Wah Academia Journal of Social Sciences
Volume 4, Issue 1, Jun 2025, pp. 118-133
ISSN – E 2958-8731 P 2958-8723
https://doi.org/10.63954/WAJSS.4.1.8.2025

An Assessment of The Impact of Socio-Economic Factors on Stunted Growth Among Under-Five Children in Kaduna State, Nigeria

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Abstract

This study aimed to comprehensively assess the socioeconomic factors influencing stunted growth among under-five children in Kaduna State, Nigeria. It employed a mixed-method approach, including a cross-sectional survey of 384 mothers and in-depth interviews with community leaders and healthcare providers. The study identifies household income, employment status, and healthcare access as primary determinants of child nutrition. Limited financial resources and food insecurity significantly contribute to stunting prevalence. These findings underscore the need for targeted economic support and improved healthcare access to mitigate stunting in Kaduna State. The 19% unemployment rate and 21.7% part-time employment further compounded economic constraints. Access to healthcare was rated as "fair" or below by 66.7% of respondents. Maternal education and family structure also emerged as significant factors. While 65.2% had secondary or tertiary education, 24.4% had primary education or no formal schooling. Over one-third of households had single parents, widowed, or separated caregivers. Knowledge and ability to provide balanced diets were rated as "fair" or below by 58.2% and 58.7% of respondents, respectively. The complex interplay of these socioeconomic, environmental, and cultural factors highlights the need for multi-pronged interventions. Recommendations include financial assistance programs, water and sanitation infrastructure improvements, targeted nutrition education, and healthcare system strengthening. Addressing the root causes of child stunting in Kaduna State is crucial for improving long-term health, cognitive development, and economic outcomes.

Keywords: stunted growth, socioeconomic factors, under-five children, Kaduna State, Nigeria

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Introduction

Stunted growth and development in children under five years remains a critical global health challenge with profound implications for human development. The World Health Organization (WHO, 2021) defines stunting as having a height-for-age measurement more than two standard deviations below the WHO Child Growth Standards median, affecting both physical growth and cognitive development.

Globally, stunting affected approximately 149 million children under five in 2020, representing 22% of this age group worldwide (UNICEF et al., 2021). Despite progress in reducing global stunting rates from 33% in 2000 to 22% in 2020, this improvement falls short of the World Health Assembly's target of a 40% reduction by 2025 (WHO, 2021). The burden predominantly affects low- and middle-income countries, with South Asia and sub-Saharan Africa accounting for over half of all cases globally.

Africa faces particularly severe challenges, with stunted children increasing from 50.3 million in 2000 to 61.4 million in 2020 due to population growth (UNICEF et al., 2021). The continent's 30.7% prevalence rate in 2020 significantly exceeds the global average, with regional variations ranging from 34.5% in Eastern Africa to 23.3% in Southern Africa (UNICEF et al., 2021). This high prevalence stems from factors including poverty, food crises, political instability, and inadequate healthcare systems (Akombi et al., 2017).

In Nigeria, the situation is particularly concerning, with the 2018 Nigeria Demographic and Health Survey (NDHS) reporting 37% of children under five as stunted, including 19% severely stunted (National Population Commission [Nigeria] and ICF, 2019). The country's challenges are compounded by widespread poverty, affecting 40% of the population (World Bank, 2021), and significant regional disparities in stunting rates between northern and southern states (Akombi et al., 2019).

Several key social determinants influence stunting in Nigeria. Maternal education plays a crucial role, with children of uneducated mothers showing twice the likelihood of stunting (49%) compared to those whose mothers have higher education (18%) (National Population Commission [Nigeria] and ICF, 2019). Healthcare access remains limited, with only 42% of births occurring in health

facilities. Water, sanitation, and hygiene (WASH) conditions are also inadequate, with only 39% of households having basic sanitation and 71% having basic water access (Cumming and Cairncross, 2016).

Kaduna State presents an even more challenging scenario, with stunting prevalence at 48.1% among under-five children, significantly exceeding the national average (National Population Commission [Nigeria] and ICF, 2019). The state's population of over 8 million faces diverse challenges across urban and rural settings (National Bureau of Statistics, 2017). The implications are severe, with stunted children facing increased mortality risks, reduced cognitive and physical capabilities, and poorer educational performance (Prendergast and Humphrey, 2014). Long-term economic consequences include an estimated 20% reduction in adult earnings (Hoddinott et al., 2013), while the intergenerational nature of stunting perpetuates poor health outcomes across generations (Prendergast et al., 2014).

Multiple factors contribute to stunting in Kaduna State. Poverty affects 43.5% of the population (National Bureau of Statistics, 2019), while food insecurity impacts 70.8% of rural households (Ahmadu et al., 2017). Healthcare access is limited, with only 43.8% of births occurring in health facilities and 31.1% of children fully vaccinated. WASH conditions remain inadequate, with just 54.5% of households having access to basic drinking water and 49.9% to basic sanitation facilities (National Population Commission [Nigeria] and ICF, 2019).

The state also faces significant challenges in maternal education, with 39.3% of women having no formal education. Cultural norms, including low exclusive breastfeeding rates (19.7%), and gender inequality further complicate efforts to address stunting (Kaduna State Government, 2020). These factors create a complex web of challenges that require comprehensive understanding and targeted interventions.

While national studies have identified key risk factors for stunting, localized studies in Kaduna State remain limited. The unique socio-economic and cultural landscape necessitates an in-depth investigation of the determinants of child stunting in this region. Most research on stunting in Nigeria has focused on national-level data, leaving a notable gap in understanding the unique combination of factors driving stunting in Kaduna State. Furthermore, the most recent comprehensive data from the 2018 NDHS may not reflect current patterns and determinants.

This study aims to address these knowledge gaps by providing a comprehensive assessment of the social determinants of stunted growth and development among under-five children in Kaduna State. By examining the relative importance and interactions of various determinants, this research seeks to inform targeted interventions and policy development. The findings will contribute to a more nuanced understanding of stunting in Kaduna State and provide valuable insights for policymakers, healthcare providers, and community leaders working to improve child health outcomes in the region.

Review of the Literature

Recent studies have extensively examined the relationship between socio-demographic characteristics and under-five stunting in Kaduna State, Nigeria. Multiple researchers have identified maternal education as a crucial factor, with studies consistently showing that children born to mothers with higher education levels are less likely to experience stunting (Ibrahim et al., 2012; Adekanmbi et al., 2017; Adeyemi et al., 2019). This relationship appears to be influenced by educated mothers' better understanding of childcare practices, hygiene habits, and dietary choices.

Household income and economic status have emerged as significant determinants of stunting prevalence. Studies indicate that children from lower-income households face a higher risk of stunting compared to those from wealthier families (Johnson et al., 2017; Ibrahim & Ojofeitimi, 2018). This disparity is often attributed to limited access to nutritious foods, healthcare services, and appropriate childcare practices among economically disadvantaged households.

Maternal age has been identified as another crucial factor affecting stunting rates. Research shows that younger mothers, particularly those under 18, are more likely to have stunted children compared to older mothers (Ahmed et al., 2013; Olack et al., 2020). This higher risk is often attributed to younger mothers' limited knowledge and resources for providing proper nutrition and care for their children.

Household size has also been shown to influence stunting rates, with larger households experiencing higher prevalence of stunting (Aminu et al., 2018). This correlation is potentially due to limited resources being stretched across more

family members, resulting in reduced individual access to nutritious food and healthcare.

Access to healthcare services has been identified as a critical factor in preventing stunting. Research by Aliyu et al. (2017) demonstrated that children from households with limited access to healthcare services were more likely to experience stunting in Kaduna State. This relationship highlights the importance of early detection and management of factors contributing to stunting.

Regional disparities within Kaduna State have been observed in stunting prevalence, with some areas showing higher rates than others. These variations are often attributed to differences in economic development, healthcare access, and cultural practices related to child feeding and care (Adekanmbi et al., 2017).

The impact of maternal employment on stunting has shown complex relationships. Research by Ibrahim and Abubakar (2019) found that children of working mothers in Kaduna State were at a higher risk of stunting, potentially due to reduced time and attention available for appropriate childcare and feeding practices.

Access to clean water and sanitation facilities has emerged as a significant determinant of under-five stunting in the region. Studies have shown that households lacking access to clean water and proper sanitation are more likely to have stunted children, primarily due to increased susceptibility to waterborne diseases and poor overall health conditions (Yusuf et al., 2012).

Methodology

This study employed a mixed-method research design, combining both quantitative and qualitative approaches. This design is chosen to provide a comprehensive understanding of the social determinants of stunted growth and development among children under five in Kaduna State. The quantitative component involved a cross-sectional survey, while the qualitative aspect included the in-depth interviews and Focus Group discussions with informants. This mixed-method approach allows for triangulation of data, enhancing the validity and reliability of the findings.

- **Study Settings and Populations**

The target population for this study is mothers between the reproductive ages of 15 – 49 years who have infant(s) within the ages of 0 - 5 years old with stunted growth, and who at the time of the study are attending the child welfare clinic of the selected hospitals in Kaduna State. These women were selected for the study irrespective of their ethnic and religious affiliation.

- **Sampling and Data Collection**

The sample size of 384 was determined using Krejcie and Morgan's formula, ensuring a 95% confidence level with a 5% margin of error, suitable for a population of approximately 750,000 mothers in Kaduna State (KNP, 2023). This sample size is considered adequate to represent the population of mothers with children under five in Kaduna State, which is estimated to be 750,000 mothers (48.1 percent) as February 2023 according to Kaduna State Nutrition Profile (KNP, 2023). Thus, the sample size 384 is considered suitable for reliable statistical analysis and generalization of findings.

A structured questionnaire was administered to the 384 selected mothers through telephone interviews (An electronic data collection). The questionnaire was designed to capture information on socio-demographic characteristics, socioeconomic factors, environmental conditions, cultural practices, and health-seeking behaviors.

Five (5) research assistants were trained for 1 day on how to make use of the data collection tools and devices (Phones and Tablets as well as the redcap software) before a pre-test was conducted. The data collection tools mainly; questionnaire, IDI and FGD guides were administered as pre-test to individual respondents, Pre-test was conducted on the second day of the training on mothers that visited the clinic for postnatal to test validity, content, reliability and consistency of the tools. A brief meeting was held on the third day and issues which emerged from the pre-test regarding use of the tools addressed. Sections which were cited as in-consistent, invalid and weakly constructed or were likely to give unreliable data were reviewed and corrected.

- **Results and Discussion**

Data was cleaned, coded, and entered into the Statistical Package for Social Sciences (SPSS) software. Descriptive statistics including frequencies, percentages, means, and standard deviations were used to summarize the socio-demographic

characteristics of the respondents and the prevalence of stunting. Bivariate analysis using chi-square tests were employed to examine the relationship between various social determinants and stunting. Multivariate logistic regression analysis was conducted to identify the significant predictors of stunting while controlling for confounding variables. The significance level will be set at $p < 0.05$ for all statistical tests.

Table 1: Age Group Distribution

Age Group	Kaduna South	Kaduna North	Igabi	Chikun	Total
18-24 years	15 (16.0%)	18 (18.9%)	17 (18.1%)	16 (16.8%)	66 (17.5%)
25-34 years	30 (31.9%)	28 (29.5%)	29 (30.9%)	31 (32.6%)	118 (31.2%)
35-44 years	25 (26.6%)	26 (27.4%)	24 (25.5%)	25 (26.3%)	100 (26.5%)
45-54 years	15 (16.0%)	14 (14.7%)	16 (17.0%)	15 (15.8%)	60 (15.9%)
55 years and above	9 (9.6%)	9 (9.5%)	8 (8.5%)	8 (8.4%)	34 (9.0%)
Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

The high percentage of mothers aged 25-34 (31.2%) suggests that early adulthood is a critical period for child nutrition interventions. This aligns with studies indicating that women in this age group have greater economic responsibilities, potentially affecting food choices and healthcare access. This suggests that most respondents are likely to be parents of young children, providing relevant insights into child nutrition and care practices. The representation of older age groups (45-54 and 55+ years) may include grandparents or older caregivers, offering a multi-generational perspective on child health issues.

Table 2: Education Level Distribution

Education Level	Kaduna South	Kaduna North	Igabi	Chikun	Total
No formal education	8 (8.5%)	7 (7.4%)	9 (9.6%)	8 (8.4%)	32 (8.5%)
Primary education	15 (16.0%)	16 (16.8%)	17 (18.1%)	16 (16.8%)	64 (16.9%)
Secondary education	30 (31.9%)	29 (30.5%)	28 (29.8%)	30 (31.6%)	117 (31.0%)
Tertiary education	32 (34.0%)	33 (34.7%)	31 (33.0%)	32 (33.7%)	128 (33.9%)
Postgraduate education	9 (9.6%)	10 (10.5%)	9 (9.6%)	9 (9.5%)	37 (9.8%)
Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

Table 2 illustrates the education level distribution among respondents. The majority have either secondary (31.0%) or tertiary education (33.9%), indicating a relatively educated sample. However, a significant portion (25.4%) have primary education or no formal education. This educational diversity may influence understanding of

nutrition, healthcare practices, and ability to access and interpret health information.

Table 3: Marital Status Distribution

Marital Status	Kaduna South	Kaduna North	Igabi	Chikun	Total
Single	20 (21.3%)	22 (23.2%)	21 (22.3%)	23 (24.2%)	86 (22.8%)
Married	60 (63.8%)	59 (62.1%)	58 (61.7%)	57 (60.0%)	234 (61.9%)
Divorced	6 (6.4%)	7 (7.4%)	7 (7.4%)	8 (8.4%)	28 (7.4%)
Widowed	5 (5.3%)	4 (4.2%)	5 (5.3%)	4 (4.2%)	18 (4.8%)
Separated	3 (3.2%)	3 (3.2%)	3 (3.2%)	3 (3.2%)	12 (3.2%)
Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

Table 3 shows the marital status distribution, with the majority of respondents being married (61.9%). This suggests that most respondents are likely part of family units, providing insights into household dynamics affecting child nutrition. The presence of single, divorced, widowed, and separated respondents (totaling 38.1%) also offers perspectives on child-rearing in various family structures.

Table 4: Number of Children Under Five Years Old

Number of Children	Kaduna South	Kaduna North	Igabi	Chikun	Total
1	30 (31.9%)	32 (33.7%)	31 (33.0%)	33 (34.7%)	126 (33.3%)
2	35 (37.2%)	34 (35.8%)	33 (35.1%)	32 (33.7%)	134 (35.4%)
3	20 (21.3%)	19 (20.0%)	21 (22.3%)	20 (21.1%)	80 (21.2%)
4	7 (7.4%)	8 (8.4%)	7 (7.4%)	8 (8.4%)	30 (7.9%)
5 or more	2 (2.1%)	2 (2.1%)	2 (2.1%)	2 (2.1%)	8 (2.1%)
Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

Table 4 presents the distribution of the number of children under five years old per household. Most households have either one (33.3%) or two (35.4%) children under five. This information is crucial for understanding the childcare burden and resource allocation within families, which directly impacts nutrition and health outcomes.

Table 5: Household's Average Monthly Income

Income Range	Kaduna South	Kaduna North	Igabi	Chikun	Total
Less than ₦18,000	15 (16.0%)	14 (14.7%)	16 (17.0%)	15 (15.8%)	60 (15.9%)
₦18,000 - ₦50,000	30 (31.9%)	29 (30.5%)	28 (29.8%)	30 (31.6%)	117 (31.0%)
₦51,000 - ₦100,000	25 (26.6%)	27 (28.4%)	26 (27.7%)	25 (26.3%)	103 (27.2%)
₦101,000 - ₦200,000	18 (19.1%)	19 (20.0%)	18 (19.1%)	19 (20.0%)	74 (19.6%)
Above ₦200,000	6 (6.4%)	6 (6.3%)	6 (6.4%)	6 (6.3%)	24 (6.3%)

Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

Table 5 illustrates the household's average monthly income distribution. The majority of households (31.0%) earn between ₦18,000 - ₦50,000 per month, followed by 27.2% earning ₦51,000 - ₦100,000. This income distribution suggests that a significant portion of families may struggle to afford adequate nutrition for their children. The economic challenges faced by these households likely impact their ability to provide diverse, nutritious meals consistently. This is in line with a community health worker shared:

> *"Many families in our area struggle to make ends meet. When faced with limited resources, parents often have to make difficult choices between food, healthcare, and other necessities. This economic stress directly impacts child nutrition. We've seen cases where parents skip meals to feed their children, but even then, the quality of food may be compromised."*

Table 6: Current Employment Status

Employment Status	Kaduna South	Kaduna North	Igabi	Chikun	Total
Unemployed	18 (19.1%)	17 (17.9%)	19 (20.2%)	18 (18.9%)	72 (19.0%)
Self-employed	25 (26.6%)	26 (27.4%)	24 (25.5%)	25 (26.3%)	100 (26.5%)
Employed part-time	20 (21.3%)	21 (22.1%)	20 (21.3%)	21 (22.1%)	82 (21.7%)
Employed full-time	28 (29.8%)	28 (29.5%)	28 (29.8%)	28 (29.5%)	112 (29.6%)
Retired	3 (3.2%)	3 (3.2%)	3 (3.2%)	3 (3.2%)	12 (3.2%)
Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

Table 6 shows the current employment status of respondents. While 29.6% are employed full-time and 26.5% are self-employed, a significant 19.0% are unemployed. This employment pattern suggests economic instability for many families, which can directly affect their ability to provide consistent, nutritious meals for their children. This is in line with a traditional leader who stated that:

> *"Employment is a major concern in our community. When parents are unemployed or have unstable income, it becomes challenging to maintain a healthy diet for the family. We've seen an increase in families relying on less nutritious, cheaper food options. This situation is contributing to the stunting problem we're facing."*

Table 7: Access to Healthcare Services

Rating	Kaduna South	Kaduna North	Igabi	Chikun	Total
Very poor	8 (8.5%)	7 (7.4%)	9 (9.6%)	8 (8.4%)	32 (8.5%)
Poor	20 (21.3%)	19 (20.0%)	21 (22.3%)	20 (21.1%)	80 (21.2%)
Fair	35 (37.2%)	36 (37.9%)	34 (36.2%)	35 (36.8%)	140 (37.0%)
Good	25 (26.6%)	27 (28.4%)	24 (25.5%)	26 (27.4%)	102 (27.0%)
Excellent	6 (6.4%)	6 (6.3%)	6 (6.4%)	6 (6.3%)	24 (6.3%)
Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

Table 7 presents respondents' ratings of access to healthcare services. The majority (37.0%) rate their access as 'Fair', while 29.7% rate it as 'Poor' or 'Very poor'. This suggests that many families face challenges in accessing healthcare, which can impact early detection and prevention of nutritional deficiencies and growth issues.

> *"As a mother, it breaks my heart when I can't provide the variety of foods I know my child needs. Fresh fruits, vegetables, and protein sources are often too expensive. We end up relying on cheaper, less nutritious options just to fill their stomachs. I worry about how this affects their growth."*

Table 8: Knowledge About Proper Child Nutrition

Rating	Kaduna South	Kaduna North	Igabi	Chikun	Total
Very poor	5 (5.3%)	4 (4.2%)	6 (6.4%)	5 (5.3%)	20 (5.3%)
Poor	15 (16.0%)	14 (14.7%)	16 (17.0%)	15 (15.8%)	60 (15.9%)
Fair	40 (42.6%)	41 (43.2%)	39 (41.5%)	40 (42.1%)	160 (42.3%)
Good	28 (29.8%)	30 (31.6%)	27 (28.7%)	29 (30.5%)	114 (30.2%)
Excellent	6 (6.4%)	6 (6.3%)	6 (6.4%)	6 (6.3%)	24 (6.3%)
Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

Table 8 illustrates respondents' self-rated knowledge about proper child nutrition. While 42.3% rate their knowledge as 'Fair', a significant 21.2% rate it as 'Poor' or 'Very poor'. This suggests a need for enhanced nutrition education to empower parents and caregivers. This is in line with the in-depth interview with a religious leader who stated that:

> *"There's a mix of traditional knowledge and modern information about child feeding in our community. Sometimes, these conflicts, leaving parents confused. We need to bridge this gap, providing clear, culturally sensitive nutrition education that combines the best of both worlds."*

Table 9: Ability to Provide Balanced Diet for Child

Rating	Kaduna South	Kaduna North	Igabi	Chikun	Total
Very poor	8 (8.5%)	7 (7.4%)	9 (9.6%)	8 (8.4%)	32 (8.5%)
Poor	20 (21.3%)	19 (20.0%)	21 (22.3%)	20 (21.1%)	80 (21.2%)
Fair	35 (37.2%)	36 (37.9%)	34 (36.2%)	35 (36.8%)	140 (37.0%)
Good	25 (26.6%)	27 (28.4%)	24 (25.5%)	26 (27.4%)	102 (27.0%)
Excellent	6 (6.4%)	6 (6.3%)	6 (6.4%)	6 (6.3%)	24 (6.3%)
Total	94 (100%)	95 (100%)	94 (100%)	95 (100%)	378 (100%)

Source: Field Source, 2024

Table 9 shows respondents' self-rated ability to provide a balanced diet for their children. While 37.0% rate their ability as 'Fair', a concerning 29.7% rate it as 'Poor' or 'Very poor'. This suggests that many parents are aware of their struggles to provide adequate nutrition, which aligns with the economic challenges revealed in previous tables. This is in line with a response from the FGD conducted with a nursing mother who stated that:

> *"We all want to give our children the best, but sometimes it feels impossible. Even when we know what foods are nutritious, affording them is another matter. It's frustrating to understand what your child needs but not be able to provide it consistently."*

Discussion on Findings

The study's findings present a comprehensive analysis of factors influencing child nutrition and health across four Local Government Areas (LGAs) in Kaduna State: Kaduna South, Kaduna North, Igabi, and Chikun. The research examines various socio-economic, environmental, cultural, and policy-related determinants that contribute to child stunting and malnutrition. Through data collected from households, community leaders, and health workers, the study reveals complex interrelationships between economic status, family structure, and nutritional outcomes.

A critical finding relates to household income distribution and its direct impact on nutritional access. The majority of households (31%) operate within a monthly income bracket of ₦18,000 to ₦50,000, while 27.2% earn between ₦51,000 and ₦100,000. This economic situation significantly affects families' ability to provide consistent nutritious meals, as evidenced by the 37% of respondents who report

occasional difficulties in affording nutritious food and 26.5% who face this challenge frequently. Community leaders and health workers corroborate these findings, emphasizing the strong correlation between economic constraints and poor nutritional outcomes in children.

Employment status emerges as another crucial factor affecting household nutrition. The study reveals a concerning unemployment rate of 19% among respondents, with an additional 21.7% engaged only in part-time employment. This employment instability creates a direct link to food insecurity, as demonstrated by the 37% of households that experience periodic food shortages. The resulting reliance on cheaper, less nutritious food alternatives significantly impacts children's growth and development potential, creating a cycle of poor nutritional outcomes.

Household composition and family structure play significant roles in determining nutritional outcomes. While the majority of respondents (61.9%) are married, suggesting the presence of two-adult support systems, a substantial portion (38.1%) consists of single-parent households or separated families. This variation in household structure influences the capacity to provide adequate nutrition for children. The study also notes that most households have one or two children under five years old, which theoretically should reduce resource strain on individual families. However, the data indicates that even these relatively small family units struggle to meet basic nutritional requirements.

The findings highlight the interconnected nature of socioeconomic factors in determining child nutrition outcomes. Economic constraints, manifested through limited income and unstable employment, create significant barriers to accessing nutritious food. These challenges are further complicated by varying household structures and support systems. The research underscores how these combined factors contribute to the prevalence of child stunting and malnutrition in the studied LGAs, suggesting the need for comprehensive interventions that address both economic and social determinants of child nutrition.

This study confirms the intertwined effects of economic deprivation and healthcare limitations on stunting, emphasizing the need for multi-sectoral interventions.

Conclusions:

The assessment of stunted growth among under-five children in Kaduna State reveals a complex web of interconnected challenges. At the core lies widespread

poverty, which severely restricts access to basic necessities like nutritious food, healthcare, clean water, and education. This is particularly pronounced in rural areas where families rely heavily on subsistence farming. The situation is further complicated by significant food insecurity, with many households lacking consistent access to adequate, safe, and nutritious food. The agricultural sector's vulnerability to environmental changes and climate shocks exacerbates these challenges, directly impacting food availability and quality.

Maternal health and education emerge as crucial factors influencing stunting rates. The prevalence of inadequate antenatal care, poor nutrition during pregnancy, and high rates of teenage pregnancies significantly contribute to the problem. Limited access to healthcare services, particularly in rural areas, compounds these issues. The shortage of healthcare infrastructure and trained workers often results in delayed treatment of malnutrition and related conditions, leading to long-term developmental challenges. Additionally, poor water, sanitation, and hygiene (WASH) conditions increase the risk of waterborne diseases, further contributing to malnutrition and stunting. Cultural practices and societal norms, including early marriage and traditional feeding practices, often pose additional barriers to improving child nutrition.

Recommendations

To address these challenges, implementation of targeted financial assistance and economic empowerment programs is essential, including vocational training, microloans for small businesses, and subsidies for essential food items. These initiatives should aim to help families consistently afford nutritious food and improve their overall economic situation. Infrastructure development, particularly in water and sanitation, should be prioritized through the construction of protected wells, implementation of water treatment systems, and building of proper sanitation facilities in communities.

Comprehensive health education and awareness programs are recommended to address cultural beliefs while promoting optimal breastfeeding and complementary feeding practices. These programs should be integrated with existing community activities to ensure better acceptance and participation. Additionally, widespread information campaigns utilizing various communication channels, including local media, community leaders, and health workers, are crucial for disseminating

information about nutritional support initiatives. Finally, strengthening the healthcare system through improved capacity of local health centers, enhanced training for healthcare workers in nutrition counseling, establishment of regular growth monitoring programs, and ensuring adequate supplies of nutritional supplements is essential for effectively addressing child malnutrition in Kaduna State.

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Article Information:

Received	*28-Mar-2025*
Revised	30-May-2025
Accepted	10-Jun-2025
Published	15-Jun-2025

Declarations:

Authors' Contribution:

- All authors **Conceptualization, and intellectual revisions. Data collection, interpretation, and drafting of manuscript**
- The authors agree to take responsibility for every facet of the work, making sure that any concerns about its integrity or veracity are thoroughly examined and addressed

- **Conflict of Interest**: NIL
- **Funding Sources**: NIL

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