

DETERMINANTS OF POVERTY AMONG RURAL ARTISANAL FISHERY HOUSEHOLDS IN KWARA STATE, NIGERIA

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ABSTRACT

The capacity of artisanal fisheries to upturn nutritional imbalance, create employment and alleviate poverty depends on the adoption of appropriate management strategies that ensure fishery sustainability to avoid wanton exploitation which prone the renewable resources to intense fishing pressure and depletion. Therefore, it is necessary to examine the determinants of poverty among rural artisanal fishery households in Kwara State, Nigeria to suggests plausible measures towards align fishery practices (rural poverty) and sustainable fishery development. Primary data were collected from 306 artisanal fishing households with the aid of structured questionnaire and interview schedule. Tobit regression model was employed to analyze the data. Evidence from regression estimates showed that eight of the nine variables included in the model had expected *a priori* expectations and were statistically significant ($0.001 > p < 0.01$). Fishermen should be educated to comprehend occupational diversifications, adopt technology capable of improving the life of rural households, and sustain fishing resources within acceptable levels of global resource depletion and environmental pollution.

Keywords: Poverty, Artisanal Household, Multistage, Tobit model, Nigeria.

INTRODUCTION

Nigeria has been listed among the 25 poorest nations in the world for several years. Yet, the country is endowed with human population of over 160 million people in addition to rich vegetation and abundant water resource, about 214 billion m³ of surface water and 87 km³ of ground water both of which are capable of supporting a large population of livestock and crop irrigation as well as to produce enough fish and fish products not only for domestic consumption but also for export (Food and Agricultural Organisation, 2013). The most recent National Bureau of Statistic (Nigeria Bureau of Statistics, 2012) report 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. It estimates the national perception index of household living in poverty in Nigeria to 92.5% and classified the Kwara State households as core poor, moderate poor and non poor to be 40.4%, 57.0% and 2.6% respectively. In addition, World Bank report in 2011 too calculated Nigeria per capita income of US\$2,069 compared to average world's per capita income of US\$10,082. Nigeria has been ranked 156th out of 187 nations in the Human Development Index (HDI), with value of 0.459 (United Nation Development Project, 2011). Suffice to note that the Nigeria's Gini Index of 48.8 and the life expectancy at birth of 51.9 years as well as average low years of schooling (5 years) scored the country 171th out of the world's 187 countries in 2011 (UNDP, 2011).

Poverty has persisted despite the large physical and human resources endowment and agricultural potential. The rural fishery households have suffered from low access to various services such as education, good sanitation, health, and rural electrification, access to safe water, housing, credit, and lack of assets such as land and livestock which are strongly related to the rural poverty. Although there is widespread poverty in Nigeria, the comprehensive study for preparing a strategy to reduce poverty in rural area is scanty particularly at micro level. A number of studies have sought to examine the determinants of poverty in rural Nigeria. The National Bureau of Statistics' (NBS, 2012) Household Income and Consumption Expenditure survey in 2010 is the recent and most extensive survey available on the poverty situation in Nigeria. However, the past national surveys including the 2003/2004 and latest harmonized living standard survey (HNLSS) 2009/2010 provide only information on the pattern of households consumption and expenditure at a greater level of disaggregation. HNLSS survey measures the national poverty incidence, urban and rural incidence, geopolitical zones as well as State poverty measurement. It shows the poverty incidence has risen from 27.2% (17.1 million people) in 1980 to 42.7% (39.2 million) in 1992 and somersaulted to 69% (112.5 million) in 2010. The survey also revealed that the incidence of poverty is higher in rural compared to urban areas with the relative poverty being 61.8% and 72.2% respectively. This does not say much about the location specific, extent and determinants of poverty in the rural area.

However, Omotesho, Adewumi and Fadimula (2010) employed discriminant analysis to assess food security and poverty of the rural households in Kwara State, Nigeria. They found that non-farm income, education level of household head, ownership of a house, age of household head, adjusted household size and farm income were major determinants of probability of households being poor. Several researches on factors that affect rural poverty in Nigeria have pointed out that socio-economic factors (such as education and training, farm income and household size); institutional factors (access to extension services and cooperative societies) and living condition variables which include good sanitary environment, health and accommodation to be the important determinants of rural poverty. Olorunsanya (2009)'s survey results indicated that households with better living conditions, education as well as better access to inputs were both,

likely to have improved welfare, reduced poverty status over time and are less prone to seasonal fluctuations in welfare. Another recent study on the determinants of poverty among rural households were Etim and Patrick (2010); Etim and Solomon (2010). The studies identified education, dependency ratio, labour employed as well as access to extension services and level of investment as most important determinants of poverty in the study area. Obamiro et al., in Omotesho *et al.* (2010) concluded that rural poverty is a very important issue in Nigeria, that needs redress as over 90% of agricultural production including fish products, is from the rural farming households with little access to productive resources (resource poverty).

PROBLEM STATEMENT

The Nigerian fishery industries consist of three broad sub sectors: the artisanal or small scale fisheries; the industrial (or large scale fisheries) and the aquaculture. Of these three sub sectors, the artisanal fisheries constitute the most significant sub sector in term of number of people employed and contribution to total fish output in the country (Oladimeji, Abdulsalam and Damisa, 2013). Available records from the Federal Department of Fisheries Statistics and FAO reveal that the total fish production in Nigeria for 25 years period averaged about 408000 tons per annum. Artisanal fisheries' (Coastal and inland rivers) contribution to total fish output in the country averaged about 93%. The findings also show the country's self- sufficiency ratio in fish production was as high as 98.8% in 1983 but now dwindled between 29.4% and 40% in 1993 to 2005 with an annual average of 49.6% and standard deviation of 19.1. But in spite of contributing the lion share to domestic fish output in Nigeria, artisanal fisheries remain the most impoverished fisheries sub sector with fishermen generally living at the subsistence level. Several reasons had been offered for the poor standard of living of artisanal fishermen which culminate in various poverty levels in the fishing communities.

Suffice to note also that despite Nigeria's abundant fishery resources, the country is still largely a protein deficient nation. It is well documented that Nigeria's per capital intake of high quality animal protein is too low (Rahji, Aiyelari, Ilemobayo and Nasiru, 2011). Not only is the total protein supply deficient but the quality of dietary protein available is inferior to that consumed in developed countries. Total protein consumption is below the United Nations/FAO'S estimated minimum of 75 g of daily per caput intake of which the recommended that 35 g of this minimum requirement should be obtained from animal products (Oladimeji, 1999). The average protein consumption in Nigeria which is about 19.38 g per caput consumption per day is less than one-half the protein intake of estimated 75 g while the contribution of 7 g from animal source is below the expected level. Further study revealed that average rural household in Kwara State consumed an average of 17 g of animal protein per caput per day (Oladimeji, 1999 and Muhammed-Lawal, 2007). However, per caput consumption per day of fish is higher than that of any other livestock products in Nigeria. It was estimated that the per caput consumption of fish per day which was 29.1 g, yielded 2.6 g of animal protein and represent 35.0% of the per caput consumption of livestock products and 30.8% of ingested animal protein. This has increase at an average rate of 3.5% per annum from 6.970 kg in 1975 to 9.096 kg in 1985 (Oladimeji, 1999) and a downward trend to total per capita consumption of about 7.52 kg in (Awoyemi and Ajiboye, 2011).

Therefore, fish production remained a better option of animal protein among Nigeria's populace since rapid increase can be achieved within a short time. It also contains essential amino acids that can be produced more cheaply than any other animal protein for human consumption. The craving for fish is on the increase in Nigeria given its implication for individual and national health. For example, fish contains Omega III fatty acids that are known to enhance good brain

cell development and Intelligent Quogent (IQ), and reduce cardiovascular diseases, hypertension and arteriosclerosis, thus becoming a preferred source of animal protein for pregnant women, children and adults (Oladimeji et al., 2013). This is in addition to the fact that other sources of animal protein such as ruminants, poultry and piggery are bedevilled with one problem or the others. For example, piggery has a religious connotation and ruminants such as cattle, sheep and goats are poor candidates for rapid short increases in numbers due to low fecundity, long gestation and long generational interval (Rahji *et al.*, 2011). And poultry production experts suffered lack of inputs and technical know-how as well as adequate finance and basic human needs such as proper housing, good/hygienic drinking water and sanitation which decimate the species within a very short time.

Fisheries are also renewable resources since their stock can be replenished. However, their renewability critically depends on the quality of management they are subjected, to maintain maximum sustainable yield. Proper management of natural resources (rivers and coastal water) are critical for sustainable development as they can be a driver for poverty reduction and economic development, while poor management arose from wanton exploitation makes fishery resources prone to depletion. Tietenberg (2000) advanced a sustainable biological model similar to an earlier one proposed by shaefer (1957) in Inoni and Oyaide, (2007). This related growth in fish stocks to the size of the fish stock (figure 1).

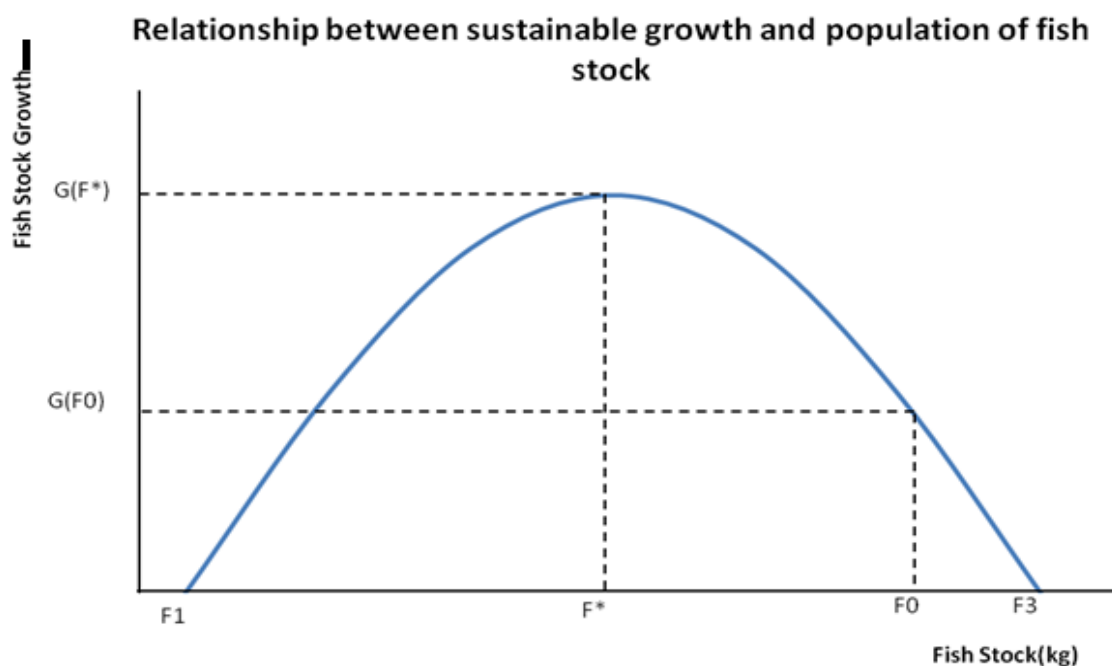


Fig. 1: Relationship between sustainable growth and population of fish stock

Source: Teitenberg, T. (2000). *Environmental and Natural Resource Economics*. 5th Edition, Addison-wesley publishers, Reading, Massachussetts.

According to the model, a range of fish population such as F_1 and F^* exists in which the growth in fish stock increases with the fish population, and another range F^* and F_3 in which the growth in fish declines as the population of stock increases. F_3 is referred to as the natural point where the aggregate annual stock growth would equal natural losses in the absence of external influences such as human exploitation. This natural equilibrium population is stable because disturbances are followed by a restoration of the population. Unlike F_3 , F_1 is an unstable equilibrium and represents the level of fish population below which population growth is negative, and this could lead to extinction. The model

assumed that fish catch levels represent sustainable yields when they are equal to the growth rate of the fish population. Given the biological characteristics, as long as the population remains constant, so does the growth rate. Thus, from the model in figure 1, catch level F^* is the biological maximum sustainable yield population, since it is the population yielding maximum growth. Therefore, the yield corresponding to such maximum growth is also maximum sustainable yield (Tietenberg, 2000); although economically sustainable yield is a fish catch level which produces the largest benefit.

The study also rests on global premise. For instance, World Bank (2005) observed four reasons to measure poverty. First, to keep the poor on the agenda; if poverty was not measured, it would be easy to forget the poor if they are statistically invisible. Second, one needs to be able to identify the poor, if one is to be able to target interventions, domestically and worldwide, that aim to reduce or alleviate poverty. Empirical measure of poverty and its determinants can be used as a powerful instrument by policy makers to understand the living conditions of the poor. Findings emanating from the study would help to formulate policy by the three tiers of government as well as donor agencies and international communities on poverty reduction strategies for the State. Strategies aimed at poverty reduction need to identify factors that are strongly associated with poverty and that amendable to modification by policy.

Hypothesis

- (i) There is no significant relationship between socio-economic characteristics and poverty status of artisanal fishery households in the study area.

OBJECTIVES OF THE STUDY

This survey therefore describe the constraints encountered in the artisanal fishery and specifically, examined the determinants of the rural fishery households' poverty in the study area. The research findings will provide an important complementary insight to past studies on poverty and contribute to give recommendations for raising living standard of rural households in the study area.

MATERIALS AND METHODS

Study area: The study was conducted in Kwara State, Nigeria. The State is located between latitude $7^{\circ} 45'$ and $9^{\circ} 30'N$ and longitude $2^{\circ} 30' E$ and $6^{\circ} 25' E$ 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 living in rural areas. 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 297, 078 respectively representing 3.2% annual growth rate and an average density of ninety four persons per sq. km. 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. In addition, the rivers are sources of water for irrigation, domestic use and transportation. The fishing activities are usually carried out by traditional fishing methods such as canoes either motorised or with paddlers, gill nets, cast nets, long lines, hook and line sets, traps and a few trawlers and outboard engine boats.

The main fish species found in the study area are *clarias anguillaris*, *barilius niloticus*, *hemichromis fasciatus*, *Synodontis filamentosa*, *Gymnachus niloticus*, *hyperopsis bebe occidentalisopsis* and *tilapia melanopleura*. Artisanal fishery

food essentials for a household to be deemed non-poor. The 2/3 of mean household expenditure per adult equivalent used for this study was derived based on moderate subjective poverty line and defined as;

$$\text{Per Capita Expenditure} = \frac{\text{Total household monthly expenditure}}{\text{Adjusted household size}} \quad (2)$$

To identify the determinants of rural artisanal fishery households, a tobit regression analysis was used. The model measures not only probability that the households' are poor but also the intensity of poverty as observed from equations 3 through 5. That is:

$$Y_i^* = \sum X_i \beta + \mu_i \quad (3)$$

$$Y_i = P_i = (X_i \beta, \mu_i), \text{ if } P_i > P_i^* \quad (4)$$

$$0 = (X_i \beta, \mu_i), \text{ if } P_i \leq P_i^* \quad (5)$$

$i = 1, 2, \dots, n$

Where Y_i is the dependent variable, P_i is the poverty depth or intensity defined as $(Z - Y_i)/Z$ and P_i^* is the poverty depth, when the poverty line (Z) equals the expenditure per adult equivalent, β is a vector of unknown co-efficient and μ_i is an independently distributed error term. X_i is a vector of explanatory variables.

The explanatory variables specified as determinants of poverty are X_1 = Age of the household head (years); X_2 = Fishing income per annum (N); X_3 = Non- fishing income per annum (N); X_4 = Investment in modern fishing equipment (N); X_5 = Membership of cooperative society (Years); X_6 = Access to extension services (Number of Contacts); X_7 = Amount of credit available for fishing activities (N); X_8 = Distance to modern medical facilities (Km) and X_9 = Level of education (years).

A marginal effect was calculated using the linear probability index. It indicated effect on the probability of being poor in a particular category for changes in the independent variables ($\delta \text{Pr}(Y=0, 1, 2, \text{ and } 3)/\delta X_i$). The marginal effect is the percentage change on the probability associated with a unit change in the explanatory variable. The marginal effect for each variable was calculated at the mean values of the independent variables. In these, comparisons were made across characteristics.

EMPIRICAL RESULTS AND DISCUSSION

The socio-economic characteristics, institutional and living condition variables of household head have been found to influence the poverty levels of the rural (fishing) households in the study area. Fishing household heads in the study area are males dominated (92.5%); average age of 40 years and married (97.8%) with mean household size of 8 and adjusted size of 6. The presence of female-headed households in actual fishing was due to death of male heads, migration, divorce and economic reasons. The estimated mean years of schooling of fisher folk heads were 2 years, largely skewed towards the informal education and fell below 2011 UNDP mean education index of 5 years for Nigeria (Table 1). This may affect the level of skill acquisition, exposure to new ideas and managerial capacity in artisanal fishing and the perception of the household members on how to adopt and integrate innovations into the households' survival strategies. However, with inclusion of Arabic education, the mean year of schooling was higher, 4.8 years, approximately equal to 2011 estimated UNDP mean education index. Hence, the large proportion of formally uneducated fishermen (71.9%) has

profound ability to communicate and write in Arabic language. It can be concluded that the ability of fishermen to write in Arabic language could be seen as positive to development of artisanal fish industry in the study area, especially if extension materials are translated into Arabic language. About 87% of fishing household heads regards fishing as their major occupation while majority of the pooled fishermen (92.4%) had subsidiary occupations with average annual off-farm income of N24369.25 which shows that the rural artisanal fishermen have developed capacity to cope with increasing vulnerability associated with fishing such as diversification, intensification and migration. These results further revealed that all the sampled fishermen in the study area belongs to cooperative and fishing associations in their various localities, but most of the these associations like other farming cooperatives are grossly underdeveloped and inactive. This does not enable the fishermen to assess most of the new innovations and inputs necessary to increase their output and improve their standard of living.

Table 1: Description of Socio-economic Characteristics

Description	Sample mean	Standard deviation	Maximum value	Minimum Value
Age (yrs)	40	11	20	70
Level of Education (years)	2.1	3.6	0	12
Fishing experience (years)	19.2	9.7	3	49
Co-oper membership (years)	16.0	9.1	0	38
Fishing income/month (N)	10602.0	10541.0	900.0	70000.0
Off-fish income/month (N)	2030.7	987.7	0	7500.0

Source: Field survey, 2013; Note *International discount rate: US\$1=N160 during survey.

The distribution of fishing gears used by artisanal fishermen in the study area is presented in Table 2. The results revealed that artisanal fisheries in the study area rely heavily on the use of non-motorized canoes (88%) as against 12% motorised canoes with the mean size of 5.6 m² length canoe and State average daily fish catch rates per canoe of 13.7kg. The results of the average daily fish catch and few motorised canoes give a clear testimony of subsistence nature of the artisanal fishery practices in the study area. Fishery households suffered from lack of suitable fishing equipments such as fishing gears, outboard engine and crafts. The bulk, about 88% of fishermen (table 2) in the study area relied heavily on manually propelled canoes and the fishing gears which are out-moded. Scarcity of fishing gears often leads to over exploitation of near river reef fisheries and resort to cheap but destructive fishing practices. This may lead to overfishing and harvesting of immature fishes which derailed fish catch level. Therefore, fishery households should imbibe fishery practices and technology, though that are economical and efficient but play more emphasis on maximum sustainable yield as canvassed by (Tietenberg, 2000).

Table 2 further revealed that the bulk of motorized canoes (98%) and invariably non-motorised canoes (85%) were largely concentrated in Nupe area situated along the Northern part of the State with river's Niger flowing along most of their boundaries and these comprise Edu, Patigi and partly Moro Local Government Areas (LGAs).

Table 2: Distribution of types of Fishing Gears used

Fishing settlements (LGAS)	No. of non- motorized Canoes	No. of motorized Canoes/boats
Moro	98(33.1%)	13(32.5%)
Edu	81(27.2%)	14(35.0%)
Patigi	74(24.8%)	11(27.5%)
Asa	45(15.1%)	2(5%)
Total	298(100)	40(100.0)

Figures in brackets are as percentages of total number of non-motorized and motorised

Source: Field Survey, 2013

The results of the maximum likelihood estimates (MLE) of the tobit estimation presented in Table 3. The results show that sigma (δ) was 0.3821 with a Z-value of 14.1391 and is significant at one per cent level. Therefore, the model has a good fit to the data and that the model as specified explained significant non-zero variations in factors influencing poverty. The likelihood ratio test for the goodness of fit shows a good fit for the model ($p < 0.001$). The results revealed that the signs of most of the estimated parameters conform to *a priori* expectations with the exception of non-fishing income. Suffice to note that non-fishing income was statistically significant at 1% while credit amount was statistically significant at 10% ($p < 0.10$). In summary, eight of the nine variables were found to be statistically significant in the tobit model at different level of significance. Age, fishing income, non-fishing income and level of education were statistically significant at 1% ($p < 0.001$). Also, the result showed that the membership of cooperative society and distance of the house to the clinic were all statistically significant at 5% ($p < 0.05$). In addition, number of extension visits made to fishing households and amount of credit were significant at 10% ($p < 0.10$) while investment in fishing inputs was not statistically significant.

The negative coefficients and statistically significant variables fishing income, cooperative membership, extension contacts, credit amount and education suggests that there is likelihood that fishery households' poverty level will be reduced. For example, the coefficient for fishing income of household head (X_2) had a regression coefficient of $-1.76e-06$ and statistically significant at ($p < 0.001$) implies that a unit increase in fish income would decrease poverty by $1.7e-06$. In addition, number of extension visits made to the households (X_6) by extension agents had a regression coefficient of -0.111 and statistically significant at 10%. The negative and significant coefficient of number of extension visits made to the households implies that the more the number of extension visits made to the household, the higher the likelihood that such a household poverty level will be reduced. This is because during such visits, households were trained and feedbacks received on the technology passed during the previous visit. Similar findings were documented by Etim and Solomon, (2010); Etim and Patrick, (2010) and Oladimeji *et al.* (2013).

However, the positive coefficients and significant t-ratio of variables age, non-fishing income₃ and distance to clinic tends to increase poverty status. For example, X_8 which denote distance to modern medical facility was statistically significant at 5%, had a coefficient of 0.132. This means that the longer the distances to modern medical facilities, the poorer the households in the study area. This is not surprising, short distance to modern medical facility will ensure patronage when a household member is indisposed and this could reduce morbidity and mortality and thus ensure higher level of welfare

for the rural households. Therefore, targeting these variables are key preconditions for the transformation of the fishery sector from subsistence to commercial production and for poverty reduction policy among artisanal rural fishery in Kwara State. However, fishery practices must performed be in a way that is appropriate, efficient, economical, and sustainable and without endangering both flora and fauna (including fishes) in the ecosystem.

Table 3: Determinants of Fishing Households Poverty

Variables	β	SE	t-ratio	Sig.
Age (X_1)	0.042	0.0088	4.77***	0.000
Fishing income (X_2)	-1.760e-06	6.21e-07	2.83**	0.005
Non-fishing income (X_3)	1.999	0.585	3.41***	0.001
Investment (X_4)	-3.310	2.270	1.46 ^{NS}	0.146
Cooperative membership (X_5)	-0.026	0.012	-2.2**	0.027
Extension contacts (X_6)	-0.111	0.065	1.71*	0.087
Credit amount (X_7)	-7.244	3.700	1.96*	0.051
Distance to clinic (X_8)	0.132	0.060	2.25**	0.025
Vocational training (X_9)	-0.114	0.0319	3.58***	0.000

Source: Field survey, 2013; ***; **; * denote significant at 1%, 5% and 10% respectively

Table 3 also shows the estimates of marginal effects of the variables, which give further incite of the estimate with respect to each poverty determinants. The marginal effects figures further strengthen the inferences obtained from the parameter estimates in the tobit model. For example, the study revealed that Age to a limit has great potential for increasing agricultural productivity and, hence, for improving household income and reducing poverty in the study area and vice versa. Our results seem also to confirm this assertion. Age of fishing household head was found to be positive and statistically significant ($p < 0.001$) which implied that among the sample households older households have greater likelihood of being non-poor. The result of the marginal effect showed that an increase in age of household by one year would increase the probability of being slightly non poor by 4.2%.

In addition, accesses to both fishing and non-fishing income are also important determinants of wellbeing in the study area. Further inference on the marginal effect also showed that a unit increase in fishing income, non fishing income and availability of production credit will decrease probability of non-poor marginally by 1.76e-06, 1.9e-05 and 7.24e-06 respectively. Non-fishing activities complement fishery sources of income by availing the household additional resources for both consumption and investment and investment in turn enhances asset accumulation and opens up additional escape routes out of poverty.

Test of Hypothesis

The result of tobit regression model (Table 3) confirmed that socio-economic, institution as well as living condition variables estimated were statistically significant at different level of significant suggests that the null hypothesis should be rejected. Therefore, it can be concluded that there is relationship between socio-economic characteristics and poverty status of artisanal fishery farmers in the study area.

The Major Constraints Affecting Fishery Households in the Study Area

Table 4 depicts the constraints faced by fishermen in the study area ranked from most critical to the least. The study showed that inaccessibility of credit ranked the most important bottleneck, (15.5%) followed by lack of extension visits (11.6%) and high cost of equipment (11.11%).

However, it is paramount to stress accessibility to river which ranked 10th due largely to its effect on sustained fishery enterprise in the study area. The advent of some industries near fishing settlements in the study areas has resulted in frequent incidents of industrial waste spillage to part of these settlements which has endangered fish fauna and flora, and drastically affects the productivity of the river waters. This also made some part of the river inaccessible for fishing since the numerous gas waste have also disrupted the natural diurnal rhythm with a resultant adverse effect on the aquatic resources in the study area. Indiscriminate and obnoxious dump of poisonous chemicals and explosives into the river or their uses for fishing can also leads to decimation of the fishes in the rivers. Therefore, environmental pollution and lack of proper water management (water pollution) pose a serious threat and constraint to accessibility to fishing in study area with resultant reduction in their potential for fish production. This poses a threat to achievement of targets for State fish production from the artisanal sector and has adverse impacts of water development projects such Asa dam which is the biggest dam located in the State capital. Unless legislation for environmental pollution control are made and vigorously enforced, the inland waters may become polluted that their usefulness for fish production will decline below the expected sustainable and existing levels.

In addition, about 3.6% of the artisanal fishermen regarded infestation by hyacinth as one of the important problem towards sustainable fishery development in the study area. The aquatic macrophyte called water hyacinth (*Eichhornia crassipes*) is not new in the ecological history of study area. In fact, it has been popularly described as the most troublesome weed of the world because of its rate of multiplication (Ndimele, 2011). Infestation by hyacinth hindered accessibility to river which made fishing and transport as well as navigation difficult in the study area. This result in loss of fishing equipments and reduce fish catches (and subsequent loss of livelihood), especially of tilapia and mud fish which are found mainly along the shores (Mailu in Ndimele, 2011) and river reef. In addition, it also increases cost of fishing expedition due to labour requirement to remove the weed.

It may be concluded that fishery department in the State cum fishermen (through fishery cooperatives) must critically examined and invest in capacity to manage these constraints if the government are to realise the long term potential of the artisanal fisheries sector in the study area.

Table 4: Constraints Faced by Fishing Households in 2013

Constraints	Frequency	Percent	Rank
Inaccessibility of credit	89	15.54	1 st
Extension contacts	71	11.60	2 nd
High Cost of Equipments	68	11.11	3 rd
Inadequate Storage/Processing gears	60	9.80	4 th
Tax and Charges	50	8.17	5 th
Distance of market	45	7.35	6 th
Scarcity of Fishing Gears and Nets	43	7.03	7 th
Menace of Water lords	42	6.86	8 th
Infestation by hyacinth	31	5.07	9 th
Accessibility to Water/River	30	4.90	10 th
High Cost of Hired Labour	24	3.92	11 th
Poor Gear Design	24	3.92	11 th
Accessibility to Fuel	20	3.27	13 th
Climatic Variability	8	1.31	14 th
Others	7	1.14	15 th
Total	612	100	

Source: Field survey, 2013, * the first two major constraints were analysed

CONCLUSION AND RECOMMENDATIONS

The State ministry of education through agency for adult education could consider providing basic education training within the fishing communities because education enhances adoption of technology and improved methods which are vital means of achieving higher fish catch levels. Fishermen should rejuvenate and bring alive their cooperative societies and associations to enable them feel government impact at all level and to asses most of the new innovations and inputs necessary to increase their output and improve their standard of living.

The National Aquaculture Strategy Plan with support from FAO could incorporate the artisanal fishermen into their plan targeted to develop aquaculture practices with the aim of combining both aquaculture and artisanal fishery practices. To reduce the level of fish imports, aquaculture has been selected as one of the priority value chains targeted for development in the next four years. This will be double barrel achievements to NASP-FAO plan of achieving self sufficiency and discouraging the importation of fish and fish products in Nigeria and generate additional employment to fishermen with apparent reduction in level of poverty among artisanal fishermen.

Extension agents and ministry of environment must collaborate to educate the fishery households on the problems of indiscriminate and obnoxious fishing equipments, climate variability, water hyacinth and other impediments in such a way that present and future harvesting of fishes is enhance through conservative and sustainability of water resources. Finally, a suitable indicator could be developed to measure activities of fishermen and other river users, and to ensure

that the water resources are managed sustainably and transparently to support inclusive economic and human development.

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