

Socio-demographic Factors Associated with Stunting Among Children Under Five in Nigeria: Evidence from the 2024 Nigeria Demographic and Health Survey

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ABSTRACT

Introduction: Nigeria continues to experience a substantial burden of stunting among children under five, with consequences that extend to long-term health outcomes, developmental capacity, and future productivity. The existence of these disparities underscores the need to further examine the association between social and demographic characteristics and the nutritional condition of children. Therefore, This study uses the most recent 2024 NDHS data to investigate the sociodemographic characteristics linked to stunting in Nigerian children under five.

Methods: This study employed a quantitative cross-sectional methodology, utilizing secondary data from the 2024 Nigeria Demographic and Health Survey (NDHS), a national survey that was conducted in all 36 states and the Federal Capital Territory of Nigeria. The study analyzed 9,321 under-five children with complete anthropometric and socio-demographic information. Stunting, defined as a height-for-age z-score that is less than -2 standard deviations from the median reference in accordance with the WHO Child Growth Standards, was examined in relation to child, maternal, and household characteristics as independent variables. Using standardized DHS procedures, the study gathered data that were subsequently analyzed through weighted univariate and bivariate analyses, as well as multivariate binary logistic regression. Adjustments for clustering and stratification were performed with Taylor linearization, and statistical significance was defined as a p-value of less than 0.05.

Results: The study found that 36.7% of children under five in Nigeria were stunted, with higher prevalence observed among older age groups, rural residents, children from low-educated and poorer households, and those in larger families. Bivariate analysis showed significant associations between stunting and children's age, place of residence, birth weight, maternal education, religion, parity, maternal occupation, number of under-five children, and household wealth. Multivariable analysis identified that older age (36–47 months: AOR=4.01, 95% CI 3.20–5.01), rural residence (AOR=1.19, 95% CI 1.06–1.33), low birth weight (AOR=2.27, 95% CI 1.47–3.51), higher parity, and having more under-five children in the household were associated with significantly higher odds of stunting, while higher maternal education (AOR=0.55, 95% CI 0.43–0.70) and higher household wealth (richest vs poorest: AOR=0.29, 95% CI 0.23–0.36) were associated with lower odds of stunting. Religion was statistically associated with stunting after adjustment for the included covariates, though residual confounding from unmeasured geographic, ethnic, and structural factors cannot be excluded. Among all variables examined, current breastfeeding (DHS variable v404) was the only factor that showed no statistically significant association with stunting.

Conclusion: Stunting among children under five in Nigeria is associated with child age, rural residence, low birth weight, maternal education, household socioeconomic status, parity, and the number of under-five children in the household, reflecting interconnected biological and socioeconomic associations. To address this issue, policy implications include targeted support for rural households, poorer households, mothers with low education, families with multiple under-five children, and children with low birth weight.

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INTRODUCTION

Stunting is still widely recognized as a major health burden in developing countries because it is closely associated with prolonged malnutrition and unfavorable socioeconomic circumstances experienced over time (1–3). Globally, an estimated 148 million children under the age of five are stunted, reflecting chronic undernutrition and longstanding exposure to adverse socioeconomic and environmental conditions (4,5). Nigeria is among the countries with the highest burden of stunting in Sub-Saharan Africa, contributing substantially to regional and global statistics (6). Despite national nutrition programs and global commitments to reduce child undernutrition, progress in Nigeria has been slower than expected, signaling the need to examine underlying factors that sustain this persistent challenge (7).

The prevalence of stunting in Nigeria varies considerably across regions, with the northern zones consistently showing significantly higher rates compared to the southern regions (8). These geographical disparities are closely linked to differences in poverty levels, food insecurity, maternal literacy, cultural customs and the availability of basic medical care (9,10). Several structural challenges, including inadequate water, sanitation, and hygiene (WASH) facilities, limited access to quality maternal and child healthcare, and recurring socio-political instability, further exacerbate the risk of chronic nutritional deficiencies among young children (11,12). These contextual differences highlight the importance of assessing determinants of stunting within the socio-demographic profile of Nigerian households (13,14).

Socio-demographic characteristics have long been recognized as crucial determinants of nutritional outcomes in early childhood (15). Maternal education, for instance, influences health literacy, feeding practices, and the uptake of preventive health services such as immunization and growth monitoring (16,17). Household socioeconomic status dictates the affordability of nutritious foods, access to healthcare, and the ability to provide a safe living environment (18). Similarly, parental employment status shapes income stability and food security within households. Evidence also shows that children from larger families may be at greater risk of stunting due to reduced per-child allocation of food and parental attention (19). These socio-demographic factors interact in complex ways to shape child growth trajectories, especially within fragile health and social systems.

In addition to household characteristics, child-level factors such as age, sex, birth order, and breastfeeding patterns also contribute to disparities in stunting (20,21). Younger children are especially at risk because of the demands of rapid growth, and boys have been reported in several studies to exhibit a slightly higher risk of stunting than girls (22). Moreover, children in rural communities often face greater exposure to food insecurity, inadequate sanitation, and limited healthcare availability, further compounding nutritional vulnerabilities (23). Understanding these child-level and environmental factors is essential, as they illuminate pathways through which socio-demographic conditions translate into chronic nutritional deficits.

In light of these complexities, further research grounded in strong empirical evidence is urgently required to examine socio-demographic factors associated with stunting among children under five in Nigeria. Although previous studies using earlier DHS rounds have documented Relationships between stunting and factors such as maternal education, household economic status, and rural place of residence, the persistence of these gradients in the post-pandemic period and after recent macroeconomic instability remains insufficiently characterized. The novelty of this analysis therefore lies in providing the first nationally representative update using the 2024 NDHS, jointly assessing child-level, maternal, and household determinants within a single model, and interpreting the persistence of socio-economic gradients in light of the most recent national evidence. Such evidence is critical for informing targeted nutrition policies and interventions tailored to the country's diverse socio-cultural and economic contexts. By examining the interplay of maternal, household, and child-level characteristics, researchers and policymakers can better understand where to prioritize resources and how to design interventions capable of reducing child undernutrition. Therefore, the objective of this study is to assess the relationship between socio-demographic factors and stunting among Nigerian children under the age of five, providing insights that can guide strategic planning for child health and nutrition improvement.

METHOD

Research Type

This research employed a quantitative cross-sectional design and looked at secondary data from the Nigeria Demographic and Health Survey (NDHS) conducted in 2024, which is a national household survey that gathers information on people's characteristics, health status, and nutrition levels across the country.

Population and Sample/Informants

The target population of the original survey of NDHS consisted of all individuals residing in Nigerian households during the 2024 NDHS enumeration period. A two-stage stratified cluster sampling approach was applied in the survey. During the first sampling stage, 1,400 enumeration areas (EAs) were selected through probability proportional to size, followed by the selection of 30 households from each EA in the second stage., producing an overall sample of about 42,000 households. Among the 41,115 households selected, 40,047 participated in the survey, corresponding to a 99% response rate. The study included women between the ages of 15 and 49 and men between the ages of 15 and 59, with response rates of 99% and 98%, respectively. For this current study, the analytical sample was derived from children aged under five years with complete anthropometric, socio-demographic, and household information. After excluding observations with missing anthropometric measurements, missing covariates, and biologically implausible height-for-age z-scores ($HAZ < -6$ or $HAZ > +6$ SD), a total of 9,321 children who were five years old or younger were part of this study.

Research Location

The study covers all 36 states in Nigeria along with the Federal Capital Territory (FCT), which includes both city areas and countryside regions. The NDHS 2024 provides comprehensive data across national, regional, state, and urban–rural levels to ensure adequate representation of all areas within the country.

Instrumentation or Tools

The child under five years old served as the study's unit of analysis. From the national dataset, all eligible records with complete anthropometric information were included ($n = 9,321$), focusing on children aged 0–59 months along with their corresponding household and maternal characteristics. The outcome variable was stunting status, categorized as either stunted or not stunted. It was determined using the WHO Child Growth Standards through the standardized height-for-age z-score (HAZ) contained in the DHS dataset. Children are classified as stunted when their height-for-age z-score (HAZ) falls below -2 standard deviations from the WHO reference median, while values at or above -2 SD were classified as non-stunted. In line with WHO and DHS guidelines, biologically implausible HAZ values (< -6 SD or $> +6$ SD) were excluded from the dataset. The independent variables included children, mother, and household's factors. For children characteristics, there were age group (in interval of months), current breastfeeding status derived from the DHS variable v404 (yes/no), recognizing that this captures whether the child was being breastfed at the time of survey rather than lifetime breastfeeding exposure and low birth weight (yes $< 2,500$ g / no $\geq 2,500$ g / birth weight not recorded). For mother characteristics, there were education level (not educated/ primary/ secondary/ and higher), religion (Catholic/ Other Christian/ Islam/ Traditionalist/ others), number of children ever born (CEB) (1-4 children/ 5-17 children), marital status (never in union/ currently in union/ formerly in union), occupation (not employed, professional, sales, agriculture, services, or unknown). The household's characteristics included place of residence (rural/ urban), number of children under five years in the households (1-2 children/ 3-10 children), and wealth index (poorest/ poorer/ middle/ richer/ and richest).

Data Collection Procedures

The data were gathered between December 2023 and May 2024 using in-person interview methods with Computer-Assisted Personal Interviewing (CAPI) systems. Four standardized DHS questionnaires—covering households, women, men, and biomarkers—were used to obtain Detailed information related to reproductive patterns as well as maternal and child health outcomes, nutrition, water and sanitation, family planning practices, domestic violence, and HIV-related knowledge, as well as other health indicators. Anthropometric and biomarker measurements were collected following DHS protocols. The analysis applied sampling weights to adjust for

variations in selection probability and non-response. Variance was estimated using Taylor linearization, while data quality was maintained through real-time electronic monitoring, regular field supervision, and additional re-screening visits.

Data Analysis

All analyses were performed using Stata version 17 with the svyset command to declare the DHS complex survey design (cluster: v021; strata: v022; weight: v005/1,000,000), and analyses applied univariate, bivariate, and multivariate methods. Univariate analysis summarized socio-demographic distributions, bivariate analysis using design-based Pearson chi-square tests assessed crude associations with stunting, and multivariate binary logistic regression was used to estimate adjusted associations between socio-demographic variables and stunting status, with all covariates entered simultaneously based on a conceptual framework of child, maternal, and household determinants. The presence of multicollinearity was evaluated using variance inflation factor (VIF) values, where values below 5 indicated acceptable levels. The model’s goodness of fit was evaluated using the Archer–Lemeshow test for survey data, and statistical significance was set at $p < 0.05$.

Ethical Approval

This research is based on secondary data from the Nigeria Demographic and Health Survey (DHS), with dataset access subject to official approval from the DHS Program, which was obtained through the official data request platform at <https://dhsprogram.com/data/>.

RESULTS

The characteristics of the respondents are summarized in Table 1. Among the 9,321 study participants, 36.7% children under five in the results research had stunting. Children were relatively evenly distributed across age groups, with the highest proportion in the 0–11-month group (21.5%). Over half of the children (57.4%) were living in rural settings. Only 25.3% had a history of breastfeeding, and birth weight data were not recorded for 43.7%. Maternal education levels varied, with 38.2% attaining secondary education and 37.0% reporting no formal education. Most mothers adhered to Islam (53.7%) and were currently in a union (94.9%). The majority had 1–4 children (65.8%) and were employed in sales (38.0%) or not working (32.5%). Most households had one or two under-five children (69.0%), and wealth distribution was relatively balanced across quintiles.

Table 1. Socio-demographic characteristics of children under five included in the analysis, NDHS 2024

Independent variables (n=9321)	Frequency	Percentage
Stunted		
No	5,899	63.29
Yes	3,422	36.71
Children's age (months)		
0–11	2,007	21.53
12–23	1,919	20.59
24–35	1,758	18.86
36–47	1,790	19.20
48–59	1,847	19.82
Place of residence		
Urban	3,971	42.60
Rural	5,350	57.40
Current breastfeeding		
Yes	2,354	25.25
No	6,967	74.75
Low birth weight		
No	5,126	54.99
Yes	123	1.32
Birth weight not recorded	4,072	43.69

Mother's education		
No education	3,448	36.99
Primary	1,138	12.21
Secondary	3,558	38.17
Higher	1,177	12.63
Religion		
Catholic	1,048	11.24
Other christian	3,204	34.37
Islam	5,009	53.74
Traditionalist	57	0.61
Other	3	0.03
Children ever born (CEB)		
1 - 4 children	6,135	65.82
5 - 17 children	3,186	34.18
Marital status		
Never in union	183	1.96
Currently in union/living with a man	8,850	94.95
Formerly in union/living with a man	288	3.09
Mother's occupation		
Not working	3,032	32.53
Professional/technical/managerial	630	6.76
Sales	3,537	37.95
Agricultural - self employed	1,131	12.13
Services	590	6.33
Don't know	401	4.30
Number of CU5 in HH		
1 - 2 children	6,435	69.04
3 - 10 children	2,886	30.96
Wealth index		
Poorest	2,027	21.75
Poorer	1,702	18.26
Middle	1,824	19.57
Richer	2,058	22.08
Richest	1,710	18.35

Note: CU5 (children under five years old). All reported frequencies and percentages are survey-weighted using DHS sampling weights (v005/1,000,000), with variance estimation by Taylor's linearization accounting for cluster (v021) and strata (v022).

The bivariate findings showed significant links between stunting and most socio-demographic factors. Stunting was most common in children who were between 24 and 35 months old, and also in those who were between 36 and 47 months old. (43.7% and 44.2%), while the lowest rate occurred in children aged 0–11 months (22.5%) ($p < 0.001$). It was also more common in rural areas (44.4%) than in urban areas (26.3%) ($p < 0.001$). The baby's weight

at birth was strongly linked to being short for their age in the initial analysis. ($p < 0.001$); children whose birth weight was not recorded showed the highest stunting prevalence (40.7%), while prevalence among children with normal birth weight (34.0%) and low birth weight (31.7%) was similar in the unadjusted comparison, with the multivariable model later revealing a stronger association for low birth weight after adjustment. Maternal education demonstrated a strong gradient, Stunting was most common among children born to mothers without education (54%), while the lowest proportion was observed among those whose mothers had attained higher education (13.4%) ($p < 0.001$). Stunting was more common among children of Islamic and traditionalist households (49.2% and 47.4%) than among Christian groups ($p < 0.001$). High parity (5–17 children) was associated with increased stunting (44.6%) ($p < 0.001$), as was having more children under five in the household ($p < 0.001$). Maternal occupation also showed significant variation, The highest proportion of stunting was observed among children of unemployed mothers (45%), whereas the lowest proportion was found among children whose mothers worked in professional or managerial roles (20.9%) ($p < 0.001$). The wealth index exhibited a strong socioeconomic gradient, with stunting highest among the poorest (54.8%) and decreasing steadily across wealth quintiles to only 13.3% among the richest ($p < 0.001$). Current breastfeeding (DHS variable v404) was the only variable not significantly associated with stunting ($p = 0.368$).

Table 2. Bivariate association between socio-demographic factors and stunting among children under five, NDHS 2024

Independent variables	Stunted		Total	Chi-2 value	p-value
	No (%)	Yes (%)			
Children's age (months)				260.3009	<0.001
0–11	77.53	22.47	2,007		
12–23	60.92	39.08	1,919		
24–35	56.31	43.69	1,758		
36–47	55.81	44.19	1,790		
48–59	64.16	35.84	1,847		
Place of residence				320.3213	<0.001
Urban	73.66	26.34	3,971		
Rural	55.59	44.41	5,350		
Current breastfeeding				0.812	0.368
Yes	64.06	35.94	2,354		
No	63.03	36.97	6,967		
Low birth weight				49.4906	<0.001
No	66.33	34	5,126		
Yes	68.29	31.71	123		
Birth weight not recorded	59.31	40.69	4,072		
Mother's education				845.5514	<0.001
No education	46	54	3,448		
Primary	63.09	36.91	1,138		
Secondary	72.4	27.6	3,558		
Higher	86.58	13.42	1,177		
Religion				740.5167	<0.001
Catholic	79.58	20.42	1,048		
Other christian	77.62	22.38	3,204		
Islam	50.83	49.17	5,009		

Traditionalist	52.63	47.37	57		
Other	66.67	33.33	3		
Children ever born (CEB)				129.6457	<0.001
1 - 4 children	67.38	32.62	6,135		
5 - 17 children	55.4	44.6	3,186		
Marital status				11.5478	0.003
Never in union	73.22	26.78	183		
Currently in union/living with a man	62.92	37.08	8,850		
Formerly in union/living with a man	68.4	31.6	288		
Mother's occupation				187.5688	<0.001
Not working	55.01	44.99	3,032		
Professional/technical/managerial	79.05	20.95	630		
Sales	66.07	33.93	3,537		
Agricultural - self employed	62.25	37.75	1,131		
Services	70.51	29.49	590		
Don't know	68.83	31.17	401		
Number of CU5 in HH				57.0195	<0.001
1 - 2 children	65.81	34.19	6,435		
3 - 10 children	57.66	42.34	2,886		
Wealth index				853.359	<0.001
Poorest	45.24	54.76	2,027		
Poorer	51.65	48.35	1,702		
Middle	62.55	37.45	1,824		
Richer	71.87	28.13	2,058		
Richest	86.73	13.27	1,710		

Note: CU5 (children under five years old). All reported frequencies and percentages are survey-weighted using DHS sampling weights (v005/1,000,000), with variance estimation by Taylor's linearization accounting for cluster (v021) and strata (v022).

Several independent variables were found using multivariable logistic regression linked to stunting in Nigerian children under five. The odds of stunting were significantly higher in the 12–23 month group (AOR = 2.63; 95% CI 2.26–3.05; $p < 0.001$), followed by the 24–35 month group (AOR = 3.62; 95% CI 3.11–4.22; $p < 0.001$), the 36–47 month group (AOR = 4.01; 95% CI 3.20–5.01; $p < 0.001$), and the 48–59 month group (AOR = 2.76; 95% CI 2.20–3.47; $p < 0.001$). Stunting was also more common in children who lived in rural regions (AOR = 1.19; 95% CI 1.06–1.33; $p = 0.003$). After correction, low birth weight was linked to significantly greater chances of stunting (AOR = 2.27; 95% CI 1.47–3.51; $p < 0.001$), even though the crude bivariate comparison did not show this gradient—suggesting a suppression effect once child age, maternal characteristics, and household wealth are accounted for; the small low-birth-weight cell ($n = 123$) means the estimate should be interpreted with appropriate caution. Children whose birth weight was not recorded did not differ significantly from those with normal birth weight after adjustment. The likelihood of stunting was reduced among children whose mothers had completed primary education (AOR = 0.83; 95% CI: 0.71–0.98; $p = 0.024$) or higher education (AOR = 0.55; 95% CI: 0.43–0.70; $p < 0.001$) education had decreased risks of stunting. Stunting was nevertheless significantly correlated with religion, with greater risks among

children of Islamic (AOR = 2.64; 95% CI 2.20–3.18; $p < 0.001$) and other Christian (AOR = 1.20; 95% CI 1.00–1.44; $p = 0.046$), and traditionalist households (AOR = 2.19; 95% CI 1.24–3.86; $p = 0.007$) compared with Catholic households; given the strong intersection of religion with geopolitical zone, ethnicity, and structural inequality in Nigeria, this coefficient is best read as a socio-contextual marker rather than a direct religious effect. The very small “Other” religion category ($n = 3$) produced an unstable estimate and is not interpreted substantively. Increased parity and a higher number of children under five living in the household were both associated with increased odds of stunting (AOR = 1.13; 95% CI 1.02–1.25; $p = 0.022$ and $p = 0.018$, respectively). Maternal employment in sales occupations was associated with reduced odds of stunting compared to non-employment (AOR = 0.83; 95% CI 0.74–0.93; $p = 0.001$). Furthermore, a clear dose–response socioeconomic gradient was observed, with progressively lower odds of stunting among children from middle (AOR = 0.71), richer (AOR = 0.56), and richest households (AOR = 0.29) compared with the poorest category.

Table 3. Multivariable logistic regression of factors associated with stunting among children under five, NDHS 2024

Independent variables	Adj Odd Ratio	Conf interval (lower - upper)		p-value
Children's age (months)				
0–11	ref			
12–23	2.63	2.26	3.05	<0.001
24–35	3.62	3.11	4.22	<0.001
36–47	4.01	3.20	5.01	<0.001
48–59	2.76	2.20	3.47	<0.001
Place of residence				
Urban	ref			
Rural	1.19	1.06	1.33	0.003
Current breastfeeding				
Yes	ref			
No	1.14	0.99	1.32	0.062
Low birth weight				
No	ref			
Yes	2.27	1.47	3.51	<0.001
Birth weight not recorded	1.14	0.96	1.35	0.142
Mother's education				
No education	ref			
Primary	0.83	0.71	0.98	0.024
Secondary	0.89	0.77	1.03	0.128
Higher	0.55	0.43	0.70	<0.001
Religion				
Catholic	ref			
Other christian	1.20	1.00	1.44	0.046
Islam	2.64	2.20	3.18	<0.001
Traditionalist	2.19	1.24	3.86	0.007
Other	1.87	0.15	22.73	0.622
Children ever born (CEB)				

1 - 4 children	ref			
5 - 17 children	1.13	1.02	1.25	0.022
Marital status				
Never in union	ref			
Currently in union/living with a man	0.83	0.58	1.18	0.289
Formerly in union/living with a man	0.68	0.44	1.06	0.089
Mother's occupation				
Not working	ref			
Professional/technical/managerial	0.97	0.77	1.22	0.800
Sales	0.83	0.74	0.93	0.001
Agricultural - self employed	0.86	0.73	1.01	0.065
Services	0.92	0.74	1.14	0.452
Don't know	0.86	0.67	1.10	0.216
Number of CU5 in HH				
1 - 2 children	ref			
3 - 10 children	1.13	1.02	1.25	0.018
Wealth index				
Poorest	ref			
Poorer	0.93	0.81	1.07	0.301
Middle	0.71	0.61	0.82	<0.001
Richer	0.56	0.47	0.67	<0.001
Richest	0.29	0.23	0.36	<0.001

Note: CU5 (children under five years old). All reported frequencies and percentages are survey-weighted using DHS sampling weights (v005/1,000,000), with variance estimation by Taylor's linearization accounting for cluster (v021) and strata (v022).

DISCUSSION

Stunting in Nigerian children under five seems to be influenced by both demographic and socioeconomic factors, reflecting the idea that undernutrition arises from biological risks as well as structural inequalities. Higher stunting risk among older children, those living in rural areas, low birth weight infants, and children from larger households points to limited access to adequate nutrition and health services as children grow. On the other hand, higher maternal education and greater household wealth are associated with lower odds of stunting, highlighting the importance of parental knowledge, capacity, and financial resources for child growth. The statistical association between religion and In the Nigerian setting, stunting should be viewed cautiously, religious affiliation intersects strongly with geopolitical zone, ethnicity, household wealth, female education, settlement patterns, and access to health services. Because these structural variables were not all included in the model, the religion coefficient likely captures residual confounding from unmeasured geographic and socio-contextual factors rather than a direct religious effect. Similarly, the non-significant finding for breastfeeding should be interpreted in light of the variable's operational definition (current breastfeeding), which is heavily influenced by child age and therefore should not be read as evidence that breastfeeding is irrelevant to stunting.

These findings are strongly consistent with a wide body of literature from sub-Saharan Africa and other nations with poor and moderate incomes. Numerous studies in Ethiopia, Kenya, Uganda, and Ghana report that older

children (especially those above 24 months) have a greater chance of stunting as a result of long-term dietary deficiencies and increased infection exposure (24–28). The strong association between rural residence and stunting mirrors previous evidence showing that rural communities often face limited availability of healthcare services, poorer dietary diversity, lower maternal education, and higher levels of household food insecurity. The impact of low birth weight on stunting also aligns with global findings indicating that intrauterine growth restriction remains a major predictor of chronic undernutrition, particularly in settings with inadequate maternal nutrition and limited antenatal care (29). Importantly, the protective effect of maternal education echoes decades of research demonstrating Educated mothers tend to be better positioned to implement appropriate child feeding practices, seek health services, and maintain healthier hygiene and sanitation routines. (30,31). Likewise, the strong gradient between wealth status and reduced stunting risk reflects a well-established pattern in nutritional epidemiology, where poverty limits access to diverse foods, clean water, sanitation, and timely medical care (32,33). Studies on family size and parity similarly confirm that households with more children face resource constraints that reduce the availability of adequate nutrition and caregiving capacity (34,35). Collectively, the consistency of these results with regional and global studies reinforces the robustness of the observed associations and underscores the structural nature of child undernutrition in Nigeria.

Despite the strength of the findings, several limitations warrant caution. The use of a cross-sectional design limits the ability to infer causality, and reliance on self-reported data may result in recall bias. The substantial proportion of missing birth weight data also introduces measurement uncertainty, potentially underestimating or misclassifying risk. Additionally, unmeasured confounding factors such as cultural feeding practices, food insecurity patterns, or regional health system disparities may affect the observed associations. Important variables not included in the model—such as geopolitical zone, ethnicity, dietary diversity, food security, WASH conditions, recent illness, and access to health services—may produce residual confounding, particularly for the religion and rural-residence coefficients. The high proportion of missing birth-weight records (43.7%) is unlikely to be missing completely at random, since it probably reflects place of delivery, household poverty, and access to facility-based care; sensitivity analyses excluding this category could strengthen confidence in the estimates. Because stunting prevalence is high (36.7%), the reported odds ratios may overstate relative risk, and the results narrative should be read with this in mind. Strengths of the study include the use of nationally representative 2024 NDHS data, full coverage of the 36 states and FCT, the large analytic sample, and the application of survey weighting.

Longitudinal designs should be used in future studies to better understand the relationships between sociodemographic characteristics and child growth outcomes throughout time. Studies examining cultural, environmental, and behavioral determinants of feeding practices would provide deeper contextual understanding, while evaluations of targeted nutrition and maternal education interventions could generate actionable evidence for policymakers seeking to reduce stunting in high-risk populations.

CONCLUSION

In conclusion, stunting is still a major public health concern in Nigeria among children under five, particularly among older children, rural populations, low birth weight infants, and those from disadvantaged and less educated households. Higher maternal education and better household economic status are linked to lower odds of stunting, while higher parity and more under-five children in the household are associated with increased odds. The 2024 NDHS evidence indicates that socioeconomic inequality and household resource constraints remain centrally associated with child stunting. Owing to the cross-sectional nature of the observational data, the results demonstrate associations only and do not establish causal effects. Evidence-informed policy implications include targeted nutrition support, social protection for rural and poor households, expansion of maternal education, and antenatal-care strategies addressing low birth weight, which together may help reduce stunting among the high-risk groups identified.

AUTHOR'S CONTRIBUTION STATEMENT

S.N. formulated the study concept, conducted the secondary data review, contributed to the technical analysis of the small-scale incinerator, and prepared the initial manuscript draft. W.H.C. refined the methodology, assisted in data interpretation, and provided critical revisions. E.F. validated the relevance of the secondary data to the

community service context and reviewed the manuscript for technical accuracy. All authors approved the final version of the manuscript.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest regarding the research, authorship, or publication of this article. The authors have no financial or personal relationships with any organizations or individuals that could inappropriately influence or bias the content of the manuscript.

DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

This manuscript involved the use of ChatGPT to assist in improving language clarity, writing structure, and overall readability.

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