Effect of Cassava Products Consumption on Food Security of Farming Households in Kwara State, Nigeria

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Abstract: *Cassava is widely known as a food security crop and about 80% of Nigerians consume cassava products, at least once a day. Nevertheless, food insecurity is still a critical issue among farming households. Consequently, we evaluated the consumption frequency of cassava products and assessed the effect of consumption of cassava products on food security among farming households. Random sampling technique was used to pick 200 farming households for this study. The analytical tools are descriptive statistic, food security index and binary logistic regression. The study revealed that the commonly consumed cassava products by the respondents were Garri, cassava tuber and Fufu. Among cassava based foods, Garri was the most frequently consumed staple. Furthermore, 28% and 72% of the respondents were food secured and in-secured, respectively. The regression analysis indicated that household size, household income, quantity of Garri consumed, quantity of Fufu consumed, quantity of other cassava products consumed and access to credit facilities were the critical factors explaining food security. In addition, eating foods that are less preferred, eating more of Garri and Fufu were the most effectual coping strategies adopted by respondents in cushioning the effects of food insecurity. Government should encourage production of cassava and other leguminous crops by given incentives such as soft loans to farmers. Farmers should also be encouraged to consume cassava products with other protein rich foods. In addition, processors should produce more of Fufu, Lafun and Garri products. Moreover, policies and strategies that raise household income and lowers family size should be enhanced to reduce food insecurity.*

Keywords: Cassava products, Farming households, Food security, Kwara state

1. Introduction

Food is essential to life. It occupies a large part of typical Nigerian household expenses. Thus, food security is critical to any country of the world. Food security occurs when all people, at all times, have enough physical, civic and financial means to secure and nourish food that satisfies their dietary needs and food choices for an energetic and beneficial life (FAO, 2005). For food security to exist at the national, regional and local levels, food must be available, accessible and properly utilized. Food availability means that enough, safe and nutritious food is either domestically produced or imported from the international market. Food availability does not ensure food accessibility. For food to be accessible, individuals or families must have sufficient purchasing power or ability to acquire quality food at all times while utilization demands sufficient quality and quantity of food intake (Omonona *et al*., 2007). These elements of availability, accessibility and utilization in a larger context, embraces the supply, demand and adequacy of food at all times. Food insecurity on the other hand occurs when there is real inapproachability of food, poor social and economic access to enough food and/or poor food conversion. Food insecurity if left untacked, could cause increased vulnerability to diseases and parasites, reduced strength for tasks requiring physical effort, reduction of the benefit from schooling and training programs and general lack of vigor, alertness and vitality. The outcomes of these is a reduction in the productivity of people in the short and long terms, sacrifice in output and income, and increasing difficulty for families and nations to escape the vicious cycle of poverty. Attempt to ensure food security can, therefore, be seen as an investment in human capital that will make for a more productive society. A population that is properly fed, healthy, alert and active contributes

more productively to economic development than one which is physically and mentally challenged by inadequate diet and poor health (World Bank, 1986).

Food insecurity is still a critical issue among farming households in Nigeria (Salau *et al.,* 2018). The food insecurity situation in Nigeria is aggravated because food demand has grown faster than food production (Idrisa *et al*., 2008), the CBN (2001) corroborates this when it maintained that the rate of increased food production of 2.5% per annum does not measure up with the annual population growth of 2.8%. In addition, poor processing techniques and low productivity of the farmers under uncertain weather conditions and fluctuating market prices worsened food security situation of households (Oriola, 2009). Furthermore, post-harvest losses and low quality products make farmers vulnerable to food insecurity (Langat *et al.,* 2010).

Cassava (*Manihot spp.*) a food security crop, can play significant role in reducing this devastating effect of food insecurity among farming households. About 80% of Nigerians consume cassava products, at least once a day. Cassava derives its importance from the fact that it is starchy, a cheap source of carbohydrate, more so, its roots are a valuable source of cheap calories especially in developing countries where calories deficiency and malnutrition are well pronounced. In addition, cassava is mostly cherished due to the following characteristics: it is easily propagated by stem cuttings and can resists drought and diseases. It is within the reach of rural people, high yielding, can adapts to poor soils, can be cultivated at any time of the year and can be processed into different forms (IITA, 2004). More importantly, cassava gives the highest profits in monetary terms to naira invested (Ezike *et al.,* 2011). Moreover, most households grow cassava as their main stable food because it requires less seasonal labor.

Cassava became well known in Nigeria following the pronouncement of presidential initiative on cassava in 2002. Through food diversification program, there has been keen interest from the government to find alternative sources of carbohydrates, especially to enhance food security. Presently, attention is turning to traditional root crops, especially cassava, because of its capacity to yield under marginal soil conditions and its tolerance to drought. Consequently, cassava became a substantial part of the diet of more than 70 million Nigerians (FAO, 2003). Apart from serving as food for human consumption, it has numerous industrial uses like chips, flour, starch and the leaves which have a high export potential. Despite the important roles cassava plays, it does not provide a balance diet and thus its consistent consumption as staple food without protein or other classes of food may leads to malnutrition. The farming households who produce bulk of cassava have low disposable income to achieve a food security benchmark of daily availability of 2260Kcal of energy and 65g of protein per capita. Numerous studies (Babatunde *et al.* 2007; Omonona, 2007; Amaza *et al.,* 2008; Ahmed, 2016; Salau *et al.,* 2018) have been done on factors influencing food security of households. However, none of these studies have considered the effect of the consumption of cassava products (Garri, Fufu, and Lafun) on households' food security. Thus, this study evaluated the consumption frequency of cassava products and examined the effect of the consumption of cassava products on food security of farming households in Kwara State, Nigeria.

2. Conceptual Framework

2.1. Concept of Food Security

Food security in a broad sense has to do with having at all times an adequate level of food and food products to meet increasing consumption demand to mitigate fluctuation in output and price (Idrisa *et al.,* 2008). According to FAO (1996) food security is a situation when all people at all time have physical and economic access to sufficient, safe and nutritious food for a healthy and active life. Ladele and Ayoola (1997), reported food security as a function of food production level, that is, high level of food production is equals to food security. According to Von Braun et al. (1992) and Omonoma and Agoi (2007), there are four major elements of food security; food availability, food access, food utilization, and not losing the excess. However, to Oriola (2009), food security entails producing food that will go round every citizen both in quality and quantity. To achieve this, agricultural production needs to be enhanced with adequate knowledge of the environment, climatic condition, the market and its operation, and be aware of price and price

mechanism, good transportation system, storage, fashion modality to check glut and be well prepared in case of disasters.

Food insecurity is the opposite of this, it is the lack of access to sufficient quality and quantity of save nutrition food for an active and healthy life; the inability of households or individuals to meet the required consumption level in the face of fluctuating production, price, and income (Maharjan and Chhetri, 2006). According to Gillespie and Haddad (2001), food insecurity boils down to inability of households to have reliable access to food in sufficient quantity and quality to enjoy active and healthy life. Food importation as a result of insufficiency has continued to be on the rise in Nigeria a country which according to Edokpa and Okafor (2009) is the highest food producer in sub-Sahara Africa. Food wastage has also been indicated as a bane of food security in Nigeria. The country experienced food wastage of 0.81 million metric tons between 1995 and 2000 and this would reduce greatly if storage facilities are in place. Export of staple food has also been indicted as a cause of food insecurity, the export of staple food crops should be de-emphasized (Igberaese and Okojie-Okoedo, 2010).

3. Materials and Methods

3.1 Study Area

The study area is Kwara state. The latitude and longitude of the state are: 8º and 10º north and 3º and 6º east, respectively. The state has an area of 35,705 Sq kilometers with a population 193,392,500 people (NPC 2016). To the west, Kwara state shares an international boundary with the Republic of Benin and to the north an interstate boundaries with Niger state. It also shares boundaries with Oyo, Osun and Kogi states to the southwest, southeast and east respectively (Figure 1).



Figure 1. Map of Kwara state, Nigeria
Source: Adapted from Ibiremo *et al,* (2010)

The climate consists of both wet and dry seasons each lasting for nearly six months. The raining season starts in April and end in October while the dry season commences in November and stops in March. Temperatures range from 33^0C to 34^0C, with the total annual rainfall of about 1318mm. Agriculture remains the principal occupation of the people. The commonly grown crops are: cassava, millet, maize, okra, sorghum, cowpea, yam, sweet potatoes, and palm tree. The state has about 1,258 rural communities. Based on ecological characteristics, cultural practices and project's administrative convenience, the state is grouped into four zones by Kwara state Agricultural Development Project

(KWADP). These are: Zone A: Baruteen and Kaima Local Government Areas (LGAs); Zone B: Edu and Patigi LGAs; Zone C: Asa, Ilorin East, Ilorin South, Ilorin West and Moro LGAs and Zone D: Ekiti, Ifelodun, Irepodun, Offa, Oyun, Isin and Oke-Ero LGAs (KWADPs, 2010).

3.2. Method of Data Collection and Sampling

Primary data was engaged for this study. Data were collected using structured questionnaires. A three-stage sampling technique was used to pick respondents for this study. The first stage involved purposive selection of zone D. This zone is the largest cassava producing zone in the state. The second stage involved random selection of four Local Government Areas (LGAs) out of the 8 LGAs in the zone. In the third stage, a random selection of 25 farming households from each selected LGA to make up a sample size of 200 respondents was done.

3.3. Analytical Techniques

The tools of analysis were: descriptive statistics, Likert scale, food security index and binary logistic regression. The socioeconomic characteristics were explained using descriptive statistics. A food security index was used to classify households into food secure or food insecure depending on which side of the line they belong.

The index is given as:

$$Yi = \frac{Xi}{M}$$

Food security index (Yi) is the ratio of daily per calorie intake Xi and recommended per calorie daily intake M.

The household calorie intake was obtained through the household consumption and expenditure data. The quantity food consumed by the household in seven days was converted into its calorie content. This was further converted into per capita calorie by dividing the estimated total household calorie intake by the adjusted household size in adult equivalent. Moreover, the per capita calorie intake was converted into daily per capita intake by dividing for seven days. The calorie requirement based on recommended per calorie daily intake M of 2260Kcal per adult equivalent was used (Babatunde *et al.,* 2007).

If the food security index (Yi) is equal or greater than 1 ($Yi \geq 1$), the household is said to be food secure. On the other hand, if the food security index (Yi) is greater than 0, but less than 1($Yi < 1$), the household is food insecure.

Binary logistic regression was used to identify the drivers of food security among farming households. The model is given as:

$$Yi = a_o + a_1N_1 + m_aN_2 + \ldots + a_kN_k + e$$

Where

Yi= the binary food security status (food secure household takes the value of 1 and 0 if otherwise.

a_o= Constant

N = independent variables

e = error term

The independent variables are:

N_1 = Sex of the respondent (D=1 for male; D=0 for female)

N_2 = Age of household head (years)

N_3 = Household size (number)

N_4 = Education status (years of schooling)

N_5 = Monthly income in Naira

N_6 = Quantity of Garri consumed in kg

N_7 = Quantity of Fufu consumed in kg

N_8 = Other cassava products consumed (kg)

N_9 = Access to credit (1 for Access to credit and 0 if otherwise)

A-three point Likert-scale was used to identify frequency of cassava products. The response options and values assigned were as follows:

Very often = 3;

Often = 2; and

Not often = 1.

These values were added and divided by 3 to obtain 2.0, which was regarded as the average. Cassava products that have mean scores greater than 2.0 will be regarded as frequently consumed. Similarly, a-three point Likert-scale was used to identify the effective coping strategies employed by households in cushioning the effect of food insecurity, the response options and values assigned were as follows:

Very effective = 3;

Effective = 2; and

Not effective = 1.

These values were added and divided by 3 to obtain 2.0, which was regarded as the mean score. Strategies that have mean scores greater and lower than 2.0 will be regarded as effective and ineffective, respectively.

4. Results and Discussion

4.1. Socio-economic Characteristics of Respondents

Most (75.5%) of the respondents were males (Table 1). Based on traditions, the male respondents usually have more access to farmland when compared with their female counterparts. The mean age of the respondents was 48.5 years. Age is a critical variable, which can influence the capacity and alacrity with which the head provides foods for the household. An old respondent may have bigger household size and may not have the vigor needed to work for the maintenance and nourishment of the household

Table 1. Socio-economic characteristics of respondents

Variable	Frequency	Percentage	Mean
Age			
1- 30	45	22.5	
31-60	90	45.0	48.5
61-90	65	32.5	
Gender			
Male	151	75.5	
Female	49	24.5	
Years of education			
1- 5	65	32.5	
6-10	75	37.5	6.8
11-15	50	25.0	
16-20	10	5.0	
Marital status			
Single	28	14.0	
Married	153	76.5	
Divorce	16	8.0	
Separated	3	1.5	
Household size			
1-5	55	27.5	
6-10	79	39.5	8.7
11-15	48	24.0	
16-20	18	9.0	
Main source of income			
Agriculture	78	39.0	
Salary	74	37.0	
Trading	48	24.0	
Access to credits			
Yes	58	29.0	
No	142	71.0	
Monthly income			
50,000 - 100,000	139	69.5	
101,000-150,000	50	25.0	67,700
151,000-200,000	11	5.5	
Farm size (has)			
1 – 5	145	72.5	
6 -10	38	19.0	4.8
11-15	17	8.5	

Source: field survey, 2019

Twenty-nine percent of the household heads had access to credit facilities. Access to credit may affect the type of food eaten and expenses of households. The average years of education were seven years. Education enables the respondents to take good decisions, which may likely enhance their food

security status (Babatunde *et al.,* 2007). The respondents operated at a subsistence level with a mean farm size of 4.8 hectares. The size of farmland cultivated may affect output production and food security of the respondents (Akinsanmi and Doppler, 2005). In addition, the study revealed that the mean monthly income was ₦67, 700. The average household size was nine, and their polygamous way of life probably accounted for the large household size recorded in the study area.

4.2. Frequency of Consumption Cassava Products

Table 2 revealed that Garri with a mean score of 2.80 was ranked first. Hence, garri is the most frequently consumed cassava products. Garri is usually obtained by grinding the tuber and squeezing out the starchy component. The remains is then fermented and dried.

Table 2. Cassava products and their frequency of consumption

Cassava Products	VO Freq (%)	O Freq (%)	LO Freq (%)	MS	Ranking
Lafun	39 (16.3)	171 (71.3)	30 (12.5)	2.04	4th
Garri	200(83.3)	33(13.8)	7(2.9)	2.80*	1st
Fufu	127 (52.9)	98 (40.8)	15 (6.3)	2.47*	3rd
Starch	0 (0.0)	52 (26.0)	148 (74.0)	1.01	5th
Kabioka	0 (0.0)	3 (16.5)	167 (83.5)	1.01	5th
Cassava tubers	161 (67.1)	58 (24.2)	21 (8.8)	2.58*	2nd

*Mostly consumed, VO = Very Often, O=Often, LO=Less Often
Source: Field Survey (2019)

Garri is slightly followed by cassava tubers with a mean score of 2.58. Others are Fufu (mean score 2.47), Lafun (mean score 2.40), and starch (mean score 1.01). From the foregoing, Garri, Cassava tuber Fufu, and Lafun were ranked first, second and third respectively. This suggests that they are the mostly consumed cassava products by the respondents in the study area.

4.3. Food Security Status of Farming Households

Table 3, indicated that 72.0% and 28.0% of the households were food secure and insecure respectively. These findings agree with that of Ifeoma and Agwu (2014), who found out that 74.2% of the households were food secure while 25.8% were food insecure in their study on an assessment of food security situation among farming households in rural areas of Kano State, Nigeria.

Table 3. Food security status of households

Variables	Status		
	Food secure *	Food insecure	All
Percentage of households	28.0	72.0	100
Number of households	56	144	200

*Recommended for being food secure 2260Kilo calorie per day (Babatunde *et al.,* 2007)
Source: Field Survey, 2019

4.4 Determinants of Food Security

The logistic regression revealed that gender, educational status, household size, household income, access to credit, quantity of Garri, Fufu and other cassava products consumed are important determinants of food security (Table 4).

Table 4. Factors influencing food security

Determinants of Food Security	Coefficient	Std. Error	Sig.	t-value
Sex	0.290	.641	.444	0.186
Age	.154	.221	.485	0.696
Household size	-.287	.136	.035**	2.110
Years of education	.469	.262	.074***	1.790
Household income	2.492	.378	.000*	6.593
Garri	.373	.046	.081***	8.109
Fufu	-.011	.006	.075***	1.833
Other cassava products	-.739	.112	.049**	6.598
Access to credit	-.528	.249	.040**	2.120
Constant	3.463	1.616	.032	2.143

$R^2 = 51.32$

Source: Field Survey, 2019 *, **, *** significant at 10%, 5% and 1% levels respectively

The coefficient of household size was negative and significance at 5% level of probability. This implies that as household size decreases, the food security status increases. The coefficient of educational status was found to be positive and significant at 1% level of probability. The positive relationship between educational level of household heads and food security implies that households with an educated household head are more likely to be food secure than those with an uneducated household head. Also, the higher the number of years the household head spends in school, the more the probability of the household being food secures. This agrees with the findings of Babatunde *et al.* (2007) and Amaza *et al.* (2008). The coefficient of total income of the family was positive and significant at 10% level of probability. This implies that as total income of the family increases, the food security status is more likely to increase. The quantity of garri consumed is positive and significant at 1%. This implies that the more the quantity of garri consumed by the household, the more likely the household is food secure. Interestingly, the coefficient of fufu and other cassava products are negative and significant at 1% and 5% level of probabilities respectively. This suggests that the more the household consumes fufu and other cassava products, the more the household is food in secure. This could probably due to the fact that consumption of fufu and other cassava products does not provide a balance diet and may lead to malnutrition. Access to credit facilities is negative but important at 5% level. The negative sign suggests that probably the credit facilities were not used for the intended purposes. According to Babatunde *et al.* (2007), farmers' access to credit facilities is a crucial factor in determining the food security status of an individual as it had a significant coefficient at 5% in their study on socio-economic characteristics and food security status of farming households in Kwara State, North-Central Nigeria. They noted that farming households with good access to credit facilities have greater probability of being food secure than those without credit facilities.

4.6. Coping Mechanism

The most effective coping strategies employed by the households in cushioning the effect of food insecurity are eating foods that are less preferred (mean score = 2.58), eating more of Garri (mean score = 2.37), eating more of Lafun (mean score = 2.24), eating more of starch (mean score = 1.07), eating more of Fufu (mean score = 2.30), consuming more of cassava tubers (mean score = 1.07), borrowing food from friends and relative (mean score = 1.50) and borrowing money to buy foods (mean score = 1.43) (Table 5).

Table 5. Coping mechanisms employed by the households

Copping strategies	Very Effective	Effective	Less Effective	MS	Ranking
Eating less preferred foods	121 (60.5)	58 (29.0)	21 (10.5)	2.58*	1st
Eating more of Garri	71 (35.5)	107 (53.5)	22 (11.0)	2.37*	2nd
Eating more of Lafun	98 (40.8)	102 (42.5)	40 (16.7)	2.24*	4th
Eating more of Starch	0 (0.0)	98 (49.0)	102 (51.0)	1.07	7th
Eating more of Fufu	68 (34.0)	110 (55.0)	22 (11.0)	2.30*	3rd
Eating more of cassava tubers	3 (1.5)	76 (38.0)	121 (60.5)	1.07	7th
Borrowing food from friends	23 (11.5)	98 (49.0)	79 (39.5)	1.50	5th
Borrowing money to buy foods	15 (7.5)	94 (47.0)	91 (45.5)	1.43	6th

Source: Field Survey, 2019 *effective copping strategies

Using the mean scores above, eating food that are less preferred, eating more of Garri, Fufu and Lafun are the most effective coping strategies used by the households in reducing the effect of food insecurity and are ranked first, second, third and fourth respectively.

5. Conclusion and Recommendations

This study assessed the effect of the consumption of cassava products on food security of households in Kwara state, Nigeria. The study revealed that most (75.5%) of the respondents were males with an average age of 48.5 years. Cassava can be processed into different forms but is mostly consumed in the forms of Garri, Fufu and Cassava tubers**.** The food security index revealed that 28% and 72% of the households were food secure and food insecure respectively. Furthermore, age of the respondents, family size, income, access to credit, quantity of Garri, Fufu and other cassava products consumed were the critical factors influencing food

security among the respondents. Eating less preferred foods, eating more of Fufu, Lafun and Garri products are the most important coping strategies adopted by the respondents to curb the effect of food insecurity. The government should encourage cassava production by given necessary incentives such as soft loans to farmers. Advocacy on the need to consume cassava products with other protein rich foods should be enhanced. Moreover, the processors should produce more of Fufu, Lafun and Garri products. Policies and strategies that raises household income as well as lowers family size should be enthusiastically pursued to reduce food insecurity in the area.

Conflicts of Interest

The authors declare no conflicts of interest.

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