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Effect of Community-based Natural Resources Management Programme on Poverty Status of Fishing Households in the Riverine Areas of Ondo State, Nigeria

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Abstract

With 2030 just ten years away, it seems unlikely that Nigeria meets the Sustainable Development Goal (SDG) targets for eradication of extreme poverty and hunger. Despite the huge fisheries resources Nigeria is endowed with, low yield, deplorable state of the fisheries resources in the country due to human activities, poor data statistics for proper planning and management especially in the face of climate change effects pervade the fisheries sector of Nigeria. The article therefore examines the effect of community-based natural resources management programme on poverty status of fishing households in the riverine areas of Ondo State, Nigeria. One hundred and twenty respondents were selected using a multi-stage sampling procedure. Data were collected from the respondents and analysed using a combination of descriptive statistics, Foster-Greer-Thorbecke (FGT) poverty measure, and probit regression model. Results revealed that 35% of the participants and 47% of the non-participants respectively fell below the poverty line. Participants needed 10% of the poverty line to get out of poverty while the non-participants needed 15% of the poverty line to get out of poverty. Poverty was a bit more severe among non-participants (7%) than the fish farmers who participated in the programme (4%) in the study area. The results of probit regression model revealed that household size, years of education, share of farm income, access to credit and participation in the community-based natural resources programme are the determinants of poverty among the respondents. The study recommended that Government should encourage the non-participants to participate in the community-based natural resource management programme and also introduce policies that facilitate increased level of education, increased access to credit facilities are essential to help reducing poverty among fishing households in the study area.

Key words: Community-based, Fishing households, Poverty Status, Riverine Areas, Nigeria.

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Introduction

Natural resource management is a discipline in the management of natural resources such as land, water, soil, plants and animals, with a particular focus on how management affects the quality of life for both present and future generations (Ogujiuba, 2014). Natural resource management involves identifying the resources by researchers, determined who has the right to use the resources and who does not for defining the boundaries of the resource (Salvati and Marco, 2008). The resources are managed by the users according to rules governing when and how the resource is used, and local condition (Van Dyke, 2008; United Nations Development Programme, 2005). The successful management of natural resources should engage the inhabitants of the specific community because of the nature of the shared resources; individuals who are affected by the rules need to participate in setting or changing them. This implies that members of a specific location are the custodians of the natural resources; they utilize them for their own benefits and would be interested in their sustainability.

Globally, community-based natural resources management (CBNRM) is an approach under which communities become responsible for managing natural resources (forests, land, water, biodiversity) within a designated area. It implies that the community is expected to assist in the planning and management of the resources within their locality and can be monitored by outside technical specialists. They are utilized and protect natural resources within established guidelines, following mutually agreed plan. The active participation of stakeholders in natural resource decision making and use increases economic and environmental benefits. It has also been established that population growth and economic development are increasing pressure on land, water, forest, and biodiversity resources. Government attempts to conserve natural resources through top-down regulatory systems have often failed. Limited government capacity to enforce laws and regulations compounds management problems, particularly when regulations are inappropriate to the social, cultural and ecological context.

Poverty on the other hand is a serious problem all over the world. People can be said to be in poverty when they are deprived of income and other resources needed to obtain the conditions of life; the diets, material goods, amenities, standards and services; that enable them to play the roles, meet the obligations and participate in the relationships and customs of their society (International Poverty Centre, 2006). Nigeria as a country is richly endowed with abundant human and natural resources but is still trapped in the poverty net (Ogujiuba, 2014). The continuous importation of fish portends a grave danger to Nigeria in terms of foreign exchange earnings and its drain on the foreign reserves, and the loss of employment opportunities for Nigerians especially the rural people thus aggravating their poverty level. Poor people in the developing countries are particularly dependent on natural resources and ecosystem services for their livelihoods. It is generally known that the unsustainable exploitation of fisheries resources in Ondo State, is a serious threat to the livelihood of its communities, especially the artisanal fishers who depend almost entirely on fishing to provide for their families. These artisanal fishers are resource poor, small-scale fishers, with little knowledge and skills, using elementary technology and traditional methods for fishing. The fact that there are many studies showing the over-exploitation, or at best the full exploitation of the Nigerian fisheries sector, particularly the artisanal sub-sector, indicates an urgent need of an effective and efficient sustainable approach to the exploitation and management of the country's fisheries resources and the need for capacity building amongst the stakeholders.

It is against this background that this study examines effect of community-based natural resource management programme on poverty status of fishing households in the riverine areas of Ondo State, Nigeria. Though there are studies on natural resources management programme (Pomeroy, 1995; Pomeroy and Berkes, 1997; Jibowo, 2000; Bulayi, 2001; Béné and Neiland, 2006; Béné *et al*., 2007; Berkes, 2010; Béné *et al.*, 2010; Ekong, 2010; Oguduvwe, 2013, Meashan and Lumbasi, 2013) to name a few. However, empirical assessment of community-based natural resource management programme and effect on poverty is scarce in Nigeria. This reveals a gap in the literature that needs to be filled. To fill the gap and complement previous studies, this study

examines community-based natural resource management programme and effect on poverty status of fishing households in the riverine areas of Ondo State, Nigeria. This study provides answers to pertinent questions such as: what are the socio-economic characteristics of participants and non-participants? what are the poverty status of participants and non-participants? what are the determinants of poverty among respondents in the study area? From a policy perspective, answers to these questions will have implications for future work in agriculture and potential of agriculture to remain panacea to poverty.

Methodology
Data

The study used primary data that were collected from the respondents with the aid of a structured questionnaire in the riverine areas of Ondo State, Nigeria. Multi-stage sampling procedure was used in the selection of respondents for the study. The first stage involved a purposive selection of Riverine area in Ondo State due to the fact that the area is particularly known for its vast community based natural resources. In the second stage, purposive selection of five communities in the area was done, these are: Apoi, Arogbo, Babomi, Igbekebo and Ojuala. In the final stage, 12 participants and 12 non-participants were selected from each community to make a total of 60 participants and 60 non-participants and in total, 120 respondents were sampled for the study.

Analytical technique

Descriptive statistics such as mean, percentage and tables were used to examine the socio-economic characteristics of the respondents. Foster Greer Thorbecke (FGT) Poverty Index was used to analyse the poverty status of fishing households and probit regression model was used to examine the determinants of poverty among respondents in the study area.

Foster Greer Thorbecke (FGT) Poverty Index

The Foster-Greer-Thorbecke (FGT) poverty indexes were used to determine the incidence, depth and severity of poverty among the respondents.

Mathematically,

Per Capita Income (PCI) = $\dfrac{\text{Total Household Income}}{\text{Household Size}}$

Mean Per Capita Household Income (MPCHI) = $\dfrac{\text{Total Per Capita Household Income}}{\text{Total Number of Households}}$

Poverty line (z) = $\dfrac{2}{3}$ x MPCHI

Mathematically, the (FGT) poverty index can be expressed as:

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

n = total number of participants / non-participants, q = number of respondents below the poverty line, z = the poverty line for the participants / non-participants (2/3 Mean Per Capita Household Income (MPCHI)), yi = Participants/ non-participants' income, α = non-negative poverty aversion parameter and takes on the value 0, 1, 2 to determine the type of poverty index while $\dfrac{z - y_i}{z}$ = proportion shortfall in the income below the poverty line.

1. When α = 0 in FGT, the expression becomes: $P_0 = \dfrac{q}{n}$

   This is called the poverty rate or incidence of poverty or Headcount index, which measures the proportion of the population that is poor.

2. When α = 1 in FGT, the expression becomes: $P_1 = \frac{1}{n} \sum_{i=1}^{q} \left(\frac{z - y_i}{z} \right)^1$

   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.

3. When α = 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, which measures the squares of the poverty gaps relative to the poverty line.

Probit Regression Model
The model is given as:

$$P\left(Y_t = \frac{1}{x_i} \right) = \frac{\exp(x_i \beta)}{1 + \exp(x_i \beta)}$$

This was expressed as,

$$q_{it} = b x_{it} + e_{it}$$

Where q_{it} = an unobservable latent variable for poor households, x_{it} = vector of explanatory variables, b = vector of parameter to be estimated, e_{it} = error term
The observable binary (1, 0) for whether household is poor or otherwise is assumed in the usual Probit Model. The probability that the binary assumes the value 1 implies,

$$prob.(q_{it} = 1) = \frac{e^{x_{it}} + \beta^{x_{it}}}{1 + e^{x_{it}} + \beta^{x_{it}}}$$

Thus, in this study, the explanatory variables (Xs) that were included in the model are:
X_1 = Age (Years), X_2 = Sex (Male = 1, Female = 0), X_3 = Marital status (Married = 1, Not married = 0), X_4 = Household size (Number), X_5 = Educational Level (years of formal education)
X_6 = Access to credit (Yes = 1, No = 0), X_7 = Membership of Cooperative Society (Yes = 1, No = 0), X_8 = Share of farm income (₦), X_9 = Participation in community-based natural resource management programme (Participants=1, Non-participants=0), (₦), X_{10} = Years of farming Experience (years).

Results and Discussion
Descriptive Analysis of the Socio-economic Characteristics of the Respondents
The descriptive analysis of the socio-economic characteristics of the respondents is presented in Table 1. From the results, the mean age for the participants and non-participants was 47years and 48years respectively, thus they are in their economically active age. Results also showed that respondents in the study area were largely dominated by female for participants (89.7%) and non-participants (87.2%) with an average household size of 6 and 7 for participants and non-participants respectively. This is an indication that respondents had large household size which could increase their poverty status due to large family members competing for fewer resources.
 Majority of the respondents (86.7%) for participants and (95%) for non-participants were married. Most (42.3%) and (48.3%) of the participants and non-participants respectively had primary school education while about 16.7% and 13.3% of the participants and non-participants respectively had tertiary education. Results further showed that 1.6% and 8.3% of participants and non-participants respectively had no formal education. This is an indication that respondents in the study area had one form of western education or the other.

Table 1: Distribution of respondents according to socio-economic characteristics

Variables	Participants Frequency	Percentage	Non-Participants Frequency	Percentage	Pooled Frequency	Percentage
Age						
41-50	34	56.6	30	50.0	64	53.3
51-60	25	41.7	29	48.3	54	45
>60	1	1.7	1	1.7	2	1.7
Mean	47		48		47.5	
Total	60	100.00	60	100.0	120	100.00
Sex						
Male	8	13.3	11	18.3	19	15.8
Female	52	86.7	49	81.7	101	84.2
Total	60	100	60	100	120	100.00
Household Size						
≤ 5	20	33.3	25	41.7	45	37.5
6-10	39	65.0	31	51.7	70	58.35
>10	1	1.7	4	6.6	5	4.15
Mean	6		7			
Total	60	100.00	60	100.00	120	100.00
Marital Status						
Married	52	86.7	57	95	109	90.85
Divorced	2	3.3	1	1.7	3	2.5
Single	6	10.0	2	3.3	8	6.65
Total	60	100.00		100.00	120	100.00
Education						
No formal Education	1	1.7	5	8.3	6	5.0
Primary Education	25	41.6	29	48.4	54	45.0
Secondary Education	24	40.0	18	30.0	42	35.0
Tertiary Education	10	16.7	8	13.3	18	15.0
Total	60	100.00	60	100.00	120	100.00

Source: Computed from Field Survey Data, 2019

Analysis of poverty status among Fishing Households

Analysis of poverty status among fishing households is presented in Table 2. From the results, the mean per capita income in the study area was ₦64, 766.60. The poverty line was computed as 2/3 of the mean per capita income of the household which was ₦43, 177.70. However, any household with per-capita income below the poverty line (₦43, 177.70) was designated as being poor, while any household whose per capita income is above or equal to the poverty line is designated as non-poor. Results further showed that the head count ratio or poverty incidence (P_0) for the participants was 0.35, while for non-participants it was 0.47. These values revealed that 35% of the participants and 47% of the non-participants fell below the poverty line. The poverty depth or gap (P_1) for the participants was 0.10, while that of non-participants was 0.15. These values indicate that the participants needed 10% of the poverty line to get out of poverty while the non-participants needed 15% of the poverty line to get out of poverty. The poverty severity or intensity (P_2) for participants was 0.04 while that of non-participants was 0.07. These values indicate that poverty was a bit more severe among non-participants (7%) than the fish farmers who participated in the programme (4%) in the study area.

Table 2: Estimate of poverty of incidence, depth and severity

Poverty	Participants	Non Participant
Headcount ratio-P_0	0.35	0.47
Poverty gap-P_1	0.10	0.15
Squared poverty gap- P_2	0.04	0.07

Source: Computed from Field Survey Data, 2019

Determinants of poverty among the respondents

Determinants of poverty among the respondents is presented in Table 3. From the results, household size, years of education, share of farm income, access to credit and participation in community-based natural resources management programme are the determinants of poverty among the respondents. The Pseudo R-square (coefficient of determination) is 0.7283, suggesting that the model has a good fit to the data. This indicates that 72.83% variation in poverty is explained by variations in the specified explanatory variables. Years of education, share of farm income, access to credit and participation in CBNRM programme had negative coefficients indicating these variables decreased poverty status of respondents in the study area. This also implies that the higher the years of education, share of farm income, access to credit, participation in the community-based natural resource management programme, the less the probability of being poor among the respondents.

Household size had a positive coefficient indicating that this variable increased poverty status of respondents in the study area. This also implies that the higher the household size, the higher the probability of being poor among the respondents in the study area. This is because large household size tends to reduce per capita income available to the household. The marginal effect for household size among the participants was 0.237 which connotes that as household size increases by one unit, it will lead to 23.7% increase in the likelihood of being poor among the participating households and also 12% increase in the probability of being poor among non-participants. Educational level of the respondents had a negative coefficient and significant at 1% and 5% for both respondents respectively which implies that the higher the level of education, the greater the likelihood of not being poor among the credit users. The marginal effect reveals that a unit increase in the years spent in school by the participants will lead to 0.5% increase in the probability of not being poor among the participating respondents and 2.2% increase in the probability of not being poor among non-participants. This means that the more educated the farmer, the more efficient he is in his farming enterprise and hence the more income he is likely to earn.

Participation in community-based natural resource management (CBNRM) of the respondents had negative coefficient and significant at 5% for both respondents. This implies that participation increases the chances of not being poor among the participants. The marginal value connotes that a unit increase in participation will lead to 9.5% increase in the probability of not being poor among the participants. Similarly, a unit increase in participation of the non-participating households will bring about 14.9% increase in their probability of not being poor. Access to credit had a negative coefficient and significant at 5% which implies that the higher the access to credit the greater the likelihood of not being poor. The marginal value connotes that a unit increase in the access to credit will lead to 0.6% increase in the probability of not being poor among the participants. Similarly, a unit increase in the access to credit of the non-participating households will bring about 0.6% increase in their probability of not being poor. Share of farm income had a negative coefficient and significant at 5% which implies that the higher the share of farm income the greater the likelihood of not being poor. The marginal value connotes that a unit increase in the share of farm income will lead to 0.4% increase in the probability of not being poor among the participants. Similarly, a unit increase in the share of farm income of the non-participating households will bring about 0.2% increase in their probability of not being poor.

Table 3: Estimates of probit regression model

Variables	Participants			Non-participants		
	Coefficient	Marginal Effect	P-Value	Coefficient	Marginal Effect	P-Value
Age	0.078	0.015	0.066	0.064	0.017	0.060
Household size	1.212	0.237	0.000***	-0.465	0.120	0.008***
Sex	-0.670	-0.131	0.469	-0.548	-0.141	0.423
Years of Education	-0.028	-0.005	0.007***	-0.086	-0.022	0.044**
Participation in CBNRM	-0.485	-0.095	0.027**	-0.582	-0.149	0.052**
Marital status	1.484	0.289	0.875	0.532	0.137	0.512
Share of farm income	-0.024	-0.004	0.007***	-0.057	-0.0024	0.048**
Cooperative Membership	1.290	0.325	0.736	0.662	0.159	0.723
Years of Experience	0.592	0.082	0.036	0.691	0.152	0.070
Access to credit	-0.032	-0.006	0.030**	-0.003	-0.006	0.041**
Constant	0.147			9.625		

Pseudo R^2 = 0.7283

*** Significant at 1% level of significance, ** Significant at 5% level of significance, * Significant at 10% level of significance
Source: Computed from Field Survey Data, 2019,

Conclusion and Policy Recommendation
   This article examines the effect of community based natural resources management programme on poverty status of fishing households in the riverine area of Ondo State, Nigeria. Descriptive statistics, Foster-Greer-Thorbecke (FGT) poverty measure, and probit regression model were employed in the study. The results revealed that majority of the fish farmers are females and are in their economically active age, with an average household size of 6 and 7 for participants and non-participants respectively. Results of the Foster-Greer-Thorbecke (FGT) poverty measure revealed that 35% of the participants and 47% of the non-participants fell below the poverty line. The poverty depth indicated that he participants needed 10% of the poverty line to get out of poverty while the non-participants needed 15% of the poverty line to get out of poverty. The poverty severity or intensity (P_2) for participants indicated that poverty was a bit more severe among non-participants (7%) than the fish farmers who participated in the programme (4%) in the study area. The empirical model of the probit regression revealed that five out of ten variables included in the model statistically had effect on poverty status. Household size, years of education, share of farm income, access to credit and participation in the community-based natural resource management programme are the determinants of poverty among the respondents. In conclusion, participation in CBNRM programme had significant effect on the poverty status of respondents, judging by the marginal value which connotes that a unit increase in the participation will lead to 9.5% increase in the probability of not being poor among the participants and about 14.9% increase in the probability of not being poor among non-participants. Hence, in order to reduce poverty in the study area, reduce youth unemployment and shape future work in agriculture, non-participants should be encouraged to engage in participation in community-based natural resource management programme. Finally, policies that facilitate increased level of education, increased access to credit facilities are essential to help reducing poverty among fishing households in the study area.

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