A Comparative Analysis of Dietary Patterns and Anthropometric Indices among Adolescents in Selected Public and Private Secondary Schools in Ilaro

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Abstract:

Adolescence marks a critical transition between childhood and adulthood, during which individuals establish lifelong health behaviors, including dietary patterns. In Nigeria, poor eating patterns, characterized by high intake of sugary snacks and inadequate fruits and vegetables consumption are prevalent among school-aged children. This study conducted a comparative analysis of dietary patterns and anthropometric indices among adolescents in selected public and private secondary schools in Ilaro. Utilizing a cross-sectional descriptive design, 380 students were selected through multistage sampling. Data were gathered via structured interviewer-administered questionnaires alongside anthropometric assessments, analyzed using AnthroPlus v1.04 and SPSS v20.0. Results revealed disparities in nutritional status: 38.8% of private school students and 25.2% of public school students exhibited normal height-for-age, while stunting, both mild (21.2%) and severe (23%) was more prevalent in public schools. Overweight prevalence was also higher in public schools (21.4%) compared to private (13.4%), although a greater proportion of private school students (64.2%) had a normal BMI-for-age. Dietary pattern showed that majority of the respondents eating pattern was more of ice creams, carbonated drinks, sweeteners, sugars and chocolate. Overall, malnutrition was more pronounced among public school adolescents. The findings underscore the need for targeted, school-based nutritional interventions to promote healthy eating behaviors among adolescents in both educational sectors.

Keywords: Comparative, Secondary School, Adolescent, Malnutrition.

Introduction

Adolescence is a period of rapid growth, a transitional phase from childhood to adulthood. The World Health Organization identifies adolescents as people between the ages of 10 and 19. This period is a developmental stage marked by major physiological, emotional, and social transformations (Kola-Raji, Balogun & Odugbemi, 2017; WHO, 2005). In 2016, the United Nations estimated that there were approximately 1.2 billion adolescents in the world, which constitutes 16% of the world's population. In Sub-Saharan Africa, adolescents constitute 23% of the region's population (UNICEF, 2016). Adolescence is considered a nutritionally critical period of life after infancy because of the rapid physical growth and development both physically and mentally. This period is also characterized by changes in lifestyle and eating habits which if not properly monitored could negatively impact their health in the future (WHO, 2006). Adolescents represent a vulnerable population susceptible to malnutrition and its effects, largely due to their rapid physical growth, developmental changes, and shifts in eating patterns often shaped by increased nutritional demands (Christian & Smith, 2018). Their vulnerability is often linked to poor dietary choices, engage in limited physical activity, and experience mental stress, all of which influence their behaviors and lifestyle. As a result, proper nutrition is essential during adolescence, making healthy eating habits and lifestyle practices critically important for optimal growth and development.

Malnutrition remains a global issue, with both over-nutrition and undernutrition occurring simultaneously in both developed and developing nations. This condition affects individuals across all age groups, but adolescents are especially vulnerable (Khaliq, Wraith, Nambiar, & Miller 2022; Davis, Oaks, & Engle-Stone, 2020). Nigerian adolescents are increasingly vulnerable to undernutrition, mainly as a result of poverty and inadequate food consumption. At the same time, there is a rising trend of overweight and obesity among them, largely driven by the shift toward Westernized eating habits and lifestyle changes. Kola-Raji et al. (2017) noted in their study that the dual burden of malnutrition, both underweight and overweight is a common and significant issue affecting adolescents in the country

Anthropometric measurements has been identified as a standard tool in the assessment of the nutritional status of adolescents. These indices are equally predictors of the

development of Non-Communicable Diseases (NCDs) in adulthood. A study conducted in Ibadan, Nigeria revealed that 29% and 7.6% of in-school adolescents were found to be underweight and overweight/obese respectively (Omobuwa, Alebiosu, Olajide, & Adebimpe 2014). Similarly, another study in Abuja also discovered a double burden of malnutrition; undernutrition (wasting and stunting) and over-nutrition (overweight and obesity), among adolescents at a prevalence of 13% and 15.8% for undernutrition and over-nutrition respectively (Abdulkarim, Otuneye, Ahmed, & Shattima, 2014). According to WHO (2005), it was reported that the nutritional status of adolescents are better assessed using anthropometry.

Adolescents in secondary schools are frequently susceptible to nutritional deficiencies, largely due to their tendency to consume diets high in sugary snacks and junk food (Intiful, Ogyiri, Asante, Mensah, Steele-Dadzie, Boateng, 2013). Studies has reported the prevalence of double burden of malnutrition among both private and public secondary schools and malnutrition has continued to be a common health problem among adolescents, thus the need to carry out a comparative study of anthropometric indices and dietary pattern of selected public and private schools in Ilaro, Ogun state.

Materials and Methods

Area of Study

The study took place in Ilaro, the administrative headquarters of Yewa South Local Government Area. This region, formerly known as the Egbado division under the old Western State, is now called 'Yewaland' and is part of Ogun State, Nigeria.

Research Design

The study employed a cross-sectional comparative design to determine the disparities between anthropometric indices and Dietary Patterns of adolescent in Selected Public and Private Schools in Ilaro, Ogun State.

Study Population

The study population was adolescents within the age of 10 -18 years attending public and private schools in Ilaro, Ogun State during the period of the study.

Inclusion Criteria

The inclusion criteria consisted of secondary school students aged 10 to 18 years who were enrolled in public or private schools in Ilaro, Ogun State, during the study period and who voluntarily consented to participate in the research.

Exclusion Criteria

Students younger than 10 years or older than 18 years were excluded from the study. Additionally, students who were ill or did not provide consent to participate were not included in the research.

Sample Size Determination

Sample size was determined using Taro Yamane formula as shown below:

$$n = \frac{N}{1 + N(e^2)}$$

n = sample size

N = population size (Population of students in study area as at the time of data collection = 5569)

e = margin of error (0.05)

$$= \frac{N}{1 + N(e^2)}$$

$$= \frac{5569}{1+5569(0.0025)}$$

$$= \frac{5569}{14.9225}$$ = 373 sample size of the study

The questionnaire was then rounded up to 380 for non-responses.

Sampling Techniques

A multi-stage sampling method was used in the study. At the initial stage, schools were grouped into two strata public and private secondary schools. From these strata, seven schools (four private and three public) were selected using simple random sampling through balloting without replacement. Next, proportionate sampling was applied to determine the number of respondents to be selected from each of the chosen schools. Finally, the individual respondents were selected using simple random sampling without replacement.

Method of Data Collection

Data collection involved the use of a semi-structured questionnaire administered by the researcher to obtain details on the socio-demographic characteristics of the participants. Dietary patterns were assessed using a food frequency questionnaire. Anthropometric data were gathered following standard procedures. The weight and height of each respondent were measured and documented to the nearest kilogram and centimeter, respectively, while the mid-upper arm circumference (MUAC) was also measured using standard methods and recorded to the nearest centimeter

Data and Statistical Analysis

WHO AnthroPlus (Version 3.2) was used to analyze the anthropometric measurements, with classifications made according to WHO growth reference standards. The data collected were further analyzed using the Statistical Package for the Social Sciences (SPSS) version 27.0. Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the data. Inferential statistics, particularly the Chi-square test, were

applied to examine associations between categorical variables

Results

Table 1 below shows the socio-demographic characteristics of the respondents. It was observed that 55.2% of the respondents were male from private school, with 44.1% also male but from public school. For females, 44.8% were from private and 55.9% were from public school. For age, majority (22.4%) of the private school students were 14years of age and for public, majority (16%) were within the ages of 13 and 14 years of age. Religion showed that 79.1% and 72.8% of both the private and public students practice Christianity, for family type, students from both private and public schools were monogamous with 85.1% and 84.3% respectively.

For occupation, 25.4% and 30% of fathers of both private and public school students were civil servants, with mothers of both students (public and private) traders by occupation with 37.3% and 36.1% respectively. Estimated weekly allowance of the respondents showed that majority both private (67.2%) and public (77%) students spends less than ₦5,000 weekly.

Table 1: Socio-demographic/Economic Characteristics of the Adolescent

Variable	Private		Public		p-value
	Frequency (n=67)	Percentage	Frequency (n=313)	Percentage	
Gender					
Male	37	55.2	138	44.1	
Female	30	44.8	175	55.9	0.097
Age (Years)					
10 – 12	14	20.9	100	32	
13 - 15	32	47.7	140	44.8	0.429
16 - 18	21	31.4	73	23.4	
Religion					
Islam	14	20.9	83	26.5	
Christian	53	79.1	228	72.8	0.496
Traditional	0	0	2	0.6	
Class					
JSS1-JSS3	28	41.8	210	67	
SSS1 – SS3	39	58.2	103	33	0.00*
Family Type					
Nuclear	61	91.0	241	71	
Extended	6	9.0	77.1	29	0.035*
Family Structure					
Monogamy	57	85.1	264	84.3	
Polygamy	10	14.9	49	15.7	0.881
Ethnicity					
Yoruba	60	89.6	274	87.5	
Hausa	1	1.5	4	1.3	0.930
Igbo	6	9.0	35	11.2	
Occupation of Father					
Trader	11	16.4	47	15.0	
Civil Servant	17	25.4	94	30.0	0.147
Self employed	16	23.9	103	32.9	
Businessman	23	34.3	69	22.0	
Occupation of Mother					
Trader	25	37.3	113	36.1	
Civil servant	14	20.9	53	16.9	
Self employed	12	17.9	63	20.1	0.841
Businesswoman	16	23.9	84	26.8	
Educational Qualification of Father					
SSCE	26	38.8	130	41.5	
OND	12	17.9	111	35.5	
HND/BSC	28	41.8	69	22	0.00*
MSC/PGD	1	1.5	3	1.0	
Educational Qualification of Mother					
SSCE	32	47.8	177	56.5	
OND	15	22.4	70	22.3	0.364
HND/BSC	19	28.4	62	19.8	
MSC/PGD	1	1.5	4	1.3	
Estimated Weekly Allowance Of					

Variable	private		Public		
	Frequency (n=67)	Percentage	Frequency (n=313)	Percentage	p-value
Height-for-Age					
Normal	26	38.8	79	25.2	
Mildly stunted	23	34.3	85	21.2	0.01*
Moderately stunted	8	11.9	77	24.6	
Severely stunted	10	14.9	72	23.0	
BMI-for-A					
Mildly thin	7	10.4	15	4.8	
Moderately thin	2	3.0	6	1.9	0.02*
Severely thin	6	9	41	13.1	
Normal weight	43	64.2	173	55.3	
Overweight	9	13.4	67	21.4	
Obese	0	0.0	11	3.5	
MUAC Categorization					
Severe acute malnutrition	26	38.8	220	70.3	
Moderately acute malnutrition	15	22.4	52	16.6	0.00*
Normal	26	38.8	41	13.1	
Respondents (₦)					
Less than 5000	45	67.2	241	77.0	
5,000 – 10,000	9	13.4	39	12.5	0.217
11,000 – 15,000	2	3.0	4	1.3	
16,000 & Above	11	16.4	29	9.3	
Estimated Income of Father (₦)					
Less than 50,000	12	17.9	110	35.1	
50,000 – 100,000	19	28.4	114	36.4	0.00*
110,000 – 150,000	16	23.9	49	15.7	
160,000 & above	20	29.9	40	12.8	
Estimated Income of Mother (₦)					
Less than 50,000	16	23.9	171	54.6	
110,000 – 150,000	9	13.4	20	6.4	0.00*
160,000 & above	8	11.9	27	8.6	

(*Significantly different at p<0.05 using Chi-square)

The result of nutritional status as presented in table 2 below showed that the height-for-age was normal at 38.8% and 25.2% for both private and public students respectively, while 34.3% and 21.2% of both private and public students were mildly stunted respectively. BMI-For-Age showed that majority (64.2%) of the private school students had a normal weight, with 53.3% of the public students having a normal weight also. For MUAC, 70.3% of the public school students suffers from severe acute malnutrition, with 38.8% of the private school student also suffers from severe acute malnutrition.

Table 2: Nutritional Status of the Respondents

(*Significantly different at p<0.05 using Chi-square)

Table 3 showed the dietary pattern of the respondents. It was observed that the respondents consumed majorly the staple foods of the area. It was observed that at least once a week, 27.9% of the respondents eat maize, with about 23.7% consuming custard at least once a week. For rice, 58.4% of the respondents eat it daily. Similarly, 36.6% eats semo daily, with majority (39.7%) of the respondents drinking garri daily. Junks consumption showed that 41.3% of the respondents eats chocolate daily, with 33.7% also consuming sweeteners daily. For ice cream, 30.5% of the respondents consumes it daily, with 35% of the respondent also consuming carbonated drink daily.

Variable	Frequency	Percentage
Rice (cooked/fried/jollof)		
Once per week	53	13.9
Daily	222	58.4

Twice in a week	22	5.8
3-4 times a week	45	11.8
Rarely	25	6.6
Seasonal	8	2.1
Never	5	1.3
Maize/grain(cooked/roasted /pop		
Daily	83	21.8
Once per week	106	27.9
Twice in a week	38	10.0
3-4 times a week	38	10.0
Rarely	57	15.0
Seasonal	27	7.1
Never	31	8.2
Custard		
Once per week	87	22.9
Daily	90	23.7
Twice in a week	54	14.2
3-4 times a week	33	8.7
Rarely	49	12.9
Seasonal	22	5.8
Never	44	11.6
White bread		
Once per week	69	18.2
Daily	169	44.5
Twice in a week	45	11.8
3-4 times a week	35	9.2
Rarely	27	7.1
Seasonal	14	3.7
Semolina		
Once per week	281	21.3
Daily	139	36.6
Twice in a week	59	15.5
3-4 times a week	48	12.6
Rarely	32	8.4
Seasonal	14	3.7
Never	7	1.8
Garri		
Once per week	92	24.2
Daily	151	39.7
Twice in a week	49	12.9
3-4 times a week	33	8.7
Rarely	26	6.8
Seasonal	9	2.4
Never	20	5.3
Fufu		
Once per week	83	21.8
Daily	87	22.9
Twice in a week	72	18.9
3-4 times a week	38	10.0
Rarely	60	15.8
Seasonal	19	5.0
Never	21	5.5
Total	380	100
Yam flour (Amala)		
Once per week	75	19.7
Daily	104	27.4
Twice in a week	61	16.1
3-4 times a week	33	8.7
Rarely	49	12.9
Seasonal	34	8.9
Never	24	6.3
Amaranthus (efo tete)		
Once per week	77	20.3
Daily	69	18.2
Twice in a week	63	13.9
3-4 times a week	45	11.8
Rarely	39	10.3
Seasonal	24	6.3
Spinach		
Once per week	46	12.1
Daily	51	18.4
Twice in a week	30	7.9
3-4 times a week	30	7.9
Rarely	44	11.6
Seasonal	40	10.5
Eggs(boiled/fried/poached)		
Once per week	87	22.9
Daily	134	35.3
Twice in a week	46	12.1
3-4 times a week	38	10.0
Rarely	54	14.2
Ice cream		
Once per week	86	22.6
Daily	116	30.5
Twice in a week	48	12.6
3-4 times a week	42	11.1
Rarely	56	14.7
Sweeteners		
Once per week	88	23.2
Daily	128	33.7
Twice in a week	48	12.6
3-4 times a week	33	8.7
Rarely	33	8.7
Chocolate		
Once per week	84	22.1
Daily	157	41.3
Twice in a week	47	12.4
3-4 times a week	44	11.6
Rarely	26	6.8
Sugar\honey		
Once per week	83	21.8
Daily	159	41.8
Twice in a week	41	10.8
3-4 times a week	37	9.7
Rarely	35	9.2
Seasonal	7	1.8
Never	18	4.7
Carbonated drinks(coke, pepsi)		
Once per week	91	23.9
Daily	133	35.0
Twice in a week	52	13.7
3-4 times a week	39	10.3
Rarely	26	6.8
Seasonal	11	2.9
Never	28	7.4

Discussion

The study was done to compare the anthropometric indices and dietary pattern of adolescent in both private and public

secondary schools in Ilaro. Majority of the respondents were male in the private while majority of the respondents were female in the public secondary schools. Class, family type, education of father, estimated monthly income of both fathers' and mothers' showed a significant difference between private and public secondary school.

The result showed that 26.8% of the students in private school were stunted (moderately and severely), with 47.6% of the public students stunted (Moderately and severely). This study recorded a higher prevalence of stunting compared to the results reported in a similar study conducted in Ibadan by Kola-Raji et al (2017), where 2.5% and 8.4% of students in private and public were stunted respectively. Similarly, it was also higher than the study conducted among adolescent in Port Harcourt, where 36.3% of them were stunted (Esimai & Ojofeitimi, 2015). The high prevalence observed in this study most especially in the public school could be due to chronic under-nutrition which is characterized by poor eating habits by the students, which will slow down growth and development (WHO, 2005). However, a study that was conducted in Abeokuta showed a high prevalence of malnutrition (Stunting) among public than private students (Senbanjo, Oshikoya, Odusanya, & Njokanma, 2011). However, significant difference ($P<0.05$) existed. This, however, supports the findings of the current study. It is noteworthy that the high prevalence of thinness among private school students was unexpected. Although thinness was observed in both school types, it was more prevalent in public schools (15%) compared to private schools (11%). One possible explanation for this could be the poor quality of healthcare services in developing countries, as suggested by a study conducted by George, Ikiba, Mukoro, Ebiwari, Fiateide, and McEteli (2014).

Regarding overweight and obesity, the results showed that 13.4% of private school students were overweight, with no cases of obesity. In contrast, 21.4% of public school students were overweight, and 3.5% were obese. The prevalence reported in previous studies was lower than what was found in the current research. For instance, a study conducted in Osun State reported prevalence rates of 4% and 1.2% for overweight and obesity in private schools, and 2.3% and 0% in public schools, respectively (Ojofeitimi, Olugbenga-Bello, Adekanle, & Adeomi, 2011). Similarly, a study in Lagos documented overweight and obesity rates of 3.1% and 3% in urban schools, and 0.4% and 0% in rural schools, respectively (Ben-Bassey, Oduwole, & Ogundipe, 2007).

These findings suggest a gradual increase in the prevalence of overweight and obesity among adolescents, which may be attributed to urbanization and the growing consumption of ultra-processed foods high in added sugar and salt—key risk factors for childhood obesity (Kola-Raji et al., 2017). A statistically significant difference ($P < 0.05$) was observed in this study. The disparities in adolescents' nutritional status within the same country may be influenced by regional variations, including differences in socio-demographic characteristics, dietary habits, and other contextual factors. This highlights the need for targeted intervention programs that are tailored to the specific needs of each region.

MUAC measurement showed that 38.8% of private school students had sever acute malnutrition with 70.3% of the public school student similarly suffering from severe acute malnutrition (SAM), this high prevalence could be due to poor health services coupled with poor socio economic status that is common among developing countries (George, et al 2014).

The findings from this study revealed that a significant proportion of the respondents had unhealthy dietary patterns, marked by the frequent consumption of energy-dense foods high in added sugars and calories. This dietary behavior may partly explain the coexistence of both undernutrition (thinness) and over-nutrition (overweight) observed among the adolescents commonly referred to as the double burden of malnutrition.

Excessive intake of sugar-sweetened beverages, processed snacks, and foods rich in simple carbohydrates has been linked to the increasing prevalence of childhood overweight and obesity. These conditions, if not addressed, can predispose individuals to long-term health complications such as type 2 diabetes, hypertension, and other non-communicable diseases (NCDs).

The study also indicated a noticeable shift in the dietary habits of schoolchildren toward Western-style diets, characterized by a high intake of fast foods, snacks, and ultra-processed items. This nutrition transition has been associated with increased risk of cardiovascular diseases, as highlighted by Chisanga, Drimie, and Kennedy (2019). Furthermore, the majority of respondents reported a dietary reliance on regional staple foods, which are predominantly carbohydrate-rich but lack dietary diversity. Overconsumption of such nutrient-deficient staples can adversely affect the nutritional status of adolescents, who require balanced, nutrient-dense diets particularly rich in quality protein, vitamins, and minerals to support optimal growth and development during this critical stage of life.

Conclusion and Future Works

The study concluded that the prevalence of malnutrition was high among the adolescent in public secondary schools than private schools. Although, adolescent in both schools have the same number of students with normal nutritional status. Dietary pattern showed that majority of the adolescent in both schools consume more of junk foods and high sugary foods. The study recommended that nutrition education should be actively promoted in both public and private schools to encourage healthier eating habits among adolescents. Additionally, it is essential to raise awareness among school administrators, students,

and parents about the nutritional challenges specific to adolescence and the potential health risks associated with poor dietary practices. Lastly, there is a critical need to strengthen and integrate comprehensive nutrition education into the curriculum of secondary schools regardless of type to support informed food choices and foster long-term healthy eating behaviors.

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