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Determinants of Food Security among Households in Kano State Nigeria

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Abstract

The paper conducted an analysis on the determinants of food ecurity among households in Kano state. A multi stage sampling technique was used in household sampling. This involved a selection of 10% (4.4) out of the 44 local governments of Kano. A total of 5 local governments were selected. Data was obtained using primary and secondary sources. Primary data were collected using structured questionnaire, secondary data was collected from journal articles and reports. The Binary regression shows age (-0.023), years of formal education (0.038) were significant at 1% ; membership of cooperation, contact with extension agents and value of asset were all significant at 5%. However, result show that as age increases household food security was likely to decrease. The result explained 24.87% (Nagelkerke R2) of the variance in food security status and correctly classified 68.2% of cases. The study recommended designing and implement policies that address gender disparities in access to resources, education, and cooperative membership. Women play a crucial role in agriculture and household food security. Ensuring they have equal access to resources and support can significantly enhance food security outcomes.

Key Words: *Food Insecurity, Food Security, Binary Logit, Regression, Household, Kano*

Introduction

Availability of food requires the consistent flow of food supply over long period of time. USAID defines food security as a situation where people at all times have physical and economic access to sufficient food that meets their dietary needs for a productive and healthy life. The total supply of physical food must be sufficient enough and easy to access by household through various sources like by producing it themselves of buying from market and to meet the dietary needs food must be adequately utilized. FAO(2002) defines food security as when people at all times have access to sufficient food supply in its physical, social and economic form which should be safe and nutritious enough to meet their dietary needs and food preferences for an active and health life. Food security is a concept that refers to the condition in which 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. Food security is a global concern and is often measured at different levels, from the individual and household level to national and global scales. It's a multifaceted issue that requires addressing not only agricultural production but also

economic, social, and political factors that influence access to food. Efforts to achieve food security often involve a combination of strategies, including: Agricultural development, Food distribution and trade, Social safety nets such as school feeding programs to help vulnerable populations access food, Nutrition education, Environmental sustainability, and Conflict resolution and peace building. Food security is a fundamental aspect of human well-being and is closely tied to broader issues such as poverty, health, and sustainable development. International organizations like the United Nations Food and Agriculture Organization (FAO) and non-governmental organizations play significant roles in addressing food security challenges globally.

Food security in Nigeria has been a persistent challenge, with various factors contributing to the complexity of the issue. While Nigeria has made efforts to improve its food security situation, there are still significant concerns and vulnerabilities in the country. Like many other countries, the country faces several food security problems that affect its population such as insufficient food production, poor access to market, malnutrition, conflict and insecurity. World Bank (2012) estimates that Nigeria accounts for 47% of West Africa's total population. As the population increases, the country's demand for food increases. In contrast, the ability to produce Food diminishes because pressures from the growing population in desertification, climate change, and erosion also impact the already diminishing resources and further threaten food production. Food security involves access and availability of foodstuff, stability of supplies, and diet quality (Raphael, *et.al* 2017) . According to FAO, Nigeria has an energy intake of 1730Kcal and an average protein supply of 64g per capita per day, far below the 2500 – 3400Kcal minimum recommended daily intake. This shows that Nigeria faces the challenge of an unbalanced diet leading to various malnutrition symptoms (FAO 2013). GFSI (2015), assessed Nigeria to be 91st with a 37.1 score based on affordability, availability, quality, and safety indices.

To address these food security challenges, Nigeria has implemented various initiatives, including efforts to modernize agriculture, improve storage and transportation infrastructure, promote sustainable farming practices, and invest in nutrition programs. Additionally, there is a need for policy reforms, increased investment in agriculture, and coordinated efforts among government agencies, NGOs, and international organizations to combat food insecurity in the country. Addressing food security in Nigeria requires coordinated efforts among government agencies, non-governmental organizations, international organizations, and the private sector to enhance agricultural productivity, reduce post-harvest losses, improve access to nutritious food, and tackle the root causes of food insecurity, such as poverty and conflict. Despite numerous research in food security in Nigeria, the country still faces immense threat especially in food access and utilization having a Global Food Security Index (GFSI) score of 42.0 out of 113 countries. This means that 12.9% of people living in extreme poverty around the globe are in Nigeria (Mojeed 2023). On this note, this paper seeks to analyze the determinants of food insecurity among some selected households in Kano State of Nigeria, and also to estimate the extent of food insecurity situation among the households.

Literature Review and Theoretical Issues

Food Security

There is no consensus definition about the concept of food security and the concept is multifaceted implying that food security varies over time and space. Food security is a critical issue that affects individuals, communities, and nations worldwide. It is defined by the Food and Agriculture Organization (FAO) of the United Nations as a condition in which "all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life" . Achieving food security involves ensuring food availability, accessibility, utilization, and stability.

Dimensions of Food Security

Availability: Refers to the physical presence of food. This can be through domestic production, imports, food aid, or stocks. Factors affecting food availability include agricultural productivity, climate conditions, technological advancements, and trade policies.

Accessibility: Economic and physical access to food. Even if food is available, individuals must have the resources to obtain it. It can be Influenced by income levels, food prices, infrastructure, and social safety nets.

Utilization: Proper use of food based on knowledge of nutrition and care, as well as adequate water and sanitation. It Involves food preparation, diversity of diet, and the biological utilization of nutrients.

Stability: Ensures that the other three dimensions are stable over time, without risks of losing access to food due to sudden shocks (economic crises, natural disasters) or cyclical events (seasonal food shortages).

Global Food Security Challenges

Climate Change: Alters agricultural productivity through changes in temperature, precipitation patterns, and increased frequency of extreme weather events. Impacts water availability and quality, soil fertility, and pest and disease dynamics.

Population Growth: Rising global population increases demand for food. Urbanization changes consumption patterns, often increasing demand for processed and animal-based foods, which have higher resource footprints.

Economic Factors: Poverty and income inequality limit access to food. Economic downturns and trade disruptions can lead to price volatility, affecting affordability.

Political Instability and Conflict: Wars and conflicts disrupt food production and distribution systems. Refugee crises result in large populations with immediate food assistance needs.

Agricultural Practices: Sustainable farming practices are necessary to maintain soil health and productivity. Intensive farming, monoculture, and overuse of chemical inputs can degrade natural resources, leading to long-term food insecurity.

Strategies to Enhance Food Security

Sustainable Agriculture: Practices like crop rotation, agroforestry, conservation tillage, and organic farming can enhance soil health and resilience to climate change. Integrating traditional knowledge with modern technologies to improve productivity can boost food sustainability.

Improving Infrastructure: Investments in rural infrastructure (roads, storage facilities, irrigation systems) could reduce post-harvest losses and improve market access. Development of supply chains and cold storage to ensure food reaches consumers efficiently and with minimal loss.

Policy and Governance: Establishing policies that support farmers, protect land rights, and encourage investment in agriculture. International cooperation on trade policies can be put in place to ensure stable food supply chains and mitigate the effects of protectionism.

Social Protection Programs: Safety nets like food subsidies, cash transfers, and school feeding programs could be introduced to support vulnerable populations. Programs should be aimed at women's empowerment, as women play a critical role in food production and household nutrition.

Technological Innovation: Use of biotechnology, precision agriculture, and information technology to increase productivity and reduce waste. Mobile technologies and apps for providing farmers with timely information on weather, market prices, and best practices are ways to mitigate food shortages.

Education and Capacity Building: Training farmers in sustainable practices and resource management like Sasakawa Projects. Nutrition education helps to promote dietary diversity and improve utilization.

Food Situation in Nigeria

Nigeria, Africa's most populous country, faces significant challenges and opportunities concerning its food security. With a population of over 200 million people, the nation must navigate complex issues related to agricultural productivity, infrastructure, climate change, and economic factors to ensure that its citizens have access to sufficient, safe, and nutritious food. Amartya Sen (1981) noted that "there is no such thing as an apolitical food problem." While natural events like droughts may initiate famine conditions, it is the actions or inactions of governments that determine their severity and even whether a famine will occur. Governments that come to power through force or rigged elections, rather than fair and open elections, often have narrow support bases built on cronyism and patronage. In such contexts, food distribution within a country becomes a political issue. Governments usually prioritize urban areas, often neglecting subsistence farmers and rural areas. In Nigeria, many agricultural policies, especially those regarding the pricing of agricultural commodities, are biased against rural areas. Governments frequently keep the prices of basic grains artificially low, preventing subsistence farmers from accumulating enough capital to invest in improving their production, thus trapping them in precarious situations. Governments with kleptocratic tendencies can undermine food security even during good harvests. When governments monopolize trade, farmers may be allowed to grow cash crops for export but are legally compelled to sell their crops to government buyers at prices far below the world market rate. The government can then sell these crops at full market price, pocketing the difference,

creating an artificial "poverty trap" from which even the most diligent farmers cannot escape. In the absence of the rule of law or private property rights, farmers have little incentive to improve their productivity. One could argue that if the government effectively implemented policies to enhance the agricultural sector's productivity, various foodstuffs would be more available in the market. If supply exceeds demand, prices tend to fall, making food more accessible to consumers. Therefore, prices would only rise if the agricultural sector fails to produce the required amount of food.

Agricultural Sector

Agriculture is a critical sector in Nigeria, employing about 70% of the workforce and contributing approximately 24% to the GDP. The sector is characterized by smallholder farms, which produce the majority of the country's food crops, including cassava, yams, maize, rice, and sorghum. However, agricultural productivity remains low due to several constraints:

1. Limited Access to Inputs: Smallholder farmers often lack access to quality seeds, fertilizers, and modern farming equipment. Financial constraints and limited access to credit hinder the adoption of improved agricultural technologies.

2. Poor Infrastructure: Inadequate rural infrastructure, including roads, storage facilities, and irrigation systems, leads to high post-harvest losses. Poor transportation networks make it difficult for farmers to access markets, reducing their income and ability to reinvest in their farms.

3. Climate Change and Environmental Degradation: Nigeria is highly vulnerable to climate change, with increasing temperatures, erratic rainfall patterns, and more frequent extreme weather events such as floods and droughts. Land degradation, deforestation, and desertification, particularly in the northern regions, exacerbate food insecurity.

Food Security Challenges

1. Economic Constraints: High levels of poverty and unemployment limit people's ability to afford sufficient and nutritious food. Inflation and fluctuating food prices make it difficult for households to maintain stable access to food.

2. Conflict and Insecurity: The Boko Haram insurgency in the northeast and clashes between herders and farmers in the middle belt have disrupted agricultural activities and displaced millions of people. Insecurity reduces food production, disrupts supply chains, and limits access to food.

3. Nutrition and Health: Malnutrition remains a critical issue, particularly among children under five years old, with high rates of stunting, wasting, and micronutrient deficiencies. Poor dietary diversity and reliance on starchy staples contribute to inadequate nutrition.

Government and Policy Responses

1. Agricultural Policies and Programs: The Nigerian government has implemented several initiatives aimed at boosting agricultural productivity and ensuring food security, such as the Agricultural Transformation Agenda (ATA) and the Agricultural Promotion Policy (APP).

Programs like the Anchor Borrowers' Program provide credit and input support to smallholder farmers.

2. Investment in Infrastructure: Efforts are being made to improve rural infrastructure, including road networks, storage facilities, and irrigation systems, to reduce post-harvest losses and enhance market access. The government is promoting the development of agro-processing zones to add value to agricultural products and create jobs.

3. Social Protection Programs: Social safety nets, such as the National Social Investment Program (NSIP), aim to support vulnerable populations through cash transfers, school feeding programs, and youth empowerment initiatives. Initiatives targeting women's empowerment and rural development are crucial, given the significant role women play in agriculture and household nutrition.

4. Climate Change Adaptation: Programs focused on climate-smart agriculture and sustainable land management practices are being promoted to build resilience against climate change. Investment in weather forecasting and early warning systems help farmers make informed decisions about weather condition.

Nigeria's food situation is a complex interplay of agricultural, economic, environmental, and social factors. While the country faces significant challenges, there are also opportunities for improvement through coordinated efforts by the government, international partners, and civil society. Enhancing agricultural productivity, improving infrastructure, addressing climate change, and implementing effective social protection programs are essential steps toward achieving food security for all Nigerians.

Determinants of Food Insecurity

Feyisa & Belete (2018) conducted a study in Ethiopia to identify the determinants of food insecurity situation, the study shows that one third of the sampled rural households were food insecure. The authors considered annual gross farm income, household size, annual non farm income of households and total farm size in hecters as determinants of food insecurity. The study revealed that farm size, gross farm income and household size were the major determinants of food insecurity in among the sampled households.

In another study conducted by Sunusi (2006) in Lagos and Oyo states of Nigeria, the determinants of food insecurity identified includes but not limited to income of households, level of education of households, and household’s size. The study revealed that about 70% of the sampled households are food insecure. In a nutshell therefore the deductions that can be made based on the above studies is that the major determinants of food insecurity in Nigeria are household’s income, educational statuses of households and size of households. However in the rural areas of Nigeria, one major determinants is farm size and income from farming based activities, while in the urban areas the off farm income and other alternative sources of income are among the determinants.

Braun (1992) have shown that fluctuation in a country’s capacity to import food also contributed to food insecurity by affecting the local availability of food as well as the global availability. Hazel carried out an ordinary least square technique to regress deficit in per calorie daily consumption on the import of food, export proceeds, output of staple crops and

found that all coefficients on the variables are significant and conclude that those variables taken together could be taken care of when policing about the determinants of food insecurity in Nigeria.

Theoretical issues

In his famous theory of population, "An Essay on the Principles of Population Thomas Malthus argued that population exhibits a natural growth rate described by geometric progression while food production grew in arithmetic progression Malthus further concludes that without restrains, there will be continued pressure on living standard both in terms of input and output. Malthus was more particular to agricultural production because of the fear of hunger and famine due to scarcity of land relative to the size of population. Malthus posits that population will soon outstrip the available resources and signified disaster, he therefore prophesized checks both natural and moral that will control population. These checks includes hunger, famine war, absistence from sex and etc. however Malthus failed to consider the technological advancement and international trade in improving food situation. Despite the above the Malthusian theory of population have succeeded in explaining the food insecurity situation especially in developing countries like Nigeria where there are constraints to technological progress and international trade and at the same time the growth in food production is not encouraging. The manifestation of food insecurity in Nigeria can however be justified on the basis of frequent food importation indices of the country.

Methodology and Model Specification

Sources of Data and Sampling

The data used were obtained using a structured questionnaire. Multistage sampling technique was used to select household in the study area. The first stage involved selection of 10% of the 44 Local Government Areas (LGAs) of Kano State. Giving a total of five (5) LGAs. The five LGAs were randomly selected namely Bebeji, Dawakin Tofa, Kiru, Nasawara and Sumaila. The second stage selection of two (2) communities from each of the five selected LGAs based on household concentration. A total of 38,545 household sample frame was established. A sample size of 381 was determined using Krejcie, R.V., & Morgan, D.W. (1970) table of random numbers. The sample size at community level was proportionately calculated.

Model Specification

Binary Logistic Regression
The Binary regression is adopted to serve the analytical framework in measuring the determinants of food security. It is appropriate for modelling dichotomous endogenous variables (Bhattacherjee, 2012). The binary logistic regression model then provides a framework for detecting the likelihood of being food secure or otherwise (food insecure) by a household. The choice of the determinants of household food security status was guided by various studies, such as the works of Ngema, Sibanda and Musemwa (2018) Mannaf and Uddin (2012), Agbola (2014), Mango et al. (2014)
Equation (1) portrays the specification of the binary logistic regression modelling:

$$Z_i = \rho_\mu + \sum(\beta_i x k_i) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

where Xi represents a set of parameters that determine the ith household's food security status. Zi is the odds of a household being food secure or not, a dichotomous dependent variable (coded 0 and 1).
ρ_{μ} represents the model intercept
βi represents the coefficients of the explanatory variables, xk_i

$$P_i = \frac{e^{Zi}}{1+e^{Zi}} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (2)$$

where
Pi = likelihood of the ith household's food security status being secure
1 − Pi = likelihood of the household being food insecure.
The proportion of the likelihood of a household being food secure is Pi (Y=1 against Y=0)
The likelihood of household being food insecure is (1 − Pi)
That is, odds = Pi/(1 − Pi).
Using the natural logarithm, the prediction is given as:

$$L_i = \ln\left(\frac{P_i}{1-P_i}\right) = Z_i \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3)$$

Given that $$P_i = \left(\frac{1}{1+e^{-Z_i}}\right) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (4)$$

Z_i denote the log of the odds ratio in relation to a household being food secure as shown in the regression below:

$$Z_i = B_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \dots\dots \beta_n X_n + \mu_i \dots\dots\dots\dots\dots\dots\dots\dots\dots (5)$$

Where Z_i = Household food security status (with value 1 for food secure and 0 for food insecure)
B_0 = intercept term for unknown parameters
μ_i = error term
Explanatory variables used in binary logistic regression analysis with apriori expectation are
Table 1: Explanatory variables used in Regression

Variable	Description	Expected outcome (+/-)
Age of household head	Age of household head in years (continous)	-
Household size	Number of household members (continous)	+/-
Education status	1=yes, 0= No (categorical-dummy)	+
Membership of cooperatives	1=yes, 0 = No (categorical-dummy)	+
Contact with extension agent	1=yes, 0= No (categorical-dummy)	+
Annual income from all sources	Total household income (₦) (continous)	+
Value of household productive assets	Actual value of household assts (₦)(continus)	+
Diversity of income	Different income sources	

sources	of the households (1=salary job, 0 =non-salary job	+

Source: Author, 2023

Results and Discussion

In this section, the result for factors that determine the food security status of household is presented. Factors analyzed were age of household head, household size, education, cooperative membership, and contact with extension agents, income, assets, and other sources of income. A binary regression model was used for the analysis.

Table 2: Determinants of Food Security Status of Household

Variables	**B**	**S.E.**	**Wald**	**Sig.**	**Exp(B)**
Age of household head	-0.023	0.013	2.94	0.086*	0.977
Household size	0.032	0.042	0.58	0.446	1.033
Years of formal education	0.038	0.022	3.099	0.078*	1.039
Membership of cooperatives	0.811	0.255	10.068	0.002**	2.249
Contact with extension agent	0.495	0.251	3.877	0.049**	1.64
Annual income from all sources	0.004	0.16	0.001	0.982	1.004
Value of household productive assets	0.248	0.1	6.199	0.013**	1.282
Diversity of income sources	1.336	0.229	34.197	0.000*	3.805
Constant	-6.024	2.069	8.482	0.004	0.002
-2 Log likelihood	444.400a				
Cox & Snell R Square	0.1864				
Nagelkerke R Square	0.248673				
Chi-square	77.784***				
Significance level	***P<0.001	P**<0.05	P*<0.1		

In Table 2 above the determinants of food security status of households in the study area are presented. Binary logistic regression was performed to ascertain the effects of age of the household head, household size, years of formal experience, membership of cooperative, contact with extension agent, annual income from all sources, value of household productive assets, and diversity of income sources. The logistic regression model was statistically significant, χ^2= 77.784, p < .001. The model explained 24.87% (Nagelkerke R^2) of the variance in food security status and correctly classified 68.2% of cases. The result shows that there was a negative significant relationship between food security status and age of household head at 10%, with Exp(B) value of 0.977 which implies that unit increase in the age of the household head decreases the likelihood of food security by factor of 0.977 and vice versa. This findings disagrees with Dube *et al;*(2018) who discovered that increase in the age of the household head increase the probability of the household been food secure. The result shows that there was a positive significant relationship between years of formal

education and food security status of the household at 10%, this indicates that as years of formal education increases probability of the household to be food secured increases by the factor of the odds ratio of 1.039 and vice versa. The result from this study is similar to Mutisya *et al*. (2016) who found that the probability of being food insecure decreased by 0.019 for a unit increase in the average years of schooling for a given household. The findings also agree with Feyisa *et al;* (2018) who reported that literate households are more food insecure than illiterate households, revealing that education contributes to food security by influencing productivity. The result also shows that there is a positive relationship between membership of cooperative and food security status with odd ratio of 2.249 and statistically significant at 5%, which indicate that the likelihood of food security increases by a factor of 2.249 when the household belong to cooperative society. The result shows that there is a positive relationship between food security status and contact with extension agents with the odds ratio of 1.64 and statistically significant at 5% which indicate that households with contact with extension agents likelihood of food security increases by a factor of 1.64 in contrast to household with no contact. The result from this finding is in line with Dube et al, (2018) who discovered that information obtained by extension agents help rural households to create new income earning mechanism so that they can be food secured. The result shows that there is a positive relationship between value of productive assets and food security status with odds ratio of 1.282 and statistically significant at 5%, which implies that the likelihood of household with better productive assets tends to increase food security by factor of 1.282 compared to households with less productive assets. The result from this finding agrees with Gemechu et *al*. (2016) who indicated that number of livestock owned by household had a significant influence on food security status and had a positive relationship in a similar study.

Furthermore , the result shows that there is a positive relationship between food security status and diversity of income sources in the study area and is statistically significant at 5%, this implies that households with diverse income sources tends to be more food secure compared to households with less diverse income sources in the study area. The result also reveals that there is a positive relationship between food security status and household size, but was not statistically significant, this implies that household size have no effects on the level food security status in the study area. The result shows there is a positive relationship between food security and annual income source, but was not statistically significant implying that the annual income sources have no influence on the food security level in the study area.

Conclusion

The problem of food insecurity is pervasive in Nigeria, the study revealed that the factors that determined the likelihood of some selected households to become food insecure in Nigeria includes household income, gender of head of household, household size, educational status of head of household, total number of assets owned by households and access to credit facilities by households. Almost all the determinants of food insecurity in the study have conformed to economic theory with exception of access to credit.

Based on the findings of the paper therefore, the followings are recommended;

Since household income is a major determinants of likelihood of household to be food insecure, then there is the need to generate employment opportunities and create more income earning activities by the government of Nigeria in order to empower the households so that the food insecurity situation can be reduced and the population be empowered.

There is also the need to improve access to education by households as this will help to empower the labour force in the households at the same time reduce the dependency rate and increase access to food and improve labor force productivity. Attached to this recommendation is the need to empower female headed households since it has been observed that they were in most cases food insecure relative to the households headed by males, micro finances and microenterprises can be used as tools for the empowerment.

Policy Recommendations

The following insights and deductions are drawn from the result of the regression of equation. The binary logistic regression analysis conducted reveals several significant factors influencing food security among households. Based on these findings, the following policy implications can be suggested to enhance food security:

1. Targeted Support for Older Household Heads: Develop support programs for older household heads to mitigate the negative impact of age on food security. This can include access to pensions, targeted agricultural training, and subsidies for inputs tailored to older farmers. The analysis shows a negative relationship between the age of the household head and food security, indicating that as household heads age, the likelihood of food security decreases.

2. Investment in Education: Increase investment in education, particularly for rural populations, to improve food security outcomes. The positive relationship between years of formal education and food security status suggests that better-educated households are more likely to be food secure. This highlights the importance of education in enhancing productivity and food security.

3. Promoting Cooperative Membership: Encourage and support the formation and functioning of agricultural cooperatives. The analysis shows that membership in cooperatives significantly increases the likelihood of food security. Cooperatives can provide members with better access to markets, resources, and information.

4. Enhancing Extension Services: Strengthen agricultural extension services to ensure farmers have access to the latest farming techniques and market information. Contact with extension agents is positively associated with food security, indicating that households benefit from the information and support provided by these agents.

5. Improving Access to Productive Assets: Facilitate access to productive assets such as land, livestock, and farming equipment through credit schemes, grants, and subsidies. The positive relationship between the value of productive assets and food security status suggests that households with better productive assets are more food secure.

6. Diversifying Income Sources: Implement programs that encourage income diversification among rural households, such as promoting off-farm employment opportunities and small-

scale businesses. Households with diverse income sources are more likely to be food secure, highlighting the importance of income diversification in mitigating risks and enhancing resilience.

7. Addressing the Needs of Larger Households: Although household size was not statistically significant in this study, policies should still consider the potential needs of larger households to ensure comprehensive support. Larger households may have different dynamics and needs that require specific interventions to ensure food security.

8. Annual Income Support Programs: Implement income support programs such as conditional cash transfers, subsidies, and microfinance initiatives to stabilize household incomes. While annual income was not statistically significant in this analysis, stable and sufficient income remains a critical factor for food security.

9. Gender-Sensitive Policies: Design and implement policies that address gender disparities in access to resources, education, and cooperative membership. Women play a crucial role in agriculture and household food security. Ensuring they have equal access to resources and support can significantly enhance food security outcomes.

10. Climate Adaptation Strategies: Develop and promote climate-resilient agricultural practices and provide support for farmers to adapt to changing climate conditions. Climate change impacts agricultural productivity and food security. Adapting to climate change is essential for sustaining food security.

The logistic regression analysis provides valuable insights into the factors affecting food security in the study area. By focusing on these significant determinants and implementing targeted policies, governments and stakeholders can enhance food security, improve agricultural productivity, and support the livelihoods of rural households. These policy implications should be integrated into broader national and regional strategies to address food insecurity comprehensively.

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