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Determinants of Household Food Insecurity in North East Nigeria: Socio-Economic, Demographic, Spatial and Shock-Related Perspectives

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Abstract

Household food insecurity remains a critical development challenge, particularly in conflict-affected and climate-sensitive regions of Sub-Saharan Africa. This study examines the determinants of household food insecurity in North East Nigeria, focusing on socio-economic, demographic, spatial, and shock-related perspectives. Primary data were collected from 384 households using a structured questionnaire, and food security status was assessed with the Food Insecurity Experience Scale (FIES). Logistic regression was employed to evaluate the effects of household income, educational attainment, age and gender of the household head, rural–urban residence, and exposure to shocks on food insecurity outcomes. Results indicate a high prevalence of food insecurity. Higher household income and tertiary education of the household head significantly reduced the likelihood of food insecurity, whereas non-formal education and exposure to shocks increased vulnerability. Age of the household head had a modest effect, while gender and rural–urban residence where not significant once socio-economic factors were controlled for. The study recommends integrated interventions that enhance household income, promote formal education and skills development, and provide shock-responsive social protection. Targeting economically vulnerable households and those most exposed to shocks can strengthen resilience and reduce structural food insecurity.

Keywords: *Household food insecurity, North East Nigeria and Food Insecurity Experience Scale (FIES).*

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Background to the Study

Food insecurity remains a critical global development challenge, affecting approximately 2.4 billion people worldwide in 2022 nearly 30 percent of the global population (FAO, 2023). It is broadly defined as the lack of consistent access to sufficient, safe, and nutritious food necessary to support normal growth, development and a healthy life (Osborne et al., 2022). Despite sustained international commitments to improving food systems, food insecurity persists and has intensified in many low- and middle-income countries due to rising inequality, environmental stress, conflict, and macroeconomic instability (Kpienbaareh et al., 2023). These pressures have placed significant strain on household welfare, particularly in fragile and conflict-affected regions.

Sub-Saharan Africa bears a disproportionate burden of global food insecurity driven by widespread poverty, low agricultural productivity, weak infrastructure and limited access to basic services (Egbi & Gaisie, 2018). Nigeria exemplifies this challenge. Although endowed with substantial agricultural resources, the country continues to experience worsening food insecurity, particularly among rural households (Iwuchukwu & Ajaegbu, 2024). Recent economic disruptions, rising inflation and structural weaknesses in the food system have further constrained household access to adequate food (Oyediran & Olajide, 2023). These challenges are especially acute in North East Nigeria, where prolonged conflict, environmental degradation, and institutional fragility have undermined livelihoods and food production systems.

The humanitarian situation in North East Nigeria has been exacerbated by the Boko Haram insurgency, which has disrupted agricultural activities, restricted access to farmland, destroyed infrastructure, and displaced millions of people. As of 2023, more than four million people in the region were estimated to require urgent food and nutrition assistance (UNICEF, 2023). In parallel, macroeconomic shocks including the removal of fuel subsidies and the devaluation of the naira have significantly increased food prices and reduced real household incomes, intensifying food insecurity among already vulnerable populations (Okoye et al., 2023). These shocks disproportionately affect rural and peri-urban households that rely on subsistence agriculture and informal income sources.

Demographic and spatial factors, including rural residence and limited infrastructure, further influence vulnerability by shaping access to markets, services and livelihood opportunities (Bala & Isah, 2024). However, much of the existing literature examines these factors in isolation or focuses on national-level patterns, with limited attention to how socio-economic, demographic, spatial and shock-related factors jointly shape household food insecurity in conflict-affected regions. Consequently, there remains a significant gap in understanding the combined and interactive effects of these determinants at the household level in North East Nigeria.

This study seeks to fill this gap by investigating the determinants of household food insecurity in North East Nigeria.

Literature review

Conceptual Literature Review

Household food insecurity refers to a situation in which households experience limited or uncertain access to sufficient, safe and nutritious food required for a healthy and active life. Contemporary literature emphasizes that food insecurity is a multidimensional outcome shaped by households' economic capacity, demographic composition, spatial context and exposure to adverse shocks (FAO, IFAD, UNICEF, WFP, & WHO, 2023). Conceptually, these factors interact to determine households' ability to access food consistently and cope with disruptions to livelihoods.

Socio-Economic Determinants of Household Food Insecurity

Socio-economic factors are central to understanding household food insecurity. *Household income* is widely regarded as a primary determinant, as it directly influences purchasing power and access to food through markets. Empirical evidence shows that households with higher income levels are better able to secure adequate food and smooth consumption during periods of stress, while low-income households face a higher risk of food insecurity (Salim & Wang, 2024). Income also affects households' capacity to invest in productive activities and diversify livelihoods, thereby strengthening resilience.

Education of the household head is another key socio-economic factor influencing food security. Education enhances human capital, improves access to employment opportunities, and increases the ability to make informed decisions regarding food consumption and nutrition. Recent studies indicate that households headed by individuals with formal education are less likely to experience severe food insecurity, whereas households with limited or no formal education are more vulnerable due to restricted access to stable income sources (Najam et al., 2023). Conceptually, education strengthens households' adaptive capacity and reduces susceptibility to food insecurity.

Demographic Determinants of Household Food Insecurity

Demographic characteristics shape food insecurity by influencing both consumption needs and earning potential. Household size is an important determinant, as larger households require more food and financial resources. When income does not increase proportionately with household size, the likelihood of food insecurity rises. Evidence from rural Nigeria shows that larger households and higher dependency ratios significantly increase the probability of food insecurity (Adeoye et al., 2023). The gender of the household head also features prominently in the literature. Female-headed households are often considered more vulnerable due to gender-based inequalities in access to land, credit, and employment. Recent empirical findings suggest that female-headed households face higher odds of severe food insecurity in contexts where economic opportunities and social protection are limited (Najam et al., 2023). The age of the household head further influences food security, as older household heads may experience declining productivity and reduced labor market participation, increasing vulnerability in the absence of adequate social support.

Spatial Determinants of Household Food Insecurity

Spatial location affects household food security through differences in access to markets, infrastructure, and livelihood opportunities. Conceptually, *rural households* are often more vulnerable to food insecurity due to reliance on rain-fed agriculture, limited market integration, and weaker access to services. Recent studies show that rural households are more likely to experience food insecurity than urban households, largely due to structural disadvantages rather than location alone (Salim & Wang, 2024). These spatial disparities are particularly relevant in regions with poor infrastructure and limited economic diversification, such as North-East Nigeria.

Shock-Related Determinants of Household Food Insecurity

Exposure to *household shocks* is a critical driver of food insecurity. Shocks including economic downturns, climate-related events, health crises, and conflict disrupt income flows, reduce agricultural output, and force households to deplete savings or sell productive assets. Evidence from Nigeria during the COVID-19 period shows that income losses and mobility restrictions significantly worsened household food security and dietary diversity (Obayelu et al., 2022). Similarly, studies from other developing-country contexts demonstrate that repeated or severe shocks can push households into chronic food insecurity by eroding their livelihood base (Alemu et al., 2023).

Theoretical Framework

This study is anchored on Amartya Sen's Entitlement Theory and the Sustainable Livelihoods Framework (SLF). These frameworks are extensively used in recent food insecurity research to explain how socio-economic, demographic, spatial, and shock-related factors shape household food insecurity outcomes, particularly in developing and fragile contexts.

Entitlement Theory

Entitlement Theory conceptualizes food insecurity as a failure of access to food rather than a problem of food availability. According to Sen (1981), households experience food insecurity when their entitlement set the legally and socially sanctioned means through which food is acquired breaks down. These entitlements include production-based, trade-based, labor-based, and transfer-based entitlements. Contemporary food security studies continue to rely on this framework to explain why households remain food insecure despite adequate food supply at the aggregate level (Chanaliya, 2025).

Recent empirical evidence demonstrates that household income is a critical determinant of entitlement strength, as it directly affects purchasing power and market access (Akombi et al., 2023). Households with higher income are better positioned to secure adequate food, while income-poor households face entitlement failure even when food is available in markets (FAO et al., 2023). Education of the household head further strengthens entitlements by improving access to formal employment, increasing income potential, and enhancing decision-making related to food consumption and resource allocation (Abdul-Rahman & Abdulai, 2021).

Conversely, limited or non-formal education weakens entitlement sets by restricting access to stable labor markets and financial resources. Household shocks, including economic shocks, health crises, climatic events and conflict-related disruptions, undermine entitlements by destroying assets, reducing income flows, and increasing vulnerability (Dercon & Porter, 2024). In conflict-affected regions such as North-East Nigeria, recurrent shocks significantly heighten the likelihood of entitlement failure and food insecurity (World Bank, 2023). Additionally, the age of the household head influences entitlement strength, as older household heads may face declining productivity and reduced labor participation, increasing vulnerability to food insecurity (Oyinbo et al., 2020).

Sustainable Livelihoods Framework

The Sustainable Livelihoods Framework (SLF) provides a holistic approach to understanding food insecurity by emphasizing households' access to five key livelihood assets: human, financial, physical, natural, and social capital. The framework posits that food security outcomes depend on how households combine these assets within a vulnerability context shaped by shocks, trends, and institutional structures. Recent applications of the SLF highlight its relevance in explaining household food insecurity in low-income and agrarian settings. Studies show that human capital, reflected in education and age of the household head, enhances productivity, adaptive capacity, and income diversification, thereby reducing food insecurity risks (Dula, 2024; Ahmed et al., 2022). Financial capital, proxied by household income, determines the ability to purchase food, invest in productive activities, and smooth consumption during adverse periods (Barrett & Constas, 2019)

The SLF also emphasizes spatial factors, noting that rural households often face disadvantages related to limited infrastructure, poor market access, and dependence on rain-fed agriculture, which increase exposure to food insecurity (Tacoli et al., 2020). Furthermore, the framework underscores the importance of vulnerability to shocks, demonstrating that households with weak asset bases are less able to cope with and recover from shocks, leading to persistent or transitory food insecurity (Dercon & Porter, 2024).

Materials and Methods

Study Area

The study was conducted in North East Nigeria, one of the six geopolitical zones of the country, comprising Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe States. The region is characterized by a combination of rural and urban local government areas (LGAs), diverse socio-economic conditions, and varying levels of institutional capacity. North East Nigeria has experienced prolonged security challenges and post-conflict reconstruction processes, which have had significant implications for governance, service delivery, and local administrative performance. For the empirical analysis, selected LGAs within the region provided an appropriate context for examining the operation of legal and institutional frameworks governing local government administration.

Data Collection and Measurement

Primary data were obtained through a structured questionnaire administered to respondents involved in, or interacting with, local government administration. The questionnaire captured information on four explanatory variables Legal Clarity (LC), Financial Autonomy (FA), Legal Enforcement (LE), and Intergovernmental Legal Relations (ILR) and one outcome variable, Local Government Performance (LGP). All variables were measured using multiple-item indicators rated on a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Legal Clarity assessed the extent to which legal mandates, roles, and responsibilities of local governments were clearly defined and understood. Financial Autonomy measured the degree of control exercised by local governments over revenue generation, budgeting, and expenditure. Legal Enforcement evaluated the effectiveness of judicial and enforcement mechanisms in upholding legal provisions relevant to local government administration. Intergovernmental Legal Relations captured the nature of coordination, overlap, and conflict among local, state, and federal authorities. Local Government Performance was measured as a composite index reflecting service delivery effectiveness, financial management, infrastructure provision, and transparency.

Sampling Design and Sample Size

The study population comprised key stakeholders in local government administration, including elected local government officials, senior administrative staff, legal unit personnel, representatives of civil society organizations, and community leaders and residents who interact with local government services. A multi-stage sampling procedure was employed. In the first stage, three states Bauchi, Gombe, and Adamawa were purposively selected based on administrative relevance, accessibility, and the presence of functional local government structures. In the second stage, three LGAs were randomly selected from each state, resulting in a total of nine LGAs. In the final stage, respondents were selected within each LGA using a combination of purposive and stratified sampling to ensure proportional representation of stakeholder categories. A total of 385 respondents were surveyed, with approximately equal numbers drawn from each LGA.

Statistical Analysis

Data analysis was conducted using SPSS and Stata. Descriptive statistics, including means, standard deviations, frequencies, and percentages, were used to summarize respondents' characteristics and response patterns. Scale reliability was assessed using Cronbach's alpha to ensure internal consistency of the measurement instruments. Exploratory factor analysis was performed to confirm the underlying structure of the composite variables, particularly the local government performance index. Correlation analysis was conducted to examine associations among the study variables. Subsequently, multiple linear regression analysis was employed to estimate the effects of Legal Clarity, Financial Autonomy, Legal Enforcement and Intergovernmental Legal Relations on Local Government Performance. Likert-scale responses were aggregated and treated as interval-level data, consistent with empirical practice in governance and institutional research. All statistical tests were conducted at conventional significance levels.

Results

Descriptive Results

Table 1 presents the descriptive statistics for the socio-economic and demographic characteristics of the 384 households surveyed. The findings reveal a high prevalence of food insecurity, substantial exposure to shocks, and limited household resources.

Table 1: Descriptive Statistics of Household Characteristics

Variable	Category / Statistic	Frequency (%) / Value
Food Insecurity	Food secure	138 (35.9)
	Food insecure	246 (64.1)
FIES Categories	Food secure / Mild	138 (35.9)
	Moderate	116 (30.2)
	Severe	130 (33.9)
Household Shock	No shock	51 (13.3)
	Experienced shock	333 (86.7)
Education (Household Head)	No formal education	108 (28.1)
	Primary	82 (21.4)
	Secondary	126 (32.8)
	Tertiary	68 (17.7)
Residence	Urban	57 (14.8)
	Rural	327 (85.2)
Household Size	Mean	9.0 (Range: 1–28)
Household Income (₦)	Mean	35,750 (Range: 7,500–270,000)
Age of Household Head	Mean	49.1 (Range: 25–103)

Source: Author's computation using Stata 13.

The descriptive results indicate that nearly two-thirds of households (64.1%) were food insecure, while only 35.9% were food secure. Using the Food Insecurity Experience Scale (FIES), 30.2% of households experienced moderate food insecurity, and 33.9% faced severe food insecurity, highlighting the magnitude of food access challenges.

Most households (86.7%) reported exposure to shocks, including crop failure, health emergencies, or economic downturns, underscoring their vulnerability. Education levels among household heads varied, with 28.1% having no formal education, 21.4% attaining primary education, 32.8% secondary education, and 17.7% tertiary education. Limited formal education likely constrains employment opportunities, income generation, and access to resources.

The majority of households were rural (85.2%), where dependence on rain-fed agriculture and weak infrastructure exacerbate vulnerability to food insecurity. Average household size was nine members, intensifying strain on resources. Income levels were generally low (mean ₦35,750), reflecting limited capacity to secure adequate food. The average age of household heads was 49 years, indicating a diverse age profile, with older household heads potentially facing higher vulnerability due to declining productivity and limited income sources.

Determinants of Food Insecurity

Table 2 summarizes the results of the logistic regression analysis examining socio-economic and demographic determinants of household food insecurity.

Table 2: Logistic Regression Results of Food Insecurity Determinants

Variable	Coef. (β)	Odds Ratio (exp(β))	z	p-value	95% CI
Household Income	-0.289	0.75	-7.37	0.000***	0.69 – 0.81
Age of Household Head	0.013	1.01	3.72	0.000***	1.01 – 1.02
Education (ref = Primary)					
– Secondary	-0.195	0.82	-1.45	0.148	0.63 – 1.07
– Tertiary	-0.840	0.43	-6.22	0.000***	0.33 – 0.56
– Non-formal	0.731	2.08	4.82	0.000***	1.54 – 2.79
Gender (ref = Male)					
– Female	-0.250	0.78	-1.48	0.140	0.56 – 1.08
Residence (ref = Urban)					
– Rural	0.089	1.09	0.94	0.347	0.91 – 1.32
Household Shock (ref = No shock)					
– Experienced shock	0.941	2.56	8.65	0.000***	2.07 – 3.17

Model summary: N = 384; LR $\chi^2(8) = 373.15$; Pseudo $R^2 = 0.083$; **$p < 0.001$.*

The regression analysis shows that household income significantly reduces the likelihood of food insecurity ($\beta = -0.289$, OR = 0.75, $p < 0.001$), consistent with evidence from Nigeria and other low- and middle-income countries where income poverty is a primary driver of inadequate food access.

Age of the household head was positively associated with food insecurity ($\beta = 0.013$, OR = 1.01, $p < 0.001$), suggesting that older-headed households are slightly more vulnerable, likely due to reduced labor capacity and larger dependent burdens.

Education of the household head was a significant protective factor. Households headed by individuals with tertiary education were substantially less likely to be food insecure ($\beta = -0.840$, OR = 0.43, $p < 0.001$), while non-formal education increased vulnerability ($\beta = 0.731$, OR = 2.08, $p < 0.001$). Secondary education showed a non-significant protective trend. These findings align with literature indicating that formal education enhances employment, income potential, and household resource management, thereby reducing food insecurity risk.

Household gender and rural–urban residence were not statistically significant predictors, indicating that once income, shocks, and education are controlled for, these factors do not independently influence food security status.

Experiencing shocks was strongly associated with food insecurity ($\beta = 0.941$, OR = 2.56, $p < 0.001$), reflecting the disruptive impact of environmental, economic, and health-related events on household livelihoods.

Discussion of results

This study investigated the socio-economic and demographic determinants of household food insecurity in North East Nigeria using the Food Insecurity Experience Scale (FIES) and a logistic regression approach. The findings reveal a high incidence of food insecurity and identify household income, educational attainment, and exposure to shocks as the most influential determinants of food security outcomes.

The results indicate that nearly two-thirds of households were food insecure, with over one-third experiencing severe food insecurity. This prevalence is consistent with recent evidence from conflict-affected and agro-ecologically fragile regions of Nigeria and the wider Sahel, where poverty, climatic variability, and insecurity continue to constrain food access (FAO et al., 2023; Ojo et al., 2022). The substantial proportion of households facing severe food insecurity suggests that food insecurity in the study area is largely chronic and structural rather than temporary.

Household income emerged as a strong and statistically significant protective factor against food insecurity. The negative relationship between income and food insecurity aligns with a substantial body of empirical evidence from Nigeria and other low- and middle-income countries (Adebayo & Adekunle, 2016; Ogunniyi et al., 2021). Higher income enhances households' ability to purchase sufficient and diverse food, smooth consumption over time, and absorb short-term economic shocks. In North East Nigeria, where household sizes are relatively large and livelihood opportunities are limited, income constraints substantially intensify food insecurity. This finding reinforces the argument that food insecurity in the region is driven primarily by limited economic access rather than by food availability alone.

Education of the household head was a key determinant of food security status. Households headed by individuals with tertiary education were significantly less likely to be food insecure, while those headed by individuals with non-formal education faced a markedly higher risk. These findings are consistent with prior studies showing that formal education improves access to stable employment, income diversification, and effective household decision-making (Adepoju et al., 2020; Headey & Martin, 2016).

The absence of a statistically significant effect for secondary education suggests that partial formal schooling may be insufficient to generate substantial improvements in livelihood opportunities within the study context. This contrasts with evidence from more urbanized or industrialized settings, where secondary education is often associated with stronger protective effects against food insecurity (Smith et al., 2021). The heightened vulnerability associated with non-formal education underscores its limited capacity to translate into economic resilience and improved food security outcomes.

Exposure to shocks was among the most powerful predictors of food insecurity, more than doubling the likelihood of being food insecure. This result strongly aligns with the resilience and vulnerability literature, which emphasizes that shocks such as crop failure, illness, displacement, and price volatility can precipitate persistent food insecurity by disrupting

income streams and depleting household assets (Dercon, 2004; Béné et al., 2018). In North East Nigeria, where livelihoods depend heavily on rain-fed agriculture and informal economic activities, such shocks rapidly undermine household resilience.

The magnitude of this effect highlights the fragility of household livelihoods and the limited availability of formal coping mechanisms. It suggests that effective food security interventions must go beyond short-term food assistance to include shock-responsive social protection and risk management strategies.

The positive association between the age of the household head and food insecurity, although modest, indicates that older-headed households face slightly higher vulnerability. This finding is consistent with evidence that aging household heads may experience declining labor productivity and reduced access to stable income sources, particularly in contexts lacking comprehensive pension or social security systems (Abdulrahman & Yusuf, 2019).

In contrast, gender of the household head and rural–urban residence were not statistically significant predictors once income, education, and exposure to shocks were controlled for. This finding diverges from studies that report higher vulnerability among female-headed or rural households (Quisumbing et al., 2015). It suggests that in the study area, structural socio-economic constraints exert a stronger influence on food security outcomes than gender or location alone. Consequently, interventions based solely on gender or residence may be less effective than those targeting underlying economic conditions and vulnerability to shocks.

Conclusion

Household food insecurity in North East Nigeria is pervasive and predominantly chronic. Using the Food Insecurity Experience Scale (FIES), this study identified household income, educational attainment of the household head, and exposure to shocks as the key determinants of food security outcomes. Higher income and tertiary education were associated with a lower likelihood of food insecurity, whereas non-formal education and exposure to shocks increased vulnerability. Age of the household head had a modest effect, while gender and rural–urban residence where not significant once socio-economic conditions were accounted for. These findings indicate that structural economic and human capital constraints, compounded by exposure to shocks are the primary drivers of food insecurity in the region.

Policy Implications

The results highlight the need for integrated policy approaches that address both economic access and vulnerability. Interventions should prioritize income-enhancing strategies and livelihood diversification, including support for small-scale enterprises and non-farm employment. Investments in formal education and adult skills development can strengthen household adaptive capacity. Given the strong effect of shocks, social protection programs should be designed to be shock-responsive, incorporating scalable cash transfers, early warning systems, and climate-smart agricultural support. Targeting should focus on economically vulnerable households and those most exposed to shocks rather than relying

solely on demographic or locational criteria. Collectively, these measures can enhance resilience and reduce structural food insecurity in North East Nigeria.

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