Ethiopian Journal of Environmental Studies & Management 7(4): 423 – 433, 2014.
ISSN:1998-0507 doi: http://dx.doi.org/10.4314/ejesm.v7i4.9
Submitted: May 04, 2014 Accepted: July 08, 2014

A MICRO LEVEL ANALYSIS OF POVERTY AMONG ARTISANAL RURAL FISHERY IN KWARA STATE, NIGERIA

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Abstract
The study investigates the poverty incidence using the Foster, Greer, and Thorbecke (FGT) index. A fishery household survey was conducted in eight fishing settlements with a sample of 306 households in 2012/2013. The households were selected through multistage random sampling procedure. The monthly mean per adult equivalent household expenditure of the household was US$56.72 (N9075.23) out of which a poverty line of US$37.81 (N6050.15) was estimated. Results of FGT decomposition revealed that poverty incidence for the study area is about 0.53. Poverty incidence, depth and severity increase with increase family size of household heads. A stochastic dominance analysis validates the choice of poverty line. Results of regression analysis revealed that the fishermen's net income is significantly influenced by 3 independent variables. Government policy should be directed at educating the fishing households through literacy campaign, access to universal basic education, and skill-enhance trainings, so as to be able to adopt new innovations and techniques which will enhance improve standard of living and apparently reduced poverty.

Key Words: *Poverty, Artisanal Household, FGT model, Nigeria*

Introduction

Nigeria is essentially an agrarian economy, two-thirds of the population of 160 million people is involved in agriculture and agricultural related industries which maintain a steady contribution of 35 to 40% to total Gross Domestic Product (GDP) between 2008 and 2012. (FAO, 2013; Oladimeji *et al*., 2013a). The country has abundant water resource, about 214 billion m^3 of surface water and 87 km^3 of ground water, both of which can be used for fishing and irrigation and capable of supporting a large population of livestock (FAO, 2013). According to Ita (1985) and Oladimeji *et al*. (2013a), the full extent of water resources cannot be accurately stated as it varies with season and from year to year depending on rainfall. However, Nigeria is endowed with coastline of about 800 kilometres, a continental shelf of about 256,000 km^2 and exclusive economic zone area of 210,900 km^2 (FAO, 2013; Oladimeji *et al*., 2013a). The major rivers and lakes estimated at about 11,666,000 hectares make up about 12.0% of the total surface area of Nigeria which is estimated to be approximately 98,300,000 hectares (Ita, 1985; FAO, 2013). Therefore, it can be concluded that Nigeria is endowed with abundant agricultural potential including fishery resources to produce enough fish and fish products not only for domestic consumption but also for export.

Despite this large natural resource endowment and agricultural potential, poverty and hunger remain critical developmental challenges. Empirical evidence abounds in the linkages between poverty and the agricultural sector in the world and particularly in Sub-Saharan Africa

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where Nigeria constitutes the bulk of the population. While up to seventy per cent of the world's poor live in rural areas and depend directly on agriculture for their survival and wellbeing, more than 239 Million (26%) people of these poor reside in Sub-saharan Africa out of which 112 Million (47%) are Nigerians (FAO, 2010; Oladimeji *et al*., 2013b). It has also been confirmed that about two-thirds of Nigerian people are poor and seventy per cent of these poor (75 million) reside in rural areas and depend largely on agriculture for their subsistence (NBS, 2013; Omotesho *et al*., 2010; Oladimeji *et al*., 2013a).

Furthermore, suffice it to note that the most recent indicators of poverty measurement confirmed that Nigeria is trapped in abject poverty despite its rich resources base and the trend of poverty is increasing unabated in the last few years. As at 2010, the perception index of household living in poverty had risen to 92.5 % while the relative poverty measure showed that 69% or 112, 470,000 of Nigerians are living in poverty. These combined with other poverty indexes placed Nigeria as 157th country out of 187 in the development indicator ranking and among the 25 poorest countries in the world (UNDP, 2011; NBS, 2013). Although there is widespread poverty in Africa including Nigeria, the comprehensive study for preparing a strategy to reduce poverty in rural area is scanty particularly at micro level. Therefore, recent and past empirical poverty studies by Kyaw and Routray (2006); Bogale and Korf, (2009); Olorunsanya, (2009); Etim and Ukoha, (2010); NBS, (2010); Omotesho *et al*. (2010); UNDP, (2011); Oladimeji, (2013) and Oladimeji *et al*. (2013b) suggest that profiling poverty, identifying and understanding the factors underlying the persistent deprivation of the poor are imperative for designing policies to meet their needs and improve their well-being.

This paper provides a disaggregated household survey and investigated the rural fishery households' poverty incidence, the factors influencing the net income, and their access to productive resources.

Hypotheses

(i) There are no poor households among artisanal fishery households in the study area

(ii) Artisanal fishery enterprise is not profitable in the study area

Materials and Methods

Study Area

The study was conducted in Kwara State, Nigeria. The State is located between latitude 7^{o} 45' and 9^{o} 30' N and longitude 2^{o} 30' E and 6^{o} 25' E with a land mass covering about 32,500 sq km, a total land size of 3,682,500 ha and 247,975 farm families in 2006 with majority (about 70%) living in rural areas(NPC, 2006). With an estimated population of about 2.4 million people (NPC, 2006), the State's population and farm families were projected in 2014 to be about 3 million and 306, 584 respectively representing 3.2% annual growth rate and an average density of ninety four persons per sq. km. Nigeria is divided into 36 States of which Kwara is one. The State is divided into 16 LGAs as shown in figure 1 and has four Agricultural Development Project (ADP) zones tagged A to D based on ecological characteristics and cultural practices (KWADP, 2008).

The study area is in the derived savannah zone and has two main seasons, namely: rainy and dry season. The annual rainfall ranges from 800mm to 1500mm per annum. Due to its proximity to River Niger, majority of the farming households in zone B, comprises Edu, Moro and Patigi LGAs are predominantly artisanal fishermen and take part in annual fish catching exhibition termed *'Rigata'*. These fishing activities are usually carried out by traditional fishing methods such as canoes either motorised or with

paddlers. The main fish species found in the study area are *clarias anguillaris*, *barilius nilotcus*, *hemichromis fasciatus*, *Synodentis filamentosa, Gymnachus niloticus* and *tilapia melanopleura*. Artisanal fishery production is much favoured in this North Eastern part of the State as a result of numerous tentacles of water and streams as well as flood plains of the River Niger that stretches from Jebba/Bacita {Moro Local Government Area (LGA)} through Shonga in Edu LGA to Gakpon in Patigi LGA of the State (KWADP, 2008).

Sampling Technique and Data Collection

Primary data which was subjected to a pre-survey were used for this study. Farm-fishing level survey provided the basic cross-sectional data from 306 artisanal fishermen households in the study area. Data were collected from artisanal fishermen with the aid of structured questionnaire and interview schedule.

The entire rural artisanal fishery households in Kwara State were the target population for the study. A systematic multistage random sampling technique was used to select the representative of artisanal fishermen households that were used for this study. The first stage was the purposive selection of the 4 fishing LGAs from 16 LGAs in Kwara State. The second stage sampling was the random selection of 2 fishing settlements per fishing LGA. Finally, random selection of 40% fishing households from the list drawn per fishing settlement to make a total of 306 fishing households.

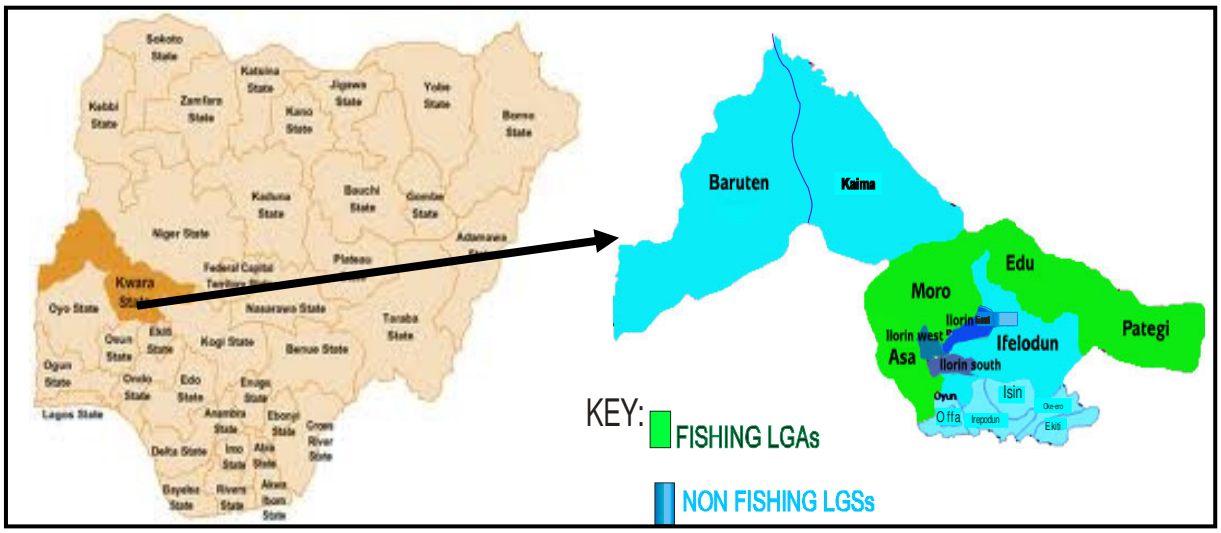

Figure 1: Map of (a) Nigeria showing Kwara State (modified from NPC, 2006).

Analytical Techniques

FGT indices was used for the quantitative poverty assessment among sub groups of fishermen's population (Foster *et al*. (1984) adopted by Kyaw and Routray, (2006); Bogale and Korf, (2009); Olorunsanya, (2009); Etim and Ukoha, (2010). The reason for this choice is due to its decomposability of the overall population into sub-groups, which allows for comparison.

The FGT measure for the subgroup i[th] $P\alpha_i$ is given as:

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

Where

$P_{\alpha i}$ is the weighted poverty index, n is the total number of households, Y_i is the income or the per adult equivalent expenditure of i-th household, z is the poverty line, q is the number of the sampled household population

below the poverty line and α is the aversion to poverty.

The poverty line that was used for this study was constructed based on the 2/3 of mean household expenditure per adult equivalent concept. Household expenditure is considered as an adequate measure of household welfare in developing countries as it better able to capture household's consumption capabilities (Bogale *et al*., 2005). Adult equivalent was generated from Organization for Economic Corporation and Development Scale adopted by Osberg and Xu (1999) in WB, (2005) and Oladimeji, (2013) as follows:

$AE = 1 + 0.7 (N_{1adult} - 1) + 0.5N_{2children}$

Where, AE represents adult equivalent, N_1 represents the number of adult aged 15 and above and N_2 is the number of children aged less than 15. The results of poverty measures were test for robustness to the changes in the estimated poverty line with the use of stochastic dominance.

Estimation of the factors influencing net fishing income of fishermen involved the use of ordinary least square regression techniques and specified by equation:

$LN\ INC_{ij} = \beta_0 + \beta_1 LNDEP_{1ij} + \beta_2 LNCHL_{2ij} + \beta_3 LNFL_{3i} + \beta_4 LNFHS_{4ij} + \beta_5 LNFEX_{5ij} + \beta_6 LNhos6ij + \mu_i$

Where:

$LNINC_{ij}$ = Net fishing income (N);

$LNDEP_{1ij}$ =Depreciation of fixed inputs (N);

$LNCHL_{2ij}$ = Cost of hired labour employed (N)

$LNCFL_{3ij}$ =Cost of family labour (N);

$LNFHS_{4ij}$ = Fishing hours per season;

$LNHos_{4ij}$ =Number of fishing trips;

$LNFEX_{5ij}$ = Fishing experience (years);

LNhos6ij= Household size (persons)

μ_i =error term associated with data collection which was assumed to be normally distributed with zero mean and constant variance.

β_0 is a constant; β_1- β_6 are regression parameters.

Results and Discussion

The mean per adult equivalent household's expenditure for all households was US$56.72 (N9075.23) per household head per month as shown in Table 1 and this gave a two-third of US$37.81(N6050.15) per household head per month at the current price. The table also showed the average amount expended on basic consumption items of the households. The total expenditure value was disaggregated into food (77.6%) and non-food, (22.4%). The subjective poverty line is US$37.81 (N6050.15) per household head per month at international discount rate of N160.00/US$ prevailing during the study period in 2013. Hence the subjective poverty line of US$1.3 (equivalent to N202) per household per day was finally derived and applied.

Table 1: Mean Household Expenditure/ Adult Equivalent (AE) and Poverty Line

Items	Amount (US$)/AE household/month	Amount (N)/AE Household/month	% Expenditure contribution
Stapled Food	30.57	4891.44	53.9
Non-stapled Food	13.44	2150.94	23.7
Energy	5.87	940.03	10.4
Clothing	2.94	470.30	5.1
Health	2.02	322.52	3.6
Miscellaneous/Others	1.88	300.00	3.3
Total	56.72	9075.23	100.0

2/3 = US$37.81(Poverty line); food poverty line= US$29.34 & non-food p. line US$8.45; Note: 1 US$ equivalent N160

Poverty Profile of Fishermen's Households based on Socio-economic Characteristics

The results of the poverty indices of the rural fishing households in the study are presented in Table 2 based on their socio-economic characteristics. About 53% of the total population was living below the poverty line of N202 (US$1.3) per household per day. Assuming household adjustment using OECD scale, the head count indices were 54% and 43% respectively for the male and female-headed fishing households while the poverty gaps were 8% and 6% respectively. The household size adjustment and the scale economy were taken into consideration as ignoring household size will overestimate poverty of fishery households with children, and underestimate fishery households without dependant(s).

Poverty incidence was prevalent (63%) among fishing households with age range of 40-59 years as against approximately 49% for age range of 20-39 years, and 27% for 59 years and above (Table 2). In summary, it could be said that poverty status of the rural fishermen in the study area increased with age of the household heads (Dercon and Krishnan, 1998). This is attributable to the fact that as one increases in age, the ability to do difficult work at a stage decreases probably due to the physical strength required in fishing which increase at a prime age in fisherman's life and decrease as the fisherman is ageing.

The results also revealed that the average years of schooling of adult household members were inversely related to the poverty status of rural fishery households in the study area. Households with educated members were more liable to adopt new technology than their unlettered counterparts which may account for low poverty incidence among educated fishery household. This is in agreement with earlier studies by Olorunsanya, (2009) and Etim and Patrick, (2010) that a higher level of educational attainment reduces rural household's poverty.

Decomposition of Rural Fishery Households based Institutional Factors

The incidence of poverty was 57% for all households, with access to extension agents 1 or 2 times a year while the headcount for the households with at least 3 times extension visits was reduced to 52% as seen in Table 3. The headcount for the fishing households with 3-4 household size was 46% as against 80% for the fishing households with 6 persons and above family size. This implies that the incidence of poverty is influenced by the household size which may be attributable to the fact that increased household size implies more dependants who rarely contribute to household income. Poverty incidence was prevalent among households that combine fishing with arable farming as the means of livelihood that is 60% compare to fishing households that engage in only fishing (56%) as means of livelihood. NBS, (2006) and Olorunsanya, (2009) also reported high poverty incidence among farming households in their studies.

Decomposition of Rural Households based on Living Conditions Characteristics

Table 4 presents the profile of the poverty status of the rural fishery households in the study area based on living conditions. The households that occupied accommodation with cemented block and roofed zinc recorded the lowest poor figures for the indices. There was prevalence of poverty among rural fishing households that utilized open spaces for disposing their faeces. Rural households in the study area had low income and had no means of constructing modern sanitary facilities. Therefore, the fishing households with access to fairly good accommodation and sanitation facility were less poor on all counts and contributed less to all the poverty indices of their groups.

The households that utilized either well water or borehole had the lowest incidence of poverty of 39% compare to the households that utilized stream water who recorded the highest figure (62%) for the headcount index. Rural households in the study area had low income and barely lived above subsistence. Acquisition of modern water facilities required fund which might not be readily available to the rural households. For example, it costs between N20000 and N50000 (US$125-US$313) to dig and complete a well water and a minimum of not less than N200 000(US$1250) to sink a borehole (KWADP/UNICEF, 2012). This resulted in the use of stream water with possible negative effect on their health status. Ninety-four percent of fishing households that utilized local lamp for lightening were poor while only 43% of the fishing households that utilized electricity were poor in the study area. Therefore, a fisherman that has access to and utilizes modern sources of energy such as electricity is an indication of higher level of well-being for the fisherman's household.

Table 2: Identified Poverty Sub-groups based on Socioeconomic Characteristics

Variables	P0	P1	P2	n	Share of poverty (p0)	
					q	%
Sex						
Male	0.54	0.08	0.003	283	154	93.9
Female	0.43	0.06	0.002	23	10	6.1
Age						
20 – 39	0.50	0.06	0.002	169	85	50.6
40 – 59	0.63	0.09	0.005	115	73	45.6
>59	0.27	0.04	0.4e-4	22	6	3.8
Education						
No education	0.58	0.10	0.006	222	119	72.6
6 years	0.54	0.08	0.003	19	11	6.7
12 years	0.49	0.12	0.007	69	34	20.7

P_o = headcount index, P_1 =poverty gap index, P_2 = squared poverty gap index

Table 3: Identified Poverty Sub-groups based on Institutional Factors

Variables	P0	P1	P2	n	Share of poverty	
					q	%
Extension contact						
1 – 2	0.57	0.09	0.004	115	65	39.6
>2	0.52	0.07	0.002	191	99	60.4
Household size						
3 – 4	0.46	0.06	0.002	41	19	11.6
5 – 6	0.48	0.07	0.002	95	46	28.0
>6	0.80	0.08	0.004	123	99	60.4
Occupations						
Fishing only	0.56	0.08	0.003	206	115	70.1
Fishing and farming	0.60	0.08	0.02	40	24	14.6
Fishing & others	0.42	0.06	0.002	60	25	15.2

Table 4: Identified Poverty Sub-groups based on living conditions.

Variables	P_0	P_1	P_2	n	Share of poverty	
					q	%
Housing						
Mud and Hut	0.55	0.07	0.003	229	125	76.2
Cemented with block	0.51	0.07	0.002	77	39	23.8
Toilet						
Open Field	0.57	0.08	0.003	209	119	72.6
Pit Toilet	0.46	0.06	0.001	97	45	27.4
Sources of water						
Stream	0.62	0.08	0.004	128	79	48.1
Well		0.06	0.001	46	18	11.0
Others	0.52	0.07	0.002	133	67	40.9
Source of light						
Local	0.94	0.13	0.01	18	17	10.4
Kerosene and local	0.52	0.08		274	141	86.0
Electricity	0.43	0.05	0.001	14	06	3.6

Stochastic Dominance Analysis

It is important to test whether the sub-group of ranking above is robust to the choice of the poverty line. The simplest way for the robustness of poverty comparisons based on the headcount index of poverty is to plot the cumulative distribution of expenditure for two household groups at a defined poverty line. It is needed to observe whether the curves intersect or not. If they do not intersect, then the group with highest curve is poorer than other group (World Bank, 2005; Kyaw and Routray, 2006 and Olorunsanya, 2009).

Figure 2 presents the Cumulative Distribution Function (CDF) for years of education attainment by fishing households. This implies that households with no formal education and those with less than 6 years education would always be poorer than these sub-groups of households within the specified range of poverty line. This may be due to the fact that educated fishermen have greater likelihood to understand the working mechanism of the motorized engines and therefore should be able to use it more than the illiterate class of fishermen.

Figure 3 presents CDF by types of fishing gears of fishing households. The CDF of fishing households that uses paddled canoes lay above that of households that uses motorised canoes. This indicated that there were first and second order stochastic dominance and the households with non-motorised canoe would always have higher head count ratio, poverty depth, and severity than motorized sub-group of households within the specified poverty range. This may be attributed to increase output which invariably results in increase income and better welfare of fishermen.

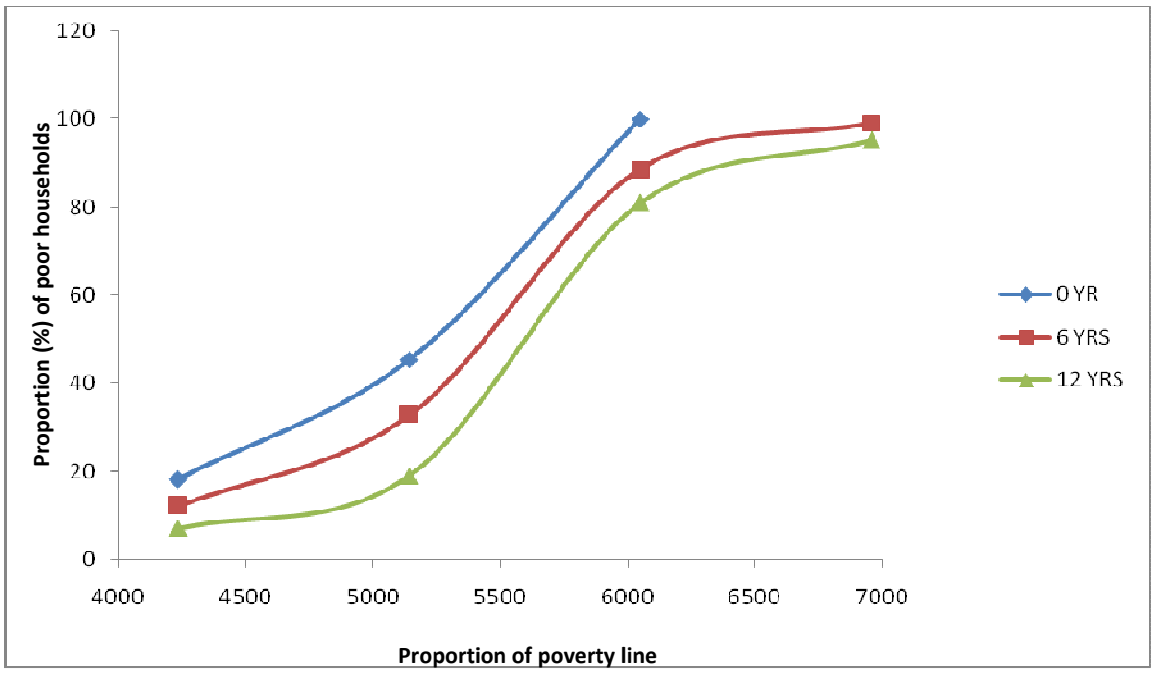

Figure 2: Distribution of dominance analysis by years of Schooling of Household Heads

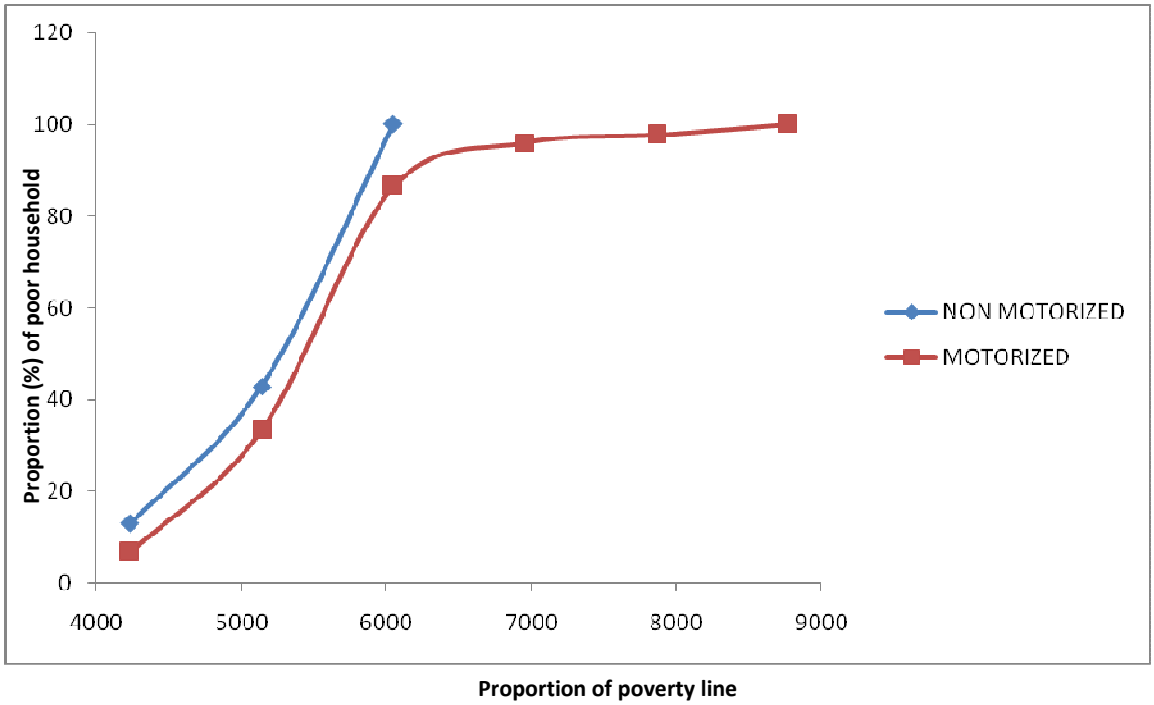

Figure 3: Distribution of dominance analysis by types of Fishing Gears of Household Heads

Conclusion on z-test

The data in Table 5 shows that the z-calculated (27.727) was greater than the critical z-values (1.978)) all at 1% level of probability. Since the results of the z-test indicate z-calculated were greater than the critical values for all the variables, the null hypothesis was rejected suggesting that there are poor households among artisanal fishery farmers in the study area.

Table 5: Test of Hypothesis (i)

Variables	n	Mean expenditure ($)	SE	z_{calc}	$z_{critical}$	Sig
Poor households	142	$25.51 (N4082)	355776.7	27.7	2.0	000
Non poor households	164	$71.18(N11388)	8366674.0			* * *

* * * denote 1% significant level

Estimated Factors Affecting Net Income of Fishermen

The result of analysis of the multiple regression models for the determinants of households' net income is shown on Table 6. The result showed that out of six variables included in the factors affecting net income of fishermen, three variables were significant at different level. These variables were depreciation of fixed assets and cost of family labour, both of which were significant at 1% level and fishing hours per season which was significant at 5% level. The hypothesized independent variables explained 62.60% in the variability of the net income of fishermen while the F-test indicated that the model was significant at the 1.0% level. Depreciation of capital input (X_i) exerted negative impact on fish returns, was statistically significant at 1% while the cost of family labour is positive and statistically significant at 1%, indicating that it's another very critical input in artisanal fisheries production.

Table 6: Estimated factors affecting net income of fishermen

Variables	B	SE	Level of Signt
Ln Dep (X_1)	-0.282	0.053	0.000 ***
Ln Chl (X_2)	-0.006	0.007	0.382
Ln Fl (X_3)	0.430	0.120	0.000 * * *
Ln Fhs (X_4)	-0.298	0.151	0.050 **
Ln Fex (X_5)	-0.098	0.091	0.281
Ln Hos (X_6)	0.052	0.160	0.744
Constant	3.18	1.323	0.017

* * * denote 1% and * * 5% level of significant

Test of Hypothesis on Profit Earned by Fishermen's Households

The data in Table 7 show that z-calculated (307.777) is greater than the tabulated z-value at 1% level of probability. Since the results of the z-calculated was greater than the critical value for returns and costs variables at all the level of significance; Therefore, the null hypothesis was rejected which suggests that the artisanal fishery enterprise is profitable in the study area.

Table 7: Test of significance of profitability in 2013

Expenditure	Mean Costs	Mean Revenue	Mean Profit	t-value
Maximum	$846.06 (N135369.2)	$1154.69 (184750.0)	$437.5 (70000)	307.8
Minimum	$142.86 (N22858.3)	$186.82 (29891.7)	$5.63 (900)	(* * *)
Mean	$358.1 (N57295.2)	$424.36 (67897.2)	$66.26 (10602)	
Std Dev	$120.68 (19309.1)	$173.04 (27686.1)	$65.88 (10541)	

t-value (* * *) denote significant at 1%

Conclusion and Recommendations

The study showed that the incidence of poverty among fishing households in the study area was 53 percent, the bulk of expenditure was on food, 77.6 percent, compare to non-food, 22.4 percent. Results of FGT decomposition revealed that poverty incidence is higher in male-headed households at 0.54 than in female 0.43. Government policy should be directed at educating the fishing households through literacy campaign, access to universal basic education, and skill-enhance trainings, so as to be able to adopt new innovations and techniques which will enhance improve standard of living and apparently reduced poverty. Education and training will also enable them to comprehend occupational diversifications which enhance mobility into more remunerative ancillary employment and increase household income.

Livelihood diversification such as multiple livelihood sources help to reduce the catastrophic effects of fisheries management measures can have where a fishery source must be closed or reduced due to state of resources. A participatory community based fisheries management system, which improves fish production through the conservation and rational exploitation of fishery resources is recommended. This can only be possible only if the fishermen engage in ancillary job. This suggests also that any policy aimed at improving the livelihood strategies of the rural fishery households in the study area should at least target both primary (fishing and farming) and secondary occupations.

It is also recommended that Government at all level should pursue participatory community approach policy that will provide the needed infrastructures that will propel fishermen out of poverty. In view of the large family size per household head, the study recommended that government should intensify enlightenment campaign on the need to reduce family size through modern family planning programs so as to reduce poverty.

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