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POST-INSURGENCY ANALYSIS OF FOOD SECURITY AMONG FARMING HOUSEHOLDS IN MICHIKA LOCAL GOVERNMENT AREA, ADAMAWA STATE, NIGERIA

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ABSTRACT

This study analysed the food security status of farming households in Michika Local Government Area, Adamawa State, Nigeria, in the post-Boko Haram insurgency period. The specific objectives were to assess the food security status, analyse the influencing socio-economic characteristics and identify coping strategies among returnee farmers. A multi-stage sampling technique was employed to select 128 households across four districts. Data were analysed using descriptive statistics, a Food Security Index (FSI) based on a 2710 kcal per day benchmark and a binary logistic regression model. The results reveal a high level of food insecurity, with 70.31% of households classified as food insecure. The mean per capita calorie consumption (2199.51 kcal) was significantly below the recommended requirement. The regression analysis identified household size, access to credit, annual income, farm size, and years of formal education as significant factors ($p<0.05$) influencing the probability of being food secure. Predominant coping strategies included eating less preferred foods, reducing meal portions, selling assets and borrowing food or money. The study concludes that food insecurity remains endemic in post-insurgency Michika. Recovery efforts have been insufficient to restore pre-conflict agricultural livelihoods. It is recommended that policy interventions prioritise improving access to credit and agricultural inputs, rehabilitating infrastructure, revitalising extension services and promoting livelihood diversification to enhance resilience and sustainable food security in the region.

Keywords: Food Security, Post-Insurgency, Farming Households, Coping Strategies, Michika, Nigeria.

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INTRODUCTION

Food security, defined as a state where all people, at all times, have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 2008), remains a fundamental global challenge. In Nigeria, this challenge is particularly acute in the Northeast region, which has been the epicenter of a prolonged and devastating insurgency led by the Boko Haram group since 2009. This conflict has resulted in widespread displacement, loss of lives, destruction of livelihoods, and a severe disruption of agricultural activities the primary occupation of the majority in the region (Bala & Fave, 2023)

Adamawa State and specifically Michika Local Government Area has been one of the areas most severely impacted by the insurgency. Michika, an agrarian community known for the production of crops like maize, sorghum, groundnuts, and vegetables, was occupied by insurgents for a significant period, leading to massive population displacement, destruction of farmlands, and looting of agricultural assets such as livestock, seeds, and tools (Amusa*et al.*, 2021).According to International Office of Migration (IOM) assessment in October 2018, over 1.8 million persons had been displaced across Borno, Yobe and Adamawa States with Borno State remaining the epicentre of Boko Haram conflict hosting over 1.4 million Internally Displaced Persons in 2020 (IDPs) (FEWS NET, 2020). Global Rights (an International Non-Governmental Organisation) report reveals that 3,188 persons, including 2,707 civilians and 481 security operatives, were reportedly killed in 2019 (FEWS NET, 2020). While military operations have since liberated these areas, marking a transition to a post-insurgency phase, the residual effects on the socio-economic fabric and food production systems are profound and enduring.

The post-insurgency environment presents a complex set of challenges that continue to threaten food security. Studies across Northeast Nigeria have documented these lingering effects. Research in Borno State, for instance, found that despite the return of relative calm, farming households face critical constraints including limited access to farmland due to fear of remnant insurgents and unexploded ordinances, severe shortage of improved seeds and fertilizers and a crippled agricultural extension service system (Baba &Azare, 2020). Furthermore, the destruction of critical infrastructure like irrigation facilities, storage silos, and rural roads has impeded production and market access, perpetuating a cycle of poverty and hunger (Nwagboso & Onwe, 2022).The psychological trauma inflicted by the insurgency is another significant, yet often overlooked, barrier to restoring food security. A study by Okeke *et al.* (2022) in neighbouring Yobe State revealed high levels of post-traumatic stress disorder (PTSD) among farmers, which negatively correlates with agricultural productivity. This suggests that the path to recovery requires not only material support but also psychosocial interventions.

In Adamawa State, evidence points to a dire food security situation. The National Bureau of Statistics (NBS) in its 2021 report indicated that Adamawa had one of the highest rates of food insecurity in the country, with a significant portion of the population consuming inadequate diets. Michika LGA, given its history of occupation and intense conflict, is likely to be among the most affected areas within the state. However, while broad regional studies exist, there is a paucity of specific, localized research that delves into the unique post-insurgency food security dynamics of farming households in Michika LGA. Most studies have focused on Internally Displaced Persons (IDPs) in camps rather than on returnee farming households attempting to rebuild their livelihoods in their communities (Akwara *et*

al., 2020). This study, therefore, seeks to conduct a post-insurgency analysis of the food security status of farming households in Michika LGA of Adamawa State, Nigeria. The objectives of this study are to assess the food security status of the respondent in the post-insurgency era, analyze the socio-economic characteristics of the respondents that influence their food security status; and identify the food insecurity coping strategies among farmers in post insurgency era.

METHODOLOGY

The Study Area

The study was carried out in Michika Local Government Area of Adamawa State, Nigeria. It lies on latitude 10°37′N and longitude 13°23′E of the Greenwich meridian. Created in 1976, it is situated in the northern part of the state, sharing boundaries with the Republic of Cameroon to the east, Madagali to the north, Askira-Uba of Borno State to the west, and Mubi North and Hong LGAs to the south. The area lies in a valley of igneous and sedimentary rocks with fertile sandy-loam to clay soils that support diverse crop production. It records annual rainfall of between 912–1223 mm lasting 5–6 months, making it suitable for agriculture. The Local government Area has a population of 155,238 people as 2006 population census and project to 242,118 as of 2024 based on annual growth rate of 2.5% (NPC, 2006). Michika is predominantly inhabited by the Kamwe people, whose language and traditions dominate the area. Oral tradition traces the founding of Michika to the late 17th century by Kwada Kwakaa, a prince and hunter. The area comprises eight districts, with Ngida Zakawa Kwache serving as the current district head since 2013. Michika is the most populated LGA in Adamawa State and is fairly cosmopolitan, hosting financial institutions, a college of health and technology, a technical college, and several secondary schools, notably the Government Senior Secondary School Michika. The people are largely Christians, with a minority of Muslims and traditional worshippers, and the area consists of about 26 chiefdoms and 84 villages (Iliya, 2016)

Culturally, Michika is renowned for its rich traditions and festivals such as the Yawale, Wasinata, Ngarba, and the Zhitta dance. It also boasts tourist attractions including the Kwandree cold spring water at Dlaka and the Kamale peak at Kamale (Debki, 2009). To preserve and showcase their heritage, the Kamwe elders revived their annual cultural festival in 2017, held every April before the rainy season. However, the town also has a history of insecurity, as it was seized by Boko Haram insurgents in September 2014. The Nigerian military, however, successfully recaptured Michika on 29 January 2015, a development publicly announced by then-President Goodluck Jonathan during his campaign visit to Adamawa State (BBC news, 2016).

Sampling procedure and Sample Size

Random sampling methods were used to collect data for the study. Five hundred and one (501) farming household were selected from 4 out of 8 districts using random sampling method to form the sampling frame for the study. Similarly, 151 (Table 1) respondents representing 30% were randomly selected from the sampling frame as posited by Hair *et al.* (2010). The distribution of the questionnaires includes both crop and livestock farmers in the study area. In the end, 128 questionnaires were correctly cleaned, retrieved and used for data analysis.

Table 1: Selection of Respondents for the Study

S/N	Districts	Villages		Total number of farmers	Sample size
1	Bazza	i.	Bazza Marghi	59	18
		ii.	Kudzum	34	10
2	Michika	i.	Anguwan Layi	51	15
		ii.	Michika	62	19
		iii.	Bokka	49	15
3	Nkaffa	i.	Wuro Gayandi	49	15
		ii.	Wula	21	6
		iii.	Mboruro	49	15
4	Futu	i.	Futudu	64	19
		ii.	Himike	17	5
		iii.	Vukague	46	14
Total	4			501	151

Source: Field Survey, 2020

Method of Data Analysis

Data generated were analyzed using descriptive statistics, Food Security Index and Binary Logistic Regression Analysis. Descriptive statistics was employed achieve objectives iii of the study.

Food Security Index (FSI)

The approach taken for the determination of food security index was the identification and aggregation procedures. Identification is the process of defining a minimum level of nutrition necessary to maintain healthy living. This is referred to as the 'Food Security Line", below which people are classified as food insecure and subsisting on inadequate nutrition. The food security line to be used in this study was based on the daily-recommended level of calories of 2710 Kcal (Babatunde *et al.,* 2007). In order to generate food security indices, the nutrient content of the food items consumed were used to derive calorie availability and this served to achieve objective i of this study. The Food Security Index was calculated using the relation;

$$Zi = \frac{household\ dialy\ per\ capita\ calorie\ and\ protein\ consumption\ \ (x)}{household\ dialy\ per\ capita\ calorie\ and\ protein\ require\ \ (y)} \qquad (1)$$

For a household to be food secured, Zi must be greater than or equal to 1 (Zi> 1). If Zi is less than 1 (Zi< 1), the household is food insecure. The quantity of crops produced, purchased and received as gifts were converted to kilogram and further to calorie consumed per day per household and then compared with the standard (2710 kcal). For the purpose of this study a Farm Household is a group of individuals who contribute to and share a common economic resources base and relied on the income from that base for the greater part of their food acquisition and utilization (Akosikumah *et al.*, 2025).

The nutrient composition of commonly eaten foods in Nigeria (Babatude *et al*., (2007) was used to estimate the calorie intake of household. On the other hand, the equivalent male adult scale to determine adjusted household size. Most studies focused attention on calorie availability and consumption in assessing food security status of respondents (Babatunde *et*

al., 2007); because according to them most diets contain adequate amounts of all other nutrient required for good and healthy living once it is taken in quantity that is enough to meet the individual's energy requirements.

Binary Logistic Regression Analysis

Logit model due to its simplicity in the interpretations of the coefficients was used to determine the factors influencing the food security status of the respondents in the post insurgency era. The dependent variable in this case, food security status, is a binary variable which takes a value of one (1) for food secured households and zero (0) for food insecure households. The cumulative logistic probability model was specified by Pindyck and Rubinfeld, (1981) as:

$$p_{i=}f(Z_i) = 1 + \frac{1}{1+e^{-(\alpha+\sum\beta iXi)}} \quad (2)$$

Where Pi is the probability that an individual is being food secure given Xi (the explanatory variables); α and β are parameters estimated. The log odds of the probability that an individual is being food secure is given by:

$$\text{Log}\left(\frac{pi}{1-pi}\right) = Z_i = \alpha+\beta_1X_1+\beta_2X_2\ldots\ldots\ldots\ldots+\beta_nX_n \quad (3)$$

The explanatory/independent variables are:

Z_i = Food Security Status of the household (1 =food secured households; 0= food insecure households)

X_1 = Age of household head (years)

X_2 = Years of formal education of household head

X_3 = Household size (number)

X_4 = Total farm size (Ha)

X_5 = Credit access (access=1, no access=0)

X_6 = Membership of farmers association (member=1, and non-member=0)

X_7 = Household total annual income (Farm + Non-Farm Income) (₦)

X_8 = Dependency Ratio (number of non-working age household member/number of working age household members)

RESULTS AND DISCUSSION

Food Security Status of the Respondents

To determine the Daily Recommended Calorie Requirement of each farming household, FAO (2019) and FAO (1983) standard of 2710 Kcal/day was used. The households' composition or daily food requirement (daily calorie requirement) was estimated by first of all categorizing members of each household into different age groups based on the fact that different age groups have different calorie requirements (FAO, 2019, cited in Babatunde *et al.*, 2007)

Table 2: Food Security Status of the Respondents

Variables	Frequency	Percentage
Food secure	38	29.69
Food insecure	90	70.31
Total	128	100

Source: Field survey, 2020

Total household composition or calorie requirement was obtained by multiplying the total number of adult in each households by the recommended calorie requirement of 2,710kcal (i.e Total Number of adult*2710kcal). The total food requirement for children was converted to adult equivalent. This was done by multiplying the total number of children below the age of six (6) years in each household by Recommended Daily Calorie Requirement of 2710kcal and conversion factor of 0.4. The total number of children between the ages of 6 to 18 years in each household was also multiplied by Recommended Daily Calorie Requirement of 2,710kcal and a conversion factor of 0.7 to obtain their adult equivalent. The total Daily Calorie Requirement for each household was obtained by summing up the requirement for the three age groups estimated above.

Table 3: Distribution of Food Security Index of Food Secure Households

Food security index	Frequency	Percentage
1.0-1.29	15	39.50
1.3-1.49	9	23.70
1.5-1.69	4	10.60
1.7-1.79	4	10.60
1.8-1.89	2	5.30
1.9-2.99	2	5.30
3.0 and above	2	5.30
Total	38	100
Minimum	1.01	
Maximum	3.57	
Mean	1.53	

Source: Field survey, 2020

Food security status of farming households in the study area is presented in Table 2. The result indicates majority (70.31%) of farming households were food insecure. The mean food security index of food secure households as shown in Table 3 and Table 4 respectively and was found to be 1.53 and food insecure households was 0.57. The food insecurity gap implies that on the average the food insecure households consumed 57% less than their daily calorie requirements, whilst food secure households consumed 53% in excess of their daily calorie requirements. Per capital daily calorie consumption among respondents as shown in Table 5 was estimated to be 2199.51kcal which is lower than FAO recommended value of 2710 Kcal. This shows that most household in the study area are food in secured.

Table 4: Distribution of Food Security Index of Food Insecure Households

Food Insecure index	Frequency	Percentage
0.1-0.29	17	18.90
0.3-0.49	23	25.60
0.5-0.69	17	18.90
0.7-0.89	16	17.80
0.9-0.99	17	18.90
Total	90	100
Minimum	0.10	
Maximum	0.90	
Mean	0.53	

Source: Field survey, 2020

Table 5: Per capita daily calorie Consumption of Respondents

Per calorie (Kcal)	Frequency	Percentage
200-500	14	10.90
501-1000	29	22.70
1001-1500	22	17.20
2001-2500	21	16.40
2501-3000	14	10.90
Above 3000	28	21.90
Total	128	100
Minimum	269.79	
Maximum	9700.83	
Mean	2199.51	

Source: Field survey, 2020

Factors Influencing Food Security Status of Farming Households

To identify factors influencing food security status of the respondents, socio-economic characteristics of household were regressed against their food security indices and results presented in Table 6. The result showed that five variables; household size, farm size, access to credit, years of formal education, and household income were relevant and significantly influencing food security status of the farming household in the study area. With the exception of household size which showed negative relationship with food security, all other variables have positive relationship with food security. The diagnostic test result revealed that the hat square was not statistically significant. Also, the models included in the variable were 86.72% correctly specified. The Pearson chi2 test was not statistically significant which explained the stability of the Pseudo R^2. Similarly, the Variance Inflation Factors (VIF) with respect to all the variables are less than 10. The model therefore fit the data analysis and interpretation of the results.

Education (X_2): Years of formal education attain by household head positively influence food security status of respondents. This could be obvious since education avails individual the opportunities that could lead to generation of income. Also, educated individuals have access to white collar job and other income generating activities when compare to uneducated ones. This makes then food secured than the later. The marginal effect of 1unit increase in the years of formal education of respondents increases the

probability of food secured by 0.02%. This corroborates the finding of Abul and Heidi (2018) who found positive relationship between education and food security in Ghana.

Household Size (X_3): This variable has negative influence on food security status of the respondents and statistically significant at 5%. The value of the marginal effect implies that if household size increases by 1%, the probability of the household being food secure will be decreased by 0.06%, holding all other variables constant.This is consistent with the argument that larger families place pressure on available food resources, reducing per capita food availability and access. Edafe *et al*. (2023) found that larger households face higher consumption requirements that often outpace household income, thereby increasing the likelihood of food insecurity.

Farm size (X_4): Cultivable farm size of the respondents positively influences food security status and statistically significant at 10%. The value of the marginal effect indicates when a farming household increase their farm size by 1 unit, the probability of the household being food secure will increase by 0.23 all things being equal.This result supports the findings of Alabi *et al.* (2023) who reported that households with larger cultivable land are more likely to be food secure due to higher production capacity and potential marketable surplus.

Access to Credit (X_5): This variable was found to have positive influence on food security status of the respondents and statistically significant at 1% level. This might be obvious because since credit serves as consumption smoothing mechanism which gives household temporal relief against the effect of food insecurity as pointed out by (John *et al.*, 2013). The value of the marginal effects indicates that when a household obtain credit; the probability of the household to be food secure will increase by 0.69.

Household Income (X_7): This variable has positive influence on food security status of farming household in the study area. The variable has the expected sign and significant at 1% level of probability. This could be expected because, increase in income all things being equal mean increase in food consumption. The value of the marginal effects indicates that if household income increase by ₦1, the probability of the household being food secure will be increased by 0.002.This finding is consistent with the results of Orjiakor *et al*. (2023) who reported that higher household income increases purchasing power, improves access to a wider variety of food, and enhances the ability to withstand food price shocks.

Table 6: Marginal Effects of Factors Influencing Food Security Status of the Respondents

Variables	Marginal effect	Standard error	p-value
Age	0.0016	0.0054	0.761
Level of education	0.0244**	0.0105	0.020
Household size	-0.0643**	0.0276	0.020
Farm size	0.2184*	0.1229	0.076
Access to credit	0.6882***	0.1555	0.000
Membership of association	0.1904	0.1444	0.187
Household total income	0.0016***	0.0005	0.007
Dependency ratio	-0.0011	0.0014	0.441
Diagnostic test			
Hat	/Z/=5.49	Prob>/z/=0.000	
Hatsq	0.82	0.412 NS	
Classified	86.72%		
Pearson chi2(166)	102.62	Prob>chi2=0.8068	
Mean VIF	=1.26		

***, **, *= Significant at 1%, 5% and 10% respectively
Number of Obs=128, LR Chi2=101.09
Prob>Chi2=0.0000, Pseudo R2=0.5822
Log Likelihood= -36.2787
Note*: The Marginal effects are used here (instead of the coefficients) as they denote the marginal changes of the dependent variables as a result of changes in the respective explanatory variables. The signs of the marginal effect are the same as those of the respective coefficients of the explanatory variables.

Food Security Coping Strategy

The coping strategies adopted by households in Table 7, indicate that eating less-preferred foods (Mean = 3.54) was the most frequently used strategy, suggesting that many households resorted to cheaper, less nutritious diets to cushion the impact of hunger during periods of food shortage. This finding aligns with the report reliance on less-preferred foods and reduction in meal frequency as the most common first-line responses to food insecurity (Popoola & Popoola, 2023; Edafe *et al*., 2023). The results also show that borrowing money, purchasing food from the market, and reducing the number of adult meals were common strategies, corroborating the findings that households often adopt credit-based coping and rationing mechanisms to smooth consumption (Kehinde & Kehinde, 2020). Moreover, the consumption of seed stock meant for the next cropping season (Mean = 3.27) identify a more severe strategy that compromises future production, a pattern also observed in conflict-affected areas where households sacrifice future yields for immediate survival (Alabi *et al*., 2023). Other strategies such as selling livestock and other assets, sending children out for paid jobs, gathering wild food, and migrating to cities for income opportunities were also reported, consistent with studies showing that households under prolonged stress liquidate productive assets and reallocate labour to maintain minimum consumption levels (Orjiakor *et al.*, 2023).

Table 7: Food Security Coping Strategies by the Respondents

Coping strategies	Very often	Often	Daily	Never	Mean	Remark
Buying from market	62(48.40)	43(35.60)	23(18.00)	0(0.00)	3.14	Often
Eating less preferred food	74(57.80)	49(38.30)	5(3.90)	0(0.00)	3.54	Very often
Borrow money or food from friends/relatives	83(64.80)	22(17.20)	23(18.00)	0(0.00)	3.47	Often
Consumption of seed stock for next year	67(52.30)	40(31.30)	9(7.00)	12(9.40)	3.27	Often
Reduced number of meals for adults	88(68.80)	22(17.20)	9(7.00)	9(7.00)	3.48	Often
Skipping meal	62(48.40)	34(26.60)	32(25.00)	0(0.00)	3.23	Often
Work for food or money	48(37.50)	45(35.20)	9(7.00)	26(2.30)	2.89	Often
Send out children for paid jobs	39(30.50)	43(33.50)	23(18.00)	23(18.00)	2.95	Often
Sale of livestock	71(55.50)	43(33.50)	0(0.00)	14(11.00)	3.34	Often
Gather wild food like hunting/scavenging	74(57.80)	40(31.20)	14(11.00)	0(0.00)	3.38	Often
Sale of assets like land	83(64.80)	22(17.20)	23(18.00)	0(0.00)	3.47	Often
Stealing	0(0.00)	0(0.00)	2(1.60)	126(98.40)	1.02	Never
Migrate to cities	39(30.50)	45(35.20)	9(7.00)	35(27.30)	2.69	Often

Source: Field Survey, 2020, Figures in parentheses are percentages
Key: mean 0.5-1.49= Never, 1.50-2.49=Daily, 2.50-3.49= Often, and 3.50-4.00= Very often

CONCLUSION AND RECOMMENDATIONS

This study concluded that food security among farming households in post-insurgency Michika LGA remained critically compromised, with a high prevalence of food insecurity resulting from the lasting disruption of agricultural production caused by the insurgency. The transition from conflict to peace did not automatically improve food availability, as most households continued to fall short of their basic caloric needs. Socio-economic factors such as access to credit, income, education, and farm size were found to positively influence food security, whereas larger household sizes exacerbated vulnerability by increasing consumption pressure on limited resources. The adoption of negative coping strategies, including the consumption of seed stocks and sale of productive assets, further undermined future agricultural potential and perpetuated cycles of poverty and hunger. It was therefore recommended that;

i. Government agencies and non-governmental organisations should improve access to inputs and credit through subsidies, vouchers and soft loans.
ii. Government and development partners should rebuild agricultural infrastructure and restock productive assets.
iii. National agricultural extension services and state extension services should be revitalised to promote climate-smart practices.
iv. Humanitarian agencies and community-based organisations should provide targeted support for large households and integrate psychosocial care.
v. Vocational training centres and development organisations should promote livelihood diversification through alternative income activities and skills development.

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