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Research Article

Dietary practices, nutritional knowledge and anthropometric indices of adolescents attending public secondary schools in Ogun State, Nigeria

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Highlights/Key Messages

- 80.3% of sample adolescents had low nutritional knowledge.
- Thinness and severe thinness affected 68.0% and 12.0% of adolescents.
- Stunting was found in 37.0%, signalling high chronic undernutrition.
- Maternal education level was associated with adolescent BMI-for-

Background
Adolescence is a critical period of heightened nutritional vulnerability. Dietary habits and nutritional knowledge during this stage shape long-term health outcomes, yet evidence among public secondary school adolescents in Southwest Nigeria remains limited.

Objective
This study aimed to investigate the dietary habits, nutritional knowledge, and anthropometric status of in-school adolescents attending public secondary schools in Abeokuta North, Ogun State, Nigeria, to identify key sociodemographic determinants of nutritional status.

Methods
A descriptive cross-sectional design recruited 300 adolescents aged 10–19 years from six public secondary schools using multi-stage random sampling. Data were collected via a structured interviewer-administered questionnaire covering sociodemographic characteristics, dietary habits, and nutritional knowledge. Anthropometric status was assessed using Body Mass Index-for-age (BAZ) and Height-for-age Z-scores (HAZ) computed with WHO AnthroPlus. Chi-square and Fisher's exact tests were used to examine associations. Poisson regression was used to compute crude and adjusted prevalence ratios (PRs) with 95% confidence intervals (CIs) for stunting and thinness, with statistical significance set at $p < 0.05$.

Results
The sample had a mean age of 15.7 ± 2.50 years, predominantly female (64%), and from low-income households. Meal skipping was prevalent (44%), with lunch most frequently omitted; home-prepared meals (92%) and high intake of fried foods (84%) were common. Low nutritional knowledge was found in 80.3% of participants, with no significant age-related difference. Stunting affected 37.0%, while thinness (68.0%) and severe thinness (12.0%) were also markedly elevated. In adjusted Poisson regression analyses, large household size (⩾11 members) was significantly associated with both stunting (adjusted PR = 2.34; 95% CI: 1.18–4.63; p = 0.015) and thinness (adjusted PR = 1.87; 95% CI: 1.09–3.21; p = 0.023).

Conclusion
This study documents a high burden of undernutrition alongside poor dietary habits and low nutritional knowledge among public secondary school adolescents in Abeokuta North LGA.

Keywords: adolescents; dietary habits; nutritional knowledge; anthropometric indices; undernutrition; Nigeria

Introduction

Adolescence, the transitional phase spanning ages 10 to 19 years, is characterised by rapid physical growth, hormonal changes, and increased nutritional demands, making this population particularly vulnerable to malnutrition. Globally, adolescents constitute a significant proportion of the malnourished population, with sub-Saharan Africa bearing a disproportionate burden, accounting for approximately 45% of the 1.2 million adolescent deaths recorded worldwide in 2015 (Canavan & Fawzi, 2019). In Nigeria, as in many low- and middle-income countries, both undernutrition and overnutrition coexist among adolescents, creating a double burden that challenges public health systems and threatens future population productivity (Uba et al., 2021).

Dietary habits are a primary determinant of nutritional status in adolescence. Poor dietary choices, driven by limited nutritional knowledge, socioeconomic constraints, and the growing influence of media and food marketing, have been shown to contribute to deficiencies in essential macronutrients and micronutrients, as well as to rising rates of overweight and obesity among young people (Otuneye et al., 2017). Nutritional knowledge plays a pivotal role in shaping these habits; adolescents with adequate nutrition knowledge are better positioned to make informed dietary decisions that support healthy growth and development (Ademiluyi et al., 2025). However, in many African settings, nutrition education remains insufficient and inconsistently integrated into school health programmes, leaving adolescents ill-equipped to navigate complex food environments (Abbas et al., 2020; Ademiluyi & Uthman-Akinhanmi, 2025).

The consequences of poor nutrition during adolescence extend well beyond this developmental stage. Undernutrition in adolescence has been linked to stunted growth, impaired cognitive function, reduced academic performance, and diminished immune capacity (Amoadu et al., 2024). For adolescent girls specifically, poor nutritional status increases the risk of adverse reproductive outcomes, including low birth weight, preterm birth, and neonatal mortality, thereby perpetuating the intergenerational cycle of malnutrition (Shapu et al., 2020). Conversely, overnutrition during this period is strongly associated with the early onset of non-communicable diseases such as type 2 diabetes, hypertension, and cardiovascular disease in adulthood (Calista et al., 2020).

Despite the well-established importance of adolescent nutrition, this age group has historically received inadequate attention from nutrition programmes, most of which have prioritised children under five years and pregnant or lactating women (Ademiluyi et al., 2025; Ademiluyi et al., 2026). Secondary school settings present a valuable and largely underutilised platform for delivering nutrition assessment and education to adolescents, given the high enrolment rates and structured environment. Yet, data on the dietary habits, nutritional knowledge, and anthropometric status of secondary school adolescents in Abeokuta North Local Government Area of Ogun State, Nigeria, remain scarce, limiting the capacity of policymakers and health practitioners to design evidence-based interventions tailored to this population. This study, therefore, sought to assess the dietary habits, nutritional knowledge, and anthropometric indices of adolescents attending secondary schools in Abeokuta North Local Government Area.

Methods

Study Area and Location

Abeokuta North is a Local Government Area within Ogun State in southwestern Nigeria It had a population of 201,329 at the 2006 census. The study location has both public and private secondary schools; however, public secondary schools were purposively targeted for this study because they predominantly serve adolescents from lower socioeconomic households. There are 17 public secondary schools in Abeokuta North LGA, serving the majority of students living in this area.

Sampling

Sampling criteria were students enrolled in public secondary schools located within Abeokuta North LGA, aged 10–19 years, with no known acute or chronic health conditions at the time of data collection, present on the day of data collection, and whose parent or guardian provided written informed consent.

The sample size for this study was calculated using Gibson 2004 formula.

$$N = \frac{z^2\ (pq)}{d^2}$$

Where N is the sample size;

Z = the standard normal variable for a 95% confidence level (CI) = 1.96

p = the proportion or estimate of percentage of sampling frame (the proportion of percentage of adolescents in Nigeria is 22.1% (Otuneye *et al.,* 2017).

q = 1-p, d is precision = (0.05).

The sample size for the present study was calculated to be;

$$N = \frac{(1.96)^2\ (0.221 \times 0.779)}{0.5^2} = 264$$

An additional 15% was added to account for nonresponses (Askia, 2001), yielding a sample size of 304 respondents.

Sampling Technique

A multi-stage random sampling procedure was employed to recruit study participants. Six secondary schools of the 17 in the Abeokuta North Local Government Area (LGA) were selected using simple random sampling. Simple random sampling by balloting was then conducted within each school, using class registers, to select students until 50 participants per school were selected, yielding a total of 300 participants. Where a drawn student was absent on the day of data collection or declined to participate, the next drawn slip was used to replace them. The age composition of the sample thus reflects the natural age distribution of students enrolled across the sampled schools.

Data Collection

This was a descriptive cross-sectional study conducted from June 2023 to July 2024.

***Sociodemographic and socioeconomic questionnaire*:** Data were collected using a structured questionnaire administered to the adolescents by trained interviewers. Age was recorded in completed years from date of birth and categorised into early adolescence (10–14 years) or late adolescence (15–19 years), in accordance with the WHO (2006) classification of adolescent developmental stages. Sex was captured as a binary variable (male or female) based on self-report, and ethnicity was similarly self-reported, with participants identifying as Yoruba, Hausa, Igbo, or other.

Family structure was identified as either monogamous or polygamous, while household size was defined as the total number of persons residing in the household, grouped into three categories: small (2–4 members), medium (5–10 members), or large (11 or more members). This categorisation was based on the observed distribution within the study sample and is consistent with classifications employed in comparable Nigerian adolescent studies (Ademiluyi et al., 2025).

Parental educational attainment was assessed for each parent separately, with responses categorised as no formal education, primary education, secondary education, or tertiary education, following the Nigerian national education system framework. Parental occupation was recorded and grouped into four categories: trader/business, civil servant, artisan, or other. Finally, estimated monthly household income was self-reported in Nigerian Naira and later categorized as: below ₦10,000; ₦10,001–₦20,900; ₦21,001–₦30,900; ₦31,001–₦40,900; ₦41,001–₦50,900; ₦51,001–₦100,000; and above ₦100,000. It is acknowledged that adolescent participants may have limited knowledge of total household income. To minimise reporting errors, interviewers were trained to prompt participants to report the income of the primary household earner when they were uncertain about the combined household income. Where participants indicated complete uncertainty, the response was recorded as 'unknown' and excluded from income-related analyses.

Nutritional Knowledge Questionnaire: Nutritional knowledge was assessed using a structured questionnaire administered via face-to-face interview. Items were adapted from Bahathig et al. (2023), who originally developed and validated the instrument for female adolescents in Saudi Arabia. To address potential cultural and contextual discrepancies, the questionnaire underwent a structured adaptation process: two nutrition experts experienced with the Nigerian adolescent population reviewed each item for cultural appropriateness, linguistic clarity, and relevance to local dietary knowledge. A pilot test was subsequently conducted among 20 adolescents from a public secondary school not included in the main study, and ambiguous or culturally incongruent items were revised accordingly. The adapted questionnaire demonstrated good internal reliability (Cronbach's $\alpha = 0.78$). Each item was scored dichotomously (correct = 1; incorrect = 0); total scores were summed and converted to percentages, with a maximum score of 10 (100%). Participants were categorised as having low nutritional knowledge (score <40%), moderate nutritional knowledge (score 41–69%), or high nutritional knowledge (score ⩾70%), consistent with the classification framework proposed by Kigaru et al. (2015).

***Dietary Habits Questionnaire*:** Participants were asked to report their usual dietary practices over the preceding four weeks. These were assessed using a questionnaire adapted from Olatona et al. (2023), contextualised to reflect the dietary patterns of adolescents in south-western Nigeria. Locally consumed staples were incorporated, namely: rice; bread and tea; yam (*Dioscorea spp.*, a starchy tuber); eba (a stiff dough made from cassava flour, commonly known as garri); beans; fried plantain; moi moi (a steamed bean pudding made from peeled black-eyed peas); pap (a fermented cereal porridge, also called akamu, made from maize, sorghum, or millet); and snacks. The instrument captured the number of daily meals; meal skipping behaviour (yes/no and which meal); frequency of breakfast skipping; source of food consumed (home-prepared, street vendor, fast food outlet); frequency of consumption of fruits, vegetables, and fried foods; and reasons for any recent changes in dietary practices. It should be noted that inter-meal snacking behaviour was not systematically assessed with a structured instrument; this represents a limitation of the dietary assessment.

***Anthropometric Measurements*:** Height was measured barefoot to the nearest 0.1 cm using a calibrated stadiometer with a headboard, following WHO (2007) standardised measurement protocols. Body weight was measured to the nearest 0.1 kg using a portable, calibrated electronic weighing scale (de Onis et al., 2007). The scale was zeroed before each measurement; participants removed footwear and heavy outer garments prior to weighing.

Nutritional status was assessed using two anthropometric indices: Body Mass Index-for-age Z-scores (BAZ) and Height-for-age Z-scores (HAZ), and referenced to the WHO 2007 growth standards for school-age children and adolescents. Children with a HAZ below −3 SD were classified as severely stunted, while those with values between −3 SD and −2 SD were classified as moderately stunted. A HAZ between −2 SD and −1 SD indicated mild stunting, whereas values between −1 SD and +1 SD were considered indicative of normal stature. Children with a HAZ above +1 SD were classified as having tall stature. A BAZ below −3 SD was categorised as severe thinness, and values between −3 SD and −2 SD were classified as thinness. A BAZ between −2 SD and +1 SD was considered normal, while values between +1 SD and +2 SD indicated overweight. A BAZ exceeding +2 SD was classified as obesity. These classifications were applied in accordance with WHO (2007) guidelines and are consistent with those used in comparable Nigerian adolescent studies (Ademiluyi, et al., 2025; Abdussalaam et al., 2024; Oladosu, et al., 2022).

Ethical Considerations

Ethical approval was obtained from the Ogun State Ministry of Health, Department of Health Planning, Research and

Statistics, Abeokuta (approval number: HPRS/381/381). Additional authorisation was granted by the Ogun State Ministry of Education. Written informed consent was obtained from parents or guardians of all participants; only students who returned signed parental consent forms were enrolled.

Data Analysis

Data were entered and analysed using IBM SPSS Statistics version 27.0 (IBM Corp., Armonk, NY, USA). Anthropometric indices were computed using WHO AnthroPlus software (de Onis et al., 2007). Sociodemographic characteristics, dietary habits, and nutritional knowledge data were summarised using descriptive statistics (frequencies, percentages, means, and standard deviations). Chi-square (χ^2) tests and Fisher's exact tests (when expected cell frequencies were fewer than 5) were used to examine bivariate associations between categorical variables, including age category and nutritional knowledge, and between sociodemographic variables and anthropometric indices. Several sociodemographic variables (e.g., maternal education, household income) are ordinal. As chi-square tests do not capture ordinal trends, Poisson regression with robust variance estimation was additionally employed to quantify the direction and magnitude of associations across ordered categories, enabling interpretation of dose-response relationships. Chi-square results are therefore presented as descriptive indicators of overall association, while regression models serve as the primary inferential estimates.

To quantify the strength and direction of associations between key sociodemographic variables and adverse anthropometric outcomes, Poisson regression with robust variance estimation was performed to compute crude and adjusted Prevalence Ratios (PRs) with 95% Confidence Intervals (CIs) for: (i) stunting (defined as HAZ < −2 SD; binary outcome: yes/no) and (ii) thinness (defined as BAZ < −2 SD; binary outcome: yes/no).

Poisson regression with robust variance estimation is the recommended method for estimating prevalence ratios (PRs) in cross-sectional studies with common binary outcomes, as it avoids the overestimation of risk inherent in odds ratios when outcome prevalence exceeds 10% (Zou, 2004; Barros & Hirakata, 2003). A PR of 1.0 indicates no difference in prevalence relative to the reference group. A PR of 1.5, for example, indicates that the outcome is 50% more prevalent in the exposed group compared to the reference group. Adjusted PRs are derived from multivariable models simultaneously controlling for all listed covariates, thereby estimating the independent association of each variable with the outcome.

The following independent variables were entered into multivariable models: household size (reference: small, 2–4 members), maternal educational level (reference: tertiary education), age category (reference: late adolescents, 15–19 years), and sex (reference: female). All tests were two-tailed, and statistical significance was set at $p < 0.05$.

Results

Socio-Demographic Characteristics of Respondents

Table 1 shows the socio-demographic and economic characteristics of the respondents. The respondents were predominantly older female adolescents aged 15–19 years, with a mean age of 15.7 ± 2.50 years. A large proportion came from monogamous families (76%) and lived with their parents (88%), indicating relatively stable family settings. The estimated monthly household income was generally low, with the largest proportion earning less than ₦10,000 (33.3%) and a mean income of ₦32,000 ± ₦20,100 month (see footnote for USD equivalent at the time of data collection).

Table 1. Socio-demographic characteristics of respondents (n=300)

Variables	Frequency	Percentage (%)
Age		
10-14	61	20.3
15-19	239	79.7
Mean ± SD: 15.7 ± 2.50		
Sex		
Male	108	36
Female	192	64
Ethnicity		
Yoruba	271	90.3
Hausa	2	0.7
Igbo	20	6.7
Others	7	2.3
Family structure		
Monogamy	228	76
Polygamy	72	24
Who do you live with?		
Both parents	264	88
Grandparents	19	6.3
Relatives	14	4.7
Father	1	0.3
Mother	2	0.7
Household size		
2-4	42	14
5-10	251	83.7
⩾11	7	2.4
Who is the household head?		
Father	281	93.7
Mother	16	5.3
Relatives	2	0.7
Grandfather	1	0.3
Source of income		
Parents	288	95.7
Friends	6	2
Hustle	3	1
Tutor	1	0.3
Mother	2	0.7
Frequency of income received		
Monthly	37	12.3
Weekly	46	15.3
Daily	190	63.3
Never	27	9
Mother's highest educational level		
No education	26	8.7
Primary education	62	20.7
Secondary education	134	44.7
Tertiary education	78	26
Mother's occupation		
Trader/Business	242	80.7
Civil servant	23	7.7
Artisan	13	4.3
Other	22	7.3

Variables	Frequency	Percentage (%)
Father's highest educational level		
No education	15	5
Primary education	46	15.3
Secondary education	141	47
Tertiary education	98	32.7
Father's occupation		
Trader	155	51.7
Civil servant	62	20.7
Artisan	41	13.7
Other	42	13.9
Estimated household monthly income[a]		
<₦10,000	100	33.3
₦10,001-₦20,900	29	9.7
₦21,001-₦30,900	43	14.3
₦31,001-₦40,900	37	12.3
₦41,001-₦50,900	39	13
₦51,001-₦100,000	28	9.3
>₦100,000	24	8
Mean ± SD: ₦32, 000 ± ₦20,100		

SD-Standard Deviation.
[a]At the time of data collection, ₦10,000 was approximately equivalent to USD 6.50 and ₦100,000 to approximately USD 65.00, based on the prevailing Central Bank of Nigeria exchange rate of approximately ₦1,530/USD

Dietary practices of respondents

Table 2 provides data on the dietary habits of the respondents. Most respondents consumed three meals daily (65.3%). Among the 20 respondents who reported a recent change in eating habits (6.7%), the most frequently cited reasons were increased cost of food (30.0%) and reduced appetite (30.0%), followed by monotonous food (10.0%). Most food consumed was home-prepared (92%), but a high proportion consumed fried foods (84%). Encouragingly, fruit (94%) and vegetable (96.7%) consumption was widely reported, though frequency varied: only 31.3% consumed fruit daily and 22% consumed vegetables daily.

Table 2. Dietary habits of respondents (n=300)

Variable	Frequency	Percentage (%)
Number of daily meals?		
Once	2	0.7
Twice	102	34
Thrice	196	65.3
Do you skip meals?		
Yes	132	44
No	168	56
If yes, which of the meals do you skip?		
Nil	168	56
Breakfast	41	13.7
Lunch	70	23.3
Dinner	21	7
How often do you skip breakfast?		
Every day in 7 days	20	6.7
1-3 days	82	27.3
Never	187	62.3
4 times/weekly	11	3.7
Source of food consumed		
Home prepared	276	92
Street vendors	18	6
Fast food outlet	6	2
Do you consume fried foods?		
Yes	252	84
No	48	16
Do you take fruits?		
Yes	282	94
No	18	6
If yes, how often do you take it?		
Nil	18	6
Everyday	94	31.3
Once a week	60	20
Twice a week	51	17
>Three times a week	77	25.7
Do you take vegetables?		
Yes	290	96.7
No	10	3.3
If yes, how often do you take it?		
Nil	10	3.3
Everyday	66	22
Once in a week	64	21.3
Twice a week	71	23.7
>Three times a week	89	29.7
Food commonly consumed as breakfast		
None	19	6.3
Any food available	6	2.0
Beans	4	1.3
Bread and tea	70	23.2
Cornflakes/Custard	3	0.9
Eba[a]	3	1.0
Fast foods/*Indomie*	3	0.9
Pap[b] and *moi moi*[c]	2	0.7
Snacks and drink	4	1.3
Rice	173	57.6
Spaghetti	1	0.3
Yam	11	3.6
Any recent change in eating habit?		
Yes	20	6.7
No	280	93.3
Main reason for change in eating habit (n=20)		
Increased appetite	1	5.0
Avoiding starchy food and vegetables	1	5.0
Change of environment	1	5.0
Increased cost	6	30.0
Limited time due to school work	1	5.0
Monotonous food	2	10.0
Parents' objection	1	5.0
Reduced appetite	6	30.0

[a]Eba: a stiff dough prepared from fermented, dried, and ground cassava (garri).
[b]Pap (akamu): a fermented cereal porridge prepared from maize, sorghum, or millet. [c]Moi moi: a steamed savoury pudding prepared from peeled black-eyed peas.

Nutritional Knowledge

As shown in Table 3, the majority of adolescents demonstrated low nutritional knowledge (80.3%), and only 2.0% had high knowledge. There was no association between age category and nutritional knowledge.

Table 3. Nutritional knowledge of adolescents by age category (n = 300)

Nutritional Knowledge Category	Total n (%)	Early Adolescents n (%)	Late Adolescents n (%)	χ^2	p-value
Low (⩽ 40%)	241 (80.3)	46 (75.4)	195 (81.6)	6.168	0.520
Moderate (41–69%)	53 (17.7)	12 (19.7)	41 (17.2)		
High (⩾ 70%)	6 (2.0)	3 (4.9)	3 (1.3)		
Total	**300 (100)**	**61 (100)**	**239 (100)**		
Mean ± SD: 32.90 ± 14.37					

Anthropometric Indices of Adolescents by Age Category and Sex

As shown in Table 4, 37.0% of respondents exhibited some level of stunting (mild, moderate, or severe). Thinness was even more prevalent (68.0%), with an additional 12.0% classified as severely thin, while only 2% were overweight. There were no statistically significant differences in height-for-age or BMI-for-age classifications across age categories or by sex.

Table 4. Anthropometric indices of adolescents by age category and sex (n = 300)

Classification	Total	Early Adolescents	Late Adolescents			Male	Female		
Height-for-Age	n (%)	n (%)	n (%)	χ^2	p-value	n (%)	n (%)	χ^2	p-value
Severely stunted	8 (3.0)	1 (2.0)	7 (3.0)	0.732[b]	0.866	3 (3.0)	5 (3.0)	1.804[a]	0.614
Moderately stunted	23 (8.0)	4 (7.0)	19 (8.0)			10 (9.0)	13 (7.0)		
Mildly stunted	79 (26.0)	18 (30.0)	61 (25.0)			24 (22.0)	55 (29.0)		
Normal height	190 (63.0)	38 (61.0)	152 (64.0)			71 (66.0)	119 (62.0)		
Total	300 (100)	61 (100)	239 (100)			108 (100)	192 (100)		
Mean ± SD: 3.50 ± 0.75									
BMI-for-Age									
Normal	55 (18.0)	11 (18.0)	44 (18.0)	1.947[a]	0.583	19 (18.0)	36 (19.0)	0.565[b]	0.900
Overweight	6 (2.0)	0 (0.0)	6 (3.0)			3 (2.0)	3 (2.0)		
Thinness	204 (68.0)	44 (72.0)	160 (67.0)			73 (68.0)	131 (68.0)		
Severe thinness	35 (12.0)	6 (10.0)	29 (12.0)			13 (12.0)	22 (11.0)		
Total	300 (100)	61 (100)	239 (100)			108 (100)	192 (100)		
Mean ± SD: 3.53 ± 1.28									

[a] Chi-Square value, b-Fisher's Exact value, n-Frequency, χ2- Chi-Square test

Associations of sociodemographic and economic characteristics with nutritional knowledge and anthropometric indices

As presented in Table 5, there were no statistically significant associations between sociodemographic characteristics and nutritional knowledge. However, household size was significantly associated with both height-for-age (HAZ) and BMI-for-age (BAZ). In addition, mother's educational level demonstrated a statistically significant association with BMI-for-age (BAZ).

Table 5. Associations of Sociodemographic and Economic Characteristics with Nutritional Knowledge and Anthropometric Indices (N = 300)

	Nutritional Knowledge		HAZ		BAZ	
Variables	χ^2	p-value	χ^2	p-value	χ^2	p-value
Age	3.65	0.160	2.21	0.527	1.97	0.581
Sex	0.37	0.829	1.09	0.580	0.24	0.887
Ethnicity	1.12	0.769	0.29	0.955	1.06	0.784
Family structure	0.78	0.856	2.95	0.399	3.99	0.264
Household size	2.67	0.261	12.82	0.012*	18.47	<0.001*
Mother's educational level	0.94	0.818	1.72	0.633	13.56	0.009*
Father's educational level	3.41	0.176	6.67	0.082	3.21	0.361
Estimated monthly income	4.45	0.111	2.11	0.550	2.32	0.508

χ^2 = Chi-square test, HAZ = Height-for-Age Z-score, BAZ = BMI-for-Age Z-score
*Statistically significant at p < 0.05

Poisson Regression Analyses: Prevalence Ratios for Stunting and Thinness

Table 6 presents the results of Poisson regression analyses with robust variance estimations for stunting (HAZ < −2 SD) and thinness (BAZ < −2 SD). Prevalence ratios greater than 1.0 indicate a higher prevalence of the outcome relative to the reference category. An adjusted PR of 2.34 indicates that the prevalence of stunting was approximately 134% higher among adolescents from large households than among those from small households, after controlling for maternal education, age category, and sex.

Large household size (⩾11 members) was significantly associated with increased stunting prevalence in both crude and adjusted models. Compared to adolescents from small households (2–4 members), those from large households had an adjusted PR of 2.34 (95% CI: 1.18–4.63; p = 0.015). Medium household size (5–10 members) was also associated with elevated stunting prevalence (adjusted PR = 1.52; 95% CI: 1.02–2.27; p = 0.039). Maternal educational level and sex were not significantly associated with stunting in adjusted analyses. Large household size was also significantly associated with thinness (adjusted PR = 1.87; 95% CI: 1.09–

3.21; p = 0.023). Additionally, compared with adolescents whose mothers had tertiary education, those whose mothers had no formal education had a significantly higher prevalence of thinness (adjusted PR = 1.64; 95% CI: 1.12–2.40; p = 0.011). Mothers with primary education also showed a trend towards higher prevalence of thinness among adolescents (adjusted PR = 1.41; 95% CI: 1.01–1.97; p = 0.045). Age category and sex were not significantly associated with thinness in adjusted analyses.

Table 6. Poisson regression analyses — crude and adjusted prevalence ratios for stunting and thinness (n = 300)

Variable	Stunting (HAZ <−2 SD)				Thinness (BAZ <−2 SD)			
	Crude PR (95% CI)	p-value	Adj. PR (95% CI)	p-value	Crude PR (95% CI)	p-value	Adj. PR (95% CI)	p-value
Household size								
Small (2–4) [ref]	1.00	—	1.00	—	1.00	—	1.00	—
Medium (5–10)	1.48 (1.01–2.18)	0.046	1.52 (1.02–2.27)	0.039*	1.59 (1.08–2.34)	0.019*	1.62 (1.10–2.38)	0.015*
Large (⩾11)	2.21 (1.12–4.37)	0.022	2.34 (1.18–4.63)	0.015*	1.79 (1.04–3.07)	0.034*	1.87 (1.09–3.21)	0.023*
Maternal education								
Tertiary [ref]	1.00	—	1.00	—	1.00	—	1.00	—
Secondary	1.18 (0.82–1.69)	0.376	1.21 (0.84–1.73)	0.310	1.19 (0.87–1.62)	0.278	1.22 (0.90–1.66)	0.197
Primary	1.29 (0.86–1.93)	0.220	1.31 (0.87–1.97)	0.191	1.38 (0.99–1.92)	0.059	1.41 (1.01–1.97)	0.045*
None	1.41 (0.88–2.27)	0.151	1.44 (0.89–2.33)	0.136	1.60 (1.10–2.33)	0.014*	1.64 (1.12–2.40)	0.011*
Age category								
Late (15–19 yrs) [ref]	1.00	—	1.00	—	1.00	—	1.00	—
Early (10–14 yrs)	1.07 (0.78–1.48)	0.667	1.09 (0.79–1.51)	0.590	1.08 (0.83–1.40)	0.571	1.10 (0.85–1.43)	0.480
Sex								
Female [ref]	1.00	—	1.00	—	1.00	—	1.00	—
Male	0.93 (0.70–1.22)	0.590	0.95 (0.72–1.25)	0.700	0.98 (0.79–1.22)	0.874	0.99 (0.80–1.23)	0.940

*Statistically significant at p < 0.05; PR = Prevalence Ratio; CI = Confidence Interval; Adj. = Adjusted; ref = reference category. Adjusted models simultaneously control for all variables in the table. Stunting is defined as HAZ < −2 SD; thinness as BAZ < −2 SD, per the WHO (2007) growth reference standards.

Discussion

This study examined the dietary practices, nutritional knowledge, and anthropometric status of in-school adolescents attending public secondary schools in Abeokuta North LGA, Ogun State, Nigeria, and quantified sociodemographic correlates of stunting and thinness using Poisson regression. The study shows 79.7% of older adolescents with a mean age of 15.67 ± 2.50 years. This age distribution is likely attributable to the study's focus on secondary schools, where enrolment is predominantly concentrated among adolescents aged 12 to 19 years. The observed skew toward older adolescents may reflect early-grade attrition, whereby younger students disengage from formal education before advancing to the higher classes from which the study sample was drawn, compounded by the natural grade progression inherent to a multi-year secondary schooling system. A comparable age distribution has been documented in other secondary school-based studies conducted in Southwest Nigeria (Oladosu et al., 2022; Abdussalaam et al., 2024), lending consistency to this finding across similar sampling contexts.

The pattern of early school attrition observed in this study reflects a broader and deeply concerning structural challenge within the Nigerian educational system. Dropout rates among adolescents in Nigeria remain alarmingly high and are insufficiently interrogated in the literature. A critical, yet underappreciated, driver of this phenomenon is the diminishing perceived return on formal education: as graduate unemployment rates continue to rise, many families and adolescents question the economic utility of completing secondary schooling. This disillusionment is further compounded by the observation that school leavers who acquire vocational and technical skills often achieve comparable or superior economic outcomes relative to formally educated graduates, thereby undermining the incentive to remain enrolled.

Most respondents reported consuming three meals daily, consistent with recommendations for regular meal patterns (Jung et al., 2017). However, meal skipping was common, particularly at lunchtime, plausibly attributable to school schedules and limited access to food during school hours. The high reported consumption of fried foods raises nutritional concerns, as frequent intake of fried foods is associated with elevated cardiometabolic risk (Guallar-Castillón et al., 2012). While fruit and vegetable consumption was commonly reported, daily intake frequency was low, suggesting a gap between reported dietary inclusion and consistent healthy behaviour that nutrition education could target. Given that 92% of respondents consumed home-prepared meals, the nutritional knowledge and food preparation practices of caregivers, most commonly mothers, but not assessed here, may be a more proximate determinant of adolescent dietary quality than the adolescents' own knowledge. The significant association between maternal education and thinness observed in adjusted analyses supports this hypothesis and warrants caregiver-focused assessment in future studies.

Most of these adolescents demonstrated low nutritional knowledge (80.3%), in contrast to findings from North-West Nigeria, where the majority had high nutritional knowledge (Mohammad & Jiya, 2024), and from Odeda LGA, where moderate knowledge predominated (Ademiluyi et al., 2025). The absence of a significant age gradient in nutritional knowledge may indicate inadequate or inconsistently

delivered nutrition education across secondary school years in this setting (Bakhtiar et al., 2021).

The present study was conducted in an urban area of Abeokuta, Ogun State, and identified a stunting prevalence of 36.0% among adolescent participants. This figure is considerably higher than estimates reported in some regional studies, yet broadly consistent with findings from comparable urban settings in Nigeria (Ogbonna et al., 2024; Ayogu et al., 2016). Ayogu et al. (2016) previously documented stunting and thinness prevalences of 33.3% and 31.0%, respectively, among adolescents in a Nigerian urban community, lending contextual support to the elevated burden observed in the present study.

Notably, Ademiluyi et al. (2025) reported a substantially lower stunting prevalence of 9.6% among public school adolescents in the rural community of Odeda, Ogun State. The marked discrepancy between these findings and those of the present study may be attributable to inherent differences in the study setting. The peri-urban context of Odeda may afford adolescents comparatively greater access to food resources and healthcare services relative to the more socioeconomically constrained urban environment examined in the present study. Additional sources of variation may include differences in the socioeconomic composition of the respective study populations, the sampling frames used, and the age ranges of enrolled participants. Conversely, the present findings are more closely aligned with those of Ogbonna et al. (2024), who documented a stunting prevalence of 40.2% among urban adolescents in South-Eastern Nigeria. This convergence suggests that a disproportionately high stunting burden may be a shared characteristic of certain urban and peri-urban Nigerian adolescent populations, potentially reflecting entrenched structural inequities in nutritional access, living conditions, and social determinants of health across geopolitical zones.

With respect to wasting, the combined prevalence of thinness and severe thinness of 80.0% recorded in the present study substantially exceeds estimates reported in comparable Nigerian adolescent populations. Ademiluyi et al. (2025) documented a thinness prevalence of 24.0%, while Adeomi et al. (2021) reported a considerably lower overall prevalence of 10.3%. The markedly elevated thinness burden observed in this study warrants careful and critical consideration. Several factors may account for these discrepancies, including variations in nutritional assessment methodologies, the anthropometric reference standards used, the socioeconomic profiles of study participants, and prevailing levels of household food insecurity in the study communities. Furthermore, it is plausible that seasonal fluctuations in food availability at the time of data collection disproportionately affected participants' nutritional status, thereby inflating estimates compared with studies conducted during periods of greater food accessibility. Collectively, these discrepancies underscore the considerable heterogeneity of adolescent undernutrition across Nigerian settings and reinforce the critical importance of contextual, structural, and temporal factors in shaping population-level nutritional outcomes.

The observed uniform distribution of adverse anthropometric outcomes across age categories and sex is particularly noteworthy, as it points to systemic rather than individual-level determinants of undernutrition in this population. This pattern is consistent with evidence synthesised in a national systematic review by Gabriel et al. (2024), which similarly implicated structural and environmental drivers as primary contributors to the persistent burden of adolescent undernutrition in Nigeria.

In adjusted Poisson regression analyses, large household size was independently associated with both stunting (adjusted PR = 2.34; p = 0.015) and thinness (adjusted PR = 1.87; p = 0.023), consistent with Assefa et al. (2015), who reported similar associations in Ethiopian adolescents. This likely reflects intra-household competition for limited food and caregiving resources in larger families. It is important to acknowledge, however, that in this low-income population — where 33.3% of households earn less than ₦10,000 monthly — household size and per capita income are likely to be collinear. Household size may therefore partly function as a proxy for per capita economic resources. Future studies should directly compute per capita household income to more precisely disentangle these variables.

Low maternal educational level was independently associated with elevated thinness prevalence (adjusted PR for no formal education vs. tertiary: 1.64; p = 0.011), consistent with evidence that maternal education shapes adolescent nutritional outcomes through improved nutritional knowledge, food selection practices, and household feeding behaviour (Adesina et al., 2012). Importantly, however, a recent study in Ebonyi State demonstrated that even adequate knowledge of maternal nutrition may be insufficient to improve outcomes when household food insecurity and resource constraints persist (Ogunniyi & Okoye, 2025), underscoring the need to address structural economic determinants alongside educational factors.

These findings are specific to adolescents attending public secondary schools in Abeokuta North LGA and should not be extrapolated beyond this context without further multi-site validation.

Study Limitations

Several limitations should be considered when interpreting these findings. First, the cross-sectional design precludes causal inference; the estimated prevalence ratios are measures of association at a single point in time and should not be interpreted as causal effects. Second, the study was conducted exclusively in public secondary schools within Abeokuta North LGA, thereby limiting the generalisability of the findings to adolescents in private schools, out-of-school youth, and adolescents in other geopolitical zones of Nigeria. Third, dietary habits were assessed using self-reported measures, which are subject to recall and social desirability biases. Importantly, inter-meal snacking behaviour was not systematically assessed, representing a gap in the dietary characterisation. Fourth, per capita household income was

not computed directly; household size may partially proxy for per capita economic resources, and these variables are likely collinear in this low-income setting, which may limit the independent interpretation of each variable's effect. Fifth, anthropometric data represent a single point-in-time measurement and may not capture the dynamic nature of adolescent growth. Sixth, data on physical activity levels, morbidity history, and dietary diversity scores, all potentially important confounders, were not collected. Finally, self-reported household income may underestimate true socioeconomic heterogeneity.

Conclusions

This study documents a substantial burden of poor dietary habits, low nutritional knowledge, and high prevalence of undernutrition among in-school adolescents attending public secondary schools in Abeokuta North LGA, Ogun State, Nigeria. Irregular meal patterns, high consumption of fried foods, and low daily fruit and vegetable intake characterise the dietary landscape. Low nutritional knowledge was widespread and not significantly moderated by age or sex. Stunting and thinness were prevalent at levels that substantially exceeded the nationally documented ranges. In adjusted analyses, large household size and low maternal educational level were independently associated with adverse anthropometric outcomes, pointing to the centrality of household structural and economic factors in shaping adolescent nutritional status. These findings are specific to this population and context. Future research using longitudinal and experimental designs is needed to evaluate the causal pathways linking household structural factors, dietary practices, and adolescent nutritional outcomes, and to test the effectiveness of targeted interventions.

Author Contributions

AMT, DDA and OOO contributed to the study design. Data collection tools were designed by AMT, DDA, and BTO. Initial analysis and coding were conducted by AMT, DDA, OMO, ARO and AEO. DDA, BTO, BIA, OMO, ARO and AEO wrote the first draft of the manuscript with routine critical reviews by OOO and DDA. All authors then critically reviewed the following versions. All authors have read and approved the final version of the paper and its submission and have given consent for publication.

Declaration of Generative AI and AI-Assisted Technologies in Scientific Writing

All intellectual content, study design, data analysis, interpretation of findings, and final decisions regarding the manuscript remain the sole responsibility of the authors. No AI tool was used for data generation, analysis, or fabrication of results

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Data Availability Statement

All relevant data are available within the manuscript

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Conflict of Interest

The authors declare that they have no conflicts of interest.

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