent girls in rural Bangladesh. *J Health Pop Nutr* 28(1): 86-94.
18. Manijeh A, Monir BE, Noot R, Rafinejad J, Chinekes A (2013) Dietary habits among adolescent girls. *Global Journal of Health Science* 5(5): 1916-9736.
19. Ejike CE, Ugwu CE, Ezeanyika LUS (2010) Physical growth and nutritional status of a cohort of semi-urban Nigeria adolescents. *Pakistan Journal of Nutrition* 9(4): 392-397.
20. Adesina FA, Oliemen P, Anochie I, Akani NA (2012) Weight status of adolescents in secondary schools in Port Harcourt using Body Mass Index. *Ital J Pediatr* 38: 19.
21. Alabi A (1998) The relationship between basal blood pressure and body mass index in apparently healthy Nigerian adolescents. April 1998. Dissertation submitted to West African college of physicians. West African College of Physicians, Lagos State.
22. Adegoke SA, Olowu WA, Adeodu OO, Elusiyan JB, Dedek IO (2009) Prevalence of overweight and obesity among children in ile - ife, Southwestern Nigeria. *West Afr J Med* 28(4): 216- 221.
23. Olumakaiye MF (2008) Prevalence of Underweight: A Matter of Concern among Adolescents in Osun State, Nigeria. *Pakistan Journal of Nutrition* 7(3): 503-508.
24. Bamidele OJ, Esther OA, Olarinmoye F, Olajide O, Abodunrin OL (2011) Prevalence and Socio-demographic determinants of under-weight and Pre-obesity among in-school adolescents in Olorunda Local Government Area, Osun State, Nigeria. *TAF Prev Med Bull* 10(4): 397-402.
25. Omuemu VO, Omuemu CE (2010) The prevalence of overweight and its risk factors among adolescents in an urban city in Edo State. *Nigerian Journal of Clinical Practice* 13(2):128-133.
26. Ejike CE, Ijeh II (2012) Obesity in young-adult Nigerians: Variations in prevalence determined by anthropometry and bioelectrical impedance analysis, and the development of % body fat prediction equations. *International Archives of Medicine* 5: 22.
27. Adamu Abiba, Adjei Naa Kai Grace, Kubuga Clement Kubreziga (2012) Effects of dietary patterns on the nutritional status of upper primary school children in Tamale Metropolis. *Pakistan Journal of Nutrition* 11 (7): 591-609.
28. Esfarjani R, Roustae Z, Kamrani M, Hadjifaraji (2006) Assessment of nutritional knowledge and anthropometric status of adolescents in East Tehran. *Nutrition and Food Technology Research* 35(2006): 522-530.
29. Olumakaiye MF (2013) Dietary diversity as a correlate of undernutrition among school-age children in Southwestern Nigeria. *Annals of Child and Youth Studies* 37(1): 137-145.
30. Mahdis, Parvin A, Mehrdad S, Mostafa H (2013) Dietary diversity and its related factors among adolescents: A survey in Ahvaz-Iran 5(2): 181-186.
31. Maunder EMW, Matji J, Hlatshwayo-Molea T (2001) Enjoy a variety of foods-difficult but necessary in developing countries. *South African Journal of Clinical Nutrition* 14(3).
32. Swindale A, Bilinsky P (2006) Household dietary diversity score for measurement of household food access: Indicator guide (2). Washington DC. Food and Nutrition Technical Assistance (FANTA) project, Academy for educational Development, p. 1-9.
33. Mirmiran P, Azadbakht L, Esmaillzadeh A, Azizi F (2004) Dietary diversity score in adolescents-a good indicator of the nutritional adequacy of diets: Tehran Lipid and Glucose Study. *Asia Pacific Journal of Clinical Nutrition* 13(1): 56-60.
34. Ogle BM, Hung PH, Tuyet HT (2001) Significance of wild vegetables in micronutrient intakes of women in Vietnam: An analysis of food variety. *Asia Pacific Journal of Clinical Nutrition* 10(1): 21-30.
35. Foote JA, Murphy SP, Wilkens LR, Basiotis PP, Carlson A (2004) Dietary variety increases the probability of nutrient adequacy among adults. *Journal of Nutrition* 134(7): 1779 -1785.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2021.37.005999

Adepoju. Biomed J Sci & Tech Res



This work is licensed under Creative Commons Attribution 4.0 License

Submission Link: <https://biomedres.us/submit-manuscript.php>



Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles

<https://biomedres.us/>