

ASSESSMENT OF INCOME GENERATING ACTIVITIES AMONG FOREST FRINGE COMMUNITIES IN CROSS RIVER STATE OF NIGERIA

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Abstract. This study assessed different income-generating activities and factors that influenced the choice of such activities among forest communities in the Cross River State of Nigeria. One hundred copies of a structured questionnaire were used to obtain information from respondents in the study area. Two local government areas (LGAs) were purposively selected for the study due to their agrarian and forest-based character. Five communities were then randomly chosen from each LGAs, and ten copies of the questionnaire were administered randomly in each community. Both descriptive statistics such as frequencies and percentages as well as inferential statistics such as multinomial logistic regression were used in the study. The study revealed that the average household size, age, farm size, and household income were 4, 36.5, 1.75 ha, and NGN 39,330, respectively. It was also observed that the respondents engaged in different income-generating activities categorized into on-farm only activities, non-farm only activities as well as non-farm + on-farm activities. Thirty-seven percent (37%) of respondents engaged in farming only, with only 20% engaging in non-farm activities alone, while 43% combined farm and non-farm activities. The multinomial logistic regression results show that age, educational qualification, access to extension services, total household monthly income, farming experience, farm size, and availability of forest were variables that significantly influenced the respondents' choice of livelihood strategies at a 5% level of significance.

Keywords: livelihood, forest, on-farm, multinomial, Cross River

INTRODUCTION

Although studies show that most Nigerian rural households participate in agricultural activities such as livestock, crop, or fish production as their main source of livelihood, they also engage in other income-generating activities to augment their main source of income. Over time, a large proportion of rural households have diversified their production and income-generating activities to cover a range of other production areas. In other words, very few of them generate all their income from only one source, hold all their wealth in the form of any single asset, or use their resources for just one activity (Barrett et al., 2001). The agricultural sector in Nigeria is faced with problems that include declining soil fertility, inadequate infrastructure, risk, uncertainty, and seasonality. Therefore, rural and forest-based households are compelled to develop strategies to cope with the increasing vulnerability associated with agricultural production through diversification, intensification, and migration or moving out of farming (Ellis, 2000). In their quest for survival and improved welfare, off-farm and non-farm activities have become an important component of livelihood strategies among forest communities in Nigeria. According to Gordon and Craig (2001), the growing interest in research on rural off-farm and non-farm income in rural economies is increasingly showing

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that rural peoples' livelihoods are derived from diverse sources and are not as overwhelmingly dependent on agriculture as previously assumed. This, however, may be connected with the fact that a diversified livelihood, which is an essential feature of rural survival and closely related to flexibility, resilience, and stability, is less vulnerable than an undiversified one. This is due to the likelihood of it being more sustainable over time and facilitating adaptation to changing circumstances.

In view of this, understanding the significance and nature of non-farm and off-farm activities (especially their contribution to rural household income or resilience) is of utmost importance for policymakers in designing potent agricultural and rural development policies. Furthermore, the rising incidence of low-level welfare of rural households in Nigeria, which remains unabated despite various policy reforms undertaken in the country, requires a deeper understanding of the problem and the need to proffer solutions to the problem through approaches that place priority on the poor and ways on which rural households can maintain their livelihood through diversification.

Rural households or forest fringe communities in Nigeria widely engage in and pursue diverse income-generating activities as livelihood strategies due to increasing land scarcity, recurrent drought, and the increasing population growth in rural areas forcing households to cultivate and make their living on extremely small areas of land. Therefore, the carrying capacity of agriculture as a sole source of household income and to attain food and livelihood security is significantly declining from time to time. Thus, diversifying livelihood strategies at the current time becomes a common phenomenon in the study area, as it is increasingly becoming clear that the agricultural sector alone cannot be relied upon as the core activity for rural households as the sole means of income generation improving livelihood and reducing poverty.

Many studies report a substantial and increasing share of off-farm or non-farm income in total household income. These studies include Ruben and van den Berg (2001), de Janvry and Sadoulet (2001), and Haggblade et al. (2005). Reasons for this observed income diversification include declining farm incomes and the desire to ensure against agricultural production and market risks (Matsumoto et al., 2006). In other words, while some households are forced into off-farm and non-farm activities, owing to lower gains and increased

uncertainties associated with farming (crop and market failures), others would take up non-farm employment when returns to such employment are higher or less risky than in agriculture. Mainly, households diversify into non-farm and off-farm activities in their struggle for survival and in order to improve their welfare in terms of health care, housing, and sustenance. Thus, the importance and impact of non-agricultural activities on the welfare of rural or forest-based households can no longer be overemphasized.

Yishak et al. (2014) conducted a study on rural household livelihood strategies in Wolaita Zone, Southern Ethiopia. In their research, four livelihood options were considered: *farm-only strategy*, *farm + non-farm strategy*, *farm + off-farm strategy*, and *farm + off-farm + non-farm strategy*. In addition, the study concluded that farmers went out of their farms to work on farms owned by other people as a form of off-farm livelihood strategy.

Ajayi et al. (2016) carried out a study on livelihood diversification of rural households in Niger State, Nigeria, where the livelihood diversification index was used to examine factors influencing livelihood diversification in the study area. Still, the study did not state the different livelihood options that were available in the study area. This study, however, specified the types of livelihood diversification strategies that people in the study area practiced.

Adeniyi et al. (2016) studied the determinants of rural women's livelihood in Ibarapa North Local Government Area of Oyo State, Nigeria. In their research, they considered only the livelihood strategies of women and limited their study to one local government in the state without considering the livelihood strategies adopted by men in the study area. This study, however, took into consideration the livelihood strategies of both men and women in the study area.

Kola-Oladiji et al. (2016) and Banjo et al. (2018) also examined the livelihood diversification strategies among forest environments' dwellers in Edo State, Nigeria, and Oluyole Local Government Area of Oyo State, respectively. In their studies, they considered only the types of livelihood strategies adopted by forest environment dwellers in their respective study areas but failed to examine the factors that informed the choice of these livelihood strategies in the study areas. This study, therefore, is carried out to: 1) determine the types of livelihood strategies adopted by people in the

study area, 2) examine the factors that influence the choice of livelihood strategies adopted by people in the study area.

MATERIALS AND METHODS

Description of study area

The study was carried out in the Cross River State of Nigeria. Cross River is one of the six states in the South South geo-political zone of Nigeria. The State is located in the tropical rainforest belt of Nigeria. Cross River lies between latitude 4°28' and 6°55'N north of the equator and longitude 7°50' and 9°28' east of the Greenwich Meridian. It shares common boundaries with the Republic of Cameroon in the east, Benue State in the north, Ebonyi and Abia states in the west, Akwa Ibom State in the southwest, and the Atlantic Ocean in the south. It has a total landmass of about 23,000 km (CRS SEEDS, 2004). Due to its location, the state enjoys a tropical climate with the Obudu Plateau at an altitude of 1,595.79 m above sea level. The state records heavy rainfall during the wet season (CRS SEEDS, 2004).

Cross River State is mainly agrarian in character. Crops grown in the state include yam, maize, cassava, cocoyam, melon, vegetables, and plantain. The agricultural nature of the state informed the choice of the state to ascertain livelihood strategies adopted by rural households in the face of declining agrarian production or crop failure.

Sampling techniques and method of data collection

A multistage sampling procedure was employed to select respondents for this study. The first stage involved a purposive selection of the state based on its agrarian character. The second stage involved a random selection of two local government areas (LGAs) in the state. The third stage comprised a random selection of five communities in each of the selected LGAs in the state, making a total of ten (10) communities. The fourth and final stage involved a random administration of ten (10) copies of a structured questionnaire to respondents in each of the selected communities, making a total of one hundred (100) copies.

Methods of data analysis

Data collected were analyzed through descriptive statistics such as frequencies and percentages as well as

inferential statistics such as multinomial logistic regression, which was used to identify factors that influenced households' choice of livelihood strategies in the study area. The data analysis was conducted using Statistical Package for Social Sciences (SPSS) version 23 and STATA 12.

Multinomial Logit Model specification

When there is a dependent variable with more than two alternatives, the decision-maker has to choose the appropriate econometric model, either multinomial logit or multinomial probit regression. With respect to estimation, they both estimate the effect of explanatory variables on dependent variables involving multiple choices with unordered response categories (Greene, 2000). However, multinomial probit is rarely used in empirical studies due to estimation difficulty imposed by the need to solve multiple integrations related to a multivariate normal distribution (Yirga, 2007). Moreover, the multinomial logit model is selected not only because of the computational ease but also because it exhibits a superior ability to predict livelihood diversification and pick up the differences between the livelihoods strategies of rural households (Keane, 1992; Chan, 2005). In addition, it is a simple extension of the binary choice model and is the most frequently used model for nominal outcomes that are often used with a dependent variable that has more than two choices.

For this study, three mutually exclusive livelihood diversification strategies were identified: *on-farm only*, *non-farm only*, and *on-farm plus non-farm*. According to some literature, the multinomial logit model is a widely used technique in applications that analyze 'polytomous' response categories in different economic and social research areas. For example, Wassie et al. (2008) stated that the multinomial logit model is vital for examining the determinants of household livelihood strategy choices among alternative livelihood strategies. Thus, the multinomial logit model was used to identify the determinants of smallholder farming rural households' choice of a livelihood diversification strategy to adopt. The assumption is that in a given period, a rational household head, having the freedom to manage asset endowment, will choose among the three mutually exclusive livelihood strategies that could offer the maximum utility.

Therefore, following Greene (2000), for the i^{th} respondent faced with j choices, the utility choice j can be specified as:

$$U_{ij} = Z_{ij} \beta + \varepsilon_{ij} \quad (1)$$

If the respondent makes choice j in particular, then U_{ij} is the maximum among the j utilities. So the statistical model is derived by the probability that choice j is made, which is:

$$\text{Prob}(U_{ij} > U_{ik}) \text{ for all others } K \neq j \quad (2)$$

where:

U_{ij} – is the utility to the i^{th} respondent from livelihood strategy j

U_{ik} – is the utility to the i^{th} respondent from livelihood strategy k . Thus, the i^{th} household's decision can be modeled as maximizing the expected utility by choosing the j^{th} livelihood strategy among J discrete livelihood strategies, that is:

$$\text{Max}_j = E(U_{ij}) = f_j(x_i) + \varepsilon_{ij}, \quad j = 0 \dots J \quad (3)$$

In general, for an outcome variable with J categories let the j^{th} livelihood strategy that the i^{th} household chooses to maximize its utility take the value 1 if the i^{th} household chooses j^{th} livelihood strategy and 0 if otherwise. The probability that a household with characteristics x chooses livelihood strategy j , P_{ij} is modeled as:

$$P_{ij} = \frac{\exp(X'_{ij}\beta_j)}{\sum_{j=0}^J \exp(X'_{ij}\beta_j)} \quad j = 0 \quad (4)$$

With the requirement that $\sum_{j=0}^J P_{ij} = 1$ for any i where:

P_{ij} – probability representing the i^{th} respondent's chance of falling into category j

X_i – predictors of response probabilities

β_j – covariate effects specific to j^{th} response category with the first category as the reference.

A convenient normalization that removes indeterminacy in the model is to assume that $\beta_1 = 0$ (Greene, 2000).

Description of variables used in Multinomial Logit Model

The dependent variable in this study was the selection of different livelihood strategies by farm households. This was identified by categorizing the sampled households into livelihood strategy groups based on their choices. Therefore, the polytomous dependent variable for multinomial logit was hypothesized as $Y_i = 3$ unordered categories of livelihood strategies. Where Y_1 – those that

adopted on-farm strategy only, Y_2 = those who engaged in non-farm strategy alone and Y_3 = those that were involved in both on-farm and non-farm strategies. Y_1 was thus chosen as a reference category.

The general regression model in its explicit form is expressed as:

$$Y_i = \alpha + \beta_1 X_1 + \dots \beta_n X_n + e \quad (5)$$

where:

Y – income generating or livelihood strategies adopted by households

$X_1(\text{AGE})$ – age of respondent (years)

$X_2(\text{EDUC})$ – educational qualification of respondent (years)

$X_3(\text{ATC})$ – access to credit (access = 1, otherwise = 0)

$X_4(\text{ATE})$ – access to extension services (access = 1, otherwise = 0)

$X_5(\text{MOA})$ – membership of association (member = 1, otherwise = 0)

$X_6(\text{HHS})$ – household size (numbers)

$X_7(\text{FE})$ – farming experience (years)

$X_8(\text{FS})$ – farm size (hectares)

$X_9(\text{FA})$ – forest availability in area (availability = 1, otherwise = 0)

$X_{10}(\text{THI})$ – total household income (in Naira).

RESULTS AND DISCUSSION

Table 1 shows the socio-economic characteristics of respondents in the study area. It was observed that despite the decline of agricultural productivity due to inclement weather conditions resulting from climate change, many respondents still practice farming. It was discovered that 37% of respondents engaged only in agriculture as a source of livelihood and income generation, while 20% engaged in non-farm activities alone. Those who reported both on-farm and non-farm activities as a source of income and livelihood accounted for 43% of respondents. The respondents who engaged in both on-farm and non-farm activities asserted that the non-farm activities serve as a safety net for them and help fill both the food and income gap that farm activities alone could not provide. Chi-square statistic of 8.540 and a p-value of 0.014 show significant differences between the three livelihood strategies used as a source of income and food to the forest dwellers in the study area. Therefore, the study could suggest that combining farm and non-farm

Table 1. Socio-economic characteristics of respondents

Variable	Frequency	Percentage (%)	Mean
1	2	3	4
Age (years)			
≤20	5	5.0	36.5
21–30	23	23.0	
31–40	45	45.0	
41–50	21	21.0	
51–60	5	5.0	
>60	1	1.0	
Total	100	100	
Gender			
Male	63	63.0	
Female	37	37.0	
Total	100	100	
Educational attainment			
No formal education	5	5.0	
Primary education	7	7.0	
Secondary education	49	49.0	
Tertiary education	39	39.0	
Total	100	100	
Household size			
1–3	38	38.0	3.8
4–6	54	54.0	
>6	8	8.0	
Total	100	100	
Livelihood strategies			
On-farm only	37	37.0	
Non-farm only	20	20.0	
On-farm + non-farm	43	43.0	
Total	100	100	
Farming experience (years)			
1–5	27	33.8	8
6–10	33	41.2	
11–15	11	13.8	
>15	9	11.2	
Total	80	100	

Table 1 – cont.

1	2	3	4
Farm size (ha)			
≤1	15	18.8	1.75
1.5–2	28	35.0	
2.5–3	27	33.7	
>3	10	12.5	
Total	80	100	
Total monthly income (N)			
≤20,000	14	14.0	39,330
20,001–40,000	28	28.0	
40,001–60,000	21	21.0	
60,001–80,000	10	10.0	
80,001–100,000	16	16.0	
>100,000	11	11.0	
Total	100	100	

Source: field survey, 2019.

activities is the primary livelihood strategy of forest dwellers in the study area. This further corroborates the findings of Ghosh and Bharadwaj(1992) that poor forest households engaged in non-farm and off-farm activities in addition to agriculture as a survival strategy. The study also shows that the average age of respondents was 36.5 years, meaning that the respondents were mostly still in their active age and could still engage in other income-generating activities. The average farm size was 1.75 ha, and the average household monthly income was NGN 39,330 (USD 128.95). Therefore, it could be deduced that the respondents earn reasonable monthly income from their income-generating activities since the average income is above the current minimum wage of NGN 18,000 (USD 59) in the country. This may not be unconnected to different income-generating activities that the respondents engaged in to have diversified income sources.

The study findings show that the main income sources of the forest households were sales of their farm produce, engagement in businesses such as fishing, lumbering, and collection and sales of non-timber forest products (NTFPs) from the forests. The NTFPs collected from the woods by the respondents include fuelwood, leaves,

bush meat, snails, timber, and roots. Eighty-seven percent of respondents affirmed that forests were available in their localities from where they collected NTFPs, as depicted in Table 2. Some of the additional reasons for gathering and selling the NTFPs included personal and family use.

Table 2. Forest availability in study area

Variable	Frequency	Percentage (%)
Yes	87	87.0
No	13	13.0
Total	100	100

Source: field survey, 2019.

In addition to the income assessment of forest dwellers from the three livelihood strategies, it was discovered that the largest income proportion (59.98%) was generated by those who combined both farming and non-farm activities shown in Table 3. However, the farming component of the strategy accounted for a more significant proportion of income generated, accounting for about 66%. This, therefore, suggests that non-farm activities in the study area could be seen as survival strategies employed by the forest dwellers whose main occupation is farming.

Table 3. Income generation by livelihood strategies

Livelihood strategy	Monthly income (₦)	Percentage of total monthly income (%)
On-farm only	1,045,000	26.57
Non-farm only	529,000	13.45
On-farm + non-farm	2,359,000	59.98
Total	3,933,000	100

Source: field survey, 2019.

Multinomial Logit Model Results

Table 4 shows the result of the maximum likelihood method employed to estimate the parameter of the multinomial logit model. This study used this model to assess the factors that influence forest dwellers' choice of livelihood strategies. The dependent variable is the category

of livelihood strategies adopted by the respondents. It takes the value of 1 if a respondent adopts only an on-farm strategy, 2 – for only a non-farm strategy, and 3 – for a combination of on-farm and non-farm strategies.

The result indicates that out of the ten independent variables hypothesized, only four were found to influence respondents' choice of non-farm strategy significantly, while eight of the variables statistically influenced their choice of the on-farm + non-farm strategy. The findings reveal that age, educational qualification (EDUC), access to extension service (ATE), total household income (THI), household size (HHS), farming experience (FE), farm size (FS) and forest availability in the location (FA) were factors that influenced the respondents' choice of livelihood strategies in the study area. The multinomial logit estimates are reported for only two out of the three categories of livelihood strategies. The first category, which is on-farm only, was used as the reference category against which the choice of the other two categories was compared.

The model result indicates that the respondent's age significantly influenced the choice of both non-farm only and non-farm + on-farm strategies as sources of income among the forest dwellers at a 5% level of significance. This study indicates older people are more likely to engage in non-farm activities than on-farm only or prefer to combine non-farm with on-farm activities. This may be connected to the fact that as farmers advance in age, they are less likely to engage in rigorous farming activities, hence the need to look for non-farm activities that are less strenuous.

This finding also indicates that respondents with high educational levels are more likely to diversify livelihood strategies into non-farming and/or off-farming activities than their less-educated counterparts. In other words, respondents with higher academic qualifications are more likely to engage in non-farm activities than on-farm only or combine non-farm activities with on-farm activities. This may be because more educated individuals have better skills, experience, and knowledge, which may help them engage in diversified livelihood strategies as other sources of income. In other words, respondents with a higher level of education are three times more likely to combine non-farm with on-farm activities than those with less educational qualification. This corroborates studies by Dilruba and Roy (2012), Babatunde et al. (2010), and Gebrehiwot and Fekadu (2012), which found that education plays a significant

Table 4. Factors influencing the choice of livelihood strategies among forest dwellers

Variables	Non-farm			Non-farm + on-farm		
	coeff.	odd ratio	P-value	coeff.	odd ratio	P-value
AGE	1.745	5.725	0.012	2.321	10.185	0.017*
EDUC	1.345	3.838	0.014	1.121	3.067	0.010*
ATC	0.172	1.187	0.775	−0.214	0.807	0.741
ATE	−1.621	0.197	0.022	−1.421	0.241	0.013*
MOA	0.211	1.234	0.602	0.035	1.035	0.833
HHS	−0.076	0.926	0.619	1.977	7.221	0.003*
FE	−0.214	0.807	0.722	1.112	3.040	0.026*
FS	−1.025	0.358	0.825	−1.812	0.163	0.008*
FA	−9.234	9.765	0.882	1.122	3.070	0.038*
THI	1.323	3.754	0.032*	1.411	4.100	0.024*

*Significant at 5%.

Source: field survey, 2019.

role in farmers' decision to increase their income through off or non-farm activities as well as time allocation of rural families in diversifying the rural economy away from agriculture.

The results further show that forest dwellers with access to extension services are less likely to engage in non-farm activities than those without access to extension services. This may be due to the fact that rural farmers with access to extension services might have received requisite training on modern methods of farming and improved agricultural inputs, which may help them to increase their farm output and income generated from the sales of their farm yields, making them likely to be less dependent on non-farm activities as a source of income. Furthermore, farmers with large farms are more likely to engage in on-farm-only activities than those with smaller farms. This may be because large farm size farmers may be too involved with their farm activities throughout the cropping season and may have little or no time for non-farm activities. In addition, respondents with large households are more likely to combine farming activities with non-farm activities. This may be connected to the fact that with the increase in the number of household members, there may be an increase in the number of household members to cater for, and income from farm activities alone may not be able to cater to their needs. This, therefore, may prompt a household to

engage in diversified livelihood strategies to meet the family's basic needs. The result also indicated that respondents living in forest fringe areas are more likely to diversify into non-farm activities as additional sources of income. These non-farm activities available to forest fringe communities include collecting fuelwood for sales, gathering leaves for personal use and sales, lumbering, bush meat sales, and sales of other non-timber forest products (NTFPs) obtained from the forests.

CONCLUSION

This study examined different income-generating activities of forest dwellers in Cross River State. It also assessed the factors that influenced the peoples' choice of such activities. The study revealed that the respondents engaged in various income-generating activities divided into three categories: *on-farm only* activities, *non-farm only* activities, and *non-farm plus on-farm* activities. Furthermore, several factors were found to inform the rural dwellers' choice of income-generating activities as livelihood strategies. Significant factors included the respondents' age, educational qualification, access to extension services, farming experience, household size, total household income as well as the availability of forest in the locality. This study, therefore, concludes that forest dwellers engage in other activities in addition to

farming treated as a safety net in times of dwindling output and income from their farming activities.

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