



Assessment of Nutritional Status and Diet Quality of Female Adolescents in Odeda Local Government, Ogun State

Ilo Jumoke Georgina¹, Ifebajo Abiodun Yetunde², Aina, Emmanuel Oluwadamilola³, Onabanjo Oluseye Olusegun³

1-Department of Home Science and Hospitality Management, Human Nutrition and Dietetics option, Olabisi Onabanjo University, Ayetoro Campus, Ogun State, Nigeria.

2-Department of Home Economics and Education, Federal College of Education (Tech) Akoka.

3-Department of Human Nutrition and Dietetics, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria.

Corresponding Author: Ilo Jumoke Georgina jumoke.ilo@ouagoiwoye.edu.ng
Nigeria. +2348034675599

ABSTRACT

Adolescence is a crucial period marked by rapid growth and development, necessitating heightened attention to nutritional needs. However, adolescent females, particularly in low- and middle-income countries, often face challenges related to malnutrition and poor diet quality. This study assesses the nutritional status and diet quality of female adolescents in selected government secondary schools in Odeda Local Government Area, Ogun State, Nigeria. A descriptive cross-sectional design was employed, involving 250 respondents selected through multistage random sampling. Data on socio-demographic characteristics, anthropometric measurements, and dietary intake were collected through questionnaires.

The findings revealed that most respondents were in the late adolescence stage with notable variations in parental income, indicating potential economic improvements. A prevalent issue was the high proportion of overweight cases among respondents, coupled with suboptimal dietary diversity and excessive consumption of carbohydrate-rich foods. Additionally, significant deficiencies in essential nutrients such as Vitamin A, fiber, calcium, and vitamin C were observed.

Recommendations stemming from this study include intensified efforts to promote the consumption of fruits, vegetables, and fiber-rich foods, possibly through school-based or community initiatives. Health promotion campaigns targeting the reduction of empty calorie consumption are warranted.

Keywords: Adolescent nutrition, diet quality, nutritional status, low- and middle-income countries.

Received: 9-4-2024

Accepted: 22-4-2024

Published: 1-6-2024

INTRODUCTION

Adolescence is a pivotal period characterized by rapid physical growth, cognitive development, and psychosocial changes. This phase, spanning from 10 to 19 years, demands heightened nutritional requirements to support optimal growth and development (**Backes et al., 2019**).

However, adolescents, particularly females, are confronted with a myriad of challenges regarding

their nutritional status and diet quality, especially in low- and middle-income countries (LMICs) (Handiso et al., 2021). The World Health Organization (WHO) defines malnutrition as a cellular imbalance between nutrient and energy supply and the body's requirement for them, encompassing both undernutrition and over nutrition (Morales et al., 2023). Despite advancements in healthcare and nutrition, malnutrition persists as a significant global health issue, particularly among adolescents residing in LMICs. This segment of the population faces what is termed the "triple burden" of malnutrition, comprising micronutrient deficiencies, underweight, stunting, and increasingly, overweight and obesity (Shapu et al., 2022). Poor diet quality exacerbates these challenges. In LMICs, adolescents often encounter inadequacies in accessing diverse, nutrient-rich foods due to poorly functioning food systems. The global shift in food systems towards increased availability and consumption of low-quality, processed foods further compounds this issue (Popkin et al., 2020). Unhealthy dietary patterns coupled with sedentary lifestyles contribute to the rising prevalence of overweight, obesity, and noncommunicable diseases (NCDs) among adolescents (Christian and Smith, 2018). The repercussions of poor nutritional status extend beyond individual health outcomes to societal implications such as low school enrollment, high dropout rates, and reduced productivity. Malnourished adolescent girls are at a heightened risk of adverse pregnancy outcomes, perpetuating the cycle of malnutrition and poverty (Handiso et al., 2021.) Despite these alarming trends, interventions targeting adolescent nutrition remain inadequate, particularly in LMICs like Nigeria. Adolescents, particularly females, represent the future of any nation. Assessing the nutritional status and diet quality of female adolescents is imperative, particularly in the context of government secondary schools in Odeda Local Government Area of Ogun State, Nigeria. Despite the recognition of adolescent nutrition as a critical public health concern, there remains a dearth of research focusing on this vulnerable demographic, especially in LMICs like Nigeria.

Previous studies of adolescent diets in LMICs have assessed dietary diversity as a proxy for overall diet quality, given its association with micronutrient adequacy (Dalwood et al., 2020; Nithya and Bhavani, 2018). There is a limitation in that dietary diversity only assesses the risk of micronutrient deficiency and misses the opportunity to evaluate the increasing consumption of unhealthy foods by adolescents. The Global Diet Quality Score (GDQS) is a novel tool that also assesses the consumption of unhealthy foods and food groups associated with a higher risk of chronic diseases such as refined grains, processed meats, fast foods and other foods that are high in saturated fats (Bromage et al., 2021). This study aims to address this gap by evaluating the nutritional status and diet quality of female adolescents in selected government secondary schools.

MATERIALS AND METHODS

The descriptive cross-sectional study was used to assess the nutritional status and diet quality of female adolescents attending the selected government secondary schools in Odeda local government area of Abeokuta. A multistage random sampling was used to select 250 respondents from 3 wards under Odeda Local Government. Questionnaire was administered to collect data on the socio-demographic and economic characteristics of the respondents and their parents, anthropometric measurement, 24- hours dietary recall, food consumption frequency of the respondents.

Information on diet quality assessment

The diet quality index international (DQI-I) tool was used to assess the overall quality of the respondents. The tool has four components which include: Variety, adequacy, moderation and overall balance. Each component has its own scoring criteria, and the total score is calculated by adding up the individual component scores. The final score range from 0 to 100, with higher scores indicating better diet quality. Variety across food group and within the protein food group (account for 20 points of the DQI-I); Adequacy of intake of 8 food groups and nutrients based on existing dietary recommendations (40 points); Moderation in intake of foods and nutrients know to be related chronic diseases (30 points); and overall balance in the intake of macronutrients and fatty acids based on dietary recommendation (10 points).

Statistical Analysis

WHO Anthroplus was used to compute the BMI for age of the respondents. Nutrisurvey which contains all useful functions which are typical for nutrient analysis and calculation of energy requirements was used to compute 24-hours dietary recall questionnaire. Data gotten from the survey was analyzed using Microsoft Excel to input the variables which was later exported to SPSS 26. Statistical Package for Social Science (SPSS) windows software version 26.0 was used for statistical analysis of this project after data collected has been sorted, cleaned and entered and it helped in using mean deviation, frequencies and percentages in describing all the variables.

Ethical Approval/Informed Consent

An ethical approval was obtained from the Ogun State Hospital, Ijaye, Abeokuta, Ogun State, Reference number: SHA/RES/VOL XII/121. This was presented to the respondents during the period of the research. The respondents gave their informed agreement at the outset of the study, and they were free to leave the study at any time if it does not sit well with them.

RESULTS AND DISCUSSION

The descriptive cross-sectional study was used to assess the nutritional status and diet quality of female adolescents attending the selected government secondary schools in Odeda local government area of Abeokuta. Most of the respondents are in their late adolescence stage which ranges from age 15 to age 18 which is similar to the study conducted by **Ibeanu et al., (2020)** in which majority of school adolescents assessed falls between age 15-18 years. The highest percentage of the respondents' parents' monthly income fall below #50,000 (50 dollars), which is different from the study by **Oladosu et al., (2022)** in which the highest percentage of the respondents earned below #10,000 which shows an improvement in the income earned by the respondents' parents. Highest percentage of estimated daily stipend by the respondents in the study fall below #1000 (1 dollar). The BMI for age (table 1) recorded in this study shows that larger percentage of the respondents were overweight while less than average have moderate thinness. Students consumed more carbohydrate food on average than recommended which may be attributed to the fact that there is predominantly large amount of starchy staple foods in the area and this suggested that some may be at risk of consuming more food energy than optimal as also seen in a study by **Nicklas et al., (2001)**. The study's report on high carbohydrate food source consumption may be supported by the report on the respondents' choice of food which is not diversified, with about two-third consuming food from less than two food groups per day as shown in table 2. This is similar to report from Lagos, Zimbabwe and Tehranian adolescents, where less than 50% of adolescents had high dietary diversity. (**Olatona et al., 2023**; Reese-**Masterson et al., 2016**). Based on the guidelines by FAO, Dietary Diversity Score is poor if

three or less food groups are consumed per day. High-dietary diversity indicates significantly higher intakes of most key nutrients and availability for the body to maintain a normal nutritional status (Kotecha et al., 2013).

The roots and tubers consumed were eba (14%), plantain (13%), amala (12%), pounded yam (11%), potato (10.9%), cassava flakes (10.5%), yam (9%), fufu (8%), cocoyam (6%) and lafu (5%). The legumes and pulses were beans (29.9%), groundnut (21.6%), moin-moin (17.4%), akara (13.9%), soyabeans (11.3%) and cowpea (5.8%). The most consumed fruits included were orange (19.6%), banana (16.9%), watermelon (16.6%), pineapple (14.1%), pawpaw (12.4%), mango (11.1%) and date (9.3%). The consumed vegetables were onions (15.8%), tomatoes (15.5%), carrot (8.4%), cucumber (7.9%), jute leaf (7.8%), okro (7.6%), water leaf (6.7%), amaranthus (6.7%), spinach (6.3%), celery (4.9%), fluted pumpkin (4.7%) and cabbage (4.5%). The most commonly consumed beverages were sweetened tea (67.3%), coffee (22.1%), wine (9.9%), gin (0.5%), sodas (0.2%), whisky (0.0%) and beer (0.0%). The commonly consumed meats were chicken meat (30.7%), turkey (27.8%), red meat (23.2%) and bush meat (18.3%). The fish included were tilapia (37.9%), crayfish (34.8%) and mackerel (27.4%).

Moderation component of diet quality using the five groups are represented under moderation namely; total fat, saturated fat, cholesterol, sodium and empty calorie. About two-third of the respondents have their saturated fat consumption greater than ten percent and consume food source attributed to have empty calorie. These findings are similar to reports by Olatona et al., (2023) where 52.3% daily consume carbonated drinks, also in Sokoto where 82.1% of the students consumed snacks daily and Ghana where the majority of adolescents were reported to have sweet tooth patterns, which are associated with the consumption of pastry snacks and carbonated soft drinks (Abdul-Razak.et al., 2019; Essien et al., 2014)

Table 1: Anthropometric Status of the Respondents (Body Mass Index for age)

Variables	Frequency	Percentage (%)
Severe thinness	0	0.0
Moderately Thinness	14	5.6
Normal	64	25.6
Overweight	155	62.0
Obesity	17	6.8
Total	250	100

Table 2: Variety component of diet quality

Variables	Frequency	Percentage
Variety of protein		
None	34	13.6
From one source per day	20	8.0
2 different sources per day	113	45.2
More or equal to 3 sources per day	83	33.2
Total	250	100.0
Variety within food groups		
4 food groups missing	21	8.4
3 food groups missing	13	5.2
Any 2 food groups missing	103	41.2
1 food group missing	65	26.0
No food group missing	48	19.2
Total	250	100.0

Table 3: Adequacy component of diet quality

Variables	Frequency	Percentage
Vegetables		
0 serving /day	90	36.0
3-5 servings per day	160	64.0
Fruits		
0 serving /day	193	77.2
2-4 servings/day	57	22.8
Grains/Roots and tubers		
0 serving /day	65	26.0
6-11 serving per day	185	74.0
Fibre		
0-19g/day	169	67.6
20-30g/day	81	32.4
Iron		
Less than 100% RDA/day	86	34.4
Up to 100% RDA/day	164	65.6
Calcium		
Less than 100% RDA per day	180	72.0
100% RDA/day	70	28.0
Vitamin C		
Less than 100% RDA per day	199	79.6
100% RDA/day	51	20.4
Protein		
Less than 10% of energy/day	87	34.8
Greater or equal to 10% of energy/day	163	65.2

There is significant Vitamin A deficiency while few had adequate vitamin A among the respondents in this study. Whereas, majority of the respondents have adequate iron intake and researcher have reported similar results (**Hastert et al., 2021**) in which a larger percentage of the respondents have iron intake that exceeded their RDA. There is likelihood of a larger part of the population not being presented with anemia or any complications from inadequate iron intake. This can be attributed to the facts on the variety component of diet quality particularly for protein. Where about half of the respondent consumed more than 2 sources of protein per day, and about a third of the study population consumed more than 3 sources of protein per day.

The reports on the diet adequacy were carried out in table 3 and 4. One-third of the respondents do not consume vegetables; two-third of the respondent do not consume any fruits per day. Also. About two-third consume less than 19 grams of fiber per day and 6-11 serving of grains/roots and tubers per day. Similar studies reported that consumption of fruits and vegetable is usually lower among adolescents due to inadequate knowledge about their benefits, family practice of inadequate fruits and vegetable intake, dislike of the taste of some fruits and others (**Onyiriuka et al., 2013, Olatona et al., 2023**). The consumption of iron and protein were adequate while that of calcium and vitamin C were not up to the recommended daily allowance.

Table 4: Nutrient Intake of the respondents

Nutrients	Mean	SD	RDA	% Mean RDA	Inadequate	Adequate	Excess
Energy (kcal)	3135.4	1442.9	2200	142.51	82(32.8%)	30(12.0)	138(55.2)
Water (g)	1090.8	530.09	2300	47.42	244(97.2)	3 (1.2%)	4 (1.6%)
Protein (g)	90.62	53.07	46	197	52 (20.8%)	12 (4.8%)	186(74.4)
Fat (g)	26.41	22.30	10	264.1	43 (17.2%)	22 (8.8%)	185 (74%)
Carbohydrate(g)	610.94	285.77	130	469.95	0	1 (0.4%)	249(99.6%)
Fiber_(g)	19.58	12.66	46	42.57	239(95.6%)	9 (3.6%)	2 (0.7%)
PUFA (mg)	7.34	8.14	0	0	0	0	0
Cholesterol(mg)	242.35	384.19	0	0	0	0	0
Vitamin A(mcg)	670.78	1661.28	700	95.83	211(84.4%)	2 (0.8%)	37 (14.8%)
Cart_(mcg)	3792.24	9480.24	0	0	0	0	0
Vitamin E (mg)	3.46	2.95	12	28.83	250 (100%)	0	0
Vitamin B1(mg)	2.02	1.23	0.9	224.44	51 (20.4%)	23 (9.2%)	176(70.4%)
Vitamin B2(mg)	0.95	0.73	0.9	105.56	160 (64%)	30 (12%)	60 (24%)
Vitamin B6(mg)	10.79	8.51	1.2	126.79	12 (4.8%)	3 (1.2%)	235 (94%)
Folate (mcg)	659.30	658.10	400	164.83	130 (52%)	8 (3.2%)	112(44.8%)
Vitamin C (mg)	74.27	62.83	65	114.26	138(55.2%)	32(12.8%)	80 (32.0%)
Sodium (mg)	1037.67	782.14	1.5	69,178	0	0	250 (100%)
Potassium (mg)	3021.25	2291.76	4.7	64281.91	0	0	250 (100%)
Calcium_(mg)	437.11	260.27	1100	39.74	245 (98%)	1 (0.4%)	4 (1.6%)
Magnesium(mg)	598.60	431.80	360	166.28	110 (44%)	0	140 (56%)
Phosphorus(mg)	1649.56	1021.22	1250	131.97	95 (38%)	28(11.2%)	127(50.8%)
Iron (mg)	44.83	26.09	15	298.87	14 (5.6%)	11 (4.4%)	225 (90%)
Zinc (mg)	20.87	13.29	9	231.89	46 (18.4%)	20 (8.0%)	184(73.6%)

CONCLUSION

The majority of respondents fell within the late adolescence stage, with notable variations in parental income compared to previous studies, indicating potential economic improvements. However, concerning dietary habits, there are areas of concern. Most notably, there is a prevalence of overweight cases among respondents, accompanied by suboptimal dietary diversity and excessive consumption of carbohydrate-rich foods, potentially predisposing individuals to energy imbalance. Additionally, there are significant deficiencies in essential nutrients such as Vitamin A, fiber, calcium, and vitamin C, which could lead to various health complications if left unaddressed.

Efforts to promote the consumption of fruits, vegetables, and fiber-rich foods need to be intensified, potentially through school-based programs or community initiatives. Also, Health promotion campaigns targeting the reduction of empty calorie consumption, such as carbonated drinks and snacks, are also warranted. In addition, strategies to address specific nutrient deficiencies, such as Vitamin A, calcium, and vitamin C, should be developed, possibly through fortified food programs or supplementation where necessary.

Despite the valuable insights gained from this study, a limitation is identified. The cross-sectional design limits the ability to establish causality between diet quality and nutritional outcomes.

REFERENCES

- Abdul-Razak A, Zakari A (2019).** Dietary patterns and associated factors of schooling Ghana adolescents. *J Health Popul Nutr.*38:5. <https://doi.org/10.1186/s41043-019-0162-8>
- Amelia Reese-Masterson and Pamela Murakwani (2016).** Assessment of adolescent girl nutrition, dietary practices and roles in Zimbabwe. *Field Exchange* 52. p113. www.enonline.net/fex/52/adolescentgirlnutrition Backes EP, Bonnie RJ, editors. *The Promise of Adolescence: Realizing Opportunity for All Youth.* Washington (DC): National Academies Press (US); 2019 May 16.
- Bromage, S., Andersen, C. T., Tadesse, A. W., Passarelli, S., Hemler, E. C., Fekadu, H., Sudfeld, C. R., Worku, A., Berhane, H., Batis, C., Bhupathiraju, S. N., Fung, T. T., Li, Y., Stampfer, M. J., Deitchler, M., Willett, W. C., & Fawzi, W. W. (2021).** The Global Diet Quality Score is associated with higher nutrient adequacy, midupper arm circumference, venous hemoglobin, and serum folate among urban and rural Ethiopian adults. *The Journal of Nutrition*, 151(Suppl._2), 130S– 142S. <https://doi.org/10.1093/jn/nxab264>
- Christian, P., & Smith, E. R. (2018).** Adolescent undernutrition: Global burden, physiology, and nutritional risks. *Annals of Nutrition and Metabolism*, 72(4), 316– 328. <https://doi.org/10.1159/000488865>
- Dalwood, P., Marshall, S., Burrows, T. L., McIntosh, A., & Collins, C. E. (2020).** Diet quality indices and their associations with health-related outcomes in children and adolescents: An updated systematic review. *Nutrition Journal*, 19(1), 118. <https://doi.org/10.1186/s12937-020-00632-x>
- Essien E, Emebu PK, Iseh KR, Haruna MJ. (2014).** Assessment of nutritional status and knowledge of students from selected secondary schools in Sokoto Metropolis, Sokoto State, Nigeria. *African J Food Agric Nutr Dev.* 14:9454–68. DOI: 10.18697/ajfand.66.12
- Handiso YH, Belachew T, Abuye C, Workicho A, Baye K. (2021).** Undernutrition and its determinants among adolescent girls in low land area of Southern Ethiopia. *PLoS One.* 16(1):e0240677. doi: 10.1371/journal.pone.0240677
- Ibeanu V., Chino ye E. and Peace A. (2020).** Evidence based strategy for prevention of hidden hunger among adolescents in a suburb of Nigeria. *BMC Public Health*; 20: 1683.
- Kotecha PV, Patel SV, Baxi RK, Mazumdar VS, Shobha M, Mehta KG, Mansi D, Ekta M. (2013).** Dietary pattern of schoolgoing adolescents in urban Baroda, India. *J Health Popul Nutr.* 31(4):490-6. doi: 10.3329/jhpn.v31i4.20047
- Mary Hastert, Jeannine R. Goetz, Debra K. Sullivan, Holly R. Hull, Joseph E. Donnelly, Lauren T. Ptomey (2021).** Calcium, fiber, iron, and sodium intake in adolescents with intellectual and developmental disabilities and overweight and obesity. *Disability and Health Journal*; Volume 14, Issue 4, 101155. <https://doi.org/10.1016/j.dhjo.2021.101155>
- Morales F, Montserrat-de la Paz S, Leon MJ, Rivero-Pino F. (2023).** Effects of Malnutrition on the Immune System and Infection and the Role of Nutritional Strategies Regarding Improvements in Children's Health Status: A Literature Review. *Nutrients.* 16(1):1. doi: 10.3390/nu16010001
- Nithya, D. J., & Bhavani, R. V. (2018).** Dietary diversity and its relationship with nutritional status among adolescents and adults in rural India. *Journal of Biosocial Science*, 50(3), 397– 413. <https://doi.org/10.1017/s0021932017000463>

- Nicklas TA, Baranowski T, Cullen KW, Berenson G. (2001).** Eating patterns, dietary quality and obesity. *J Am Coll Nutr.* Dec;20(6):599-608. doi: 10.1080/07315724.2001.10719064.
- Onyiriuka AN, Umoru DD, Ibeawuchi AN (2013).** Weight status and eating habits of adolescent Nigerian urban secondary school girls. *South African Journal of Child Health*, vol 7 no 3, p108-112, aug. 2013. doi:10.7196/SAJCH.529
- Olatona FA, Ogide PI, Abikoye ET, Ilesanmi OT, Nnoaham KE (2023).** Dietary diversity and nutritional status of adolescents in Lagos, Nigeria. *J Family Med Prim Care.* Aug;12(8):1547-1554. doi: 10.4103/jfmpe.jfmpe_1783_22
- Popkin, B. M., Corvalan, C., & Grummer-Strawn, L. M. (2020).** Dynamics of the double burden of malnutrition and the changing nutrition reality. *The Lancet*, 395(10217), 65– 74. [https://doi.org/10.1016/S0140-6736\(19\)32497-3](https://doi.org/10.1016/S0140-6736(19)32497-3)
- Shapu RC, Ismail S, Lim PY, Ahmad N, Garba H, Njodi IA (2022).** Effectiveness of Triple Benefit Health Education Intervention on Knowledge, Attitude and Food Security towards Malnutrition among Adolescent Girls in Borno State, Nigeria. *Foods.* 5;11(1):130. doi: 10.3390/foods11010130