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DETERMINNATS OF FOOD SECURITY AMONG RICE FARMING HOUSEHOLDS IN WUKARI LOCAL GOVERNMENT AREA OF TARABA STATE, NIGERIA

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ABSTRACT

This study examined the determinants of food security among rice farming households in Wukari Local Government Area of Taraba State, Nigeria. Specifically, it described the socioeconomic characteristics of the respondents, assessed their food security status, analyzed the determinant of food security, and identified coping strategies adopted during food shortages. Primary data were collected using structured questionnaires administered to 162 household heads selected through a multistage sampling technique. Analytical tools employed included descriptive statistics, food security index based on a recommended daily caloric intake of 2260 Kcal, and binary logistic regression. Results indicated that 74.1% of the respondents were male with average age of 35.5 years, with 71.6% attaining at least secondary education. Majority (76.5%) of the households were food secure, with an average daily calorie intake of 5772.88 Kcal, while food-insecure households consumed 1697.74 Kcal daily. The binary logistic regression model revealed that farming experience, education level, extension contact, and farm size were positive and significantly influenced food security, whereas age and household size had negative effects. Coping strategies employed during food scarcity included purchasing food from markets, borrowing from social networks, foraging wild food, skipping meals, and consuming less preferred foods. The study concluded that enhancing farmers' access to agricultural extension services, improving educational opportunities, and increasing farm size through land policy reforms could strengthen food security among rice farming households in the area. Policy recommendation were made that Education should be promoted to enhance adult literacy and agricultural training to help farmers adopt innovations, hence, improve productivity because education increases the likelihood of household food security.

Keywords: Determinants, Food Security, Rice and Farming Households

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INTRODUCTION

Background of the study

Rice is a major staple food crop in Nigeria, consumed across all socio-economic groups, and plays a crucial role in the country's agricultural economy (Oluwaseun *et al.*, 2024). Nigeria is the largest producer of rice in Africa and among the top consumers globally (Philip *et al.*, 2018). In Taraba State, rice farming constitutes a significant livelihood activity, particularly in agrarian communities such as Wukari Local Government Area (LGA), where a substantial proportion of the rural population is engaged in rice cultivation either on a subsistence or commercial scale (Abuh *et al.*, 2017). The fertile plains of Wukari and the favorable agro-climatic conditions make it suitable for both upland and lowland rice production (Blench and Dendo, 2004). Despite the expansion in rice farming, Nigeria continues to face serious food security challenges. The Global Hunger Index (2023) ranks Nigeria among countries with a serious level of hunger, with food insecurity affecting a large segment of the rural population. In Taraba State, poor infrastructure, conflict-related displacement, and climate-related shocks have compounded food insecurity (Onyigbuo *et al.*, 2023). In Wukari LGA, food security remains precarious, with many households struggling to maintain adequate food availability, accessibility, and utilization throughout the year (Ogbue *et al.*, 2024)

Food security among rice farming households is particularly critical, as these households not only produce food but also depend on their production outcomes for income and consumption (Arifin *et al.*, 2021). However, food insecurity among food producers persists, as many rice farmers in rural areas are unable to secure sufficient food due to low yields, poor market access, and limited income diversification (Bjornlund *et al.*, 2022). This raises concerns about the vulnerability of rice farming households to both economic and environmental shocks that threaten their food security status. Food security is central to the well-being of rice farming households, serving as a foundation for nutritional health, labor productivity, and economic stability. It has both immediate and long-term implications on household welfare and agricultural productivity (Olurankinse, 2019). Achieving food security is not only about producing enough food but also ensuring that households can access and utilize nutritious food sustainably (El Bilali *et al.*, 2019). As such, understanding the dynamics of food security is essential, particularly in the context of smallholder farming systems.

The concept of food security is multidimensional, encompassing four key pillars: food availability, food accessibility, food utilization, and food stability (Guiné *et al.*, 2021). These dimensions are influenced by a range of factors including income levels, land ownership, access to agricultural inputs, education, and climate conditions. Food security is dynamic, and households may move in and out of food security depending on seasonal variations, policy interventions, and shocks such as floods or price volatility (Sibhatu and Qaim, 2017). Factors such as limited access to credit, poor extension services, low adoption of improved technologies, post-harvest losses, and market inefficiencies have constrained their productivity and food security outcomes (Nnaemeka, 2024). Additionally, climatic changes, land degradation, and recurring communal conflicts further exacerbate the challenges faced by these farmers (Onyekachukwu and Clinton 2024). This study therefore seeks to explore and empirically assess the determinants of food security in order to inform targeted interventions for improving household resilience and well-being. The specific Objectives were to; describe the socioeconomic characteristics of the respondents; examine food security status among respondents; analyze the determinant of food security status of the respondents and identify copping strategies adopted by the respondents to mitigate challenges of food security in the study area

Materials and Methods

The Study Area

The study was carryout in Wukari local government area of Taraba State, Nigeria. Wukari is situated in the southeastern part of the Taraba state. Wukari's approximate geographical coordinates are 7.87° N latitude and 9.78° E longitude. The larger part of the population of people in Wukari are agrarian in nature, they plant food crops such as rice, yam, melon, groundnut e.t.c.

Sampling Procedures

Primary data used for the study was obtained directly from the respondents using structured questionnaire administered to the farmers. A multi-stage sampling technique was employed for the study. The local government comprises of 10 wards in which five wards were selected. The second stage involved the random selection of 50% of these wards, which were proportionately sampled. The last stage was the selection of 162 household heads from the chosen settlements proportionate to their size.

Data collection

Primary data were obtained through the use of a well structure questionnaire. Data were obtained on socioeconomic characteristics, food security status of the rice farming households, determinant of food security status of rice farming households and coping strategies adopted toward food insecurity by rice farming households in the study area.

Analytical Techniques

Descriptive statistics such as frequency, percentage, mean and standard deviation was used to achieve objective i, and iv. Food Security Index (FSI) was used to analyze objective ii and the food security line used was based on the daily-recommended level of calories, which is 2260Kcal. In addition, binary logit regression analysis was used to analyze objective iii.

Logit regression model

The study employed the logistic model in line with previous researchers. The cumulative logistic probability model can be econometrically stated as:

$$Yi = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + eu \ldots\ldots\ldots\ldots(1)$$

Where:
Yi = the probability of an ith household been food secured, stands for dummy,
Xi = vector of independent variables, which are defined as:
Where:
Y = Food Security status (Food secure = 1, Food Insecure = 0)
X_1 = Age of farmers (years)
X_2 = Gender (Male =1, Female = 0)
X_3 = Farming experience (years)
X_4 = Level of education (years)
X_5 = Household size (number of persons)
X_6 = Extension Contact (Yes = 1, No = 0)
X_7 = Farm size in hectares (Hectares)
X_8 = Membership of farmer-based organization (Yes = 1, No = 0)

Food Security Index (FSI)

The food security line used in this study was based on the daily-recommended level of calories and protein, which are 2260 Kcal.

In order to generate food security indices, the nutrient content of the food items consumed was used to derive calorie availability.

$$FSI = Zi = \frac{\text{Household per capita calorie available}}{\text{Household's daily per capita calorie requirement}} \ldots\ldots\ldots\ldots(2)$$

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 rice consumed and other food items, purchased and received as gifts was converted to kilogram and further to calorie consumed per day per household and then compared with the standard (2260 kcal). The nutrient composition of commonly eaten foods in Nigeria adopted by 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 adopted by Ojeleye (2015) was used. The quantity of rice produced and other food items purchased for consumption was converted to kilogram and then to calorie and then divided by the adult equivalent household size, using FAO adult equivalent scale. To estimate the calorie consumed per day per household, the result was further divided by 7 days and then compared with the FAO standard (2260 Kcal), for a food secured individual. The households whose daily per capita calorie was up to 2260 Kcal were regarded as food secure, while those below the food security line of 2260 Kcal were regarded as food insecure.

RESULTS AND DISCUSSION

Socioeconomic Characteristics of Rice farming households in the study area

The result revealed 74.1% of the respondents were male while 25.9% were female which implies that male dominate rice production in the study area. This is in conformity with Elias et al., (2018) who stated that rice farming, being labor-intensive and traditionally associated with men, often excludes women from large-scale participation due to socio-cultural barriers and land access inequality. 55.6% of the respondents were between the age of 21 and 40 years, with a mean age of approximately 35.5 years, indicating a youthful and potentially more energetic workforce. Youthful respondents is a promising demographic factor, as younger farmers are often more receptive to innovation, technology adoption, and modern farming techniques.

The result further shows that 82.7% of the respondents had household size between 1–20 members, with a mean size of 8 persons. Larger household sizes potentially provide family labor, which can reduce the cost of hired labor and increase net returns (Ayaz and Mughal, 2024). The findings further show that 71.6% of the farmers had attained secondary education, while 13.6% had tertiary education. This relatively high literacy level is a positive factor for technology diffusion and farm management. Education is important for accessing agricultural extension services, using improved inputs, and implementing modern farming practices

The farmers had a mean rice farming experience of 17.2 years, suggesting strong practical knowledge and skill in rice farming. In decision-making, risk management, and resource use optimization, years of farming experience is a crucial asset. Most farmers (80.2%) cultivated between 1 and 10 hectares of land, with a mean of approximately 2.6 hectares. This indicates that rice farming is primarily practiced on a small-scale basis in the study area. Small-scale farming can limit productivity due to insufficient economies of scale, yet it remains the dominant form of agriculture in rural Nigeria (Omotilewa *et al.*, 2021). Increasing access to land through leasehold arrangements or land reforms could significantly enhance output and income. Extension contact with rice farmers in the study area, majority of the respondents (80.2%), had no extension contacts while 19.8% of the respondents had extension contact. The poor extension contact may be due to inadequate number of village extension agents within the study area. One of the roles of the cooperative societies is to boost the performance of farmers, however, not all farmers are educated on the importance of being a member of a cooperative society (Femi and Shittu, 2014). The result also revealed that 87.7% of the respondents were not member of any cooperative societies while 12.3% of the respondents in the study area were members of farmers cooperative society

Table 1: Socioeconomic Characteristics of Rice farming households in the study area

	Frequency	**Percentage**	**Mean(Standard Deviation)**
Gender			
Male	120	74.1	
Female	42	25.9	
Age			
21-40	90	55.6	
41-60	20	12.3	
61-80	10	6.2	
81-100	42	25.9	35.5473(±10.68175)
Household size			
1-20	143	82.7	
21-40	26	16.0	
41-60	2	1.2	7.5185(±5.84190)
Level of Education			
Adult and Non formal Education	14	8.6	
Primary	10	6.2	
Secondary	116	71.6	
Tertiary	22	13.6	
Farming Experience			
1-10	58	35.5	
11-20	50	30.9	
21-30	42	25.9	
31-40	12	7.4	17.2346 (±8.91666)
Farm Size			
<1	32	19.8	
1-10	130	80.2	2.6049 (±3.42301)
Extension contact			
Yes	32	19.8	
No	130	80.2	
Cooperative Membership			
Yes	20	12.3	
No	142	87.7	
Total	162	100.0	

Author's compilation

Food Security Status of rice farming households

The food security status of rice farming households in Wukari Local Government Area, Taraba State, Nigeria, as shown in Table below indicates that a significant proportion of households (76.5%) were food secure, while 23.5% were food insecure. This suggests that rice-farming household plays a crucial role in enhancing food security in the study area.

The results further revealed that, food security indices for food-secure and food-insecure households were estimated to be 2.6 and 0.8, respectively. An index value of 2.6 for food-secure households indicates a surplus index of 1.6, signifying that these households consumed more calories than the recommended level of 2260 Kcal. An index value of 0.8 for food insecure household indicate a shortfall index of 0.2, signifying that those household consumed less calories than the recommended level of 2260 Kcal. The shortfall/surplus index measures the extent of deviation from the food security line, further reflecting the nutritional sufficiency of food-secure households and nutritional insufficiency for food insecure households.

The average daily calorie consumption for food-secure households was 5772.88 Kcal, demonstrating an excess of 3512.88 Kcal above the recommended dietary allowance. On the other hand, food-insecure households, with a food security index of 0.8, revealed a shortage index of 0.2, indicating that these households need to increase their calorie intake to meet the recommended level. The average daily calorie consumption for food-insecure households was 1697.74 Kcal, reflecting a calorie deficit of 562.26 Kcal. The percentage distribution further highlights the disparity in food security among rice farming households, with 76.5% being food secure and 23.5% food insecure. This result is consistent with the findings of Keku (2017), who reported that majority of the sampled farmers were food secure.

Table 2: Summary of Rice farming households' food security status

Variable in Average	
Food secured households	**124**
Food security index	2.6
Surplus index	1.6
Average household daily calorie consumption for food secured households	5772.88
Average calorie consumption in excess of recommended (2260Kcal)	3512.88
Percentage of food secured household	76.5%
Food insecure households	**38**
Food insecurity index	0.8
Shortage index	0.2
Average household daily calorie consumption (Kcal) for food insecure households	1697.74
Average calorie consumption in shortage of recommended (2260Kcal)	562.26
Percentage of food insecure household	23.5%

Author's compilation

Determinant of food security status of rice farming households

The determinant of food security status of rice farming households in the study area were analyzed using binary logit regression model. The Pseudo R-square of 0.8920 implies that all the explanatory variables included in the model were able to explain 89.20% of the variation in food security status of the respondents. The log-likelihood ratio (LR) test was significant at one percent (1%) meaning that the model was adequate in explaining probability of the effect of the explanatory variables on respondents' food security status. The result of the model is given in the Table below and it was revealed that farming experience, educational level, extension contact and farm size of the respondents were positively significant to the respondent's food security status; while age and household size were inversely related to the household food security status of the respondents.

Age of household head is expected to have impact on his labour supply for food production. It is also expected to have impacts on ability to seek and obtain off-farm jobs and income, which could increase household income and living standards. The result shows that age (X_1) variable had negative effect on food security and was significant at 1%. The negative sign implies that a unit increase in age of the farmers will lead to 0.63905 decreases in the food security status of the farmers; this thus suggests that as farmers grow older, they tend to be less productive and thus less food secure. This is in agreement with Babatunde *et al.* (2007), who reported that the older the household head, the lower the probability that the household would be food secure. Farming experience (X_3) was significant at 1% and had positive relationship with the respondents' food security status, which indicated that the probability of household food security increases with increase in farming experience. Specifically, farming experience increased the probability of being food secure by 2.6045.

Educational level (X_4) of the respondents was statistically significant at 5% and exhibited a positive relationship with food security status. This implies that, increase in the number of years spent in school increases the possibility of a household becoming food secure by 4.6843. Educated farmers have the ability to adopt new innovation which will lead to an increase in production and translate to improving the food security status of rice farmers. Household size (X_5) of the respondents was statistically significant at 5% and exhibited a negative relationship with food security status. Which implies for every unit increase in the households size, it leads to probability of decrease in food security by 3.1876.

Contact with extension agents (X_6) is statistically significant at 1% and had a positive relationship with food security. This signifies that a unit increase in contact with extension agent will lead to an increase in food security status of the respondents by 0.0002144. This is due to the fact that the farmers might have acquired a lot of knowledge and experience about new farming practices which will increase his productivity and in turn increase his food security status. Farm size (X_7) was positive and significant at 5% level of probability. This implies that a unit increase in the farm size of the farmer will probably lead to an increase in the food security status of the respondent by 24.365.

Table 3: Determinant of food security status of rice farming households

Variable	Odds Ratio	Standard Error	Z-Statistics	P-value
Constant	816602.4	248658.9	3.28	0.001
Age	.63905***	0 .5505714	-1.21	0.000
Gender	1.496	0 .2338055	4.12	0.229
Farming experience	2.6045***	0 .4990905	7.66	0.000
Educational Level	4.6843**	7670.095	2.62	0.010
Household Size	3.1876**	14993.35	-2.22	0.028
Extension contact	.0002144***	6038.101	4.15	0.000
Farm Size	24.365**	38842.88	2.25	0.026
Membership	21.1026	6.960571	-1.49	0.138
Number of Observation				
LR chi^2(9)	183.44			
Prob>chi^2	0.0000			
Pseudo R^2	0.8920			

Author's compilation

Coping strategies adopted by rice farming households in the study area during periods of food shortage

The findings from the study reveal some coping strategies adopted by rice farming households in Wukari Local Government Area of Taraba State during food shortages. These strategies reflect the extent of food insecurity and the socio-economic vulnerabilities of the households.

The most frequently adopted coping strategy was buying food from the market with a Mean of 4.66, indicating that despite being food producers, rice farming households still rely heavily on market purchases to meet their dietary needs. This suggests that food self-sufficiency is not guaranteed among farming households, likely due to seasonal production limitations, post-harvest losses, or low yields. Similar findings have been reported by Akinyele (2009), who noted that rural households often resort to market-based food access as a primary response to food shortages. Borrowing food or money from relatives and friends had a mean of 4.42 and is ranked second as a coping strategy adopted by the respondents in the study area. This aligns with findings from Babatunde and Qaim (2010), who emphasized the role of social support systems in buffering the effects of food insecurity among rural households in Nigeria.

The third most adopted strategy was increased reliance on wild food, hunting, or scavenging with a mean of 4.24. This strategy, though relatively accessible, raises concerns about nutritional adequacy and environmental sustainability. Reliance on wild foods during food scarcity reflects both resilience and desperation, especially when conventional food sources are exhausted (Omotesho *et al.,* 2006). Skipping meals with a Mean of 4.03 and consumption of less preferred foods with a Mean of 3.87 were also common coping strategies identified in the study area, which were ranked fourth and fifth respectively. These findings are consistent with the coping strategy index framework, which ranks such practices as indicative of moderate to severe food insecurity (Maxwell and Caldwell, 2008). More distressing strategies, such as mothers reducing their own food intake for their children with a mean of 3.79 and reducing the quality and quantity of food with a mean of 3.63 were ranked sixth and seventh respectively, point to the gendered dimensions of food insecurity. Parents often bear the burden of household food insecurity, prioritizing children's needs over their own (Hevesi *et al.,* 2024).

Table 4: Coping strategies adopted by rice farming households in the study area during periods of food shortage

Coping Strategies	Mean	Rank
Buying from the market	4.66	1st
Borrowing money or food from friends/relatives	4.42	2nd
Increased reliance on wild food like hunting/scavenging	4.24	3rd
Skipping one or two meals per day	4.03	4th
Eating less preferred foods	3.87	5th
Parents limiting their own food intake in order to ensure that their children get enough to eat	3.79	6th
Reduction in quality and quantity of food consumed	3.63	7th
Sale of livestock/household assets	1.55	8th
Send out children for paid jobs/ work for food	1.44	9th
Begging for food on streets/neighborhood	1.42	10th
Parents abandoning children to secure food for themselves	1.42	10th

Author's compilation

CONCLUSION AND POLICY RECOMMENDATION

Conclusion

This study concludes that while majority of rice farming households in Wukari LGA are food secure, a significant minority remain vulnerable to food insecurity, highlighting persistent challenges even among food producers. Key determinants of food security include education, farming experience, extension contact, and farm size factors that enhance household capacity and access to critical resources while larger household size and older age tend to reduce food security. The reliance on short-term coping strategies during food scarcity further reveals the fragility of household resilience mechanisms. Strengthening agricultural extension services, promoting farmer education, expanding farm holdings, and encouraging cooperative membership are essential policy interventions to sustainably improve food security in the region.

Policy Recommendation

Based on the outcomes of this study, the following recommendations were drawn:

i. Education should be promoted to enhance adult literacy and agricultural training to help farmers adopt innovations and improve productivity because education increases the likelihood of household food security.
ii. Expand and improve access to agricultural extension services and information channels to enhance farmers' knowledge and productivity.
iii. Leverage experienced farmers through mentorship and peer-learning programs, Farming experience improves decision-making and food security outcomes.
iv. Provide mechanized tools and labor support for older farmers and encourage youth in agriculture to offset aging workforce challenges.

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