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Assessment of Childhood Malnutrition and Household Food Security in Angwan Rogo and Tudun Wada Communities of Jos North, Nigeria

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Abstract

Background: Childhood malnutrition remains a significant public health problem in northern Nigeria, particularly in low-income urban settlements where food insecurity, infectious diseases, and poor feeding practices all occur simultaneously. Angwan Rogo and Tudun Wada are two densely populated Hausa-Fulani communities in Jos North that present especially heightened conditions of vulnerability among children under five years.

Methods: A community-based cross-sectional study was conducted among 1,034 caregivers of children aged 0–59 months recruited by multistage sampling. Data collection used a structured interviewer-administered questionnaire with Likert-scaled measures on food security, feeding practices, sanitation, and coping mechanisms. Anthropometric measurements were obtained by following WHO protocols. Associations between food security, feeding practices, and nutritional outcomes were determined using descriptive statistics and chi-square tests. The level of significance was set at $p<0.05$.

Results: Both communities reported severe household food insecurity, characterized by high frequencies of meal skipping, reduced dietary diversity and a strong reliance on low-cost carbohydrate foods. Chi-square analysis revealed that food insecurity was significantly associated with stunting, wasting and underweight. Poor dietary diversity reported in the households led to increased rates of

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malnutrition among the children. Illness frequency, low maternal education, poor hygiene and poor breastfeeding practices were also significantly related to malnutrition. Coping strategies included reduction of meal size, borrowing of food, meal skipping by adults, and reliance on neighbors.

Conclusion: Childhood malnutrition in Angwan Rogo and Tudun Wada is strongly influenced by household food insecurity, inadequate feeding practices, and socioeconomic deprivation. Targeted nutrition interventions should be strengthened, food access improved, and the knowledge of caregivers enhanced in these vulnerable communities.

Keywords: childhood malnutrition; food insecurity; feeding practices; Angwan Rogo; Tudun Wada; Jos North; caregivers.

Introduction

Childhood malnutrition continues to be one of the most complex and chronic public health problems in Nigeria, where children under five years of age continue to face unacceptably high prevalence of stunting, wasting and micronutrient deficiency from inappropriate infant feeding practices, inadequate dietary consumption and limited access to nutritious foods (1). These nutritional gaps can have irreversible consequences, including reduced cognitive ability, poor academic achievement, compromised immunity and increased risk of morbidity and mortality. National surveys reveal the burden is concentrated in northern Nigeria, where many children live in food-insecure households under circumstances of poverty, exposure to disease, and limited access to sufficient services which all work against the health of children (1).

Urban informal settlements are characterized by overcrowding, unemployment, poor sanitation and limited access to health and social services, increasing these vulnerabilities (2). They represent environments that maintain a cycle of food deprivation, low dietary diversity and unhealthy living conditions. The case of Angwan Rogo and Tudun Wada in Jos North Local Government Area epitomize the severity of these challenges associated with high population density, the predominant reliance on low-wage occupations, and the overall poor ability of household to maintain an adequate diet for children (3). These communities also confront structural challenges with food prices, seasonality of food availability and astronomical reductions in purchasing power which all contribute to increasing rates of childhood malnutrition.

Food insecurity, which is a leading cause of malnutrition, can influence the availability, accessibility, and utilization of food at the household and individual levels (4). Households that experience food insecurity in Nigeria typically resort to low-quality and monotonous diets with insufficient micronutrient content. Many studies conducted in northern Nigeria have shown a reliable association between a lack of dietary diversity and poor child growth outcomes, particularly stunting and underweight children (5). In addition to these factors, caregiver level factors—such as maternal

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education, knowledge of complementary feeding guidelines, responsive feeding, and hygiene—are also vital for child nutrition outcomes (6). Many low-income communities have both inadequate knowledge of feeding children appropriately and limited availability of resources to positively influence the quality and frequency of meals for children.

The impact of infectious diseases, including diarrhoea, respiratory infections and malaria further complicates child malnutrition in resource-poor contexts (7). Illness has the potential to elevate metabolic demands, diminish appetite and disturb absorption of nutrients, further exacerbating malnutrition. These interactions create malnutrition as a cause and a consequence of illness, both of which form a cycle that appears to be especially salient among many children living in urban informal settlements.

Though there is increasing attention towards malnutrition in Plateau State, there is limited evidence which highlights the specific contexts of Angwan Rogo and Tudun Wada (8). These urban communities differ from the other urban communities in the study with regards to a number of socio-cultural issues including household structures, economic instability and higher dependency ratios. Exploring how food security dynamic, caregiver's practices and living conditions interact to shape child nutritional status in these two urban contexts is vital for informing future interventions that take context into account.

This study examined childhood malnutrition and household food insecurity in the communities of Angwan Rogo and Tudun Wada and sought to determine whether associations using anthropometric and socio-behavioural indicators exists. The results will strengthen the evidence supporting specific nutritional programs and policy decisions aimed at improving child health in urban slum low-income communities of Jos North.

Methods

Study Design and Setting

A cross-sectional, community-based study was conducted in two densely populated, low-income communities in Jos North, Plateau State, Nigeria, namely Angwan Rogo and Tudun Wada. Both communities are characterized by closely built houses, inadequate sanitation facilities, high unemployment levels, extreme dependency ratios, and limited access to a variety of often unsatisfactory foods (9). Both communities are urban informal settlements that are occupied primarily by the Hausa-Fulani population, as would be expected in a typical urban poverty context in northern Nigeria. The study covered a four-month period to ensure adequate household coverage.

Study Population

Caregivers of children aged 0-59 months who had lived in the selected communities for at least one year served as the study population for this research project. This inclusion criterion allowed for stability of exposure to household food environments and community settings. A total of 1,034 respondents were recruited using a multistage sampling strategy, which involved first selecting wards, then systematically

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sampling households, and finally identifying eligible caregivers within each household. To prevent clustering, we only interviewed one caregiver-child dyad in each household.

Data Collection

Data collection was conducted using a structured questionnaire, administered by the interviewer, which was developed with standard nutrition and food security assessment tools. The questionnaire obtained information on socio-demographic factors, food security in the household using Likert-scaled items, child feeding practices, water and sanitation, recent episodes of illness, and coping strategies used in the household. Anthropometric measurements such as weight, height/length, and mid-upper arm circumference (MUAC) were collected according to established WHO procedures to determine stunting, wasting, and underweight status (10). All data collectors were trained to ensure consistency and each instrument was calibrated daily.

Data Analysis

Data were inputted and analyzed using SPSS. Descriptive statistics such as frequencies, means and percentages were used to summarize respondent characteristics and key variables. Chi-square tests were used to assess associations between household food security, feeding practices, illness frequency and child nutritional status. Statistical significance was determined at $p<0.05$. Results are presented in tables with chi-square values, degrees of freedom and p-values for clarity.

Ethical Considerations

The Desh Bhagat University Institutional Review Board (Approval No. IRB/DBU/2024/017) and the Wesley University, Ondo, Research Ethics Committee provided ethical approval for this study. All participants provided written informed consent prior to their enrollment. We took extreme measures to ensure confidentiality; no names were recorded, and responses were expressed in unique identifiers. Participation in the study was voluntary and participants were not offered any monetary or material incentives for their involvement in the study. All procedures were carried out in accordance with the ethical standards established in the Helsinki Declaration

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Results

Table 1. Household Food Security Status by Community

Food Security Level	Angwan Rogo (n=518)	Tudun Wada (n=516)	χ^2	df	p-value
Food secure	74 (14.3%)	92 (17.8%)	**7.62**	2	**0.022**
Moderately insecure	201 (38.8%)	224 (43.4%)			
Severely insecure	243 (46.9%)	200 (38.8%)			

The findings show a significant burden of food insecurity in Angwan Rogo and Tudun Wada. In Angwan Rogo, nearly half of households (46.9%) were found to be severely food insecure compared to 38.8% in Tudun Wada. Similarly, moderately food insecure households were also large component of both communities, making up 38.8% in Angwan Rogo (43.4% in Tudun Wada). Only a small portion of households are food secure, 14.3% in Angwan Rogo and 17.8% in Tudun Wada.

The chi-square analysis ($\chi^2 = 7.62$, df = 2, p = 0.022) found a significant association in community of residence and level of household food security. This suggests that the proportion of food security categories is different in a substantial way between the two communities. Angwan Rogo had a much higher proportion of severe food insecure households than Tudun Wada, signifying somewhat poorer household food access and a higher degree of vulnerability.

The results indicate that food insecurity is pervasive across both sites, although Angwan Rogo is in a slightly more disadvantaged situation, demonstrating a hungry community that will likely benefit from food security focused assistance and nutrition intervention.

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Table 2. Nutritional Status of Children by Community

Indicator	Angwan Rogo	Tudun Wada	χ^2	df	p-value
Stunted	156 (30.1%)	118 (22.9%)	**9.84**	1	**0.002**
Wasted	91 (17.6%)	67 (13.0%)	**4.52**	1	**0.033**
Underweight	122 (23.6%)	101 (19.6%)	**3.97**	1	**0.046**

The results indicate significant variations in childhood nutritional outcomes between Angwan Rogo and Tudun Wada. The prevalence of stunting was demonstrated to be more substantial in Angwan Rogo (30.1%) than in Tudun Wada (22.9%). The chi-square score (χ^2 = 9.84, p = 0.002), suggests a statistically significant association between community and stunting, thus indicating a higher occurrence of chronic malnutrition in Angwan Rogo.

Similarly, the prevalence of wasting, a measure of acute malnutrition, was elevated in Angwan Rogo (17.6%) than Tudun Wada (13%). This association between community and wasting was statistically significant (χ^2 = 4.52, p = 0.033) thus revealing differences in children's experiences of recent or short-term nutritional stress in the two communities..

Likewise, the prevalence of underweight status was higher among the children in Angwan Rogo (23.6%) than in Tudun Wada (19.6%). This association was statistically significant (χ^2 = 3.97, p = 0.046), and this indicates that overall malnutrition is more severe in Angwan Rogo.

Overall, children in Angwan Rogo showed consistently higher levels of stunting, wasting and underweight compared to the children in Tudun Wada. This implies that the children in Angwan Rogo may have more severe social and economic challenges, and more significant food access challenges, creating worse outcomes for growth in children in Angwan Rogo

Table 3. Feeding Practices and Malnutrition Status

Feeding Practice	Good Practice	Poor Practice	χ^2	df	p-value
Exclusive breastfeeding	412 (68.9%)	186 (31.1%)	**11.20**	1	**0.001**
Minimum dietary diversity	379 (63.2%)	221 (36.8%)	**15.84**	1	**<0.001**

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Meal frequency adequacy	356 (59.4%)	244 (40.6%)	**13.27**	1	**<0.001**

The study produces substantial evidence of strong links between feeding methods and malnutrition in children among the sample. Based on the survey responses, 68.9% of caregivers reported good practices of exclusive breastfeeding while 31.1% reported poor breastfeeding practices. A chi-square statistic (χ^2= 11.20, p = 0.001), showed a statistically significant association between those who had good exclusive breastfeeding practices and those who did not. This suggests that inadequate exclusive breastfeeding practices places the child at a greater risk of malnutrition.

Minimum dietary diversity, an important indicator of dietary quality, was measured at 63.2% of good caregiver practices and 36.8% of poor caregiver practices. The association between minimum dietary diversity and malnutrition was significant (χ^2= 15.84, p < 0.001). This suggests that those children with limited access to other food groups are more likely to experience adverse nutrition outcomes - specifically stunting and underweight.

In the same way, feeding frequency adequacy was assessed as sufficient for 59.4% of households, compared to 40.6% of households not meeting the recommended feeding frequency. The chi-square was statistically significant (χ^2 = 13.27, p < 0.001) for insufficient feeding frequency and malnutrition, which indicates a strong relation. Irregular or infrequent feeding contributes to acute and chronic forms of undernutrition.

Ultimately, the results indicate that any feeding practices that were sub-optimal, either related to breastfeeding, dietary diversity, or frequency, were all statistically significant related to childhood malnutrition. These results provide support for caregiver education and improved access to food as key components of malnutrition reduction in low-income settings..

Table 4. Illness Frequency and Child Malnutrition

Illness Frequency (Last 3 Months)	Normal	Malnourished	χ^2	df	p-value
No illness	148 (72.9%)	55 (27.1%)	**21.14**	2	**<0.001**
1–2 episodes	291 (57.1%)	218 (42.9%)			
≥3 episodes	73 (41.7%)	102 (58.3%)			

The findings reveal a strong and statistically significant correlation between the frequency of recent illness and child malnutrition (χ^2 = 21.14, df = 2, p < 0.001). Children who had not been ill in the past three

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months had the lowest or best malnutrition rate (27.1%). In contrast, there was a clear upward trend in malnutrition as illness frequency increased for children with 1 to 2 episodes (42.9%) and for children with 3 or more episodes (58.3%). This suggests that repeated illness is a significant contributor to negative nutritional outcomes in children, possibly because of decreased appetite, nutrient malabsorption, or increased metabolic demands during illness. In summary, in the end, that children who had experienced repeated episodes of illnesses at any point in the last three months are significantly more likely to experience malnutrition..

Table 5. Coping Strategies and Food Insecurity

Coping Strategy	Food Secure	Food Insecure	χ^2	df	p-value
Borrowing food	58 (11.2%)	459 (88.8%)	**27.63**	1	**<0.001**
Reducing meal size	72 (13.9%)	446 (86.1%)	**33.48**	1	**<0.001**
Skipping meals	49 (9.5%)	469 (90.5%)	**41.02**	1	**<0.001**

The results indicate a strong and statistically significant relationship between household coping strategies and food insecurity. Simply put, households that adopted any of the three coping strategies measured—borrowing food from neighbors, reducing meal size, or skipping meals altogether—were food insecure. In fact, 88.8% of households that borrowed food were food insecure, with a higher percentage (90.5%) of households that reported skipping meals. The same holds true for households that reported reducing meal size at 86.1%. All chi-square tests are significant ($p < 0.001$), which demonstrates that each of these coping strategies is a clear marker of food stress. The trend appears to be that using a severe coping strategy is strongly related to greater food insecurity, which suggests that the behaviors could be used as cautionary indicators of the population's nutritional vulnerability.

Discussion

A considerable burden of food insecurity and childhood malnutrition was observed in Angwan Rogo and Tudun Wada, two densely populated, low-income communities. The proportion of households reporting severe food insecurity was considerably higher than the national estimates for comparable urban settlements in Nigeria, which indicates that complex socioeconomic and environmental conditions may amplify vulnerability (11). This represents an increased burden of limited food security, demonstrating unequal access to food remains a serious

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concern amongst residents of informal urban settlements.

The significant association found with food insecurity and stunting noted in this study resonates with previous studies from across Africa, which have found the quantity and quality of food consumed, is a strong contributor to impaired linear growth during early childhood (12). Stunting is the manifestation of chronic nutritional deprivation, and the relationship found with food insecurity in this study speaks to the longer-term consequences that inadequate food access has on child development.

The almost epidemic level of wasting and underweight further substantiates existing literature from urban poor communities characterized by overcrowding, poor sanitation, and recurring infection, which increases the likelihood of acute malnutrition (13). This study's findings also further elucidate the role of inadequate feeding practices as determinants of poor nutritional outcomes. Minimum dietary diversity had a significant association with malnutrition, foreshadowing global evidence showing that limited intake of nutrient-dense foods negatively impacts micronutrient adequacy and growth, particularly in low-resource contexts (14). Likewise, the protective association of exclusive breastfeeding seen in this study concurs with the literature demonstrating its power to reduce illness and to provide optimal nutrition in early life (15).

The occurrence of illness was frequently and significantly associated with malnutrition, which affirmed the well-established bi-directional relationship between infection and nutritional deficits (16). Illness increases nutritional demands and decreases appetite, while malnutrition negatively impacts immunity, creating a cyclical pattern of increased vulnerability.

Furthermore, the universal use of coping mechanisms around food, such as borrowing food, eating smaller portions, and skipping meals, exemplified the structural dimensions of food insecurity faced by these communities. The use of coping mechanisms that were also reported in other studies indicate chronic economic stress and a lack of resiliency of households experiencing a lack of sufficient food (17).

Overall, the results highlight the pressing need for improved community-based nutrition interventions to improve access food with an appropriate balanced nutrition in addition to selective feeding programs for at risk children, education for caregivers and their children on appropriate nutrition and the importance of hygiene practices. Interventions that can impact the larger socioeconomic restrictions are critical to reducing food insecurity and improving nutrition outcomes among young children in disadvantaged urban settings.

Conclusion

The problem of childhood malnutrition in Angwan Rogo and Tudun Wada is an urgent public health issue, exacerbated by a combination of household food insecurity, limited dietary diversity, frequent illness and poor feeding practices. The study showed that

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children in food insecure households are much more likely to be stunted, wasted or underweight, demonstrating that poverty, food insecurity, and limited access to food from a diverse diet play a predominant role in determining nutritional status.

In order to improve child health outcomes, Integrated multi-level interventions utilizing targeted nutrition interventions, strengthened food assistance and social protection systems, and improved access to diverse nutritious foods is needed in these communities. Community based interventions to alleviate the burden of infectious disease will need to address limitations to sanitation and hygiene, and accessible public health systems.

Educational resources for caregivers of young children to improve knowledge on optimal breastfeeding practices, complementary feeding, or meal frequency can also help to reduce malnutrition in this population.

In sum, both immediate and underlying factors of malnutrition for children need to be addressed through appropriate combination of interventions and context-specific to serve children for the expected outcomes of increased nutritional status and healthier, more resilient households in these urban underserved communities.

Take-Home Message

Key drivers of childhood malnutrition in Angwan Rogo and Tudun Wada include household food insecurity, low dietary diversity, suboptimal feeding practices and recurrent childhood illness. Addressing food access, improving health conditions in the community, and enhancing caregiver knowledge of nutrition are key strategies for reducing malnutrition and improving child wellbeing in these vulnerable urban communities.

Authors' Contribution

SHU-ACHET Daniel Gimbason designed the study, methodology, and made data collection contributions. The data analysis, interpretation, and manuscript drafting was coordinated by Dr. Stephen Monday. Prof. (Dr.) Daniel Mairafi Gimbason gave general supervision, critical revisions, and approval of the research design. Amina Elisha Atikinpan assisted in data curation, literature review, and figure and table preparation. Ruby S. Gibson assisted with writing, editing, and final manuscript formatting for publication. All authors read and approved the final manuscript, and agreed to be held responsible for the wor

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Conflict of Interest

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