



INFLUENCE OF AGROFORESTRY TECHNOLOGY ADOPTION ON POVERTY REDUCTION AMONG FARMING HOUSEHOLDS IN OKUNLAND OF KOGI STATE, NIGERIA

D. O. Oke*, S. A. Adisa, E. O. Obafunsho, C. A. Ojedokun, A. O. Oyetoki,
Y. O. Adesina

Department of Forest Economics and Extension, Forestry Research Institute of Nigeria, Ibadan, Oyo State

*Corresponding author's email address: bunmioyetunji@yahoo.com

ARTICLE INFORMATION **ABSTRACT**

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The significance of Agroforestry to the enhancement of livelihoods of farming households, through its contribution to food and income security as well as the improvement of crop productivity of farmers, cannot be overemphasized. Consequent upon this, the study assessed the impact of agroforestry practices on poverty reduction among small farming families in Okunland, Kogi State, Nigeria. In selecting respondents for the study, a multi-stage sampling approach. This study used descriptive statistics and inferential statistics for analysis. The descriptive statistics used are frequencies and percentages, while the inferential statistics used is Foster Greer Thorbecke (FGT) technique. Findings showed that about 35% of those who adopted the practice of agroforestry did not measure up to the poverty line (₦54, 520.13k). Therefore, since they were found below the poverty line, they were regarded as poor. For those who did not adopt the practice of agroforestry, sixty seven percent of them were found below the poverty line (₦31, 654.19k). By implication, this category of people can be regarded as poor. In order to reveal the extent of poverty among the respondents, FGT poverty index was used. Results from this therefore showed that the farming households who adopted and practiced agroforestry technology had a better livelihood when compared to those that failed to adopt the technology. In addition, it was discovered from the study that several constraints were militating against the adoption of agroforestry technologies by the farming households in the study area. Some of the constraints were lack of knowledge and required skills on agroforestry, long gestation period of trees, insufficient land for tree planting, lack of planting materials among others. Consequent upon this, this study recommends that necessary efforts should be made by government and concerned stakeholders to increase the adoption of agroforestry technology by creating awareness and sensitizing farmers on significance of adopting agroforestry technology and the associated benefits derivable from agroforestry practices. To accomplish this, extension agents and subject matter specialists on agroforestry should train and enlighten farmers on how best to use their land so as to accommodate both arable and tree crops so as to ensure improved productivity.

1.0 Introduction

According to World Bank (2001), poverty can be defined as the deprivation of well-being related to lack of material income or consumption, low levels of education and health, vulnerability and exposure to risk, lack of agency, and powerlessness. Poverty has remained a threat and challenge to humanity in all ramifications. Poverty is commonly measured using

incomes or consumption levels. Therefore, an individual is said to be poor if his or her consumption or income level falls below some minimum level necessary to meet basic needs. This minimum level is usually called the “poverty line” (Maduka, 2007).

Poverty remains a significant subject in Nigeria and Africa in general (Beegle *et al.*, 2016) and has therefore, been linked to climate vulnerability (Thornton *et al.*, 2006) and food insecurity (Charles, 2019). The incidence of poverty in Nigeria has defied several efforts made both by government and Non-Governmental Organizations (NGOs) to reduce it through poverty alleviation/reduction programmes and projects (Adepoju and Okunmadewa, 2010). It was earlier estimated that by 2016, the poverty rate in the country would have fallen to 48.4% from the estimated 53.5% in 2009-10. But rather, poverty has been on the increase, as a result of slow economic growth (World Bank, 2018). According to United Nations Human Development Report (2019), Nigeria’s Human Development Index (HDI) value for 2018 was 0.534 which puts the country in the low human development category, positioning it at 158 out of 189 countries and territories. In recent times in Nigeria, there have been several efforts to produce food to feed the rising population. But these attempts have been mainly through the traditional slash and burn approach of agriculture. Unfortunately, this has often resulted in wanton destruction of forest cover and the alteration of the dynamics of the forest ecosystem leading to climate change. In order to address this ugly trend, production of food should be done in a way that ensure that forest resources and the environment are not indiscriminately depleted. To achieve this, there is need for the adoption of a system that provides a good opportunity which enables the combination of the characteristic advantages associated with forestry technology and agricultural practices. This approach is therefore known as agroforestry.

The International Council for Research in Agroforestry (ICRAF) now World Agroforestry Centre defined agroforestry as a “dynamic ecologically based natural resources management system that through interactions of trees on farm and in the agricultural landscape diversifies and sustains production, enhancing social, economic and environmental benefits for land users at all levels”. Agroforestry enhances food and income security, amelioration of environmental hazards, improvement of crop productivity and mitigation of climate change (Ajayi and Catacutan, 2012; Mutua *et al.*, 2014 and Kennedy *et al.*, 2016). According to Maren and Carolyn (2011), agroforestry affects the socio-economic livelihood of rural farmers by enhancing income earning potentials and overall food and nutritional security (Kennedy *et al.*, 2016). According to Rahman *et al.*, (2010), agroforestry as a practice plays a significant role in lifting poor rural families out of poverty through market driven, locally led tree cultivation systems that generate income and build assets; conserve biodiversity through integrated conservation-development solutions based on agroforestry technologies. It can as well protect forest through agroforestry-based solutions; assist the rural poor to better adapt to change and to benefit from emerging carbon markets, through tree cultivation (Rahman *et al.*, 2010).

Some studies have been carried out to establish that agroforestry practices enhance farmers’ income, food security and improve on poverty status of the farming households (Tiwari *et al.*, 2017; Olajuyigbe, 2016; Kareem *et al.*, 2017). However, no such studies have been conducted in the Yoruba speaking part of Kogi State, popularly known as Okunland. This study therefore, attempts to address this gap by evaluating the influence of the adoption of agroforestry technology on poverty reduction among rural households as well as the factors militating against the adoption of agroforestry among the rural households in Okunland of Kogi State, Nigeria, with the aim of determining the contribution of agroforestry practices to poverty reduction as well as identifying factors militating against the adoption of agroforestry in the study area.

2. Materials and Method

2.1. Study Area

This study was conducted in Kogi State (Figure 1), specifically the western senatorial district of the State. The people in this area are known as “Okun People”. The Local Government Areas in this region are Mopa-Muro, Ijumu, Yagba East, Lokoja, Kabba-Bunu and Yagba West as shown in Figure 2. Kogi State is one of the six states that make up the North-Central zone of Nigeria, with a population of 3,595,789 (NPC, 2006). It comprises Igala, Ebira, Kabba, Yoruba and Kogi divisions of former Kabba Province with Yoruba, Nupe and Bassa as the main ethnic groups and Yoruba, Nupe and Ebira as the major languages spoken. The State has two distinct seasons (the wet and dry seasons) and a humid tropical climate prevails over the State.

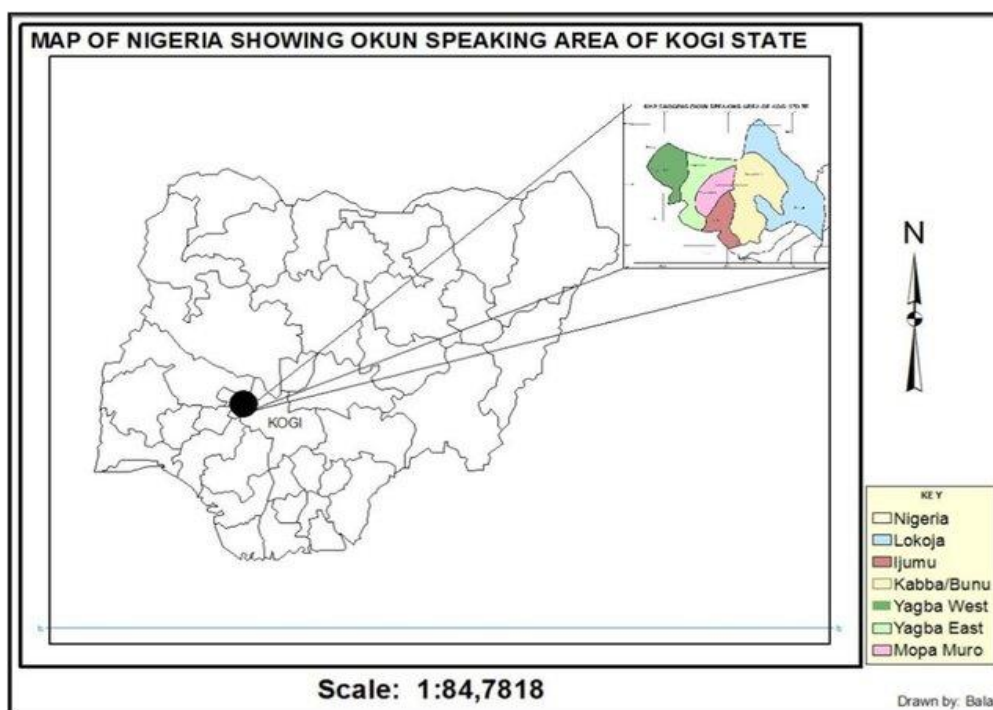


Figure 1: Map of Nigeria showing Okun Region of Nigeria

Source: OCHA(2018): <http://www.unocha.org/>

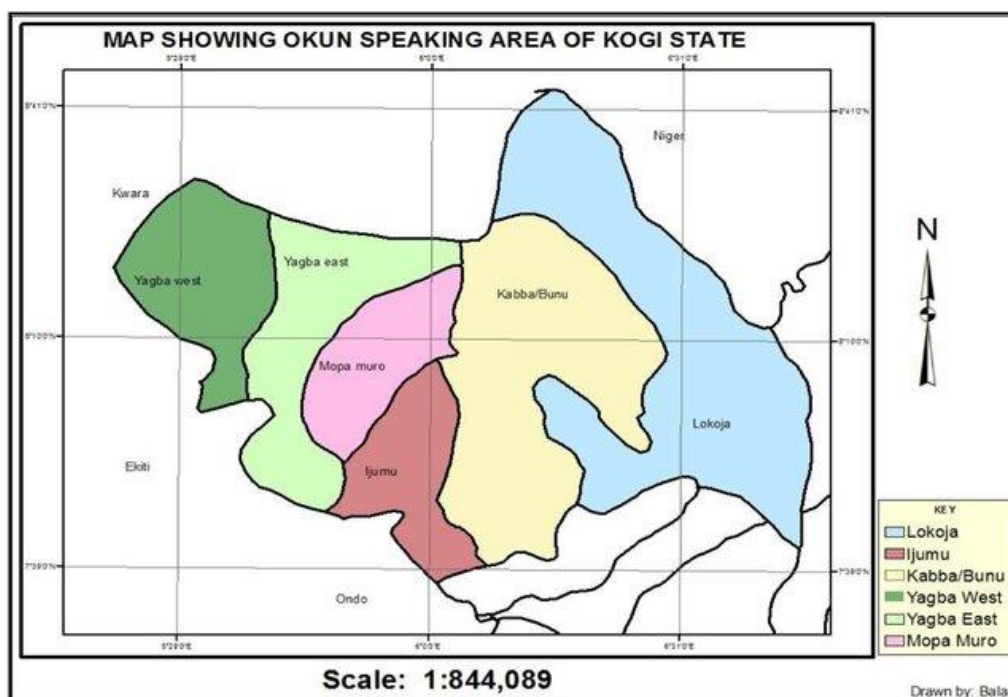


Figure 2: Map Showing Okun Region of Kogi State

Source: OCHA (2018): <http://www.unocha.org/>

2.2. Sampling Technique and Method of Data Collection

The sampling techniques used for this study was a random sampling using a multistage approach. Stage one was the random selection of three LGAs out of the five LGAs in the study area. Stage two was the random selection of two communities each from the three LGAs selected. In all, a total of six (6) communities were selected. The last stage of the multistage process was the random selection of thirty (30) respondents from each of the selected communities, making a total selection of one hundred and eighty (180) respondents. But only one hundred and seventy-four (174) copies of the questionnaire were retrieved and were used for the analyses.

Information was sourced from the respondents using questionnaire. In addition to questionnaire administration, additional information was sourced through focused group discussion. These additional approaches were adopted so as to capture information not captured through the use of questionnaire.

2.3. Analytical Techniques

In order to determine if the adoption of agroforestry technology had significant impact on alleviating poverty among farming households in the study area, the FGT technique was adopted to construct poverty line. This line is defined as a borderline that distinguishes poor from non-poor households in terms of their level of welfare. In determining the poverty line, two methods are commonly used. These are expenditure and income techniques. This FGT method as expressed in equation 1, was also used to compare the level of poverty among the adopters and non-adopters of agroforestry technology (Ajayi and Catacutan, 2012).

According to Foster-Greer-Thorbecke, (1984), the model is expressed as

$$P\alpha = \frac{1}{n} \sum_{i=1}^q \left[\frac{Z-y}{Z} \right]^\alpha \quad (1)$$

Where,

Z = the poverty line defined as 2/3 of Mean annual per capita expenditure

y = the annual per capita expenditure –poverty indicator/welfare index per capita

q = the number of poor households in the population of size n,

a = the degree of poverty aversion;

a = 0; is the Headcount index (P_0) measuring the incidence of poverty (proportion of the total population of a given group that is poor, based on poverty line). a = 1; is the poverty gap index measuring the depth of poverty that is on average how far the poor is from the poverty line; a = 2; is the squared poverty gap measuring the severity of poverty among households, that is the depth of poverty and inequality among the poor.

3. Results and Discussion

Table 1 depicts the socio-economic attributes of respondents in the study area. From the table, it was observed that about 66% of the adopters of agroforestry technology were between 40 and 59 years of age while 68.42% of non-adopters were within the same age range. In addition, about 75% of the adopters had farm size of 8ha and below while about 84% of the non-adopters had similar land holdings. This corroborates similar study conducted by Idumah *et al.* (2021) in Oyo State, where 72.68% of farming households that adopted agroforestry technology did not have more than 8ha of farmland and 83.81% of the non-adopters had similar farm size. This is an indication that majority of the farming households in the study area are small scale farmers. This is because, according to Ozowa (2005), farm households with less than 10ha of farmland are regarded as small-scale farmers. This is according to international standards measurement for farm sizes.

Table 1: Socio-economic Characteristics of Respondents

Variable	Adopters (N=79) Frequency	Percentage	Non-adopters (N=95) Frequency	Percentage
Age (Years)				
≤ 39	04	5.06	8	8.42
40-49	15	18.99	28	29.47
50-59	37	46.84	37	38.95
60-69	17	21.52	17	17.89
>70	6	7.59	05	5.26
Gender				
Male	71	89.87	81	85.26
Female	08	10.13	14	14.74
Educational Status				
No Formal	07	8.86	07	7.37
Primary	5	6.33	12	12.63
Secondary	31	39.24	31	32.63
Tertiary	26	32.91	36	37.89
Vocational	10	12.66	9	9.47
Farm Size (Ha)				
≤2	17	21.52	22	23.16
2.1 - 5.0	30	37.97	50	52.63
5.1 – 8.0	12	15.19	8	8.42
≥8.1	20	25.32	15	15.79
Household Size				
≤5	20	25.32	32	33.68
6-10	48	60.76	57	60.00
11-15	10	12.66	05	5.26
≥16	01	1.27	01	1.05
Farming Experience (Years)				
≤10	04	5.06	08	8.42
11-20	34	35.79	46	48.42
21-30	20	25.32	23	24.21
≥ 31	21	26.58	18	18.95

Source: Field Survey, 2022

Foster Greer Thorbecke (FGT) poverty index was used to show the extent of poverty among the farming households in Okunland. The poverty aversion parameters used were P_0 , P_1 , and P_2 which translate to poverty incidence (headcount), poverty depth (gap) and poverty severity respectively. Table 2 showed that the incidence of poverty (P_0) among the adopters was 0.3544 and 0.6737 for the non-adopters. This implies that 35.44% of the adopters were poor and 67.37% of the non-adopters were poor, considering the poverty line. The value of the poverty depth (P_1) among the adopters was 0.4733 and 0.6322 for the non-adopters. The implication of this is that an average poor adopter of agroforestry technology would require about 47% of the poverty line to get out of poverty while an average poor non-adopter would need about 63% of the poverty line to get out of poverty. This result collaborate with Ajayi *et al.* (2007) findings that adopters of agroforestry technologies had a higher probability of moving out of poverty compared to non-adopters.

Furthermore, the value of poverty severity (P_2) among the adopters was 0.2522 and 0.4778 for the non-adopters. In view of this, it could be deduced from the study that the adopters of agroforestry technology were better off than the non-adopters of agroforestry technology, as there were records of lower poverty incidence and depth than the non-adopters of the technology. It could therefore be concluded that adoption of agroforestry technology plays significant role in poverty reduction among farming households in the study area.

Table 2: Effect of Agroforestry Technology on Poverty Reduction among Farming Households

Variable	P_0	P_1	P_2	G	N
Adopters	0.3544	0.4733	0.2522	28	79
Non-adopters	0.6737	0.6322	0.4778	64	95

P_0 = Poverty incidence; P_1 = Poverty depth (gap); P_2 = Poverty severity; G= No of poor households; N= Total no of households

Findings from the study revealed that the respondents faced some challenges in the adoption of agroforestry technologies by the respondents. These challenges, as stated by the respondents were lack of technical assistance, lack of planting materials, long gestation period of trees, lack of knowledge and skills, illegal felling of trees, insufficient land for tree planting, as well as competition among trees and arable crops on farmland. It was also discovered that about 70% of the respondents (both adopters and non-adopters) stated that lack of knowledge and required skills on agroforestry was the main constraint to their adoption of agroforestry, as shown in Table 3. This is also in tandem with the study by Idumah *et al.* (2021) in Oyo State where lack of knowledge and required skills ranked highest among the factors militating against the adoption of agroforestry technology among farming households. Likewise, about 58% of the respondents cited insufficient land as a constraint to the adoption of agroforestry. This, however, is where trainings by extension agents and some subject matter specialists are needed to enlighten the farmers on how to make effective use of their land to accommodate both their tree crops and arable crops. This therefore corroborates studies by Amonum and Bada (2019) as well as Idumah *et al.* (2021) where lack of land, lack of tree seedlings as well as inadequate extension personnel were stated as some of the constraints affecting the adoption of agroforestry in Katsina and Oyo States respectively.

Table 3: Constraints to the Adoption of Agroforestry among Farming Households in the Study Area

Constraint	*Frequency	Percentage	Rank
Lack of knowledge and skills	121	69.54	1 ST
Competition among trees and arable crops on farmland	81	46.55	6 TH
Lack of planting materials	86	49.43	4 TH
Illegal felling of trees	78	44.83	7 TH
Lack of technical assistance	83	47.70	5 TH
Long gestation period of trees	106	60.92	2 ND
Insufficient land for tree planting	101	58.05	3 RD

*Multiple Responses; Source: Field Survey, 2022

4. Conclusion

From the study, it can therefore be concluded that the adoption of agroforestry technology plays significant role in reducing poverty among farming households in Okunland, Kogi State, Nigeria. It was found that a smaller number of the adopters of agroforestry fell below the poverty line than the non-adopters. It was therefore concluded that the adopters of agroforestry technology were better off in terms of welfare than the non-adopters of agroforestry technology. Agroforestry practices can therefore be said to play prominent role

in the reduction of poverty and the overall improvement in livelihood farming households in the study area.

In addition, quite a number of factors were given as constraints to effective adoption of agroforestry technology in the study area by the respondents. Some of these included lacks of knowledge and skills, long gestation periods of trees and insufficient land for tree planting, among others. In view of the findings, the recommends that government at all levels as well as relevant stakeholders should make required efforts to increase the adoption of agroforestry technology by creating awareness and sensitizing farmers on significance of adopting agroforestry technology and the associated benefits derivable from agroforestry practices. To accomplish this, extension agents and subject matter specialists on agroforestry should train and enlighten farmers on how best to use their land so as to accommodate both arable and tree crops so as to ensure improved productivity.

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