Socioeconomic analysis of the food security status of maize farming households in giwa local government area of kaduna state, nigeria

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Abstract: This study specifically examined the food security status of the maize farming households, their perception on the contribution of maize farming to their households food security status and the determinants of the food security status of the maize farming households in the study area. Primary data collected from a sample size of 100 maize farming households were employed in the study and the data were analysed using descriptive statistics, food security index and logit regression. The result showed that 54% of the maize farming households was food secure while 46% were food insecure. The maize farming households perceived maize farming to be important in contributing to their household food security. The factors significant in influencing food security in the study area were household size, household income, farming experience, association, extension, education and farm size. It was recommended that farmers should adopt proper maize farming management practices aimed at high intensity of maize production which will serve as maize production offers an opportunity for increasing household food security.

Keywords: Food security, Households, Maize, Perception

1. Introduction

One of the greatest problems facing developing country today is the production of sufficient food for their large population. It is a widely accepted fact that food is a basic necessity of life [1]. Its importance at the household level is obvious since it is a basic means of sustenance. Food security has posed some challenges to human welfare and economic growth in Nigeria [2]. Low food availability and profound poverty have caused a number of undernourished people in the continent to rise considerably in recent years [2]. Food security exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food which meet their dietary needs and food preferences for an active and healthy life [3]. There are four major elements that constitute food security. These are availability, adequacy, accessibility, and sustainability of access. Availability connotes the physical presence of food in large amount. Accessibility suggests sufficient purchasing power or ability to acquire quality food at all time while utilization demands sufficient quantity of food intake [4]. The elements of availability, accessibility, utilization and sustainability in a larger context embrace the supply, demand and adequacy of food at all times [4].

Agricultural growth is particularly effective in reducing hunger and malnutrition [3]. The Agricultural growth rate relative to population growth is said to be low in Nigeria[5]. Agriculture is reported to grow at a rate of 2.5% per annum as at against 3.5% per annum of population growth rate, thus resulting to food insecurity in the nation [6]. A number of factors such as climatic changes, soil fertility and variability, and lastly population explosions are examples of some factors that can lead to foods security constraints. These fluctuations in weather patterns pose serious threat to mankind and its environs and may have overall adverse effect on food security issues [7].

Food crops such as rice, maize, cowpea, melon, groundnut, cassava, sweet potatoes, millet, sorghum, etc. are crops that contribute to food security to meet the consumption needs of the households, and as a source for livestock feeds. Its production is therefore important in meeting the food need of the poor rural households in particular and Nigeria in general [8]. Maize is one of the important sources of food supply to many people all over the world. Maize is an important food and feed crop in Nigeria and remains an important crop for rural food security [9]. Maize has huge lucrative potentials for food security [10]. Maize has now risen to a commercial crop on which agro based industries depend on as raw materials [11].

Food insecurity is a major development problem that is caused by myriad of factors in the global, regional, national and local spheres of human life. Several efforts have been put in place to alleviate food insecurity globally, nationally and even locally [12]. Despite these efforts the situation continues to prevail and sometimes increase in the contemporary human society because there exist little empirical knowledge on the analysis of food security status. It is therefore imperative that food insecurity gets addressed appropriately. Small scale farmers play a vital role in food production especially through subsistent farming. However, their households are major causalities of food insecurity despite their effort in food production [12]. Therefore, this study was designed to contribute to existing literature on food security status especially among maize farming households in Giwa Local Government Area of Kaduna State. The study specifically examined the food security status of the maize farming households, the perception of maize farming households on the contribution of maize farming to their households food security status and the determinants of the food security status of the maize farming households in the study area.

2. Methodology

2.1 Description of the Study Area

The study was conducted in Giwa Local Government Area of Kaduna State, Nigeria. The local government lies between latitude 11.20° and 11.50° N and longitude 7.0° and 7.5° E. It is located North-West of Zaria in the transition zone between Northern Guinea Savannah and southern tip of Sudan Savannah and about 640m above sea level. The local government is bounded on the north by Funtua and Malumfashi Local Government Areas of Kastina State and on the West and South by BirninGwari and Igbabi Local Government Areas of Kaduna State respectively. Giwa Local Government has an estimated population of 350,586. The population growth rate is 4%. The total rural population in maize production is 171,856 and about 70% of the households in Giwa Local Government produce maize annually. The percentage of rural population is 60%. The average household size is 7 members and the average farm size per household is 2.5 hectares. The local government has eleven (11) districts and eleven (11) wards. These wards include Kadage, Gangara, Galadimawa, Danmahawayi, Shika, Giwa, Kidandan, Kankangi, Panhauya, Idasu and Yakawada. The wards include: Karaukarau, Gangara, Fatika, Danmahawayi, Shika, Giwa, Kidandan, Kakangi, Tsibiri, Kaya and Yakawada

2.2 Sampling Procedure and Sample Size

A combination of purposive and random sampling technique was used for this study. Giwa Local Government area will be purposively selected since it is one of the Local Government in Kaduna state that is known for high intensity of maize production relative to other local government areas in the state. Five districts of the eleven districts in Giwa Local Government Area where the cultivation of maize is high were randomly selected. These districts are Giwa, Shika, Kaya, Fatika, and Karaukarau. The household heads were used as sampling units. Twenty (20) farming household were selected from each district randomly. Therefore the total number of maize farming household that was used for this study was hundred (100) because there was no reliable sampling frame of maize farming households in the study area.

2.3 Method of Data Collection

The study used both primary and secondary data. The primary data were collected through the administration of structured questionnaire. To facilitate the collection of these data, the services of an extension agent was engaged. The information collected include farmers' socio-economic characteristics such as age, gender, marital status, educational qualification, farming experience, contact with extension staff, cooperative participation, farm size, household size and access to credit, farmers' food consumption and expenditure. The secondary data on the other hand was sourced using journals, bulletins, internets, past projects and the library.

2.4 Analytical Technique

The analytical tools used for achieving the objectives of this study include descriptive statistics, food security index and logit regression.

2.4.1 Food Security Index

Food security indexas used by[13] was used to measure the food security status of the maize farming households. This was used to classify the maize farming households into food secure or food insecure depending on their ability to meet the recommended daily per capita intake of 2260 kilo calorie [14].

The food security index was given as:

$$Z_i = \frac{Y_i}{R} \quad \text{...(1)}$$

Where:
Z_i = food security of maize farming households
Y_i = daily per capita calorie intake of maize farming households
R = recommended per capita daily calorie intake (2260 kilo calorie)
Z_i = 1 for Y_i greater than or equal to R
Z_i = 0 for Y_i less than R

The degree of food security/insecurity was estimated using the equation given as:

$$P_a = \frac{1}{n}\sum_{i=1}^{n} G_i = \frac{1}{n}\sum_{i=1}^{n}\left(\frac{Y_i - Z}{Z}\right)^a \quad \text{...(2)}$$

Where P_a is degree of food insecurity for α taking values of 1, 2 and 3 for headcount, short-fall and severity of food insecurity, n is the number of food insecure households, G_i is the *per capita* calorie intake deficiency of the ith household.

2.4.2 Logit Regression Model

Logit regression model was used to achieve objective ii. The probability of a farmer being food secure was determined by an underlying response variable that captured the true economic status of the farmers. The underlying variable (y) in the case of the food security status of the maize farming households is expressed as follows:

$$y = a + \sum_{i=1}^{7} x_i\,\beta_j + \mu \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots (3)$$

Where:

y = Food security status measured as dichotomous response variable (1 = food secure, 0 = not food secure)

x_1= Household size (number of members of the household)

x_2 = Household annual income (naira)

x_3 = Farming experience (years)

x_4 = Membership of cooperative (years)

x_5= Extension (number of extension contacts)

x_6= Education (years of formal schooling)

x_7 = Farm size (hectares)

$\beta_1 - \beta_7$ = coefficients for the respective variables in the logit function

a = constant term

μ = error term

3. Results and Discussion

3.1 Food security status of maize farming households

The result of the food security status of the respondents using their food security indices is presented in Table 1.Based on the recommended daily calorie intake (R) of 2260 Kcal, the head count ratio showed that 54% of the maize farming households were food secure with an average daily per capita household calorie consumption of 6415.80Kcal and 46% of the maize farming households with an average daily per capita calorie consumption of 1321.52 were food insecure. The shortfall/surplus index which measures the extent of deviation from the food security line by the households was also estimated. The food secured maize farming households had a surplus index of 0.77 and the food insecured maize farming households had a shortfall index of 0.24 indicating that food secure households exceeded the calorie requirement by 77% while the food insecure households fell short the calorie requirement by 24%. This implies that majority of the maize farming households in the study area are food secured.

Table 1: Food Security indices of maize farming households in the study area

Maize Farming Households				
Food secured	**Food insecure**	**All**		
Household recommended daily calorie intake (Kcal/ day)		2260		
Household daily per capita calorie consumption (kcal/day)	6415.80	1321.52	4072.43	
Food security index	2.83		0.58	1.8
Head count	0.54		0.46	
Shortfall index	-		0.24	
Surplus index	0.77	-		

NB: (-) implies not applicable

3.2 Perception of maize farming households on the contribution of maize farming to their household food security

Responses to the importance of maize farming contribution to household food security in the study area were measured on a 5-point Likert-type scale with values of very important = 5, important = 4, undecided = 3, unimportant = 2 and very unimportant = 1. A cut off point of 3.00 was used to determine the maize farming households perception regarding the importance of maize production in contributing to their household food security. Hence, a mean score of 3.00 and above depicts that maize farming contributes to household food security in the study area. The result in Table 2 Showed that a larger proportion of the maize farming households (87%) perceived maize farming to be very important to their household food security, 13% of the respondents perceived maize farming to be important and none of the respondents were undecided or perceived maize farming to be unimportant or very unimportant. The mean perception score wasestimated to be 4.87 and was above the cut off point (3.00) and this implies that the respondent perceived maize farming to be important in contributing to their household food security.

Table 2: Perception of maize farming households on the contribution of maize farming to their household food security

Likert scale	Frequency	Percentage
Very important	87	87
Important	13	13
Undecided	0	0
Unimportant	0	0
Very unimportant	0	0
Total	100	100
Mean perception score	4.87	
Cut off point	3.00	

3.3 Factors influencing food security among maize farming households

As shown in Table 3, the logistic model explains 81% of the total variation in the food security status of households. The chi-square statistics shows that the variables included in the model were significantly different from zero at 1% level of probability.

Household size was negative and significant at 1% level of probability, suggesting that the larger the household, the more food insecure the respondents. A unit increase in household size decreases the likelihood that the household will be food secured by a factor of -0.233. This implies that respondents with large household size are more prone to food insecurity than those with small household sizes. Large household size translates into higher consumption expenditure of households. This result is similar to that obtained by [15] in his study on the determinants of food insecurity among arable farmers in Edo State Nigeria. He found household size to be positively related to the probability of a household being food secure. The finding of this study also agrees with [16] who reported that household food availability is negatively related to household size.

Household income was positive and significant at 10% level. This indicates that the higher the household income, the higher is the probability that the households will be food secure. The result implies that a unit increase in household farm income increases the likelihood that the household will be food secure by a factor of 2.203. This could be expected because increased income, other things being equal, means increased access to food. The result is similar to the findings of [13] who found household income of household head to be significant and positively related to food security.

Membership of cooperatives has a positive coefficient, which though not significant but agrees with a priori expectation. This implies that membership of cooperative will lead to increase in the odds in favour of food security because cooperatives are viewed as vehicles for development in rural areas in terms of credit accessibility and exchange of ideas that can improve their productivity and household food security. This finding agrees with [17] and [13] who indicated that membership of cooperative was significant in influencing food security in their respective studies.

Farming experience has a negative coefficient and it is not significant. This implies that increase in farming experience will lead to decrease in food security. This is not in agreement with expectation. The negative effect may be derived from aging or reluctance to change from old and familiar farm practices and techniques to those that are modern and improved[18]. This result is not in line with [18] who indicated that years of farming experience of household heads is positively related to food security.

Extension has negative coefficient and it is not significant. This implies that extension contact with the respondents will lead to a reduction in food security of households. This is contrary to expectation. The negative sign could be due to inadequate extension service delivery in the study area and as such the benefits of extension must have eluded the farmers. This result is not in line with [18] who indicated that access to extension agent is significant factor affecting food security.

Education was positive and significant at 1% level. This implies that the higher the educational level, the more food secure the farmers and vice versa. This implies that a unit increase in household education increases the likelihood that the household will be food secure by a factor of 0.527. This is because education enhances the productivity of the respondents and the respondents tend to be better informed and have better food management techniques that will ensure equitable all round supply of food.

Farm size was found to exert positive and significant (5%) influence on food security status of the respondents. The result implies that a unit increase in household education increases the likelihood that the household will be food secure by a factor of 1.080. This implies that the likelihood of households being food secure increases with an increase in farm size. This result agrees with the findings of [19] who found farm size of household head to be significant and positively related to food security.

Table 3: Parameter Estimates of the Logistic Regression Model

Variable	β	SE	Sig	Exp. B
Constant	-0.844	0.998	0.398	0.430
Household size	-0.233***	0.081	0.004	0.792
Household income	2.203*	0.868	0.011	9.050
Farming experience	-0.022	0.026	0.405	0.978
Cooperative	0.833	0.792	0.293	2.300
Extension	-0.834	0.170	0.002	0.434
Education	0.527***	0.466	0.20	1.694
Farm size	1.080**	0.998	0.398	0.430
Model chi-square = 60.182***				
-2log likelihood = 77.445				
Percentage prediction = 81%				

*** = significant at 1% ** = significant at 5% * = significant at 10%

4. Conclusion and Recommendation

The study established that 54% of the maize farming households in the study area was food secure while 46% were food insecure. The factors significant in influencing food security of the maize farming households were household size, household income, farming experience, association, extension, education and farm size. Maize farming contributed to the household food security and therefore, maize production offers an opportunity for increasing household food security. Therefore, it is recommended that farmers should adopt proper maize farming management practices aimed at high intensity of maize production which will serve as a strategy for reducing food insecurity.

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