Determinants of Poverty Status among Crop and Fish Farmers in Southern Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author IOE designed the study. Authors IOE and GMU performed the statistical analysis. Authors IOE, EAE and AI wrote the protocol. Authors IOE and GMU wrote the first draft of the manuscript. Authors IOE and GMU managed the analyses of the study. Authors AI and EAE managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The research study was carried out to determine the poverty status and their determinants among crop and fish farmers in Itu Local Government Area of Akwa Ibom State, Nigeria. A two-stage sampling technique was adopted to select crop farmers and fish farmers' households in the study area. The data used for this study were obtained from primary sources. Data were obtained through validated structured questionnaires. The determinant of poverty among crop farmers and fish farmers was analyzed using logistic regression, while poverty indicators were analyzed using the three indicators of poverty as highlighted in the Foster, Greer and Thorbecke (FGT) model. Result of analysis on the incidence of poverty shows that about 52.5% of crop farmers and 62.5% of fish farmers in the area had their per capita income less than the poverty line income. The result also

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showed that poverty depths of 0.342 for crop farmers and 0.309 for fish farmers in the area. Similarly, the severity of the poverty index was 0.252 for crop farming households and 0.221 for fish farmers' headed households. On the determinants of crop farmers, gender, age, marital status education, farm size and membership of association were all found to be positive and significant determinants, while education, credit, farm income and experience were the positive and significant determinant of poverty among fish farmers in the area. The following are recommended: credit delivery mechanism which is without or with very minimal stringent conditions (such as the provision of collateral) targeting the poor crop farming and fishing households should be implemented and improved crop farmers/fishermen access to technological information.

Keywords: *Poverty; crop farmers; fisher folks; indicators; farm business.*

1. INTRODUCTION

The United Nations Department of Economic and Social Affairs [1] report on common country assessment stated that Nigeria is one of the poorest and most unequal countries in the world, with over 76 million or 64 per cent of her population living below poverty line. Poverty and hunger have remained high in rural areas, remote communities and among female-headed households and these cut across the six geo-political zones of the country. Poverty is seen as a situation of low income and/or low consumption. People are considered poor when their measured standard of living is below a minimum acceptable level of poverty known as poverty line [2]. On a global dimension as reported by FAO [3] a look at the extent of food insecurity beyond severe levels and hunger reveals that an additional 17.2 percent of the world population, or 1.3 billion people, have experienced food insecurity at moderate levels, meaning they did not have regular access to nutritious and sufficient food.

According to Olutosin et al. [4] poverty is strongly associated with hunger in Nigeria. The authors contended that the National Social Investment Programmes are major tools for reducing hunger in Nigeria but that country is not making significant progress towards ending hunger soonest. Many developing countries, especially African countries, are faced with extreme hunger often caused or compounded by bad governance, conflicts and climate change. Efforts towards eradicating poverty and achieving Millennium Development Goals (MDGs) are being carried out by Governments, Non-Governmental Organizations (NGOs), International organizations, and private institutions in Akwa Ibom State and Nigeria and around the world. The organization aims to reduce by 50% the number of people who suffer

from poverty [5]. In Akwa Ibom State, Nigeria government and non-governmental organizations at national and international levels have been doing a lot towards poverty reduction, but their concentration is mostly in the urban centres.

Poverty has generated a lot of interest in recent times and poverty reduction strategies are increasingly being accorded centrality in the development planning process. According to several authors [6-8], more than 60% of the rural population who are mostly farmers in Sub Saharan Africa live below the poverty line and do not have sufficient access to social amenities and infrastructures. As noted by several authors [9,10], the UN Human Poverty Index, in 1999, placed Nigeria among the 25 poorest nations in the world. To substantiate this fact, the UNDP report [11] asserted that, about 68.7 million Nigerians were poor in 2004; while it rose to 112.7 million in 2010 representing 69 % of the population. Issues related to poverty and income inequality are mostly reported as a rural phenomenon and more prevalent among farming households in Nigeria [12].

However, it has been established that majority of the poor in Akwa Ibom State and elsewhere in Sub-Sahara Africa live in rural areas and depend on agriculture and fishing as their principal means of survival [13]. Therefore significant increases in agricultural productivity and fishing must be supported and achieved at the household level [14] and this can only be achieved if the factors that determined poverty status of the farm households and fishermen are empirically determined and addressed. To date farming household and fishermen level research on poverty challenges in Ikot Offiong, Itu Local Area of Akwa Ibom State is limited. Mishra [15,16] used regression method on cumin and black pepper to find the factor affecting their production. This study which intends to analyze and compare the poverty status and factors that

influence the poverty status of rural farmers and fishermen in Akwa Ibom State, Nigeria used poverty index and will not only add to the topical issue of poverty but will be of immense use to policymakers. The study, therefore, sought to address the following objectives:

- i. Determine the poverty status of crop farmers and fishermen in the study area;
- ii. Analyze the determinant of poverty among farmers and fishermen in the study area;

2. RESEARCH METHODOLOGY

2.1 Description of Study Area

The study was conducted in Ikot Offiong, Itu Local Government Area in Akwa Ibom State, South-South region of Nigeria. Ikot Offiong lies within the humid tropical rainforest zone of Nigeria with an average annual precipitation range of 2000 mm - 3000 mm, and is located between latitude 40° and 20°N of the equator and longitude 30° and 47°E of the meridian and has an area of about 128.32 square kilometres and a population of about 327, 033 [17]. Itu Local Government Area is bounded in the north by Odukpani and Arochukwu Local Government Area in Cross River and Abia States respectively, in the west by Ibiono-Ibom and Ikono Local Government Areas, in the south by Uyo Local government Area and in the east by Uruan Local Government Area. The people of the area are predominantly crop farmers and fishermen and are Ibibio speaking group with pockets of Efik speaking people and the Ijaws.

2.2 Sampling Technique and Sample Size

A two stage sampling technique was adopted to select crop farmer and fishermen households in the study area. The first stage involved the purposive selection of Ikot Offiong out of all the clans in Itu LGA., because of the prevalence of fishermen and proximity to watercourse and high crop activities in the area. The second stage involved the random selection of forty (40) crop farmers and fishermen each from the area to give a total sample size of eighty (80) respondents. This sample was obtained from the list of registered crop farmers and fishermen from the Department of Agriculture in the Local Government Headquarters.

2.3 Method of Data Collection and Analysis

The data that were used for this study was obtained from primary sources. Primary data

were obtained through validated structured questionnaires and were designed based on the study objectives. Data collected were analyzed using inferential statistics; the specific method for each objective was as follows:

Objective i: The poverty status of crop farmers and fishermen in the study area was analyzed using Foster, Greer and Thorbecke (FGT) Poverty Index.

Objective ii: The determinant of poverty among farmers and fishermen in the study area was analyzed using logistic regression.

2.4 Model Specification

2.4.1 Logistic regression model

In order to identify the determinants of poverty status of crop farmers and fishermen households, a logit regression was carried out. The model was chosen because of the dichotomous dependent variables and because the technique has no restrictive distribution assumptions.

The logistic (logit) probability function is given as;

$$P_i = \frac{1}{1 + e^{-(\alpha + \beta X)}} = f(Z_i) \quad (i)$$

Where P_i is the probability that a household i ($i = 1, 2 \dots n$) would be poor. Index Z_i is a random variable which predicts the probability of a household being poor or non-poor. The probability P_i in equation i is further transformed to give equation ii as follows:

$$P_i = e^{Z_i} / 1 + e^{Z_i} \quad (ii)$$

Therefore for the i th observation, a household would be

$$\frac{P_i}{1-P_i} = Z_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_n X_n + U_i$$

Where,

P_i = the probability of a crop farmer being poor, where $Y = 1$.

$1 - P_i$ = the probability of a crop farmer or fisher not being poor, where $Y = 0$.

X_i = is a vector representing explanatory variables.

U_i = is the random error term. Explicitly, the model is specified as follows

Map 1. Map of Itu L. G. A. Akwa Ibom State, Nigeria

Model 1 for crop farmers:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + U_i \quad (iii)$$

Where:

Y = Poverty status of farm households sampled (1= if poor, 0 otherwise)
 X_i = Farm size (hectares),
 X_2 = Highest educational level (years of formal schooling)
 X_3 = Farming experience (years),
 X_4 = Age of household head (years),
 X_5 = Sex (male = 1, female = 0),
 X_6 = Household size (number)
 X_7 = off farm income (₦),
 X_8 = farm income
 X_9 = Membership of farmer association (member = 1 and 0, otherwise)
 X_{10} = Amount of credit accessed (₦),
 U_i = errors term

Model 2: for fishermen

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + U_i \quad (iv)$$

Where:

Y = Poverty status of fishermen sampled (1= if poor, 0 otherwise)
 X_1 = Marital status (D = 1 if married, 0 if otherwise)
 X_2 = Highest educational level (years of formal schooling)
 X_3 = Fishing experience (years),
 X_4 = Age of household head (years),
 X_5 = Sex (male = 1, female = 0),
 X_6 = Household size (number)
 X_7 = Non- fishing income (₦),
 X_8 = fish farming income (₦)
 X_9 = Membership of farmer association (member = 1 and 0, otherwise)
 X_{10} = Amount of credit accessed for fishing activities (₦),
 U_i = errors term

2.4.2 Foster Greer Thorbecke (FGT) poverty indices

The FGT measure was used to determine the level of poverty among crop farmers and fishermen (Foster Greer & Thorbecke, 1984). The FGT poverty index is given as:

$$P_{ai}(y, z) = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^\alpha$$

Where

n = Total number of rural farm households under consideration

q = Number of poor rural farm households (those below the poverty line)

Z = Poverty line, estimated using $\frac{2}{3}$ mean per capita expenditure of all households
 y_i = per capita expenditure of the i^{th} household
 α = poverty aversion parameter and takes on value 0, 1, 2

$\left(\frac{z - y_i}{z} \right)$ = proportion shortfall in expenditure

below the poverty line. Determining the poverty index, When $\alpha = 0$ in FGT, the expression

$$\text{becomes: } P_0 = (q) \left(\frac{1}{n} \right) = \frac{q}{n} = H$$

This is called the Incidence of poverty or headcount index, which measures the proportion of the population that is poor i.e. falls below the poverty line.

When $\alpha = 1$ in FGT, the expression becomes:

$$P_1 = \frac{1}{2} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)$$

This is called Poverty depth or Poverty gap index, which measures the extent to which individuals fall below the poverty line as a proportion of the poverty line.

When $\alpha = 2$ in FGT, the expression becomes:

$$P_2 = \frac{1}{n} \sum_{i=1}^q \left(\frac{z - y_i}{z} \right)^2$$

This is called Poverty severity index measures the squares of the poverty gaps relative to the poverty line.

2.4.3 Construction of poverty line

In line with recent work on poverty [2], the analysis in this study used the per capita household expenditure as a measure of poverty incidence and for determining the poverty line. The farm households were categorized into a poor and non-poor group using the two-third mean per capita expenditure [9], (World Bank, 2017) as the benchmark. Households whose mean consumption expenditure falls below the

poverty line were regarded as being poor while those with their expenditure above the benchmark are non-poor, this is shown below:

$$PCE = \frac{TCE}{HHS} \quad MPCHE = \frac{THHE}{TNH}$$

$$Poverty\ Line = \frac{2}{3} MPCHE$$

Where:

PCE = Per Capita Expenditure
TCE = Total Consumption Expenditure
HHS = Household Size
MPCHE = Mean Per Capita Households Expenditure
THHE = Total Households Expenditure
TNH = Total Number of households
PL = Poverty Line.

3. RESULTS AND DISCUSSION

3.1 Poverty Status among Crop Farmers and Fishers in the Area

The poverty status of crop farmers and fishermen in the study area is shown in Table 1. The poverty line estimated for this study was ₦ 21,173.66 for crop farmers and ₦ 15,651.048 for fishermen a month. Therefore, a household that has a per capita expenditure falling below ₦21,173.66 and ₦ 15,651.048 a month for both crop farmers and fishermen respectively were designated as poor while household that has a per capita expenditure equals or is greater than ₦21,173.66 and ₦15,651.048 for crop farmer and fishermen respectively were non-poor. It was observed that majority representing 52.5% (crop farmers) and 62.5% (fishermen) were poor, while 47.5% (crop farmers) and 37.5 % (fishermen)

were non-poor. This result is contrary to that of [18] who had less than 30% poverty level of farmers studied.

Poverty indicators among sampled respondents in this study were analyzed using the three indicators of poverty as highlighted in the Foster, Greer and Thorbecke (FGT) model. The indicators were the incidence of poverty, poverty depth and poverty severity. Result in Table 1 showed that, the incidence of poverty among crop farmers and fishermen were 0.525 and 0.625 respectively. This means that about 52.5% of crop farmers and 62.5% of fishermen in the study area had their per capita income less than the poverty line income. Poverty head count of 56.9 % was estimated by [19] from fish vendor households in Lower Cross River Basin, Nigeria. But the result is also in line with the studies of Oladimeji et al. [20] who obtained head count of 0.53. From this result, it can be inferred that the majority of the respondent in the study area live in poverty. The result further showed that fishermen are more vulnerable to poverty than crop farmers in the State.

The result also revealed the poverty depths of 0.342 for crop farmers and 0.309 for fishermen in the study area. This result implies that about 34.2% and 30.9% of per capita income is needed to bring poor farmers and fishermen from below poverty line up to the poverty line income. Similarly, the severity of the poverty index was 0.252 for crop farming households and 0.221 for fishing headed households in the study area. This result means that crop farmers need about 25.2% increases in per capita income to push them away from severe poverty. Likewise, the fishermen need about 10.64% increment in per capita income to escape from severe poverty.

Table 1. Summary statistics of poverty status of the crop farmers and fishers in the study area

Poverty status	Farmer		Fishers	
	Frequency	Percent	Frequency	Percent
Poor	21	52.5	25	62.5
Non-poor	19	47.5	15	37.5
Total	40	100	40	100
Indicators				
Incidence of poverty (P0)	0.525		0.625	
Poverty depth (P1)	0.342		0.309	
Poverty severity index (P2)	0.252		0.221	
Poverty line	21,173.66		15,651.048	

Source: field survey data, 2018

Table 2. Logit model estimates of determinants of poverty status farmers

Variables	Coefficients	Standard errors	Z-value	Marginal effect	Z-value
Constant	-27.99	13.15	-2.13**		
Gender	2.709	1.751	1.55	0.672	1.54
Age	0.279	0.181	1.55	0.0693	1.53
Marital Status	2.007	1.161	1.73*	0.498	1.71*
Education	0.0832	0.135	0.61	0.0207	0.62
Household size	-0.317	0.216	-1.47	-0.0788	-1.47
Farm size	1.178	0.678	1.74*	0.292	1.76*
Farm income	-5.03E-5	4.54 E-5	-1.11	-1.25 E-5	-1.10
Association	7.425	3.668	2.02**	1.843	2.06**
Experience	-0.965	0.443	-2.18**	-0.239	-2.18**
Log-likelihood	-14.869				
LR chi2 (9)	25.61***				
Pseudo R ²	0.4627				

Source: field survey, 2018. *=10%; **=5%; ***=1%

3.2 The Determinant of Poverty among Crop Farmers and Fishermen in the Study Area

The Logit model was used in estimating factors that influencing poverty among crop farmers and fishermen in the study area and the results presented in Tables 2 and 3.

3.3 The Determinant of Poverty among Crop Farmers

The estimated coefficients of the Logit model for crop farmers along with the standard error, z-values and p-values are presented in Table 2. The Pseudo R² of 0.46 implies that all the explanatory variables included in the model were able to explain 46 % of the variation in the poverty status of the households. The likelihood ratio statistics as indicated by the χ^2 statistic is significant at 1%. This implies that all the variables included in the Logit model are jointly significant in influencing farmers' poverty status. Therefore, the socio-economic characteristics of farmers have a significant effect on their poverty status. Table 3 shows that marital status, farm size, association and farming experience are statistically significant determinants of poverty status. However, the parameter estimates of the Logit model provide only the direction of the effect of the independent variables on the dependent (response) variable: estimates do not represent the actual magnitude of change or probabilities. Thus, the marginal effects from the model, which measure the expected change in probability of a particular choice being made concerning a unit change in an independent variable, are also reported in Table 3 and were used for discussion.

The coefficient of marital status of farmers was statistically significant at 5% and had a positive effect on the poverty status in the study area. The marginal effect value of 0.498 obtained implies that, if marital status of farmer changes from single to married, the probability of the crop farming household been non-poor is 49.8%. The results imply that households headed by married people are more likely to be non-poor than those headed by unmarried households. This finding is in line with that of several authors [8-10,21,22].

Farm size also had a positive and significant effect on poverty at 1% level of probability. The marginal effect value of 0.292 implies that, if farm size is increased by one unit, the probability that farming households would be non-poor is 29.2%. This means that the larger the farm size, the more likely farming households would be non-poor. Similarly, farmers' belonging to association also had a positive and significant effect on poverty status at 1% level of probability. The marginal effect value of 1.843 implies that, if a farmer belongs to the association, the probability that such farming households would be non-poor is 84.3%. This means that, the more a household head belongs to the association, the more likely they would be non-poor.

On the other hand, the relationship between poverty status and farming experience of farming household head is negative and statistically significant. The marginal effect of farming experience has a negative relationship with poverty incidence among farmers in the study area. A unit increase in farming experiences will reduce poverty incidence by increasing the household per capita income of farmers by N 0.239. This connotes that, as farming experience

Table 3. Logit model estimates of determinants of poverty status of fishers

Variables	Coefficients	Standard errors	Z-value	Marginal effect	Z-value
Constant	2.169	7.04	0.31		
Gender	-0.464	1.16	-0.4	-0.0911	-0.40
Age	-0.076	0.116	-0.66	-0.0149	-0.69
Marital Status	-0.644	0.929	-0.69	-0.126	-0.69
Education	0.303	0.161	1.88*	0.0595	2.13**
Household size	-0.098	0.206	-0.48	-0.0193	-0.48
Credit	0.776	1.273	0.61	0.152	0.61
Farm income	4.76E-06	2.59E-06	1.84*	9.35E-07	1.96*
Association	-1.041	1.134	-0.92	-0.204	-0.93
Experience	0.121	0.261	0.46	0.023	0.47
Log-likelihood	-0.1855				
LR chi2 (9)	15.83*				
Pseudo R ²	0.299				

Source: field survey, 2018. *=10%; **=5%; ***=1%

increases, it would dwindle the prevalence of poverty among poor farming household heads. Researchers like [18,23,24] obtained a similar result in other regions of the country. Also, gender, age, education, household size and farm income of the household head were not significant. This suggests that this variable might not fully explain the poverty status of a household.

3.4 The Determinant of Poverty among Fishermen

The estimated coefficients of the Logit model for fishermen, along with the standard error, z-values and p-values are presented in Table 3. The Pseudo R² of 0.299 implies that all the explanatory variables included in the model were able to explain about 30% of the variation in the poverty status of the fishermen households. The likelihood ratio statistics as indicated by the χ^2 statistic is significant at 1%. This implies that all the variables included in the Logit model are jointly significant in influencing fishermen' poverty status. Therefore, the socio-economic characteristics of fishermen have a significant effect on their poverty status. Table 3 shows that education, credit experience and farm income were the only statistically significant determinants of poverty among fishermen. However, the marginal effect of the model was used for discussion.

The table showed that years of education have a positive marginal effect of 0.0595. This shows that the probabilities of being non-poor would increase by about 6 percent for a unit increase in year of education. Several authors [19,25] also obtained years of education as the determinant

of poverty among fish vendors. The result is also in line with the report of several authors [13,25,26]. Similarly, credit returned a coefficient of 0.776 indicating that a percent increase in this variable increases the chances of been non-poor by 78%. Farm experience had a coefficient of 0.121 indicating that a unit increase in farm experience gets fishermen out of poverty 1%. The result further showed that income from fishing had a positive marginal effect of 9.35E-07. This indicated that the probabilities of being non-poor would increase for a unit increase in fishermen income.

4. CONCLUSION AND RECOMMENDATIONS

The present study showed that fishermen are more vulnerable to poverty than crop farmers in the State. Result also indicated that about 34.2% and 30.9% of per capita income is needed to bring poor farmers and fishermen out of poverty. Also, crop farmers and fishermen need about 25.2% and about 10.64% increases in per capita income respectively to push them away from severe poverty. On the determinants of crop farmers, gender, age, marital status education, farm size and membership of association were all found to be positive and significant determinants, while education, credit, farm income and experience were the positive and significant determinant of poverty among fishermen in the area. The following are recommended: credit delivery mechanism which are without or with very minimal stringent conditions (such as provision of collateral) targeting the poor crop farming and fishing households should be implemented, improved crop farmers/fishermen access to technological

information, policy actions that tend to increase educational and training opportunities for the poor should be encouraged and government should enhance the educational status of the crop farmers/fishermen through adult education which will lead to increased income.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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