



# UNDERSTANDING THE NEXUS BETWEEN PARTICIPATION IN AGROFORESTRY AND FOOD SECURITY STATUS: EMPIRICAL EVIDENCE FROM RURAL HOUSEHOLDS IN KOGI STATE, NIGERIA

<sup>1</sup>Sale, F.A. and <sup>2</sup>Shaibu, U. M.

<sup>1</sup>Department of Forestry and Wildlife, Faculty of Agriculture,  
Kogi State University Anyigba, Nigeria

<sup>2</sup>Department of Agricultural Economics and Extension,  
Faculty of Agriculture, Kogi State University Anyigba, Nigeria

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## Abstract

Participation in agroforestry services is associated with various benefits. Although Kogi State rural households have been practicing agroforestry, an attempt at empirically ascertaining the level of participation and quantitatively determining the relationship between such participation and food security status have not been examined. This study specifically described the socioeconomic characteristic of rural household heads participating in agroforestry activities and determined the relationship between participation in agroforestry and the food security status of households. Primary data were used for the study. The data were obtained from 240 randomly selected rural households from the four agricultural zones in Kogi State. The data were analysed using descriptive and inferential statistical tools. The result shows that 70 % of the rural household head were males and a mean age of 43 years was recorded among the respondents. Majority (71.3 %) of the respondents were married with a mean household size of 6 members and 91.2 % have formal educational. Participation was more in planting and retaining of trees for economic gain. However, participation in; alley cropping, tree erosion control, and integration of trees, crops and rearing of livestock were low among the respondents. There was established association between participation in agroforestry and household food security status. Age, gender and education of respondents also impact food security status. The study recommends relevant support by government and other stakeholders to increase the level of rural household's participation in agroforestry activities.

**Keywords:** agroforestry, participation, food security, tree planting, relationship

## Introduction

Recent statistics shows that, about 7.1 million people in Nigeria are facing acute food insecurity (FAO, 2017) and larger percentage of this population depend on agriculture for their livelihoods. Expectedly, to meet the global demand for food, which is to increase by 60 % in 2050, agricultural production must increase by 70–100 % and most of this will be sourced from smallholder farmers in rural areas (FAO – WFP, 2018). The Nigeria agricultural sector continues to contribute significantly to the country's Gross Domestic Product (GDP). For Nigeria to be self-sufficient in food production and by extension be food secure, the agricultural sector must be consciously prioritized.

Food security is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy being. Food is a basic necessity of life; and its inadequacy or unavailability has some associated effects. According to Abu (2014), inadequate nutrition is considered a critical yardstick for poverty in many communities around the world. The concept of food security in Nigeria could go simultaneously with poverty alleviation. Essentially, to alleviate poverty and its multiplier effect on food security, there is the need to improve agricultural production and productivity. One

of the potential options to increase production and productivity is agroforestry.

Agroforestry is the integration of trees and shrubs with crops and livestock systems (Kiptot *et al.* 2014). It enhances field crop yields; diversify income, and increases farmers' livelihood. According to Dawson *et al.* (2013), agroforestry system comprises of; open parkland assemblages, dense imitations of tropical rainforests such as home gardens, planted mixtures of only a few species, and trees planted in hedges or on boundaries of fields and farms, with different levels of human management of the various components. The systems provide a variety of products and services that are important locally, nationally and globally.

It is no longer a debate that Nigeria is facing acute food insecurity and there is the need for urgent steps. The contribution of agroforestry to food security status of households cannot be overemphasized. Participation in agroforestry services is associated with various benefits. Although Kogi State rural households have been practicing agroforestry, an attempt at empirically ascertaining the level of participation and quantitatively determining the relationship between such participation and food security status have not been thoroughly examined. Thus, the need for this study. This study was specifically aimed to describe the socioeconomic socioeconomic characteristic of rural households,

ascertain household participation in agroforestry activities and determine the relationship between participation in agroforestry activities and food security status of households in the study area.

### Methodology

The study was carried out in Kogi State, Nigeria. The State is popularly called the Confluence State due to the confluence of River Niger and River Benue at its headquarters in Lokoja. The State lies between latitude 6° 30' N and 8° 48' N and longitude 5° 23' E and 7° 48' E. The State has land area of about 30 354.74 square kilometers (KOSEEDS, 2004).

Kogi State was chosen due to the involvement of rural households in agroforestry practices. A multistage sampling technique was used in this study. The four agricultural zones (A, B, C and D) as delineated by Kogi state ADP were used. Zone A comprises of Yagba-East, Yagba-West, Kabba-Bunu, Ijumu, and Mopamuro LGAs; zone B include LGAs such as: Bassa, Dekina, Omala, and Ankpa; zone C LGAs are in Kogi, Lokoja, Adavi, Okene, Okehi, Ajaokuta, and Ogori-Mangogo; while zone D is in Ibaji, Idah, Ofu, Igalamela-Odolu, and Olamaboro LGAs.

In stage one, two extension blocks were randomly selected from each zone. In the second stage, from the eight extension blocks, three extension cells in each block were randomly selected. This gave a total of 24 cells. In the third stage, ten rural households per extension cell were randomly selected which gives a total of 240 rural households.

Structured questionnaire and interview schedule were used to obtain primary data from the respondents. The research instrument (questionnaire) was designed in line with the research objectives. The instrument used for data collection was validated for content appropriateness and it was also subjected to pre-test which yielded a reliability of 0.76 using Pearson moment correlation coefficient. The interview schedules were through trained enumerators or research assistants.

Descriptive statistics of frequency count and percentage, and inferential statistics of chi-square analysis were used for data analysis. According to Olayiwola *et al.* (2017), the food security line was estimated as two-third of mean per capita monthly expenditure of all respondents. Households were then classified into their food security status as food secure and food insecure households based on the food security line. The formula is given as;

$$FS_i = \frac{\text{per capita of food expenditure for } i\text{th household}}{\frac{2}{3} \text{mean per capita food expenditure of all households}}$$

Where:  $FS_i$  = food security index.

Decision Rule: If  $FS_i \geq 1 \rightarrow$  food secure ith household.

If  $FS_i < 1 \rightarrow$  food insecure ith household.

$$X^2 = \sum (F_o - F_e)^2 / F_e$$

Where:  $X^2$  = chi-square calculated value;

$F_o$  = Observed frequencies in each cell;

$F_e$  = expected frequencies in each cell;

$\Sigma$  = summation

## Results and Discussion

### Selected Socioeconomic Characteristics of Rural Households

Findings on the socioeconomic characteristics of rural households in the study area are presented in Table 1. The result shows that majority (70 %) of the rural household head were males while the remaining 30 % were females. The higher percentage of male could be associated with the “norm” in African society where males are regarded as head of the households. This finding agrees with Ademiluyi (2014) who found that 74.32 % of rural household heads in Plateau State were males.

**Table 1: Distribution of Respondents According to Socioeconomic Characteristics**

Socioeconomic Variables	Percentage	Mean/Mode
<b>A. Sex</b>		
Male	70.0	Male
Female	30.0	
<b>Total</b>	<b>100</b>	
<b>B. Age (years)</b>		
18 – 48	35.4	43 years
49 – 68	54.2	
Above 68	10.4	
<b>Total</b>	<b>100</b>	
<b>C. Marital Status</b>		
Unmarried	28.7	Married
Married	71.3	
<b>Total</b>	<b>100</b>	
<b>D. Household size</b>		
1 – 5	20.8	6 members
6 – 10	77.9	
Above 10	1.3	
<b>Total</b>	<b>100</b>	
<b>E. Educational Status</b>		
No formal education	8.8	Formal education
Formal education	91.2	
<b>Total</b>	<b>100</b>	

**Source: Field Survey, 2019****Number of respondents = 240**

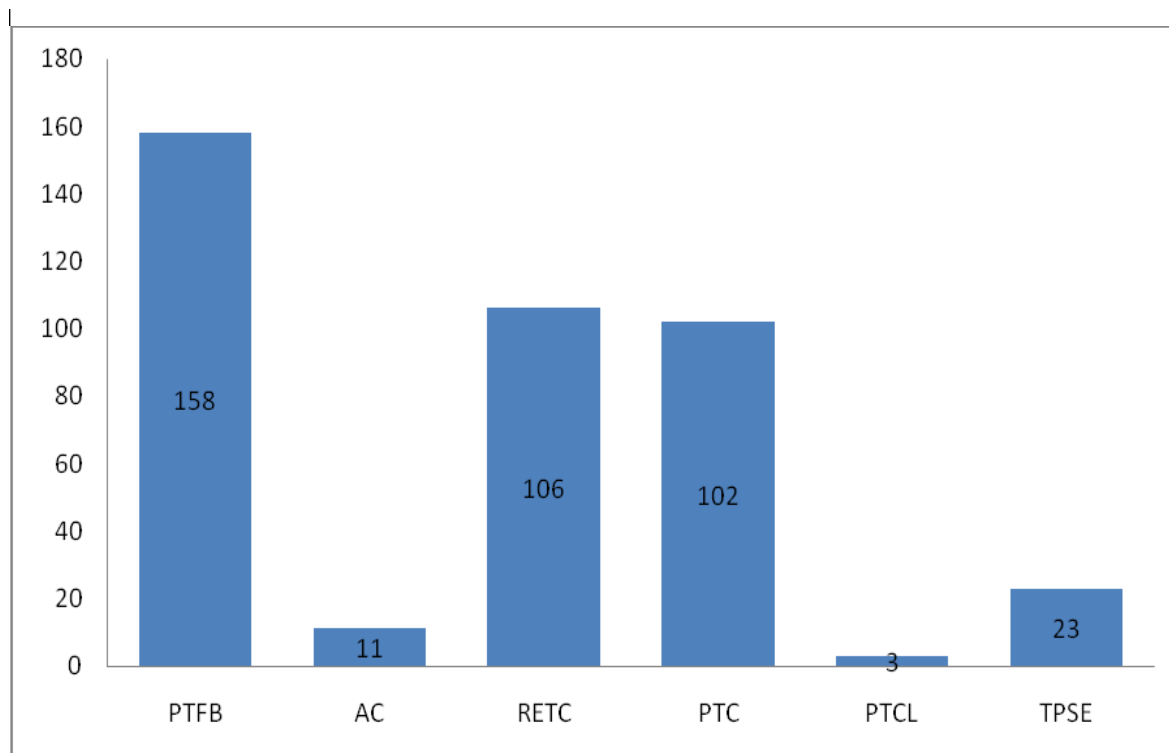
The mean age of 43 years is an indication that the respondents were still energetic in carrying out agricultural practices such as agroforestry. Furthermore, majority (71.3 %) of the respondents were married while 28.7 % were unmarried. In most rural areas of Nigeria and the study area in particular, married people easily settle for farming as a profession. This corroborates the position of Kimaro, *et al.* (2015) that married individuals have more socio-economic needs to meet than unmarried ones. Shaibu (2016) reported that more often than not, marriage signals readiness to accept responsibilities and the willingness to settle for a particular profession.

The mean household size of 6 persons reported in this survey was almost the same as the national average of 7 members per household as reported by the National Bureau of Statistics. It is expected that members of the household will help in agroforestry practices with its expected multiplier effect on productivity and food security status. The finding further shows that, majority (91.2 %) of the household heads could read and write with various levels of formal educational qualification. Education could influence the adoption

of innovation in agroforestry practices, thereby sustaining virile farming population. This finding agrees with Mutambra *et al.* (2013) who reported that higher educational attainment could facilitate the adoption of newer technologies among Nigerian farmers.

#### **Household Participation in Agroforestry Activities**

Household participation in agroforestry activities/practices are presented in Figure 1. The Figure shows that majority, 158 (65.8 %) of the rural households in the study area planted economical trees on their cropland. During the discussion, it was observed that larger proportion of the respondents that planted trees on cropland planted cashew tree and oil palm. The purposeful planting of these trees could be associated with their income generating capacity. Presently, Kogi State is one of the leading producers of cashew nut and oil palm. The result further shows that 102 (42.5 %) of the respondents planted tree along their farm boundaries. Aside its economical implication, these trees serve as mark or symbol to differentiate one's farmland from another. Oil palm was mostly used for this purpose by rural households in the area.



**Figure 1: Agroforestry Practices among Rural Households in Kogi State**

**N = 240**

**Legend:**

PTFB = Planting of Trees along Farm Boundary  
AC = Alley Cropping  
RETC = Retaining Economic Trees on Cropland  
PTC = Planting of Trees on Cropland  
PTCL = Planting of Trees, Crops and rearing of Livestock  
TPSE = Trees planted for Soil Erosion control

Furthermore, 9.6 % of the rural households reported to planting trees for the purpose of controlling erosion.

This finding could be associated with the fact that the study area is not totally prone to soil erosion. It was also revealed that fewer (4.6 %) percentage of the respondents planted trees and grass in rows on their farm with crops. The practice of integrating crop, livestock and tree planting was also very low (1.3 %) among the respondents.

**Food Security Status**

Food security index which is per capita food expenditure for the *i*th household divided by 2/3 mean per capita food expenditure of all households was used to determine the food security status. The result is presented in Table 2.

**Table 2: Food Security Status of Rural Households in Kogi State**

Food security status	Frequency	Percentage (%)
Food insecure	163	67.9
Food secure	77	32.1
Total	240	100
MPCHHFE/month → ₦4 092.75		
FSL → ₦2 728.50		

Source: Field Survey, 2019

MPCHHFE = Mean Per Capita Household Food Expenditure.  
FSL = Food Security Line (NOTE: FSL = [2/3 (MPCHHFE)])

Table 2 reveals that, the monthly mean per capita food expenditure for the total household was ₦4 092.75 and the 2/3 mean per capital food expenditure for all the household was ₦2 728.50. Using the mean per capita household food expenditure, the selected households were divided accordingly. The finding shows that 32.1 % of the sampled households had per capita food expenditure equal or greater than 2/3 mean per capita food expenditure, while 67.9% fall below the poverty line. This implies that most (67.9 %) of the rural households in the study area were food insecure. Oyekale *et al.* (2017) and Olayiwola *et al.* (2017) reported a 70.1 % and 58.7 % food secure households among rural households in Ogun State and Oyo State, respectively.

### Relationship between Participation in Agroforestry Activities and Food Security Status

**Table 3: Participation in Agroforestry activities and food security status**

Variable	df	X <sup>2</sup> Value	p-value	Decision
Participation level	2	5.679	0.050	Significant @5%
Age	2	24.395	0.000	Significant @1%
Gender	1	24.068	0.000	Significant @1%
Education	1	25.331	0.000	Significant @1%
Marital status	1	0.688	0.407	Not Significant

Source: Computed from Field Survey Data, 2019

The result presented in Table 3 shows significant relationship between the selected variables and rural household's food security status, except for marital status which was not significant at the level of measurement. The Chi-square value for participation level was significant at 5 percent level of significance (95% confidence). This implies that, there is an association between rural households' participation in agroforestry activities and their food security status. Similar result in terms of association was found between age, gender and education with household's food security status. Respondent's age, gender and education showed a very strong association with food security status when compared with participation in agroforestry activities.

### Conclusion and Policy Recommendation

This study shows that rural households are actively involved in various agroforestry activities at different levels. Indicatively, household participation in agroforestry activities makes a substantial and significant contribution to food security status of rural households. Rural households with high level of participation in agroforestry activities could be more food secure than households that do not. Considering the association between participation in agroforestry activities and food security status, government and

The Chi-square analysis on the relationship between rural household participation in agroforestry activities and their food security status is presented in Table 3. In applying this mode, the assumption of the independence of observations was not violated. Hence, all the included variables were in categorical form. Depending on the number of agroforestry activities engaged in, the respondents were grouped into three broad categories: high participation (involvement in above 3 agroforestry activities), medium level of participation (involvement in 3 – 2 agroforestry activities) and low level of participation (involvement in 1 agroforestry activity to none). Aside participation level, other variables such as age, gender, education and marital status were also included in the Chi-square model.

relevant stakeholders should help rural households and farmers through provision of necessary inputs and other technical assistance in order to actively participate in agroforestry practices for enhanced food security which will consequently spur national economic growth.

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the association between participation in agroforestry activities and food security status, government and relevant stakeholders should help rural households and farmers through provision of necessary inputs and other technical assistance in order to actively participate in agroforestry practices for enhanced food security which will consequently spur national economic growth.

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