



DETERMINANTS OF RURAL HOUSEHOLDS' FOOD INSECURITY AND COPING MECHANISMS IN WESTERN AGRICULTURAL ZONE OF BAUCHI STATE, NIGERIA

¹Yusuf, F. A., ¹Abdullahi S., ²Muhammed, R. and ¹Garba M.

¹Department of Agricultural Extension and Rural Development, ATBU Bauchi

²Department of Agricultural Economics, ATBU Bauchi

Corresponding Author's Email: fatee1995.fya@gamil.com, **GSM:** 07064424418

ABSTRACT

This study examined the determinants of rural households' food insecurity and coping mechanisms in the Western Agricultural Zone of Bauchi State, Nigeria. A multi-stage and simple random sampling technique was used to select 212 rural households from two Local Government Areas Bauchi and Toro. Primary data collected through structured questionnaires were analyzed using descriptive statistics and linear regression. The results revealed that mean age of respondents was 36 years; majority were male (81.1%), married (75.9%), with a mean household size of 5 persons. Secondary education (32.5%) and crop farming (41.5%) were predominant among households. Linear regression showed that membership of cooperatives ($P < 0.05$) and frequency of extension contact ($P < 0.05$) were positive and significant in influencing food security among the respondents. Similarly, sex ($P < 0.01$) and access to extension ($P < 0.05$) were negative and significant in influencing food security. The most frequently cited constraints were lack of government support (57.1%), lack of awareness (46.7%), no assets to sell (20.3%), poor transportation (17.9%), and high cost of inputs (16.0%). It is concluded that food insecurity in the study area is significantly shaped by cooperative membership, extension contact frequency, and gender disparities. However, weak institutional support, poor awareness, and asset poverty severely limit households' capacity to adopt effective coping strategies. Hence, it is recommended that respondents should strengthen and expand farmer cooperative societies with improved access to inputs, credit, and collective marketing, government should revitalize agricultural extension services through regular, gender-sensitive, and nutrition-focused training visits, establish targeted social safety nets (e.g., food assistance, subsidized inputs) for female-headed and asset-poor households.

Keywords: Food, Insecurity, Households, Coping, Mechanisms, Determinants

INTRODUCTION

Food is the most basic and necessary need in life, and it must be met before any other emerging need, it is very essential for human survival (Osuji *et al.*, 2017). Food security can be measured by proxies such as food consumption scores, household dietary diversity score, months of adequate food provision, household food expenditure, etc. (Pritchard *et al.*, 2019). Food insecurity's general prevalence in society as well as its overall ill effects are no longer in question; instead, researchers aim to identify higher risk populations in efforts to better understand the exact mechanisms by which food insecurity manifests itself. However, by definition, food security status is seen as "an inherently subjective social condition" (Nikolaus *et al.*, 2019). This becomes problematic to study at only one period in time because an individual's financial resources shift over time, which typically correlates with a subsequent shift in their food security status (Fernandez *et al.*, 2019). The alarming rise of food insecurity in Nigeria necessitates prompt action. As much as 21.4% of Nigerian families were experiencing acute food scarcity in 2020 (Osabohien *et al.*, 2020). Similarly, Erokhin and Gao (2020) reported that 50% of the Nigerian population are living below poverty line of 1.9 USD per day. The Global Food Security Index (GFSI) rating shows that Nigeria ranked 94th out of 113 nations in 2019 with a 48.4/100 score, which puts the country below Ethiopia, Niger, and Cameroon (Ayinde *et al.*, 2020). In addition, Nigeria has overtaken India as the world's most impoverished country (Ayinde *et al.*, 2020). Otekunrin *et al.* (2019) and Amzat and Aminu (2020) reported that food insecurity in the country is aggravated by rapid population growth; they predicted that Nigeria's population would grow to 400 million people by 2050. Globally, Nigeria is rank 103rd out of 121 countries in Global Hunger



Index (GHI) with a score of 27.3 that signifies hunger is serious (GHI, 2022). The poverty in rural areas is 72% compared to 42% in urban areas (MBS/UNICEF, 2022). On income measure of poverty, 40% (83 million people) of the population lives below the International Poverty Line of \$1.90 daily and food insecure, whilst another 25% are vulnerable (World Bank, 2021).

The poorest countries of the world are found in Africa while they face chronic poverty and food insecurity (Farzana *et al.*, 2017). In the same vein, these countries are heavily dependent on rain fed agriculture and this predisposes the region to environmental hazards such as droughts, desertification, erosion and many others. Consequently, countries have had to develop a range of coping mechanisms to either cushion the effect or strengthen their resilience to household food insecurity. Literature has identified diverse coping strategies applied at the household level amongst population affected by natural calamity such as droughts and erosion (Farzana *et al.*, 2017; Drammeh *et al.*, 2019; Mohammed *et al.*, 2021). Of particular reference is the construction of several dam projects to alleviate issues. The determinants of food insecurity can be broadly categorized into social, economic, environmental, political and physical factors. Countries have become more food insecure as a result of factors such as: droughts, land degradation, population explosion, lack of productive resources, insufficient assets, poverty and deprivation (Fikire and Zegeye, 2022). Food insecurity has been and remained a public health threat that needs to be addressed in order to reduce environmental hazards and problems of malnutrition, dietary diversity needs and psychological dysfunction (Drammeh *et al.*, 2019). This study aims at addressing the pressing issue of food insecurity among rural households, particularly in the western agricultural Zones of Bauchi State. By examining the determinants and coping strategies of rural farmers, the research aims to enhance understanding of their unique challenges. The findings will inform policy makers and support the development of targeted interventions to improve food security for vulnerable populations.

The aim of this study is to examine the food insecurity among rural households, in the Western Agricultural Zone of Bauchi State. The specific objectives are to;

- i. describe the socioeconomic characteristics of the respondents in the study area;
- ii. determine the factors influencing the food security status of the respondents
- iii. identify constraints to adoption of the coping strategies.

METHODOLOGY

The Study Area

The study was conducted in Bauchi State, Nigeria, specifically within the Western Agricultural Zone. Bauchi State is located between latitude 9°30'N to 12°30'N and longitude 8°50'E to 11°00'E of the Greenwich meridian (BASDP, 2019). It lies in the northeastern region of Nigeria and shares boundaries with Jigawa and Kano States to the northwest, Yobe State to the northeast, Gombe and Taraba States to the southeast, and Plateau State to the southwest. According to the National Population Commission (NPC, 2023), Bauchi State has a projected population of approximately 8 million people, with an annual growth rate of 3.2%. The area is characterized by two distinct seasons: the dry season, which lasts from November to March, and the rainy season, which spans from May to October. The annual rainfall ranges from 800 mm to over 1,200 mm, with rainfall duration of 4–5 months (BASDP, 2019). The temperature ranges from 14°C to 38°C, depending on the season. The vegetation of the area falls within the Sudan and Guinea savannah zone, featuring scattered trees, shrubs, and grasses. Dominant tree species include *Parkia biglobosa* (locust bean), *Azadirachta indica* (neem), and *Mangifera indica* (mango). Rivers and streams such as River Gongola and River Jama'are are key water sources in the region.

Sampling Technique and Sample Size

A multi-stage and simple random sampling technique will be used to select the respondents for this study. The first stage involved a purposive selection of two (2) local government areas which are Bauchi and Toro LGA's as they represent key areas in the western agricultural zone. In the second stage, a simple random sampling technique was used to select two (2) rural communities from each selected local government area, making a total of six rural communities. The last stage will involve a



random selection of twenty (20%) households from each selected rural community to give a total of 212 households for the study.

Table 1: Sampling size and Sampling Technique

LGA	Communities	Sampling frame	Sample size (20%)
Bauchi	Kangere	257	51
	Bayara	198	40
Toro	Tilde	342	68
	Magama	265	53
Total		1,062	212

Authors computation, 2025

Methods of Data Collection

Primary data were collected using a structured questionnaire, which will be administered to rural households in the study area. The questionnaire is divided into sections based on the specific objectives of the study.

Methods of Data Analysis

Data collected were analyzed using both descriptive and inferential statistics.

Descriptive statistics

The descriptive used for this study include, frequency distribution, percentage and mean to analyzed objective i, and iii.

Inferential statistics

The inferential statistics used was linear regression to achieve objective ii. The explicit form of the model is;

Linear regression is use to estimate regression function statistics which is given as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + e$$

Where:

Y= Rural household food security status ($Y=1$ – for food secure)
($Y=2$ – for food insecure)

X₁ = Age (years)

X₂ = Sex (1= male, 2=female)

X₃ = Marital status (1= divorced, 2=married, 3=single, 4=widowed)

X₄ = Household size (number of persons)

X₅ = Educational level (1=primary, 2=qu’anic, 3=secondary, 4=tertiary)

X₆ = Occupation (1=artisan, 2=civil servant, 3=crop farming, 4=livestock farming, 5=trading)

X₇ = Access to credit (1=yes, 2=no)

X₈ = Membership of cooperatives (1=yes, 2=no)

X₉ = Access to extension (1=yes, 2=no)

X₁₀ = Frequency of extension contact (1=none, 2=annually, 3=fortnightly, 4=monthly, 5=quarterly, 6=weekly)

β_0 = Constant

$\beta_1 - \beta_{10}$ = Regression coefficients

e = Error term

RESULTS AND DISCUSSION

Socioeconomic Characteristics of the Respondents

Table 2 shows the socioeconomic characteristics of the respondents. The results indicated that 29.7% and 25% of respondents were between 35–44 years, and 25–34 years with a mean age of 36 years. the results also revealed that 20.3%, 13.2% and 11.8% of the respondents were within the age of 55 years and above, 45-54 years and 15-24 years, respectively. This implies that most farmers were in their economically active age, capable of engaging in productive agricultural activities. Similar findings by Mohammed *et al.* (2024) and Bello and Musa (2021) affirm that active working-age farmers tend to adopt better production practices that influence household food security positively. The findings further



revealed that majority (81.1%) of the respondents were male, while 18.9% were female. This finding showed that farming in the study area is male-dominated, which could be attributed to cultural norms and gender roles that limit women’s participation in farming and decision-making processes. This result is consistent with Adamu *et al.* (2023) and Garba & Bala (2022), who reported male dominance in agricultural production in northern Nigeria.

In addition, majority (75.9%) of the respondents were married, while 19.3%, and 2.4% were single, divorced and widowed. The predominance of married farmers indicates family stability and access to family labour, which can contribute to agricultural productivity and household welfare (Yakubu *et al.*, 2022). The findings further showed that most respondents (60.8%) had between 1–5 members, while 31.1% had between 6–10 with a mean household of 5 persons. Smaller households may have less family labour for agricultural work but lower consumption needs. This finding agrees with Musa and Idris (2023), who noted that household size affects food security by influencing consumption production balance.

Table 2: Distribution of Respondents According to their Socioeconomic Characteristics of the (n=212)

Variables	Frequency	Percentage	Mean
Age			
15 – 24	25	11.8	
25 – 34	53	25.0	
35 – 44	63	29.7	36
45 – 54	28	13.2	
55 and Above	43	20.3	
Sex			
Female	40	18.9	
Male	172	81.1	
Marital status			
Divorced	5	2.4	
Married	161	75.9	
Single	41	19.3	
Widowed	5	2.4	
Household size			
1 – 5	129	60.8	5
6 – 10	66	31.1	
11 – 15	8	3.8	
16 – 20	7	3.3	
21 and Above	2	1.0	
Educational level			
Primary School	40	18.9	
Qur’anic education	62	29.2	
Secondary School	69	32.5	
Tertiary Education	41	19.3	
Occupation			
Artisan	14	6.6	
Civil servant	14	6.6	
crop farming	88	41.5	
livestock farming	44	20.8	
Trading	52	24.5	

Source: Field Survey (2025)

The results further showed that 32.5% of the respondents had secondary education, while 29.2% and 19.3% had qur’anic, and tertiary education. This reflects a moderate literacy level among rural farmers, which can enhance awareness of improved farming practices and nutrition knowledge (Adewuyi and Ahmed, 2023). Similarly, the results revealed that 41.5% of the respondents, while 24.5%, 20.8% and 6.6% were traders, livestock farmer, artisans and civil servants, respectively. This



indicates that crop farming remains the dominant livelihood source, while trading serves as an important supplementary income source. This aligned with FAO (2022) and Ojo *et al.* (2023), who reported that households solely dependent on agriculture were more food insecure than those with diversified income sources.

Factors Influencing Food Security among Respondents

The results from Table 3 revealed the regression results on the factors influencing food security among respondents. The finding showed that frequency of extension contact (2.25) had a positive and significant ($P < 0.05$) influence on food security. This indicated that more frequent interactions with extension agents improved food security. The implication was that regular extension contacts enhanced farmers’ knowledge, adoption of improved practices, and decision-making, thereby improving food availability and access. This finding aligned with World Bank (2023) and FAO (2021), who emphasized that consistent and sustained extension engagement was critical for improving household food security. Membership of cooperatives (2.37) had a positive coefficient and was significant ($P < 0.05$). This result indicated that cooperative membership significantly improved food security among respondents. The implication was that cooperatives enhanced access to inputs, information, collective marketing, and social support, thereby strengthening households’ food security. This finding was consistent with FAO (2022) and Adepoju *et al.* (2023), who emphasized the role of farmer organizations in improving food access and resilience.

Table 3: Factors Influencing Food Security among Respondents

Variables	Coef.	Std. Err.	t	P t
Age	-.0022558	.0024241	-0.93	0.353
Sex	-.2069826	.0797832	-2.59	0.010***
Marital status	-.0263421	.0309485	-0.85	0.396
Household size	-.0083141	.0084638	-0.98	0.327
Educational level	-.0111126	.0320289	-0.35	0.729
Farming experience	-.0016103	.0034372	-0.47	0.640
Occupation	.0151007	.0199863	0.76	0.451
Access to credit	-.081304	.0737638	-1.10	0.272
Membership of cooperatives	.1715823	.0722504	2.37	0.019**
Access to extension	-.1414753	.0706098	-2.00	0.046**
Frequency of extension contact	.0475915	.0211446	2.25	0.025**
-cons	1.985159	.2982711	6.66	0.000

Source: Field Survey (2025)

***, **Significant at 1% and 5%

Similarly, sex (-2.59) was negative and significant ($P < 0.01$). This result indicated that sex significantly influenced food security, with female-headed households being more food insecure compared to male-headed households. The implication was that gender-related inequalities in access to productive resources, income opportunities, and decision-making power negatively affected food security outcomes. This finding was consistent with FAO (2023) and World Bank (2022), who documented that female-headed households in sub-Saharan Africa were more vulnerable to food insecurity due to structural and socio-economic disadvantages. The finding further showed access to extension services (-2.00) had a negative but significant ($P < 0.05$). This unexpected negative relationship suggested that respondents with access to extension services were more likely to be food insecure. The implication was that extension services might have been inadequate, poorly targeted, or focused on production without addressing post-harvest handling, income, and nutrition. Similar paradoxical findings were reported by Sani *et al.* (2021), who argued that weak extension systems often failed to translate advisory services into tangible food security outcomes.

Constraints to Adoption of Coping Strategies

The finding from Table 4 presented the constraints that limited respondents’ ability to adopt effective coping strategies against food insecurity. The findings revealed that lack of government support ranked first, with more than half of the respondents (57.1%) identifying it as a major constraint. This finding implied that inadequate policy backing, social safety nets, and targeted intervention



programmes limited households’ capacity to cope effectively with food insecurity. The absence of government support reduced access to subsidies, food assistance, and livelihood programmes that could strengthen resilience. This finding was consistent with World Bank (2023) and FAO (2022), who reported that weak institutional support significantly constrained households’ ability to respond to food shocks in developing countries. Lack of awareness was the second-ranked constraint, reported by 46.7% of respondents. This indicated that many households were not sufficiently informed about available coping options, food assistance programmes, or adaptive strategies. The implication was that information gaps reduced households’ ability to make informed decisions during periods of food stress. Similar observations were made by Oluwatayo and Oluwatayo (2022), who noted that inadequate awareness limited the utilization of food security interventions among rural households.

Table 4: Constraints to adoption of Coping Strategies

Variables	Frequency*	Percentage	Rank
Lack of government supports	121	57.1	1 st
Lack of awareness	99	46.7	2 nd
No assets to sell	43	20.3	3 rd
Poor transportation	38	17.9	4 th
High cost of inputs	34	16.0	5 th
No one to borrow from	31	14.6	6 th
Market not accessible	16	7.5	7 th
Lack of access to credit facilities	11	5.2	8 th
Inadequate extension services	11	5.2	8 th
Cultural or religious restrictions	10	4.7	10 th
Lack of Collateral	9	4.2	11 th
Poor health or physical weakness	4	1.9	12 th

Source: Field Survey (2025)

*Multiple response

The finding further showed that lack of assets to sell was identified by 20.3% of respondents as a constraint. This finding implied that some households lacked physical or financial assets that could be liquidated during food shortages. The absence of assets reduced flexibility and increased vulnerability, as asset-based coping strategies often serve as a buffer during crises. This finding aligned with Maxwell *et al.* (2021), who emphasized that asset-poor households faced higher risks of falling into chronic food insecurity. Poor transportation was reported by 17.9% of respondents. This suggested that inadequate transport infrastructure constrained access to markets, food sources, and employment opportunities. The implication was that even when food was available, households faced logistical barriers to accessing it. Similar findings were reported by IFAD (2022), which highlighted poor rural transport systems as a key barrier to food access and livelihood diversification. In addition, high cost of inputs was identified by 16.0% of respondents as a limiting factor. This finding implied that rising prices of agricultural and livelihood inputs reduced households’ ability to increase production or income as a coping response. The implication was that cost-related barriers weakened productive coping strategies and reinforced reliance on consumption-based adjustments. This observation was consistent with FAO (2023), which linked high input costs to reduced adaptive capacity among smallholder households. Lack of where to borrow from was reported by 14.6% of respondents. This indicated weak social networks and limited access to informal credit. The implication was that households without strong social capital were less able to smooth consumption during food shortages. This finding supported earlier studies by Woolcock and Narayan (2021), who emphasized the role of social networks in enhancing household resilience to food insecurity.

Similarly, inadequate access to market was identified by 7.5% of respondents. This finding implied that geographical distance, poor roads, or market inefficiencies constrained food access and income generation. The implication was that limited market access restricted households’ ability to purchase food or sell produce as part of their coping strategies. This result was consistent with findings by WFP (2022), which reported that market access significantly influenced food security outcomes in rural areas. Lack of access to credit facilities and inadequate extension services, each reported by 5.2%



of respondents, indicated institutional constraints. Limited access to credit reduced households' ability to invest in productive activities or smooth consumption, while weak extension services constrained access to technical advice and livelihood diversification options. These findings aligned with studies by Adekunle *et al.* (2023), who emphasized that credit and extension services were critical enablers of effective coping and adaptation strategies. The finding also revealed that cultural or religious restrictions, reported by 4.7% of respondents, suggested that social norms and beliefs influenced the acceptability of certain coping strategies. The implication was that cultural constraints could limit participation in specific livelihood activities or food choices, thereby reducing adaptive flexibility. This finding was consistent with Sulaiman and Ahmed (2021), who noted that sociocultural factors shaped food security behaviors in northern Nigeria.

Lack of collateral was identified by 4.2% of respondents. This finding implied that households were unable to secure formal loans due to the absence of acceptable assets. The implication was that credit constraints reinforced vulnerability and limited investment in coping and recovery strategies. Similar findings were reported by IFAD (2021), which highlighted collateral requirements as a major barrier to rural credit access. Poor health or physical weakness was the least reported constraint (1.9%). Although reported by a small proportion of respondents, this finding implied that health challenges reduced labour capacity and limited households' ability to engage in income-generating or labour-intensive coping strategies. This observation was consistent with WHO (2022), which emphasized the strong linkage between health status, labour productivity, and food security.

CONCLUSION AND RECOMMENDATION

The study concludes that food insecurity among rural households in the Western Agricultural Zone of Bauchi State, Nigeria, is significantly shaped by institutional, gender, and knowledge-related factors. While cooperative membership and frequent extension contact positively influence food security, female-headed households remain disproportionately vulnerable due to structural inequalities. Furthermore, weak institutional support, poor awareness of coping strategies, asset poverty, and infrastructural barriers such as poor transportation and high input costs severely constrain households' capacity to adopt effective coping mechanisms.

It is therefore recommended that;

- i. Government should strengthen farmer cooperatives with subsidized inputs, credit access, and collective marketing.
- ii. Extension services should be revitalized with regular, gender-sensitive, and nutrition-focused training visits.
- iii. Awareness campaigns should be conducted at community workshops and radio programs in local languages on coping strategies.
- iv. Rural roads and market access should be improved to reduce transportation barriers.

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