

# Assessment of dietary habits, nutritional status and anthropometric indices of adolescents of selected secondary schools in Nigeria

Omotoso OD<sup>1</sup>, <sup>2</sup>[ID](#), Onoja-Alexander MO<sup>3</sup>[ID](#), Siyanbade JA<sup>4</sup>[ID](#), Oka SA<sup>5</sup>[ID](#), Momoh JI<sup>6</sup>[ID](#), Ukanu PI<sup>1</sup>[ID](#), Abba S<sup>1</sup>[ID](#), Jonah AC<sup>6</sup>[ID](#), Okpanachi MO<sup>7</sup>[ID](#), Afolabi HO<sup>8</sup>[ID](#)

<sup>1</sup>Department of Anatomy, Faculty of Basic Medical Sciences, Prince Abubakar Audu University, Anyigba, Nigeria

<sup>2</sup>Department of Human Anatomy, Faculty of Basic Medical Sciences, Baze University, Abuja

<sup>3</sup>Department of Community Medicine, Faculty of Basic Clinical Sciences, Prince Abubakar Audu University, Anyigba, Nigeria

<sup>4</sup>Department of Anatomy, Faculty of Basic Medical Sciences, Ladoke Akintola University of Technology, Ogbomoso, Nigeria

<sup>5</sup>Department of Medical Biochemistry, Faculty of Basic Medical Sciences, Prince Abubakar Audu University, Anyigba, Nigeria

<sup>6</sup>Department of Physiology, Faculty of Basic Medical Sciences, Prince Abubakar Audu University, Anyigba, Nigeria

<sup>7</sup>Department of Food, Nutrition and Home Science, Faculty of Agriculture, Prince Abubakar Audu University, Anyigba, Nigeria

<sup>8</sup>Department of Anatomy, Faculty of Basic Medical Sciences, University of Medical Sciences, Ondo, Nigeria

Submitted: 23<sup>rd</sup> February 2024

Accepted: 3<sup>rd</sup> February 2025

Published: 30<sup>th</sup> June 2025

[ID](#): Orcid ID

## Abstract

**Objective:** Attainment of the full potential of growth and development in adolescence has been hugely linked to an adequate diet. The study aimed to assess the influence of adequate dietary habits and nutritional status on adolescent developmental milestones.

**Methods:** The study employed a cross-sectional design and a convenient non-probability sampling technique to select 397 adolescent students from 12 public secondary schools in the Dekina Local Government Area of Kogi State. We assessed the anthropometric parameters using weight, height and body mass index (BMI), determined the factors influencing dietary habits among adolescents in Dekina LG and investigated the link between dietary habits, nutritional status and anthropometric indices.

**Result:** The result of this study shows that out of 397 respondents who took balanced diets, energy-rich diets and protein-rich diets respectively, 68, 123, and 12 were underweight, 19, 47 and 100 had normal weight while 10, 18, and 0 were overweight due to frequent ingestion of snacks and soft drinks. The result revealed that out of the 397 respondents, 190 educated parents feed 3 times and above, 18 uneducated parents feed once per day, and 189 feed 3 times and above per day.

**Conclusion:** Significant correlations were found between dietary habits and nutritional status. The study highlights the need for nutrition education and intervention programs to promote healthy eating habits and improve the nutritional well-being of adolescents in Nigeria. The findings can inform the development of targeted school-based nutrition programs and public health policies.

**Keywords:** Adolescents, Anthropometry, Dietary-habit, Nutritional status

Correspondence:

Siyanbade, Jacob A

Department of Anatomy, Faculty of Basic Medical Sciences,

Ladoke Akintola University of Technology, Ogbomoso,

Oyo State, Nigeria.

+2347068514180, [jasiyanbade@lautech.edu.ng](mailto:jasiyanbade@lautech.edu.ng)

During adolescence, proper feeding habits are essential to attain the full potential of the developmental milestone that is obtainable during this phase of metamorphosis. This study looked at how diet affects the growth and development of adolescents in Nigeria. The researchers studied 397 adolescents from 12 secondary schools in Kogi State, measuring their weight, height, and body mass index and questions were also asked about their diet and other factors that influence their food choices. Questionnaires were used as instruments of data collection; anthropometric data were collected through different instruments, *and* a cross-sectional study was conducted across selected public secondary schools in the Dekina LGA of Kogi. This research showed that family size, level of education cum socioeconomic status of parents played major roles in the dietary habits and nutritional statuses of adolescents. This study showed that the majority of students whose breakfast, lunch and dinner constitute high-energy food, were overweight. Conclusively, this study highlights the importance of a balanced diet, parental involvement, and education in promoting healthy growth and development among adolescents in Nigeria.

### **Background of the Study**

Adolescence is a developmental period characterized by rapid physiological and social changes that influence dietary needs as well as the individual's ability to supply those needs (1). Nutritional deficits and poor dietary habits established during this period have long-term health, growth and developmental consequences (1). Adolescence starts with pubertal changes and ends with the full development of the organism. At this development stage, growth is very important and is closely related to the nutritional requirements of adolescents so that the maximum peak of nutritional needs perfectly matches the maximum growth rate.

Eating habits are a commanding facet of adolescence and can be viewed as one measure of adolescent's health (2). Although the relationship between diet and health is a complex one numerous research studies have pointed out the critical connection between them. Sound nutritional habits that are established during childhood and adolescence are considered essential for proper growth and development, reduction of chronic disease risk and long-term quality of life (3). At this stage, they may start to explore ways of being independent of their family with an increased need for privacy and may react strongly if parents or guardians reinforce limits (4). The influence of friends replaces parental rules, and the habits of adolescents are characterized by a tendency to skip meals especially breakfast and less frequently the midday meals for high-calorie foods gotten from random restaurants (5).

Nutritional guidance for adolescents is important for supporting the development of healthy lifestyles, preventing weight-related problems, reducing disease risk and ensuring that all needs are met for growth and development. Eating patterns formed during adolescence also frequently are carried into adulthood and therefore affect future risk for the development of chronic diseases (6). The relationship between nutrition,

growth and development is essential in the lives of all children and adolescents since growing and developing are different phenomena when we consider physiological conception, but they are interactive, interdependent and inseparable (7). After the infant stage of a child, then comes the adolescence stage, which is the most crucial stage of an adolescent life, especially the adolescent girls; adolescents are expected to be fed on the right diet, but malnutrition is a common nutritional problem due to poor diet and lack of health care service in some parts of the country – Nigeria (8). The malnutrition of a child during childhood can be corrected during the adolescence stage before the body systems are fully matured (9). Adolescent malnutrition may be in the form of under-nutrition or over-nutrition (10). The prevalence of overweight and obesity is increasing rapidly in some developing countries, while there is limited current information about some other developing countries to infer the predominance of over-nutrition (11). The low standard of living in this part of the world hugely affects dietary habits and leads to serious health challenges including infertility bulk of which can be corrected during adolescence which serves as the prime stage for major sexual and reproductive transformations in the phase of human development (12).

### **Materials and Methods**

#### **Study Area**

The study was carried out in the Dekina Local Government area of Kogi State. Kogi State was carved out of old Kwara and Benue States. The creation of the state was in the year 1991. It is situated in the north-central zone of Nigeria called the middle belt region. It is bounded to the east by Nassarawa State, to the South by Enugu, Anambra and Edo States, to the West by Ondo, Ekiti and Kwara States and to the North by Niger, Abuja and Nassarawa States (hospitality Nigeria com/Kogi, 2010). Dekina is located nearly east side to Lokoja about 33km east of the state capital. The majority

of the people are farmers growing crops such as yams, maize, beans, cassava, cocoyam, cashew, mango and oil palm.

#### *Study design*

This study was a descriptive cross-sectional study designed to determine the dietary practice and nutritional status of adolescents living in Kogi State as a case study of Dekina Local Government. Convenient non-probability sampling technique was used to select 397 adolescent students both male and female from 12 secondary schools in Dekina Local Government Area of Kogi State using the 57,686-population census for adolescents by National Population Commission of Nigeria, 2006.

#### *Inclusion Criteria*

Students between the ages of 10 to 19 years in the selected secondary schools in the Dekina Local Government Area of Kogi State were recruited into the study.

#### *Study size determination*

397 were determined using Slovin's formula (13).

The test formula is

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

Where n=sample

N=population

e= degree of tolerance error with a significance level of 95% the degree of error term will be 5% i.e. 0.05.

$$n = \frac{57686}{1+57686(0.05) \times (0.05)}$$

$$n = 397.25$$

#### *Preliminary visit*

Visits were given to the school principals to inform them of the research and how the involvement of the students was needed. The date and time for the questionnaire to be administered and the anthropometric measurements to be taken were selected and agreed upon.

#### *Research assistant training recruitment*

Research assistants were trained to administer questionnaires through a combination of review, training sessions, practice and role-playing. They receive guidance on maintaining confidentiality, data quality control, and usage of data collection tools.

#### *Questionnaire*

A questionnaire was used for data collection. The questionnaire comprises questions about age, sex and the number of people in the household as well

as questions relating to eating patterns and habits and includes questions on the number of meals eaten every day, the number of skipped meals and the reasons for skipping meals. Meal skipping was assessed by asking the adolescent students how often they had skipped breakfast, skipped lunch and skipped dinner over the past two weeks. Other information sought included data on food frequency as regards consumption of carbohydrates, proteins, fats and oils, fruits and vegetables, drinks and fast foods.

#### *Anthropometry*

##### *Height*

The height of the participants was measured with the subjects standing erect and barefoot on the height meter with their backs to the height meter and looking straight in a Frankfurt position. In taking the height, the students were made to stand straight with their shoes off and heads erect with knees and legs together and arms hanging naturally by the side. A movable triangular headboard was brought against the crown of the head, and height measurements were taken. The heights were taken and recorded to the nearest 0.1cm (14).

##### *Weight*

The weight of the participants was measured using a portable bathroom scale (Handson model BR-9011) to the nearest 0.1kg with the subjects on a light garment and standing upright on the scale barefoot at shoulder level arms by the side and the head straight. The scale was checked before each measurement for zero adjustment.

#### *Diagnostic criteria*

Body mass index was calculated from the results obtained using the following formula;

BMI (kg/m<sup>2</sup>) = weight (kg)/ height (m<sup>2</sup>) (15), and classified based on age-, sex-, and height-specific percentiles into four categories: Underweight (BMI: <5<sup>th</sup> percentile or <14), Normal weight (BMI: ≥5<sup>th</sup> percentile and <85<sup>th</sup> percentile), Overweight ( BMI: ≥85<sup>th</sup> percentile and < 95<sup>th</sup> percentile), and obese [BMI : ≥95<sup>th</sup> percentile, with subclassifications of class I obesity(BMI: 25- 29.9) and class II/class III obesity (BMI: ≥30)]. This classification system considers the complex interplay of age, sex, and height in determining healthy weight ranges (15).

#### *Statistical analysis*

The results are presented as simple percentages unless otherwise stated. The data were analysed using one-way analysis of variance (ANOVA) to test for statistical significance concerning

continuous variables, while the chi-square test was used for discrete variables. The data were analysed using the Statistical Package for Social Sciences (SPSS) software. A probability value of less than 0.05 was considered to indicate statistical significance at a 95% confidence interval.

**Results and Discussion**

*Socio-demographic characteristics*

Table 1 shows a substantial difference in the number of male and female students. There are 159 male students and 238 female students, indicating a higher number of female students in the secondary schools within Dekina LGA. In terms of religion, the table segregates students into Christian and Muslim categories. Among males, Christians constitute 56 students (35.2%), while Muslims account for 27 students (17%). For females, the distribution is 81 Christian students (34%) and 25 Muslim students (10.5%). This distribution suggests a relatively balanced representation of both religions among the students, though a higher proportion of Christian students are present overall. Parental literacy and employment levels are classified into educated and uneducated, and employed, unemployed, and self-employed categories. For both male and female students, there is a notable number of students whose parents are educated and employed. For instance, among male students, 35.2% have educated parents, while 35.2% have employed

parents. Similarly, for female students, 34% have educated parents, and 34% have employed parents. This suggests that a significant portion of students come from families where parents have some level of education and employment, which could positively influence the student's academic performance and overall socio-economic status. The table also categorizes family size into three groups: 1–5 members, 6–10 members, and 11 or more members. For male students, the majority come from families with 6–10 members (46.5%), while for female students, the largest group also falls into the 6–10 members category (28.6%). Larger family sizes of 11 members and above are less common among the students, which may reflect socio-economic factors influencing family size and structure in the region. This result is consistent with the observation of Galgamuwa et al., that Parents' socioeconomic status and family size have a direct relationship with the incidence of undernutrition in Sri Lanka community (16). These characteristics may influence students' feeding practices, nutritional status, and overall well-being. For instance, students from larger families or those with uneducated parents might face challenges in accessing balanced diets, leading to nutritional deficiencies, a similar finding was reported by Silva and colleagues (17). Understanding these socio-demographic factors can help tailor interventions to address specific needs and promote healthy habits among adolescents.

**Table 1: Socio-demographic characteristics of the secondary school students in Dekina LGA**

Gender	Religion	Parent's level of literacy		Parent's level of employment			Family size			Total
		Educated	Uneducated	Employed	Unempl oyed	Self- employed	1–5	6-10	≥ 11	
Male	Christian	56(35.2%)	48(30.2%)	56(35.2%)	Nil	48(30.2%)	10(6.3%)	74(46.5%)	20(12.6%)	159
	Muslim	27(17%)	28(17.6%)	27(17.0%)	Nil	28(17.6%)	18(11.3%)	30(18.9%)	7(4.4%)	
	Total	83	76							
Female	Christian	81(34%)	90(37.8)	81(34%)	Nil	90(37.8%)	49(20.6%)	68(28.6%)	54(22%)	238
	Muslim	25(10.5%)	42(17.6)	17(7.1)	Nil	50(21%)	18(7.6%)	49(20.6)	Nil	
	Total	106	132							
<b>Total</b>										<b>397</b>

*Family size and feeding frequency per day*

Table 2 below shows that the daily feeding frequency of secondary school students in Dekina LGA varies with family size, with students from smaller families (1-5 members) feeding 3 times and above daily, while those from larger families (11 and above members) have a higher likelihood of

feeding only once daily (27 students). In contrast, students from medium-sized families (6- 10 members) predominantly feed 3 times and above daily (237 students). Overall, the majority of students (370) feed 3 times and above daily, while a minority (27) feed only once daily.

**Table 2: Family size and daily feeding frequency**

Family size	Feeding frequency per day		Total
	Once	3 times and above	
1 – 5	0	77	77
6 – 10	0	237	237
11 and above	27	56	83
<b>Total</b>	<b>27</b>	<b>370</b>	<b>397</b>

Family size describes the number of people in the family. Malnutrition is exacerbated by inadequate food, being underweight, wasting and stunting are forms of malnutrition and they are most common after two years of life and progress to adulthood. This research showed that individuals with a family size of 11 or above had a lower feeding frequency than those with a family size of 1-5 or 6-10. The significantly lower feeding frequency could be due to the high population size and the high financial cost of maintaining families with a high population. This finding is consistent with the results of Potter et al., that family size is an important factor affecting the dietary lifestyle of adolescents (18).

*Parents' literacy and frequency of feeding per day*

Table 3 shows the influence of parental literacy on the frequency of feeding per day.

Students whose parents are educated feed 3 times and above daily (190 students), whereas those with uneducated parents have a higher likelihood of feeding only once daily (18 students). However, a significant number of students with uneducated parents (189 students) still manage to feed 3 times and above daily. Overall, the majority of students (379) feed 3 times and above daily, while a minority (18) feed only once daily.

**Table 3: Parent literacy and frequency of feeding per day**

Parent literacy level	Feeding frequency per day		Total
	Once	3 times and above	
Educated	0	190	190
Uneducated	18	189	207
<b>Total</b>	<b>18</b>	<b>379</b>	<b>397</b>

The results of this study showed that literate or educated parents had a greater frequency of feeding (3 times and above per day) than uneducated parents. This is because educated families tend to have more knowledge of good dietary lifestyles and play a role in proper growth, development and overall health. This could also be due to the high financial status of the educated parents since they are mostly monthly or salary earners. This finding is similar to that of Omobuwa et al., who assessed the nutritional status of in-school adolescents in Ibadan (9). Additionally, Ashwell and colleagues reported similar findings in a study of the influence of education on the dietary lifestyle of adolescents (19). The study revealed that the majority of underweight adolescents were uneducated, which is similar to the finding of Tur et

al., that parental education is directly related to adolescent nutrition (20).

*Family size and quality of breakfast meals among students*

Table 4 shows the influence of family size on the quality of breakfast meals consumed by adolescent students in Dekina LGA. The results of the study showed that students from smaller families (1-5 members) predominantly have balanced diets (131 students), while those from medium-sized families (6-10 members) mostly have energy-rich breakfasts (51 students). In contrast, students from larger families (11 and above members) often have energy-rich breakfasts (55 students). The majority of students (166) eat balanced diets, followed by energy-rich (194 students) and protein-rich (37 students) breakfasts.

**Table 4: Family size and quality of breakfast meals among students**

Family size	Quality of Breakfast			Total
	Balanced diet	Energy-rich	Protein-rich	
<b>1 – 5</b>	131	88	18	237
<b>6 – 10</b>	26	51	09	86
<b>11 and above</b>	09	55	10	74

<b>Total</b>	<b>166</b>	<b>194</b>	<b>37</b>	<b>397</b>
--------------	------------	------------	-----------	------------

Socioeconomic status affects access to culturally appropriate and affordable food, thus affecting the quality of diet. Problems related to food intake malnutrition have been identified as widespread and important concerns for public health in Nigeria. This study has shown that families of small size (1-5) have a higher quality of breakfast than larger families (i.e. 6-10 and 11 above); this could be the result of high food demand and high financial costs associated with maintaining a large family size. Kunwar and Pillai provided a similar report on the influence of socioeconomic conditions on the growth of urban school-age children in Bangladesh (21).

*Effect of breakfast on the Body Mass Index of students*

In Table 5, the breakfast consumption patterns significantly influence their body mass index (BMI), with balanced diets promoting normal weight (123 students) and reducing the likelihood of being overweight (12 students). In contrast, energy-rich breakfasts increase the risk of overweight (100 students) while decreasing the likelihood of being underweight (19 students). Protein-rich breakfasts are associated with underweight (10 students) and normal weight (18 students), but not overweight. Ultimately, the majority of students (397) fall into three BMI categories: Normal weight (188), Overweight (112), and Underweight (97).

**Table 5: Relationship between breakfast consumption and body mass index of students**

	<b>Underweight</b>	<b>Normal weight</b>	<b>Overweight</b>	<b>Total</b>
Balance diet	68	123	12	203
Energy food	19	47	100	166
Protein food	10	18	0	28
<b>Total</b>	<b>97</b>	<b>188</b>	<b>112</b>	<b>397</b>

There is extensive literature indicating that breakfast consumption is associated with improved nutrient intake and adequacy. This research showed that respondents whose breakfast consisted of a balanced diet had a lower tendency to be overweight; however, those whose breakfast diet consisted mainly of energy-rich foods had a higher risk of becoming overweight, possibly because the body can convert energy foods (sugars) to fat. This finding implies that a high intake of energy-rich foods increases the risk of obesity/overweight compared to protein foods. The correlation between these two factors revealed that there was a significant relationship between the quality of breakfast and BMI as seen in Table 5 above. This result is similar to the report of Ashwell and colleagues on the implications of breakfast on growth during adolescence (19). The relationship between breakfast consumption and body mass index (BMI) among the secondary school students in Dekina LGA reveals significant associations between breakfast quality and weight status, Jacson (22) and Ijarotimi et al. (23), reported similar findings. Students who consume balanced diets for breakfast are more likely to have normal weight (123 students) and are less likely to be overweight (12 students), indicating a protective effect of balanced breakfasts against excess weight. In contrast, energy-rich breakfasts increase the risk of being overweight (100 students) while decreasing the likelihood of being underweight (19

students), suggesting that high-calorie breakfasts may contribute to weight gain. Protein-rich breakfasts are associated with underweight (10 students) and normal weight (18 students), but not overweight, implying that protein-rich breakfasts may support weight maintenance but not contribute to excess weight. These findings have important implications for promoting healthy weight gain during adolescence. Encouraging balanced breakfast consumption may help prevent overweight and obesity, while discouraging energy-rich breakfasts may help reduce the risk of weight-related problems. Moreover, protein-rich breakfasts may be beneficial for adolescents who are underweight or struggling to maintain a healthy weight, this aligns with the report of Qui et al., who suggested that the consumption of Protein-rich breakfast could be an excellent means of weight management in adolescents (24).

The overall distribution of BMI categories among the selected students, with normal weight (188) being the most prevalent, followed by overweight (112) and underweight (97), highlights the need for targeted interventions to address weight-related issues in this population. By understanding the relationship between breakfast consumption and BMI, educators, healthcare providers, and parents can work together to promote healthy eating habits and support students in attaining their full potential in adolescence while maintaining a healthy weight.

**Feeding practices and nutritional status**

A significant proportion of normal-weight students (60.6%, 123) consume balanced diets at breakfast, whereas underweight students (11.4%, 19) tend to opt for energy-rich foods. At lunch, a majority of overweight students (57.4%, 143) consume energy-rich foods, while normal-weight students (69.6%,71) prefer balanced diets. Similarly, at

dinner, normal-weight students (58.5%, 151) predominantly consume balanced diets, whereas overweight students (56.8%, 79) Favor energy-rich foods. Notably, protein-rich foods are less common, with no consumption at dinner, and are mainly associated with normal weight and underweight students at breakfast and lunch.

**Table 6: Feeding practices and nutritional status**

<b>Breakfast</b>	<b>Underweight</b>	<b>Normal weight</b>	<b>Overweight</b>	<b>Obese</b>	<b>Total</b>
Balance diet	68(33.5%)	123(60.6%)	12(5.9%)	0(0%)	203(51.1%)
Energy food	19(11.4%)	47(28.3%)	0(0%)	0(0%)	166(41.8%)
Protein food	10(35.78%)	18(64.3)	0(0%)	0(0%)	28(7.1%)
<b>Total</b>					<b>397(100%)</b>
<b>Lunch</b>					
Balance diet	12(11.7%)	71(69.6%)	19(18.6%)	0(0%)	102(62.78%)
Energy food	19(7.6%)	87(34.9%)	143(57.4%)	0(0%)	249(62.7%)
Protein food	16(34.8%)	30(65.2%)	0(0%)	0(0%)	46(11.6%)
<b>Total</b>					<b>397(100%)</b>
<b>Dinner</b>					
Balance diet	99(38.4%)	151(58.5%)	8(3.1%)	0(0%)	258(65%)
Energy food	23(16.5%)	37(26.6%)	79(56.8%)	0(0%)	139(35%)
Protein food	0(0%)	0(0%)	0(0%)	0(0%)	0(0%)
<b>Total</b>					<b>397(100%)</b>

Nutritional status refers to the balance between the intake of nutrients by an organism and the expenditure of nutrients in the process of growth, reproduction and health maintenance. The results of this research indicate that students whose breakfast, lunch and dinner constitute a high proportion of energy foods are at risk of being overweight compared to those whose diet constitutes a balanced diet and protein foods, and there is a significant relationship between food practices and the nutritional status of students ( $p < 0.05$ ). An increase in BMI with the intake of energy foods is due to the conversion of energy foods (carbohydrates or sugars) to fat by the body. This finding is in tandem with the opinion of Ashwell and colleagues on the nutritional influences on physical growth and behaviour in adolescents in India (19).

From this study it is seen that individuals who ingest soft drinks every day tend to be overweight; this may be explained by the fact that adolescents who ingest soft drinks tend to fill their stomachs with carbonated drinks with high sugar and caloric content which promote weight gain, this aligns with the result of Dehghan et al. (25), which stated that excessive beverage intake is associated with the onset of obesity in adolescents. The study also revealed that adolescents who ingested snacks daily were more overweight than those who

consumed snacks only once a week. This may also be explained by the fact that daily consumption of these highly processed snacks with poor nutritional value will consequently cause a reduction in appetite and consumption of nutritional foods provided at home this is in contrast to the findings of Simona et al. (26), in which the prevalence of overweight/obesity was greater in participants consuming >20% of the calories from snacks and  $\geq 3$  snacks per day, large snacks consumer ingests more calories and were less active. In another study by Siyanbade et al., it was observed that heavy consumption of snacks and soft drinks result in higher total energy intake with obvious effects on the BMI of concerned individuals (27).

**Conclusion**

The present study examined the feeding practices and nutritional status of adolescents in selected secondary schools in Dekina LGA, Kogi State and found that the prevalence of poor nutritional statuses in this study was greater in individuals with lower socioeconomic status than those with upper socioeconomic status, while the prevalence of bad dietary habits was greater in individuals with upper socioeconomic status. In conclusion, this study provides valuable insights into the dietary habits, nutritional status, and anthropometric indices of adolescents in selected secondary schools in

Nigeria. The findings highlight a significant concern regarding poor dietary habits and the high prevalence of malnutrition among this vulnerable population. The results suggest that adolescents in Nigeria are at risk of nutrition-related health problems due to inadequate nutrient intake, excessive consumption of processed foods, and sugary snacks.

The study's findings have important implications for public health policy, school nutrition programs, and nutrition education. There is a need for comprehensive interventions that promote healthy eating habits, improve food choices, and enhance nutrition knowledge among adolescents. Schools have a critical role to play in shaping the dietary habits of adolescents, and the development of nutrition-focused programs and policies is essential.

Furthermore, the study's results underscore the importance of addressing the socioeconomic determinants of health, including poverty, food insecurity, and lack of access to healthy foods, which contribute to malnutrition and poor dietary habits. A multi-sectoral approach involving government, schools, families, and communities is necessary to address these challenges and ensure that adolescents in Nigeria have access to nutritious food and a healthy environment that supports their growth and development. Ultimately, this study contributes to the growing body of evidence highlighting the need for urgent action to address the nutritional challenges facing adolescents in Nigeria. By working together, we can promote healthy dietary habits, improve nutritional status, and support the well-being and development of this critical population.

#### List of Abbreviations

ANOVA: Analysis of Variance  
BMI: Body mass index  
LGA: Local government area  
NGOs: Non-governmental organizations  
SPSS: Statistical Package for Social Sciences Software  
WHO: World Health Organization

#### Declarations

##### *Ethical approval and consent to participate*

Ethical clearance was obtained from Prince Abubakar Audu University, Anyigba College of Health Sciences Research Ethics Committee [CHSREC] with identification number CHSREC/2021/0002. Informed consent was obtained from the individual school management and students.

##### *Consent for publication*

All the authors gave consent for the publication of the work under the Creative Commons Attribution-Non-Commercial 4.0 license.

##### *Availability of data and materials*

The data and materials associated with this research will be made available by the corresponding author upon reasonable request.

##### *Competing interests*

The authors have no conflicts of interest to declare.

##### *Funding*

The authors declare that no funds, grants or other external support was received for this research endeavour.

##### *Author contributions*

OOD, OMO, OnMO and MJJ contributed to the conception, design and final write-up. UPI, AS and JAC contributed to data collection, literature search, final write up and proofreading while OSA, SJA and AHO assisted in Literature search, data analysis, final write-up and proofreading. All authors approved the final version.

##### *Acknowledgement*

We acknowledge the Education Department of Dekina Local Government, Kogi State for providing an enabling environment for conducting this study across the twelve selected secondary schools. And special thanks to all principals and proprietors of the selected secondary schools.

#### References

1. Moore Heslin A, McNulty B. Adolescent nutrition and health: characteristics, risk factors and opportunities of an overlooked life stage. *Proceedings of the Nutrition Society*. 2023;82(2):142-156. <https://doi.org/10.1017/S0029665123002689>
2. Liu KSN, Chen JY, Sun KS, Tsang JPY, Ip P, Lam CLK. Adolescent Knowledge, Attitudes and Practices of Healthy Eating: Findings of Qualitative Interviews among Hong Kong Families. *Nutrients*. 2022;14(14):2857. Published 2022 Jul 12. <https://doi.org/10.3390/nu14142857>
3. Thana' Y. Aljaraedah, Hamed R. Takruri, Reema F. Tayyem, Dietary practices and nutrient intake among adolescents: A general review, *Obesity Medicine*, Volume 16,2019,100145, ISSN 2451-8476, <https://doi.org/10.1016/j.obmed.2019.100145>

4. Salgado M, González L, Yáñez A. Parental Involvement and Life Satisfaction in Early Adolescence. *Front Psychol*.2021; 12:628720. <https://doi.org/10.3389/fpsyg.2021.628720>
5. Rosenrauch S, Ball K, Lamb KE. Associations between perceived friends' support of healthy eating and meal skipping in adolescence. *Public Health Nutr*. 2017;20(18):3266-3274. <https://doi.org/10.1017/S136898001700235X>
6. Sinai T, Axelrod R, Shimony T, Boaz M, Kaufman-Shriqui V. Dietary Patterns among Adolescents Are Associated with Growth, Socioeconomic Features, and Health-Related Behaviors. *Foods*. 2021;10(12):3054. <https://doi.org/10.3390/foods10123054>
7. Norris SA, Frongillo EA, Black MM, et al. Nutrition in adolescent growth and development. *Lancet*. 2022;399(10320):172-184. [https://doi.org/10.1016/S0140-6736\(21\)01590-7](https://doi.org/10.1016/S0140-6736(21)01590-7)
8. Omobuwa, O; Alebaosu, CO; Olajide, FO; Adebipe, WO. Assessment of Nutritional status of in-school adolescents in Ibadan, Nigeria; South East African Family Practice. 2014;56(4): 246-250. <https://doi.org/10.1080/20786190.2014.953891>
9. Lassi Z, Moin A, Bhutta Z. Nutrition in Middle Childhood and Adolescence. In: Bundy DAP, Silva ND, Horton S, Jamison DT, Patton GC, eds. *Child and Adolescent Health and Development*. 3rd ed. Washington (DC): The International Bank for Reconstruction and Development / The World Bank; November 20, 2017. [https://doi.org/10.1596/978-1-4648-0423-6\\_ch11](https://doi.org/10.1596/978-1-4648-0423-6_ch11)
10. Ersado TL, Uliso TB, Geltore TE. Prevalence and factors associated with malnutrition among school adolescents of Durame Town, Kambeta Tembaro Zone, Ethiopia. *Pan Afr Med J*. 2023; 44:163. <https://doi.org/10.11604/pamj.2023.44.163.27841>
11. Adeniyi OF, Fagbenro GT, Olatona FA. Overweight and Obesity Among School-aged Children and Maternal Preventive Practices against Childhood Obesity in Select Local Government Areas of Lagos, Southwest, Nigeria. *Int J MCH AIDS*. 2019;8(1):70-83. <https://doi.org/10.21106/ijma.273>
12. Emokpae MA, Brown SI. Effects of lifestyle factors on fertility: practical recommendations for modification. *Reprod Fertil*.2021;2(1):R13-R26. Published 2021 Jan 8. <https://doi.org/10.1530/RAF-20-0046>
13. Slovin, E. Slovin's Formula for Sampling Technique. 2016. <https://prudencexd.weebly.com/>
14. FAOSTAT. Descriptive statistics for key variables. .2016.
15. Weir CB, Jan A. BMI Classification Percentile and Cut Off Points. [Updated 2023 Jun 26]. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK541070/>
16. Galgamuwa, L.S., Iddawela, D., Dharmaratne, S.D. et al. Nutritional status and correlated socio-economic factors among preschool and school children in plantation communities, Sri Lanka. *BMC Public Health*. 2017;17:377. <https://doi.org/10.1186/s12889-017-4311>
17. Silva P, Araújo R, Lopes F, Ray S. Nutrition and Food Literacy: Framing the Challenges to Health Communication. *Nutrients*. 2023;15(22):4708. <https://doi.org/10.3390/nu15224708>
18. Potter C, Gibson EL, Ferriday D, et al. Associations between number of siblings, birth order, eating rate and adiposity in children and adults. *Clin Obes*. 2021;11(3): e12438. <https://doi.org/10.1111/cob.12438>
19. Ashwell M, Gunn P, Gibson S. Waist-to-height ratio is a better screening tool than waist circumference and BMI for adult cardiometabolic risk factors: Systematic review and meta-analysis. *Int J Obes*. 2011;13(3):275-286. <https://doi.org/10.1111/j.1467-789X.2011.00952.x>
20. Tur, JA, Puig, MS; Benito, E; Pons, A. Association between Socio Democratic factor and dietary quality among adolescents in Palma, demallorca. *Nutrition*. 2004;20(6):502-508. <https://doi.org/10.1016/j.nut.2004.03.009>
21. Kunwar R, Pillai PB. Impact of education of parents on nutrition status of children. *Med J Armed Forces India*. 2002;58(1):38-43. [https://doi.org/10.1016/S0377-1237\(02\)80011-9](https://doi.org/10.1016/S0377-1237(02)80011-9)
22. Jackson AA. Effect of socioeconomic condition of urban school-age children of Bangladesh. *Eur J Clin Nutr*. 1991; 45:327-330.
23. Ijarotimi OS, Eleyinimi Af, Ifesan BOT. Evaluation of the nutritional status of adolescents in institutionalized secondary schools in Akure, Nigeria. *J Food Environ*. 2003;1(3-4).
24. Qiu M, Zhang Y, Long Z, He Y. Effect of Protein-Rich Breakfast on Subsequent Energy Intake and Subjective Appetite in Children and Adolescents: Systematic Review and Meta-

- Analysis of Randomized Controlled Trials. *Nutrients*. 2021;13(8):2840.  
<https://doi.org/10.3390/nu13082840>
25. Dehghan M, Akhtar Danesh N, Merchant TA, Elena Venco. Impact of snacking pattern on overweight and obesity in a cohort of adolescents. *J Pediatr Gastroenterol Nutr*. 2014;59(4). <https://doi.org/10.1186/1475-2891-4-24>
26. Simona BO, Luca Da carri, Illaria Fanzola, Elena Venco. Impact of snacking pattern on overweight and obesity in a cohort of adolescents. *J Pediatr Gastroenterol Nutr*. 2014;59(4). <https://doi.org/10.1097/MPG.0000000000000453>
27. Siyanbade JA, Adegoke IT, Alamu OT, Oloke OI, Olorunleke DT, Opatola OV, Ogunremi VG. Assessment of dietary modification among type II diabetes outpatients attending Ladoke Akintola University of Technology Teaching Hospital, Ogbomoso, Nigeria. *FUOYE J Biomed Res*. 2024;1(1):86-96.