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ANALYSIS OF RESILIENCE CAPACITY TO FOOD INSECURITY OF FARMING HOUSEHOLDS IN TARABA STATE, NIGERIA

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ABSTRACT

The study analyzed food security status of farming households in Taraba State, Nigeria. A multi-stage sampling technique was used in selecting 398 farming households for the study. Data were collected through the use of questionnaire and analyzed using descriptive statistics, binary logistic regression and resilience capacity index. The results of binary logistic regression showed that age ($p<0.01$) and sex ($p<0.01$) of the household head, attainment of primary ($p<0.01$), secondary ($p<0.01$) and tertiary ($p<0.01$) education, household income ($p<0.01$), the proportion of adults of working age ($p<0.01$), farming experience ($p<0.01$), household size ($p<0.01$) and marital status such as single ($p<0.01$), widowed ($p<0.01$) and divorced ($p<0.05$), were the significant factors influencing food security status in the study area. The results also revealed that 63.8% of the households were resilient to food insecurity shocks, with about 66% of them having low resilience capacity. Results of coping strategies adopted by the households to attenuate the effect of food shortage indicated that about 48.2% of the households deployed all the available coping strategies in varying degree of application, with 'reduced portion at meal time' (97.2%), 'reduced number of meals per day' (96.7%), 'restrict consumption by adults to feed children' (96.5%), and 'rely on less preferred food' (94.5%) as the most commonly used coping strategies by the stressed households. The study concluded that socioeconomic characteristics of the household heads such as education, household size and income has significant influence on household food security and were prime socioeconomic determinants in achieving household's food security and that a considerable number of households (36.2%) in the State were non resilient to food insecurity with 66.5% of the resilient households having low resilience capacity. It is therefore recommended that Policies and programs aimed at improving household resilience such as strengthening adaptive capacity; prioritizing access to basic services and implementing social safety nets should be implemented to foster household and national resilience capacity to food insecurity

Keywords:
Analysis, resilience capacity, food insecurity farming households, Taraba State

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INTRODUCTION

Food insecurity remains a major development challenge to global community, especially among farming households whose livelihood depends on agriculture (FAO, 2026). Farming households are exposed to recurrent shocks such as climate variability and extreme weather events; crop and livestock losses; rising input and food prices; insecurity and displacement; income and employment shocks; and pest and diseases outbreak (Sadiq *et al*., 2023). These shocks can undermine households' ability to secure adequate food to maintain their livelihood. However, households differ in their ability to anticipate, absorb, adapt to and to transform in response to shocks (Ansah *et al*., 2023). This ability is commonly conceptualized as resilience capacity. Resilience therefore provides a dynamic perspective for understanding why some households remain food secure or recover faster after exposure to shocks while others become increasingly vulnerable (Dearsley and Enganya, 2024). In agricultural communities, resilience capacity may be influenced by access to basic services; households assets; social safety nets and; and adaptive capacity (Ado *et al*., (2022). Understanding these underlying variables is important for designing policies that move beyond short-term assistance toward sustainable household resilience.

Taraba State as an agrarian State has about 85% of its population residing in rural areas where majority of them (90%) derive their livelihood from farming (Sanusi *et al*., 2013). Despite the importance of agriculture to rural livelihoods in the State, many farming households continue to experience vulnerability to food security shocks due to their poor access to basic services; weaker households assets; inadequate social safety nets and under developed adaptive capacity. Many farming households in the State struggle to improve or maintain their food security status when exposed to challenges such as extreme weather events; crop and livestock losses; rising input and food prices; insecurity and displacement; and income and employment shocks. This scenario define most of the farming households to be seasonally or perpetually non resilient to food insecurity. Conventional food security assessments often focus on the current food security of the households. Such assessment may provide limited information about the household's capacity to withstand future shocks or recover from existing shocks. The critical issue is therefore, not only are households food secure, but also what capacity do households possess to remain food secure when exposed to shocks and stressors. This knowledge gap necessitates an empirical investigation into the resilience capacity to food insecurity of farming households in Taraba State. In view of the above, this research measured the resilience capacity to food insecurity of farming households in Taraba State. The specific objectives were to:

i. determine the effect of the farming household heads' socioeconomic characteristics on the households' food security status in the study area;
ii. measure farming households' resilience capacity to food insecurity;
iii. identify the copping strategies adopted by the farming households against food insecurity.

METHODOLOGY

The Study Area

Taraba State is located in the North-Eastern region of Nigeria between Latitudes $6^0.25$ and 9^030 North of the Equator and Longitudes $9^0.30`$ and $11^0.45`$ East of the Greenwich Meridian (CDF, 2016). The State shares boundaries with Gombe and Bauchi States in the North, Adamawa State in the east and Cameroon Republic in the south. The State is bounded along its western side by Plateau, Nasarawa and Benue States. The State has a land area of 54, 428$km^{2.}$ However, the 2016 estimates put the population of the State at 3,438,204 million people (NPC, 2016) with estimated total farm-families of 625,336 (Ahmed *et al* 2015). The estimated population of the state from 2016 to date (2025) at the current growth rate of 3.5% is 4,685,913 million. Taraba State has 16 Local Government Areas; Yoro, Ardo-Kola, Karmi Lamido, Lau, Zing, Gashaka, Sarduna, Bali, Kurmi, Gassol, Wukari, Takum, Donga, Ibi, Ussa and Jalingo as the State capital. The state is located in the Northeastern part of the country where majority of the population are heavily dependent on farming for food supply and income generation (Johnson & Jackson, 2020). The region benefits from a favorable climate and fertile soil, which support the cultivation of various crops such as maize, yam, rice, cassava, millet, sorghum, ground nuts and vegetables. Livestock rearing, including cattle, goats, and poultry, also contribute to the agricultural production in the area (Grace & Martina, 2020).

Sampling Procedure and Sample Size

A multi-stage sampling technique was used in selecting 398 farming households for the study. Yamane's formula for determining sample size at 5.5% margin of error was used to select sample households (Yamane, 1967), while the Bowley's proportion allocation formula was used to establish the sample size at each stratum. In the final stage, a total of 398 farming households were selected randomly as presented in Table 1. The household heads or any delegated member(s) of the household was interviewed (Vhurumuku, 2024) to elicit the needed information for the study (Table 1).

Table 1: Sampling Frame and Sample Size Selection Matrix

Zone	LGA	No. of Wards	Wards (17%) selected	Villages selected	No. of households	Sampled households
Southern	Wukari	17	Kente	Chinkai	62	17
				Sondi	49	14
			Bantaje	Gindin Dorowa	47	14
				Bantaje	59	17
			Rafin Kada	Kpanawa	61	18
				Rafin Kada	86	25
	Takum	11	Dutse	Dutse	68	20
				Tampa	43	12
			Chachanji	Dogon Gawa	71	21
				Yelwa	52	15
Central	Bali	11	Suntai	Garin Garba	60	17
				Gobir	44	13
			Ganglari	Gankida	63	18
				Jangare	49	14
	Gashaka	10	Jamtari	Mayo Jamtari	39	11
				Adda Goro	47	14
			Mayo selbe	Goje	65	17
				Mayo Jarandi	59	17
Northern	Gassol	12	Gunduma	Garin Garba	50	14
				Lariski	44	13
			MutumBiyu	Kachela	61	18
				Mutum Biyu	67	20
	Lau	12	Garin Dogo	Lushi	31	07
				Minda	41	12
			Jimlari	Ardido	42	12
				Lubbe	33	08
Total	**6**	**72**	**13**	**26**	**1393**	**398**

Source: Field Survey, 2023

Method of data Collection

The demand for data in this study was satisfied by primary source. Primary data was collected mainly from the respondents with the aid of questionnaire which was designed into the following sections: **Section A**: Socioeconomic characteristics of the farming household head; **Section B:** Information on pillars and indicators of household resilience to food insecurity, and **Section C:** Information on various coping strategies adopted by the households in times of food shortages

Data Analytical Techniques

Data collected were analyzed using descriptive statistics, Regression analysis (Logistic regression) and Resilience Capacity Index (RCI).

Binary logistic regression model

The binary logistic regression was employed to determine the effect of socioeconomic characteristics of the household heads on food security status among farming households (objective 1) in the study area.

In explicitly term,

$$Logit\ (Pi1-Pi)=\mathbb{Z}i= \beta0+\beta1X1+ \beta2X2+ \beta3X3 + \beta4X4 +\beta5X5 +\beta6X6 +\beta7X7 +\beta8X8 +\beta9X9 +\beta10X10 +\beta11X11 +\beta12X12 \quad \dots (1)$$

Where;

Zi = Food security status (0 = food insecure, 1 = food secure)

β0−β12 = regression parameters

X1 = sex of the household head (categorical variable: male or female),

X2 = age of the household head (years)

X3 = marital status (categorical variable: marred, single, divorced and widowed and separated),

X4 = Household size (number of people in the household)

X5 = Infants (<5 years)

X6 = Children (5-17 years),

X7 = Adults (18-59 years)
X8 = Aged (60 years and above) 66
X9 = Educational attainment of the Household Head (categorical variable: No formal education, Qur'anic, Primary, Secondary, Tertiary education)
X10 = Farming experience in years
X11 = Cooperative membership (a member, or not a member)
X12 = Household monthly income in Naira

Resilience capacity index

The resilience index capacity of the farming households was analyzed using RIMA-II as employed by FAO (2019a). Resilience is an intricate term that can be measured through latent variable modeling, the technique that analyzes household resilience statistically. Two steps were taken in the analysis following FAO (2016). First, the principal component analysis (PCA) was used to show the pillars of household resilience. These pillars are access to basic services, asset, social safety net and adaptive capacity. Secondly, Systems of equations were used to specify the link between resilience (the unobserved latent variable), food insecurity indicators (outcome variables) and the pillars.
Algebraically, it is presented as:
RCIi = f(ABSi, ASTi, APTi, SSNi, ACi) ... (2) Where:
RCIi = Resilience capacity index of ith household;
ABSi = access to Basic services of ith household;
ASTi = assets of ith household;
SSNi = Social Safety Nets of ith household;
ACi = Adaptive capacity of ith household.
.

RESULTS AND DISCUSSION

Socio-economic Determinants of Food Security

The summary statistics of the binary logistic model showing the effects of the predictors (socioeconomic variables) on the probability of households' food security or otherwise, are presented in Table 2. The preliminary results showed the overall likelihood (93.8%) of food insecurity prevalence among households considering the model specificity of 69.8% for food insecure category and a highly significant Omnibus tests (P<0.001), that measures the overall performance of the model. The estimated logistic regression model recorded a -2log likelihood value of 448.889. The log likelihood provides a measure of model fit, with higher values indicating a better fit. The Cox and Snell R^2 (pseudo R square statistic) and Negelkerke R^2 (adjusted version of Cox-Snell R^2), were 0.226 and 0.302, suggesting that between 22.6 and 30.2% of the variability were explained by the set of variables included in the model.

It is important to stress that the interpretation of the relationship of the predictors of food (in)security is based on the magnitudes of the coefficients of each predictive variable and the corresponding exponential values {Exp(B)}, the odds ratios (OR). According to Smith and Subandoro (2021), the odds ratio is the increase (or decrease if the ratio is less than one) in odds of being in one outcome category (food secure or food insecure) when the value of the predictor increases by one unit. The Wald Chi- Square statistic, which tests the unique contribution of each predictor, holding the other predictors constant, was used to test the proposed hypotheses.

Table 2: Socioeconomic Determinants of Household Food Security

Variable	B	S. E.	Wald	Sig	Exp(B)
Sex	-0.025	0.009	7.721	0.005***	0.975
Age	-0.209	0.037	31.827	0.000***	0.812
Marital status			0.306	0.989 NS	
Single	-0.115	0.038	9.162	0.002***	0.91
Widowed	-0.706	0.104	45.815	0.000***	0.493
Divorced	-0.031	0.012	6.673	0.010**	1.031
Separated	-0.609	0.338	2.459	0.117 NS	0.544
Household size	-2.603	0.488	28.512	0.000***	0.074
Infants (≤ years)	-0.807	0.117	47.544	0.000***	0.446
Children (6 – 17 years)	-0.632	0.163	15.017	0.000***	1.882
Adults (18 – 59 years)	0.354	0.171	4.267	0.039*	1.425
Aged (≥ 60 years)	-0.146	0.222	0.432	0.511 NS	0.864
Educational attainment			71.737	0.000***	
Quranic	0.268	0.178	2.252	0.133 NS	1.307
Primary	1.853	0.579	10.222	0.001***	0.157
Secondary	1.957	0.361	29.391	0.000***	0.141
Tertiary	2.896	0.480	36.328	0.000***	0.055
Farming experience	0.070	0.019	13.816	0.000***	1.073
Cooperative membership	-0.165	0.109	2.306	0.129 NS	0.848
Monthly income	0.231	0.041	31.792	0.000***	1.260
Constant	-0.091	0.100	0.814	0.367 NS	0.913
Overall percentage	**69.8**				
Chi-square	**102.041 (P<0.001**				
-2 Log Likelihood	**448.889**				
Cox and Snell R^2	**0.226**				
Negelkerke R^2	**0.302**				

Source: Field Survey, 2025
***, **, * and NS = Significant at (P<0.01), (P<0.05), (P<0.10) levels and Not Significant respectively.

The results of binary logistic regression showed that age (B = -0.209; p<0.01) and sex (B = -0.025,p<0.01) of the household head, attainment of primary (B = 1.853; p<0.01), secondary (B = 1.957; p<0.01) and tertiary (B = 2.896; p<0.01) education, household income (B = 0.231; p<0.01), the proportion of adults of working age (p<0.01), farming experience (p<0.01), household size (p<0.01) and marital status such as single (p<0.01), widowed (p<0.01) and divorced (p<0.05), were the significant factors influencing food security status in the study area. These findings agreed with the a priori expectation that socioeconomic factors of a household head has influence on the household's food security status. It is then not surprising that majority of the variables included in the model had significant influence on the household food security status. This result is supported by the findings of Ahungwa (2019) who asserted that farming experience, educational attainment, income level, household size and marital status of rural household heads in Jigawa State, Nigeria has significant effect on the household food security status. This by implication means that improving the household head education and income level alone can exert significant influence on the household food security status. Other factors that were found to have influence on food security, though not statistically significant but are of importance include; cooperative membership (B = -0.165, p<0.129) household head with quranic educational as the highest level of education (B = 0.268, p<0.133), separated headed status(B = -0.609, p<0.117) and Aged (≥60 years) household heads (B = -0.146, p<0.511).

Resilience Capacity to Food Insecurity

A cursory view of the farming households' resilient status showed that majority (63.8%) of the households were resilient to food insecurity while about 36.2% of the sampled households were non-resilient to food insecurity during the period of study (Table 3). This considerable proportion (36.2%) of non-resilient households is a worrisome situation for the state as it depicts that about 36% of farming households in the study area are vulnerable to shock exposure. The reason for the existence of this scenario in the study area could be attributed to lack of or inadequate access to basic services, poor social safety nets, low adaptive capacity and or weak asset base (Chamdimba *et al.*, 2021). This finding shows mark similarity with previous researches in Nigeria. For instance, Odozi *et al.* (2022) established that 29.6% of farm households in Nigeria were non-resilient to food insecurity shocks. There is therefore the need to address these pillars among farming households as they hold key to households food security.

Table 3: Resilience Status of Farming Households to Food Insecurity

Resilience indices	Frequency	Percentage
Resilience status		
Non resilient	144	36.2
Resilient	254	63.8
Total	**398**	**100.0**
Resilience categories		
Low	169	66.5
Moderate	70	27.6
High	15	5.9
Total	**254**	**100.0**

Source: Field Survey, 2025

RCI*i** <33 = low, 33 ≤ RCI*i** < 66 = moderate, and RCI*i** ≥ 66 = high

However, a detailed view of the resilient status of farming households to food insecurity revealed that, among the resilient households, majority (66.5%) of them had low resilience capacity while only 27.3% and 5.9% were among the moderate and high resilient capacity categories respectively. This result affirms the assertion that majority (72%) of farming households in the northeastern Nigeria have weaker resilience to food insecurity shocks (Oruonye *et al*., 2024). It then implies that majority of the resilient households are at the verge of becoming non-resilient to food insecurity given a little exposure to shocks. It becomes important to strengthen the resilience capacities of farming households to move from low and moderate to high resilience capacity.

4.6 Analysis of Household's Coping Strategies

To analyze the various food insecurity coping strategies employed by the households in the State to attenuate the effect of food shortages. Data on the households' food consumption attitudes and measures taken in the events of food shortages were collected, rated using a 3 points rating (1= Never used, 2 = used occasionally (1 – 4 days in a week), and 3 = used always (5 – 7 days in a week) (Shaibu *et al*., 2023). Table 4 shows the application of coping strategies by households in the state and the results depicted that households in the state employed various coping strategies to attenuate the effects of food shortages. A cursory look at the result showed that 48.2% of the households deployed all available coping strategies in varying degree of application,

which is an indication of the existence of food shortage in Taraba State. The frequency of the deployment of coping strategies showed that 97.2% of the food stressed households deployed the strategies of 'reduced portion at meal time' and 96.7% deployed the strategy of 'reduced number of meals per day' as a coping option. Similarly, 96.5, 94.5 and 84.9% of the households embarked on 'restrict consumption by adults to feed children' 'rely on less preferred and less expensive food' and 'feed working members of the family only' as commonly used coping strategies by the food stressed households in the state. Furthermore, the result (Table 14) indicated that among the households that agreed to the use of the aforementioned coping strategies, about 66.8 to 78.8% of them attested that these strategies were among the coping strategies that were used always (5 to7 days a week). By implication, households that are food stressed used the aforementioned coping strategies at least 5 days per week. Similar study in Kwara State, Northcentral Nigeria by Omotesho *et al*., (2022) discovered these strategies among the most frequently used coping options employed by households in times of food crisis.

Table 4: The use of Coping Strategies among Households in Taraba State (n = 398)

Strategies	Frequency of application of coping strategies					
	Never	Occasionally	Always	Frequency	Percentage	Rank
Limit portion size at mealtime	11	102 (26.4)	285 (73.6)	387	97.2	1st
Reduce number of meals per day	13	122 (31.7)	263 (68.3)	385	96.7	2nd
Restrict consumption by adults to feed children	14	82 (21.4)	302 (78.6)	384	96.5	3rd
Rely on less prefer and less expensive Food	22	103 (27.4)	273 (72.6)	376	94.5	4th
Feed working members of the family only	60	112 (33.2)	226 (66.8)	338	84.9	5th
Borrow or rely on friends/relatives	72	251 (77.0)	75 (23.0)	326	81.9	6th
Purchase food on credit	75	199 (61.8)	123 (38.2)	322	80.9	7th
Borrow money to buy food	84	228 (72.6)	86 (27.4)	314	78.9	8th
Worked for food	87	272 (87.5)	39 (12.5)	311	78.1	9th
Skip entire day without food	233	119 (72.1)	46 (27.9)	165	41.6	10th
Consume seeds stock held for next season	262	91 (67.4)	45 (32.6)	136	34.2	11th
Sells animals or other household assets	300	33 (33.7)	65 (66.3)	98	24.6	12th
Send household members to eat somewhere	322	66 (86.8)	10 (13.2)	76	19.1	13th
Send household members to beg for food	327	71 (100)	0 (0.0)	71	17.8	14th
Gather wild foods or harvest immature crops	354	39 (88.6)	5 (11.4)	44	11.1	15th
Look for temporary jobs outside the community	370	11 (39.3)	17 (60.7)	28	7.0	16th
Sells land	373	19 (76.0)	6 (24.0)	25	6.3	17th
Engage children to work and earn income	376	18 (81.8)	4 (18.2)	22	5.5	18th
Taking children out of school	381	17 (100)	0 (0.0)	17	4.3	19th
Migration of household	386	12 (100)	0 (0.0)	12	3.0	20th
Total	**4122 (51.8)**	**1967 (24.7)**	**1870 (23.5)**	**3837 (48.2)**	**48.2**	

Source: Field Survey, 2025 *Values in parenthesis are in percentages
Never = never used, **occasionally** = used 1 – 4 days in a week, and **always** = used 5 – 7 days in a week

Other coping strategies such as 'borrow or rely on friends/relatives' (81.9%), 'purchase food on credit' (80.9%), 'borrowing money to buy food' (78.9), 'work for food' (78.1%), skipping an entire day without food' (41.6%) and 'consuming. seeds stock held for next season' (34.2%) and 'sells animals or other household assets' (24.6) were among the coping strategies that were used occasionally (at least 1 to 4 days a week) as indicated by about 61.8 to87.5% agreement of household to the use of these statements. By implication, large proportion of the sampled households using these strategies attests that households have certain assets left to keep them from deploying erosive coping strategies (Sanusi *et al*., 2023; Sani and Kemaw, 2019). The summary statistics of the use of coping strategies in Taraba State as presented in table 16 shows that, 48.2% of the households used all the constructed coping strategies at different frequencies to cope with food shortages. This result shows similarities with the findings of Ahungwa (2019) who reported that 49.8% of farming households in Jigawa State applied similar coping strategies, though with different intensity and magnitude.

CONCLUSIONS AND RECOMMENDATIONS

Conclusion

Based on the results of the findings, it was concluded that socioeconomic characteristics of the household heads such as education (P≤0.01), household size (P≤0.01) and income (P≤0.05) has significant influence on household food security and were prime socioeconomic determinants in achieving household's food security. Similarly, evidence showed that a considerable number of households (36.2%) in the State were non resilient to food insecurity, and that among the resilient households, majority (66.5%) of them were having low resilience capacity. Moreover, majority of the households opted for "reduced portion at mealtime" (97.2%), "reducing the number of meals per day" (96.7%) and "restricting consumption by adults to feed children" (96.5%) as the prime coping strategies in attempt to attenuate the effect of food shortage and insecurity

Recommendations

Based on the findings of the study, the following policy recommendations are made:

i. Appropriate policy interventions should focus on parameters that promote food security such as support and investment in education and income frontiers, financial inclusion and institutional support to foster human capital development.
ii. Policies and programs aimed at improving household resilience such as strengthening adaptive capacity; prioritizing access to basic services and implementing social safety nets should be implemented to foster household and national resilience
iii. Farmers are encouraged to diversify their revenue streams to assist their households to move beyond daily adjustments of coping options.

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