ORIGINAL ARTICLE

Dietary Patterns and Nutritional Status of School-Aged Children in Osogbo Local Government

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Keywords:
food consumption; nutritional status; school-aged children; malnutrition; nutrition education

Article history:
Received: 9 August 2025
Accepted: 21 January 2026

ABSTRACT

Background: Despite growing evidence of poor dietary intake and food insecurity among children in public primary schools, national nutrition efforts focus mainly on under-five children, leaving school-aged children underserved and increasingly vulnerable to malnutrition and its long-term health and learning consequences. This study assessed dietary patterns and nutritional status among school-aged children (5-10 years) in Osogbo Local Government, Osun State, Nigeria. **Methods:** A cross-sectional study was conducted among 393 public primary school pupils (175 boys and 218 girls). Dietary patterns were assessed using a structured food frequency questionnaire, while anthropometric measurements (weight and height) were obtained to determine nutritional status based on WHO growth standards. Associations between dietary patterns and nutritional status were examined. **Results:** Among the 393 pupils, 48.3% were underweight, 43.0% had normal weight, and 8.7% were overweight. Most children (90.6%) consumed home-packed meals and preferred rice, beans, and fish. The association between food consumption frequency and nutritional status was statistically significant and of moderate to strong magnitude (χ^2 = 66.2–110.8, p<0.001; Cramér's V =0.41–0.53). **Conclusion:** Undernutrition is highly prevalent among school-aged children in Osogbo, with 48.3% classified as underweight. Dietary patterns were significantly associated with nutritional status, highlighting the importance of improving diet quality and diversity among school-aged children.

INTRODUCTION

Malnutrition remains a persistent public health concern in many developing countries, driven by complex factors such as food insecurity, economic inequality, and limited access to nutrient-rich foods (Ilo et al., 2025). These challenges are particularly critical for school-aged children, who require adequate nutrition to support healthy growth, cognitive development, and academic performance (Asmare et al., 2018). Despite the importance of this age group, national nutrition programmes often focus primarily on children under five, leaving older children underserved and at increased risk of undernutrition. Growth monitoring in primary schools provides a useful tool for identifying nutritional problems early, yet data on dietary patterns and nutritional status among school-aged children in Osogbo remain limited.

Nutritional assessment, which includes measuring both undernutrition and overnutrition, is the standard way to evaluate children's health. In regions across Asia and Africa, undernutrition is especially widespread (Moseley & Battersby, 2020). Current UNICEF data indicate that among children and adolescents aged 5–19 years, the prevalence of underweight has declined to about 9.2%, while obesity has risen to approximately 9.4%, marking the first time obesity exceeds underweight worldwide (UNICEF, 2025). However, data on dietary patterns and nutritional status of school-aged children in Osogbo Local Government are limited, highlighting the need for this study.

In fact, almost half of all child deaths globally are linked to poor nutrition. National efforts have focused on undernutrition among under-five children, with recent reports indicating a 30% underweight prevalence in South-West Nigeria (Ogunniyi et al., 2023). However, less attention has been given to school-aged children, especially those in public schools, despite their increased vulnerability due to socio-economic challenges. Around 60% of child deaths from common illnesses like malaria or diarrhoea could have been prevented if those children had not lacked an adequate diet (undernutrition) to begin with (WHO,2016). Undernutrition is not the only form of malnutrition; overnutrition (excessive food intake) also contributes to malnutrition. Childhood obesity is rising globally — not just in wealthy nations, but also in low- and middle-income countries. It increases the risk of chronic diseases like heart conditions, diabetes, and hypertension later in life (Asmare et al. 2018; UNICEF, 2025).

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Childhood obesity and undernutrition are major public health challenges affecting school-aged children worldwide. Children who are overweight are more likely to remain obese into adulthood, with estimates suggesting that 40–60% of obese children carry the condition into their adult years (Umer, 2017). These trends have implications not only for individual health but also for healthcare systems and the global economy (Rito, 2021). Thus, early prevention of childhood obesity has become a critical goal for public health initiatives worldwide (Waters et al. 2018).

Nigeria's National Home-Grown School Feeding Programme (NHGSFP), reintroduced in 2016, aims to improve nutrition and school attendance by providing one nutritious meal per school day to pupils in public primary schools (World Bank, 2022). However, several studies have reported implementation challenges such as underfunding, irregular meal delivery, and inconsistent coverage across states (Onah & Onah, 2021; Agu et al., 2023). These gaps highlight the need to assess the dietary patterns and nutritional status of school-aged children in Osogbo Local Government, Osun State.

The study examined dietary patterns and nutritional status of school-aged children in public primary schools in Osogbo Local Government, Osun State, and explored the relationship between them.

MATERIALS AND METHODS

This study employed a cross-sectional, school-based design to examine the dietary patterns and nutritional status of school-aged children. Ten public primary schools were purposively selected from both urban and rural areas of Osogbo Local Government, Osun State, Nigeria, based on the approval and cooperation of local school authorities. The purposive selection of schools may limit generalizability beyond the study area.

Inclusion and Exclusion Criteria

The study included 393 school-aged children (5–10 years old) enrolled in public primary schools in Osogbo Local Government, Osun State, Nigeria. Participation was granted through parental consent. Children with chronic illnesses, physical disabilities, or acute illnesses at the time of measurement were excluded to ensure accurate assessment of nutritional status and dietary patterns.

Sample Size Determination

The sample size for this cross-sectional study was calculated using the formula for a single proportion as described by Leslie Kish (1965).

$$n = z2p(1-p)/d2 \quad (1)$$

Where,
n = Minimum desired sample size
z = the standard normal deviate usually set at 1.96, which corresponds to 5% significant level
p = prevalence of outcome of interest
d = degree of accuracy desired (precision), usually set at 5% (0.05)
p = 36.9% (Iheme, 2021)

$$n = \frac{(1.96)2 \times 0.369 \times (1 - 0.369)}{(0.05)2}$$

$$n = \frac{3.84 \times 0.369 \times 0.631}{0.0025}$$

$$n = \frac{0.894}{0.0025}$$

n = 357.6

10% of the value of n was added to replace the loss or incomplete questionnaires (10% of 357.6 = 35.76), therefore, 35.76+ 357.6 = 393.36, n = 393 (Approx.)

Data collection

Data collection was carried out using a structured questionnaire administered through oral interviews and anthropometric measurements conducted in a relaxed and conducive environment. The questionnaire was adapted from previously published school-based dietary surveys and pretested among pupils in a neighboring school. It comprised three sections: Section A addressed demographic and household information; Section B involved anthropometric measurements obtained following standard WHO procedures. A height meter (calibrated in centimeters) and a weighing scale (calibrated in kilograms and pounds) were used to obtain accurate physical measurements. Each measurement was taken twice, and the average value was recorded to minimize measurement error. Section C focused on dietary intake and food frequency. For pupils in lower primary classes (Primary One to Primary Four; approximately 5–8 years), the questionnaire was interviewer-administered, with responses recorded based on verbal reports. Where feasible, caregivers assisted in confirming habitual dietary intake for this age group. For pupils in Primary Five, who demonstrated sufficient literacy skills, responses were self-reported under the close supervision of the interviewer to ensure accuracy and engagement. This approach was adopted to encourage participation and minimize anxiety among the respondents. Data collectors were trained prior to the study on standardised measurement techniques and questionnaire

administration to ensure consistency and accuracy.

Data analysis

Data was analysed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize socio-demographic characteristics, dietary habits, and anthropometric indicators. Nutritional status (BMI-for-age) was computed using WHO AnthroPlus software based on the WHO 2007 growth reference standards.

Dietary habit scores were derived from six key behavioural indicators: number of meals consumed per day, preference for home-prepared meals, source of lunch, frequency of snack consumption, preference for protein sources, and consumption of sugary beverages. Each favourable dietary behaviour was assigned a score of 1, while unfavourable behaviours were assigned a score of 0, yielding a total possible score ranging from 0 to 6. Based on score distribution and commonly applied approaches in school-based dietary surveys, scores of 0–3 were categorised as poor dietary habits, while scores of 4–6 were categorised as good dietary habits. This classification was used solely to facilitate interpretation of overall dietary behaviour patterns.

Associations between dietary patterns and nutritional status categories (underweight, normal, and overweight) were examined using the chi-square (χ^2) test, and effect size was estimated using Cramér's V. Statistical significance was set at $p < 0.05$. Given that multiple chi-square tests were conducted across several food items, the risk of Type I error was addressed by adjusting p-values using the Benjamini–Hochberg false discovery rate procedure.

Ethical considerations

Ethical approval for the study was obtained from the Osun State University, College of Health Sciences Research Ethics Committee and parental consent was sought for learners to participate in the study and individual consent was obtained from learners. Consent was also sought from the head teachers of the conveniently sampled schools who served as the key gatekeepers. Participants did not receive any form of remuneration or incentives which could have influenced their participation.

Participation was voluntary and participants were free to withdraw from the study at any time without any negative consequences. All participant information was treated as confidential and anonymous as their only form of identification was a study code that was allocated to them. The contact details of the primary researcher and study supervisors were provided on both the written informed consent forms (for parents/legal guardians) and assent forms (for the pupils) in case additional information or clarification regarding the study was required.

RESULTS

Socio-Demographic Characteristics of the School-Aged Children in Osogbo Local Government

A total of 393 pupils participated in the study. Slightly more than half were girls, and the majority fell within the 7–10-year age group. Most respondents identified as Yoruba and practiced either Islam or Christianity. Household size was generally moderate, with most pupils living in families of four to six members. The occupational profile indicated that trading was the dominant source of livelihood for both fathers and mothers, while only a small proportion were civil servants or farmers (Table 1).

Table 1: Socio-demographic characteristics of the pupils (n=393)

Characteristics	Frequency	Percent
Gender		
Female	218	55.5
Male	175	44.5
Age group		
5-7	132	33.6
7-10	261	66.4
Ethnicity		
Yoruba	383	97.4
Igbo	7	1.7
Hausa	3	0.7
Religion		
Islam	218	55.4
Christianity	175	44.5
Family size		
Fathers		
Trading	300	76.3

Civil Servants	20	5.1
Farmer	10	2.5
Others	63	16.0
Mothers		
Trading	201	51.1
Civil Servants	33	8.4
Farmer	26	6.6
Others	133	33.8

Dietary Habits of the School-Aged Children in Osogbo Local Government

Most of the pupils reported eating three meals per day, with only a few consuming one or two meals daily. Nearly all children preferred homemade food, and the majority brought lunch from home rather than buying food in school. Snack consumption after school was also common among pupils. Meat was identified as the most preferred protein source, followed by egg and fish. Sugary beverages were widely consumed, with almost all respondents indicating intake. Overall, dietary habit scores showed that most pupils had poor dietary habits, with only about one-quarter demonstrating good dietary patterns (Table 2; Figure 1).

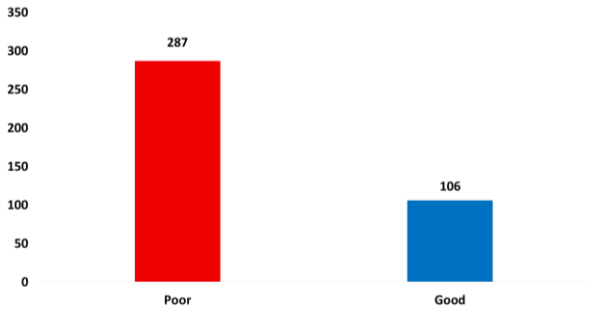

Figure 1: Dietary habit categories of respondents

Food Consumption Pattern of the School-Aged Children in Osogbo Local Government

Table 3 shows the food consumption patterns of the pupils. The majority regularly consumed staple foods such as rice (97.4%), beans (70%), and bread (74.5%). Spaghetti and Indomie were also commonly consumed, though to a slightly lesser extent. Fish were the most frequently consumed protein source (94.9%), while vegetables and fruits were consumed by about 70% and 52% of pupils, respectively. Cassava granules (garri) were consumed regularly by 60.3% of pupils. Overall, these results indicate a high consumption of staple and protein-rich foods, with lower intake of fruits, vegetables, and some carbohydrate alternatives.

Nutritional Status of the School-Aged Children in Osogbo Local Government

The anthropometric assessment of school-aged children (Table 4) revealed a high prevalence of undernutrition. Based on BMI-for-age percentiles (WHO growth standards), 48.3% of children were underweight (<5th percentile), 43.0% had normal weight (5th–85th percentile), and 8.7% were overweight (85th–95th percentile). The mean BMI-for-age was 15.8 ± 2.3 kg/m², indicating considerable variability within the population.

Table 2: Dietary Habits of the Pupils

Dietary Habits	Frequency	Percent
Home-made food preference		
Yes	393	100.0
No	0	0.0
Lunch source		
Buy at School	37	9.4
Bring Packed Lunch from Home	356	90.6
Snacks after school		
Yes	375	95.4
No	18	4.6
Meals per day		
Once	2	0.5
Twice	15	3.8
Thrice	376	95.7
Preferred source of protein		
Meat	250	63.6
Fish	70	17.8
Egg	73	18.5
Sugary beverages		
Yes	388	98.7
No	5	1.3

Table 3: Food Consumption pattern of the pupils (n (%))

Food	Always	Often	Sometimes	Rarely
Rice	383[97.45]	10[2.54]	0 (0.0)	0 (0.0)
Beans	275 [70]	75[19.1]	43[11]	0 (0.0)
Spaghetti	253L64.3]	90L23]	50[12.7]	0 (0.0)
Yam	200[50.8]	30[7.6]	150[38.1]	13[3.30]
Potatoes	200[50.8]	30[7.6]	150[38.1]	13[3.30]
Fish	373[94.9]	20[5.0]	0 (0.0)	0 (0.0)
Egg	312[79.4]	81[20.6]	0 (0.0)	0 (0.0)
Vegetables	278[70.7]	58[14.7]	58[14.7]	0 (0.0)
Garri	237[60.3]	70[17.8]	86[21.8]	0 (0.0)
Indomie	250[63.6]	63[16.03]	80[20.3]	0 (0.0)
Bread	293[74.5]	45[11.4]	55[13.9]	0 (0.0)
Fruits	205[52.1]	58[14.7	50[12.7	80[20.3
Cereals	136[34.6]	78[19.84]	59[15.0]	120[30.5]

Table 4: Anthropometry measurements of the pupils

Categories	Frequency	Percent
BMI		
Normal (5th – 85th percentile)	169	43.0
Overweight (85th – 95th percentile)	34	8.7
Underweight (Below 5th Percentile)	190	48.3
Mean ± SD = 15.8±2.3Kg/m²		

Table 5: Association between food consumption patterns and nutritional status of the pupils

Food	Consumption	Underweight n (%)	Normal n (%)	Overweight n (%)	χ^2	p
Rice	Frequent	190 (48.4)	169 (43.1)	34 (8.5)	38.52	<0.001
Beans	Frequent	157 (40.0)	161 (41.0)	32 (8.2)	17.32	<0.01
	Infrequent	33 (8.4)	8 (2.0)	2 (0.5)	—	—
Spaghetti	Frequent	170 (43.2)	149 (38.0)	24 (6.1)	62.78	<0.001
	Infrequent	20 (5.1)	20 (5.1)	10 (2.5)	—	—
Yam	Frequent	127 (32.3)	79 (20.1)	24 (6.1)	66.20	<0.001
	Infrequent	63 (16.0)	90 (22.9)	10 (2.5)	—	—
Potatoes	Frequent	127 (32.3)	79 (20.1)	24 (6.1)	66.20	<0.001
	Infrequent	63 (16.0)	90 (22.9)	10 (2.5)	—	—
Fish	Frequent	190 (48.4)	169 (43.1)	34 (8.5)	8.68	<0.05
Egg	Frequent	190 (48.9)	169 (43.0)	34 (8.1)	1.15	0.56
Vegetables	Frequent	190 (48.4)	169 (43.1)	34 (8.5)	8.68	<0.05
Garri	Frequent	170 (43.2)	142 (36.1)	24 (6.1)	42.94	<0.001
	Infrequent	40 (10.2)	27 (6.9)	10 (2.5)	—	—
Indomie	Frequent	165 (42.0)	110 (28.0)	32 (8.1)	87.45	<0.001
	Infrequent	50 (12.7)	74 (18.8)	2 (0.5)	—	—
Bread	Frequent	175 (44.5)	116 (29.5)	22 (5.6)	52.94	<0.001
	Infrequent	40 (10.2)	53 (13.5)	12 (3.1)	—	—
Fruits	Frequent	175 (44.5)	144 (36.5)	19 (4.8)	46.38	<0.001
	Infrequent	41 (10.4)	39 (9.9)	20 (5.1)	—	—
Cereals	Frequent	145 (36.9)	100 (25.4)	18 (4.6)	110.80	<0.001
	Infrequent	60 (15.3)	46 (11.8)	29 (7.4)	—	—

Values are presented as number (percentage). "Frequent" = Always + Often; "Infrequent" = Sometimes + Rarely.

Association between Dietary Patterns and Nutritional Status of the School-Aged Children in Osogbo Local Government

Table 5 shows the association between frequency of food consumption and nutritional status of the pupils. Significant associations of moderate to strong magnitude were observed between nutritional status and the consumption of rice ($\chi^2 = 38.52$, $p < 0.001$), beans ($\chi^2 = 17.32$, $p < 0.01$), spaghetti ($\chi^2 = 62.78$, $p < 0.001$), yam ($\chi^2 = 66.20$, $p < 0.001$), and potatoes ($\chi^2 = 66.20$, $p < 0.001$), with corresponding Cramér's V values ranging from 0.41 to 0.53. In each case, a higher proportion of pupils who frequently consumed these foods were classified as underweight or normal weight, with a smaller proportion being overweight.

Fish ($\chi^2 = 8.68$, $p < 0.05$) and vegetables ($\chi^2 = 8.68$, $p < 0.05$) also showed statistically significant associations with nutritional status, although the magnitude of association was comparatively lower. Egg consumption was not significantly associated with nutritional status ($\chi^2 = 1.15$, $p = 0.56$).

Further significant associations of moderate to strong effect size were observed for garri ($\chi^2 = 42.94$, $p < 0.001$), Indomie ($\chi^2 = 87.45$, $p < 0.001$), bread ($\chi^2 = 52.94$, $p < 0.001$), fruits ($\chi^2 = 46.38$, $p < 0.001$), and cereals ($\chi^2 = 110.80$, $p < 0.001$), with Cramér's V values within 0.41–0.53. Frequent consumption of these foods was more common among underweight pupils compared with overweight pupils.

After Benjamini–Hochberg false discovery rate correction, the association between consumption frequency of rice, beans, spaghetti, yam, potatoes, garri, Indomie, bread, and cereals remained statistically significant ($p<0.05$), while associations for fish and vegetables did not remain significant. Egg consumption showed no association with BMI.

DISCUSSION

This study examined dietary patterns and nutritional status among school-aged children in Osogbo Local Government and found a high prevalence of undernutrition, with 48.3% classified as underweight and 8.7% as overweight. These findings highlight nutritional challenges within this population and suggest the presence of multiple contributing factors.

Although most pupils reported eating three meals per day and nearly all snacks consumed regularly, this did not translate into optimal nutritional outcomes. These results align with a study which observed that frequent meal consumption in Ibadan did not necessarily ensure nutritional adequacy (Rasaki et al., 2022). In the present study, most pupils brought lunch from home, suggesting ongoing parental involvement. However, the reported meal composition suggests limited variety, which may reduce overall nutrient intake. School food environments, whether home-packed or purchased, influence dietary quality, emphasising the need for nutritious options across settings (Ogum-Alangea et al. 2020).

Food frequency data showed predominant consumption of carbohydrate-based staples, including rice, spaghetti, bread, Indomie, and garri. While many pupils reported consuming nutrient-rich foods such as fish, vegetables, and eggs, the relatively lower intake of fruits and cereals suggests limited dietary diversity. This pattern is consistent with earlier findings that children may rely heavily on affordable, filling staple foods while consuming nutrient-dense foods less consistently (Rasaki et al., 2022). The coexistence of frequent protein intake and high undernutrition may reflect factors not captured in the present study, such as portion size, energy density, food preparation methods, infection burden, or household food insecurity — all commonly associated with inadequate growth in children.

Associations between food consumption patterns and BMI were observed, with several food items showing statistically significant relationships of moderate to strong magnitude. Frequent consumption of energy-dense foods such as Indomie, spaghetti, and bread was significantly associated with BMI categories, whereas egg consumption showed no significant association. These findings suggest that variations in BMI may be related to combinations of foods rather than single items, and they may be influenced by broader dietary or environmental patterns. Similar studies have reported that limited dietary diversity, particularly when accompanied by processed food intake, is associated with suboptimal anthropometric outcomes, supporting the patterns observed here (Asakura et al., 2017; Asare et al., 2022). However, given the cross-sectional nature of the study, no causal inference can be drawn from these associations.

Almost all pupils reported regular consumption of snacks and sugar-containing foods or beverages. Although these were not evaluated quantitatively in the present study, high snacking frequency may displace nutrient-rich foods or increase overall energy imbalance, which could help explain the coexistence of underweight and overweight observed in the sample.

While socio-cultural and religious practices may play a role in shaping dietary choices, as reported by Jayasinghe et al. (2025), this study did not directly collect data on food taboos or restrictions. Therefore, such factors cannot be confirmed as explanatory contributors within the current sample. Instead, they remain potential considerations for future research.

Finally, the prevalence of undernutrition observed in this study is higher than that reported during the implementation of the National Home-Grown School Feeding Programme (Otunla et al., 2019). Although this comparison may indicate the potential role of structured nutrition-support programmes in improving child growth outcomes, the findings should be interpreted with caution Future longitudinal or comparative investigations are

warranted to clarify the impact of such interventions. Dietary intake data were obtained through pupil self-reports, an approach commonly employed in school-based surveys, which may not fully capture habitual intake patterns. Dietary diversity was assessed using consumption frequency, without quantification of portion sizes or nutrient composition. Inclusion of household-level dietary data, socio-economic indicators, and biochemical measures in future studies would enhance the robustness of evidence on the determinants of nutritional status.

CONCLUSION

This study demonstrates a substantial burden of undernutrition among school-aged children in Osogbo Local Government Area. Dietary patterns were associated with nutritional status, suggesting that overall diet quality may play a role alongside broader socio-economic and environmental factors. The findings underscore the importance of continued attention to the nutritional wellbeing of school-aged children through nutrition education, routine growth monitoring, and improved access to diverse, nutrient-rich foods. Further longitudinal studies are needed to clarify causal pathways and to examine the long-term implications of dietary patterns for health and learning outcomes.

ACKNOWLEDGEMENT

We acknowledge everyone who has contributed to the success of this research.

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