# ANALYSIS OF POVERTY STATUS OF RURAL ARTISANAL FISHERFOLKS IN KWARA STATE, NIGERIA

**BY**

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**DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY**
**AHMADU BELLO UNIVERSITY, ZARIA**
**NIGERIA**

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**AHMADU BELLO UNIVERSITY, ZARIA NIGERIA**

**FEBRUARY, 2015**

## DECLARATION

I hereby declare that this Dissertation entitled ‘‘**Analysis of Poverty Status of Rural Artisanal Fisherfolks in Kwara State, Nigeria**’’ has been written by me in the Department of Agricultural Economics and Rural Sociology and it is a record of my research work. It has not been presented in any previous application for another degree or diploma at any institution. All borrowed ideas have been duly acknowledged in the text and a list of references provided.

_____ _____

**Yusuf Usman OLADIMEJI** **Date**
Student

## CERTIFICATION

This Dissertation entitled ‘‘**Analysis of Poverty Status of Rural Artisanal Fisherfolks in Kwara State, Nigeria**’’ by Yusuf Usman OLADIMEJI meets the regulations governing the award of the Degree of Doctor of Philosophy (Ph.D) in Agricultural Economics of the Ahmadu Bello University, Zaria and is approved for its contribution to knowledge and literary presentation.

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## DEDICATION

This dissertation is dedicated to the all the oppressed people of the world and thousands of Africans who die every-day from hungers, diseases and deprivations.

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## LIST OF ABBREVIATIONS AND ACRONYMS

**CBN:** Central Bank of Nigeria

**CDF:** Cumulative Distribution Function

**FDF:** Federal Department of Fisheries

**FGN:** Federal Government of Nigeria

**FOS:** Federal Office of Statistics

**FRN:** Federal Republic of Nigeria

**FISON:** Fisheries Society of Nigeria

**FACU:** Food and Agricultural Coordinating Unit

**FAO:** Food and Agriculture Organisation

**FGT:** Foster-Greer and Thorbecke

**GDP:** Gross Domestic Product

**GNI:** Gross National Income

**HDI:** Human Development Index

**HPI:** Human Poverty Index

**ICN:** International Conference on Nutrition

**IFP:** Inshore Fishing Project

**IFAD:** International Fund for Agricultural Development

**ILO:** International Labour Office

**IRFDP:** Integrated Rural Fishing Development Project

**KLRI:** Kainji Lake Research Institute

**km:** kilometre

**KWADP:** Kwara Agricultural Development Project

**LCRI:** Lake Chad Research Institute

**LGAs:** Local Government Areas

**MDGs:** Millennium Development Goals

**MLE:** Maximum Likelihood Estimate

**MAEHE:** Mean Per Adult Equivalent Household Expenditure

**₦: Naira;** Nigeria Currency

**NAFPP:** National Accelerated Food Production Project

**NAPEP:** National Poverty Eradication Programme

**NASP:** National Aquaculture Strategy Plan

| | |
|---|---|
| **NBS:** | National Bureau of Statistics |
| **NEEDS:** | National Economic Empowerment and Development Strategy |
| **NIOMR:** | Nigerian Institute for Oceanographic and Marine Research |
| **NPC:** | National Planning Commission |
| **NPC:** | National Population Commission |
| **OECD:** | Organization for Economic Corporation and Development |
| **PPMC:** | Petroleum Product Marketing Company |
| **PDC:** | Poverty Deficit Curve |
| **PROSAB:** | Promoting Sustainable Agriculture in Borno State |
| **UNCTAD:** | United Nations Conference on Trade and Development |
| **UNDP:** | United Nations Development Program |
| **UNEP:** | United Nations Environmental Programme |
| **UNICEF:** | United Nations International Children's Fund |
| **US$:** | United State Dollar |
| **WB:** | World Bank |
| **WHO:** | World Health Organisation |

## Abstract

This study focused on the poverty status of rural artisanal fisherfolks in Kwara State, Nigeria. Primary data was collected through structured questionnaire administered to 306 randomly selected fisherfolks. Data were analysed using descriptive statistics, the net margin analysis, Foster Greer and Thorbecke poverty index and tobit regression model. The mean age of 40 years indicates that majority of fisherfolks fell within the productive age group and the estimated mean years of schooling implies that artisanal fisheries operations in the State were performed mostly by illiterate and semi-illiterate fisher folks. The institutional variables of fishery households revealed that fisherfolks that had access to clinic and hospital were only 8.2%. About 43% of respondents who engaged in self and traditional medication, and about 20% who uses modern drugs without prescription. About one-third of respondents' households, 29.1% patronized orthodox medical services for prescription. The monthly mean per adult equivalent household expenditure was ₦9075.23 with a poverty threshold of ₦6050.15. About 77.7% of total monthly expenditure of fishery households were expended on food and the left over, 22.3% comprises of payments for others. Net margin of ₦10, 601.98, Gross ratio of 82.5%, profit margin of 17.5% and a return on investment of 1.21 were obtained as profitability measures, which implied that for every ₦1 invested in fishery enterprise, a profit of ₦1.21 was made. Results of FGT decomposition revealed that poverty incidence for the whole sample households yield a poverty headcount ratio of 0.533, that is, 53.3% of the total sample households spent less than what they would need to meet minimum living standard requirements. Poverty incidence, depth and severity revealed that the years of schooling of household heads were inversely related to the poverty status and directly related with family size of household heads. However, fisherfolks that utilized credits, and adopt improve fishing techniques and outboard engines had lower poverty incidence, depth and severity respectively. A stochastic dominance analysis validates the choice of poverty line. Evidence from maximum likelihood estimates of determinants of fishing households' poverty of tobit regression showed that eight of the ten variables included in the model were significant at different levels ($P<0.01$, $P<0.05$ and $P<0.10$) and had expected *a priori* expectations expect non-fishing income. The study identified poor access to credit and low extension visits as prime constraints affecting fishery practices. The study recommends that State Ministry of Education in collaboration with extension agents could consider providing basic education training within the fishing communities. Fisherfolks should rejuvenate their cooperative societies to enable them feel government impact; to access credits and new innovations; opening up the rural roads by self or community effort. Educating the fisherfolks on the problems of obnoxious fishing equipments, climate variability, water hyacinth is necessary to increase their output and improve their standard of living, and reduce urban drift of youths who are the major source of labour in the study area.

# CHAPTER ONE

# INTRODUCTION

## 1.1 Background to the Study

Nigeria is one of the most resource endowed nations in the world. For instance, in terms of agricultural resources, Nigeria has a land area of 98.3 million hectares, out of which 79 million hectares is arable land. Between 60-70% of about 160 million people are 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{Udolis, Solam and Ambrose, 1994; United Nation Development Programme (UNDP), 2009; Etim, Ukoha and Akpan, 2009; Food and Agricultural Organisation (FAO), 2013}. Suffice it to note that the country has rich vegetation and abundant water resource capable of supporting a large population of livestock and fishes, with 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 (FAO, 2013). According to Ita, (1985); Oladimeji, (1999) and FAO, (2013), 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 $km^2$.

In addition, the topography of the coastal area is straddled by the drainage systems of Rivers Niger and Benue as well as their main tributaries (Akande and Tobor, 1992; Ita, (1993); Oladimeji, 1999; Oladimeji *et al.*, 2013a). The country is also blessed with over 14 million of hectares of reservoirs, lakes, ponds, and major rivers capable of producing

over 980,000 tonnes of fish annually {Federal Department of Fishery (FDF), 2007}. The water system of Nigeria is dominated by two great river systems, the Niger-Benue and the Chad systems. With the exception of a few rivers that empty directly into the Atlantic Ocean such as Cross River, Ogun, Oshun, Imo, Qua Iboe and a few others, all other flowing waters ultimately find their way into the Chad Basin or down the lower Niger to the sea. The approximate extent and distribution of the major inland water system is given in Table 1.

Table 1: Major inland water resources of Nigeria

| **Types of Water Bodies ( Inland)** | **Approximate Surface Area (Ha)** | **Fraction of each River Component (%)** |
|---|---|---|
| Anambra River | 1,401,000 | 12.0 |
| Benue River | 129,000 | 1.1 |
| Cross River | 3,900,000 | 33.4 |
| Imo River | 910,000 | 7.8 |
| Kwa iboe River | 500,200 | 4.3 |
| Niger River less kainji lake | 169,800 | 1.5 |
| Ogun River | 2,237,000 | 19.2 |
| Oshun River | 1,565,400 | 13.4 |
| Lakes & Reservoirs | 853,600 | 7.3 |
| Total | 11,666,000 | 100.0 |
| Mean | 2333200 | – |
| STDEV | 3288422 | – |

Source: Ita, (1985); Oladimeji, (1999)

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 fishery resources to produce enough fish and fish products not only for domestic consumption but also for export. However, there is a persisting paradox of a rich country inhabited by poor people which has been of great concern for many years but more especially in the last two decades.

Despite this large natural resource endowment and agricultural potential, poverty and hunger remain critical developmental challenges. Though poverty, which is a pervasive and endemic phenomenon is not peculiar to developing countries including Nigeria, its existence on a significant scale is however one of the defining characteristics of such countries {International Fund for Agricultural Development, (IFAD), (2001)}. Empirical evidence abounds in the linkages between poverty and the agricultural sector in the world and particularly in Africa. Seventy per cent of the world's poor live in rural areas and depend directly on agriculture for their survival and well-being. More than 239 Million (26%) people of the world that are poor reside in Sub-Saharan Africa out of which 112 Million (47%) are Nigerians (FAO, 2010). About seventy per cent of Nigerian poor reside in rural areas and depend on agriculture including artisanal fishery households for their subsistence {National Bureau of Statistics (NBS), 2006; 2013}.

Poverty continues to be widespread, severe and on the increase in Nigeria. The most recent indicators of poverty such as literacy level, access to safe water and the incidence of poverty ranked Nigeria below Cameroon, Mauritania and Senegal (World Bank, 2011). Nigeria's Gross National Income (GNI) per capita in 2011 was also found to be far lower than that of Gabon, Angola and Algeria, while purchasing power continues to decline with

high inflation and increasing income inequality. The Nigeria's Gini Index of 48.8 was above 33.0 and 44.1 for Mali and Madagascar respectively for the same period showing high level of income inequality in Nigeria (World Bank, 2011). As at 2010, about 61% of Nigeria's population of about 160 million live below poverty line of United State Dollar (US$) 1.25 a day. This placed Nigeria as the157th country out of 187 in the development indicator ranking and among the 25 poorest countries in the world (UNDP, 2010; NBS, 2013).

Nigeria Human Development Index (HDI) values for 2011 was 0.459, in the low human development category, positioning the country at 156th out of 187 countries. Using selected world developmental indicators, the life expectancy at birth in 2011 in Nigeria was 51.9 years for which the country was ranked 171th out of the world's 187 countries (UNDP, 2011). Between years 2000 and 2007, 27.2 percent of children under five years of age were malnourished. This is alarming, compared to 3.7 percent between the same periods in Brazil, another emerging economy. Worse still, the mortality rate for children under five years of age was given as 191 per 1000 births in 2006. This situation is very outrageous compared to the figures of 69 per 1000 births in South Africa , 108 per 1000 births in Togo, 120 per 1000 births in Cameroon (World Bank, 2008). This implies that there is a generalised high level of poverty in the country.

World Bank (2011) estimated the world's per capita income in 2011 to be $10,082, compared to Nigeria per capita income of $2,069, which made the country one of the poorest in the world. This relegated Nigeria to the ranks of Cameroon ($2,031),

Mauritania ($1,859) and Senegal ($1,768). Other indicators of development such as life expectancy, for which Nigeria is ranked 171th out of the world's 187 countries, and infant mortality, for which Nigeria is ranked 148th among 173 countries were consistent with Nigeria's low rank in income per capita (UNDP, 2011). Based on these empirical data, Nigeria has been classified as a poor nation; a situation which can be described as a bewildering paradox given the vast resources base of the country. The Nigerian economy being predominantly rural and agrarian in nature, the pattern of national poverty is reflective of the pre-eminence of agriculture and rural dominance with 70.2 percent of the rural households being poor in 2006 (NBS, 2006). This seems to also follow a global pattern as reported by World Bank (2009), that over seventy per cent of world population were farmers living on less than two American dollars a day in 2009.

Therefore, to achieve poverty reduction in Nigeria, it becomes necessary to empirically measure the poverty status and examine the determinants of poverty among the rural fisherfolks. The need to investigate poverty and its determinants has also been justified by {Ravallion, (1998) and Bandabla, (2005)} who argued that 'a credible measure of poverty and its determinants can be a powerful instrument for focusing the attention of policy makers on the living conditions of the poor'.

## 1.2 Problem Statement

The Nigerian economy, as in many other Sub-Saharan African countries, is basically agrarian with majority of the people living under poor conditions. A good proportion of the Nigerian fishing households are subsistence small holder, relying heavily on the use

of non-motorised canoes and fishing nets under a traditional system characterised by low technology, low capital investment, high labour intensive practices and low productivity (Ibrahim, Auta and Balogun, 2009). Statistical surveys have shown that the demand for fish in Nigeria exceeds supply and the domestic production is very low despite the abundant water resources and available man power. The annual fish consumption and demand in Nigeria have been estimated to be over 1.3 million metric tonnes and the total domestic production is just about 407, 869 metric tonnes per annum (Tsadu, Ojutiku and Ayanwale, 2006; FAO, 2007). The implication of these is that the national demand has not been met which culminates in fish importation of about US$ 400 million annually. The bulk of agricultural production including artisanal fisheries (about 85%) in Nigeria take place in the rural areas and ironically, the level and incidence of poverty is very pronounced in those areas {National Population Commission (NPC), 2006; FAO, 2007; NBS, 2012}.

With the recognition by the Nigerian Government of the multi-sectored and multi-dimensional nature of poverty, a number of coordinated programmes and policies had been formulated to combat poverty in all its ramifications. Some of these measures and programmes include the National Aquaculture Strategy Plan (NASP), the National Poverty Eradication Programme (NAPEP), the National Accelerated Food Production Project (NAFPP), Inshore Fishing Project (IFP), Integrated Rural Fisheries Development Project (IRFDP), Fish Storage, Processing and Marketing Scheme, the National Economic Empowerment and Development Strategy (NEEDS), UNDP/FAO Artisanal and Inshore Fisheries Project (Oladimeji, 1999; NBS, 2005; Omokore, 2009).

However, poverty in Nigeria is more of a rural phenomenon and is increasing unabated. Its incidence and severity are more in the agricultural sector than other sectors of the economy. The renewed interest in the potential roles of agriculture in meeting poverty reduction targets stems from the contribution that the sector can make to the economy. Agriculture is the source of food, livelihood, market, foreign exchange earnings and savings. However, the ability of the Nigeria agricultural sector to meet these roles is of concern, considering the high poverty level inherent in the sector (Olorunsanya, 2009).

The inter-linkages between artisanal fishery households and poverty have also been the major issues in the role and effectiveness of policy interventions in poverty reduction in developing countries. The Nigerian Fisheries sub-sector contribute about 3.5% to the country's annual GDP, employs about 4.3% of Nigeria population and is an important contributor to the population's nutritional requirements, constituting about 50% of animal protein intake (FAO, 2013). There is however, scanty literature on artisanal fishery households cum poverty and the particular disadvantages they might encounter. A study by Etim *et al.* (2009) concluded "that fishing is being practiced by virtually all homes in the coastal and riverine areas". Suffice to note however, that these activities have had limited success in increasing income and improving the quality of life of these fisherfolks. Understanding the factors underlying their persistent deprivation is important, when designing policies to meet their needs and improve their welfare.

The Millennium Development Goals (MDGs) were established by the United Nations in 2000 to combat poverty, hunger, disease, illiteracy, gender inequality, environmental

degradation and biodiversity. Poverty is the key to the achievement of all the MDGs goals, and the fulfilment of this international commitment by 2015. Meeting the MDGs of halves the proportion of people in poverty and hunger would require investing in rural artisanal fishery. This will require a renewed interest in fishery and agriculture as a whole, being renewable resources and due to its ability to facilitate a sustainable labour intensive growth with provision of employment for the ever increasing population in the State in line with new global agenda for poverty eradication. This will be achieved with deeper understanding of poverty and its causes, in particular the incidence, depth and severity of poverty among artisanal fishery households.

While there are national data on food security and poverty, information on rural food security and poverty are not readily available especially in Nigeria (Omotesho, Adewumi and Fadimula, 2010). Poverty assessment studies in Nigeria particularly Kwara State have focused on all farming households (Omonona, 2000; Olorunsanya, 2009; Omotesho *et al*., 2010; FAO, 2010; Olorunsanya and Omotesho, 2011). However, there is limited study on poverty assessment among artisanal fishery households in Kwara State.

The study therefore, provides answers to the following pertinent research questions:

(i) What are the socio-economic characteristics of the fisherfolks in the study area?

(ii) What are the institutional variables prevailing among the fisherfolks in the study area?

(iii) What is expenditure pattern of the fisherfolks in the study area?

(iv) What is the profitability/returns of fisherfolks in the study area?

(v) What is the incidence of poverty among fisherfolks in the study area?

(vi) What are the determinants of poverty among fisherfolks in the study area?

(vii) What are the constraints encountered in fishing activities that are influencing poverty status of fisherfolks in the study area?

## 1.3 Objectives of the Study

The broad objective of this study was to analyse the poverty status of rural fisherfolks in Kwara State, Nigeria.

The specific objectives were to:

(i) describe the socio-economic characteristics of the fisherfolks in the study area;

(ii) describe the institutional variables prevailing among the fisherfolks in the study area;

(iii) analyse the expenditure pattern of the fisherfolks in the study area;

(iv) determine the profitability /returns of fisherfolks study area;

(v) determine the incidence of poverty of the fisherfolks in the study area;

(vi) estimate the determinants of poverty of fisherfolks in the study area; and

(vii) describe the constraints encountered by the fisherfolks in the study areas.

## 1.4 Justification of the Study

The Nigeria 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 *et al*., 2013a). Available records from the Federal Department of Fisheries (FDF) and Food and Agricultural Organization (FAO) Statistics reveal that the total fish production from artisanal unit in Nigeria for 25 years period (1981-2005) averaged about 408000 tons per annum and artisanal fisheries' (Coastal and inland rivers) contribution to total fish output in the country ranged from 242,525 (79%) to 534,690 (90%) during the 1981 to 2010 decades. But, the estimated demand for fish ranged from 510,000 to 1,380,000 tons with annual average of approximately 954,000 tons during the three decades.

FDF and FAO Statistics also shows 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 36.6%. But in spite of contributing the lion share to domestic fish output in Nigeria, artisanal fisheries remain the most impoverished fisheries sub sector with fisherfolks generally living at the subsistence level. Several reasons had been offered for the poor standard of living of artisanal fisherfolks which culminate in various poverty levels in fishing communities.

Suffice to note also that despite Nigeria's abundant fisheries resources notwithstanding, the country is still largely a protein deficient nation. The average protein consumption in Nigeria which is about 36.6 g per caput consumption per day is less than United Nation/FAO'S estimated minimum of 75 g of daily per caput intake. The contribution of 13.3 g/day from animal source of which fish products captured 6 g/head/day (about 42%),

is below the recommended 35 g/day by the FAO to be the minimum protein requirement that should be obtained from animal products for the growth and development of the body (Oladimeji, 1999; Esobhawan, Ojo and Ikheloa, 2008).

Apart from fishes, other sources of animal protein are ruminants (cattle, sheep and goats), poultry (chicken, turkey and duck), and piggery. However, fish production remained a better option of animal protein among Nigeria's populace since rapid increase can be achieved within a short time coupled with diverse sources from both cultured and wild. 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 are poor candidates for rapid short increases in numbers due to low fecundity, long gestation and long generational interval (Rahji, Aiyelari, Ilemobayo and Nasiru, 2011).

In addition, poultry production experts suffered lack of inputs and technical know-how as well as adequate finance and basic human needs such as proper housing and sanitation which decimate the species within a very short time. Therefore, the combination of low domestic production of poultry and beef and their relative high prices, coupled with religious stigma attached to piggery consumption and more importantly the driving force to improve the well being of fisherfolks (rural poverty) and meet animal protein requirements from domestic sources demand intensification of production of fish.

The study also rests on global premise. For instance, World Bank (2005) observed four reasons to measure poverty: 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; to be able to identify the poor, if one is to be able to target interventions that aim to reduce or alleviate poverty domestically and worldwide; to monitor and evaluate projects and policy interventions that are geared toward the poor. And finally, to evaluate the effectiveness of institutions whose goal is to help the poor. Therefore, an 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.

## 1.5 Hypotheses

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

(ii) There is no poor household among artisanal fishery farmers in the study area

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

## 1.6 Organization and Plan of Study

The whole research was presented in five chapters. Chapter one highlights the statement of the problem, research questions, objectives of the study as well as justification of the study. Chapter two reviews related literature and presents conceptual framework on poverty and artisanal fishery enterprise as well as historical perspective and importance of the fishery sub-sector in Nigeria economy. It also presents application of stochastic dominance in artisanal poverty analysis.

Chapter 3 discusses the methodology of the study. This includes the description of the study area, sources of data, sampling procedure, analytical techniques, variables definitions, and *a priori* expectations. Chapter Four describes the socio-economic and demographic characteristics; expenditure pattern of the fishing households; profitability of artisanal fishing enterprise and profiles their poverty status based on the household heads and some specific characteristics of the households. The results of the Tobit regression analysis, its coefficients and the sensitivity analyses of the weighted poverty measures to change in poverty line as well as robustness of such parameters to change in poverty were also discussed in this chapter. In the fifth chapter, a summary of the results of major findings, conclusion, recommendations and contributions to knowledge were given.

## 1.7 Scope and Limitations of the Study

The overall concern of the study was concentrated on measurement of variables such as socio-economic characteristics, expenditure pattern and production characteristics as well as institutional variables and problems encountered in artisanal fishery activities. These variables were estimated and formed the basis for discussing pattern of expenditures and income, and poverty status of rural artisanal fishery.

The study also concentrated on identification and description of the artisanal fishing activities and did not cover the aspects of fish farming/ aquaculture in Kwara State. Measurement of variables and subsequent analyses were based on cross sectional data obtained from the field during the period of the study. The average values used cover a season and to a large extent covers wholly seasonal variations in volume of fish catch and

prices of the different forms of fish in the studied location. But, this study does not capture full answers to the question of understanding the poverty status of artisanal fisherfolks in the study area or to have suggested ready-made solutions to the complex nature of the concept of poverty and problems faced by the fisherfolks and their households. There may be other relevant issues such as political and living condition variables which may have not been incorporated in the analysis.

One of the most important limitations of the primary data is that the household heads and the member of the family relied on memory to recall information. In spite of the fact that the bulk of our small scale farmers including artisanal fisherfolks are rational and have good level of memory recall, there is no way they could have remembered all, since few of the household heads were alone during the interview. In addition, the fact that some of the respondents were illiterates that kept no record and relied on memory to answer each question are likely to have given rise to some margin of errors in some instances.

The intra fishing household compositions were not considered expect household size was adjusted to adult equivalent using normalization by Organization for Economic Corporation and Development (OECD) scale. The money-metric approach used for this study is consumption-based which makes it difficult to provide answers to intra-household distribution of income, expenditure and assets. The study does not incorporate disutility such as environmental pollution through shadow prices into a monetary equivalent that could be incorporated into the fitted econometric model. The study delimited itself to the use of non-parametric aspect of multi-dimensional approach to poverty assessment. It

does not consider parametric multi-dimensional approach to poverty analysis such as set theory and fuzzy approach.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Concept of Poverty

Roberts (2006) asserts that the flood of development rhetoric on poverty, the primacy accorded by lenders and donors to the Millennium Development Goals, of which the reduction of extreme poverty is the first and usually considered the most important, and the frequency with which reducing, alleviating or eliminating poverty is seen as a prime goal and measure of development makes it matter more than ever to know what poverty is. Poverty is multifaceted and has no single universal accepted definition. What it takes to mean depends on who asks the question, how it is understood, and who responds.

Poverty could be viewed from income-poverty or its common proxy consumption-poverty, material lack or want which includes lack of or little wealth and lack or low quality of other assets such as shelter, clothing and furniture, personal means of transport and radios or television. In addition, capability deprivation, referring to what we can or cannot do, can or cannot be. This includes but goes beyond material lack or wants to include human capabilities such as skills and physical abilities, and self respect in society. Therefore, people can 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 and services that enable them to play the roles, meet the obligations and participate in the relationships and customs of their society (Roberts, 2006).

The understanding and relief of poverty have been the debating concept and a major human preoccupation for many centuries. Since the 1880's, three alternative conceptions of poverty had evolved as a basis for international and comparative work. They depend principally on the ideas of subsistence, basic needs and relative deprivation.

### 2.1.1 Subsistence concept of poverty

Peter in UNDP, (2006) inferred that the subsistence idea was a result of work prompted by nutritionists in Victorian England. Families were defined to be in poverty when their incomes were not sufficient to obtain the minimum necessities for the maintenance of merely physical efficiency. A family was treated as being in poverty if its income minus rent fell short of poverty line. Although allowance was made in calculating the income level for clothing, fuel and some other items, this allowance was very small, and food accounted for much the greatest share of subsistence.

The use of subsistence idea to define poverty has been criticized because it implies that human needs are mainly physical rather than social needs. People are not simply individual organisms requiring replacement of sources of physical energy; they are social being expected to perform socially demanding roles of workers, citizens, parents, partners, neighbours and friends. Moreover, they are not simply consumers of physical goods but producers of those goods and are also expected to act out different roles in their various associations. They are dependent on collectively provided utilities and facilities.

### 2.1.2 The Basic need concept

According to Peter in UNDP, (2006), the ‘‘basic’’ need concept is an extension of the subsistence concept. In addition to material needs for individual physical and survival efficiency, there are the facilities and services for health care, sanitation and education required by local communities and population as whole. The attractions to some of the subsistence concept included its limited scope and therefore limited implications for policy and political action. In the past and into the present, it seemed easier to restrict the meaning of poverty to material and physical needs than to include the non-fulfilment of social roles, given the overriding emphasis of individualism. The ‘’basic need’’ concept, on the other hand, aimed at establishing at least some of the pre condition for community development. It played a prominent part in national development plans fostered by the international community, especially United Nations agencies.

### 2.1.3 Relative deprivation concept

In the late 20th century, a third social formulation of the meaning of poverty was developed. ‘’Relativity’’ as suggested above applies to both income and other resources and including material and social conditions. In the 21$^{st}$ century societies are passing through such rapid change that a poverty standard devised at some historical date in the past is difficult to justify under new conditions. People living in the present are not subjected to the same laws, obligations and customs that applied to the previous era. Globalisation is concerning people and their standards of living, while inequalities within and between countries are growing. There are, therefore, major objections to merely updating any historical benchmarks of poverty on the basis of some index of prices. Over

many years the ‘relativity’ of meanings of poverty has come to be recognized, in part if not comprehensively (UNDP, 2006).

### 2.1.4 Current notion of poverty

The current notion of poverty is also seen from individual perceptions in definition and measure of well being. Poverty defined as lack of well-being is clearly multidimensional. According to Kakwani (2006) and Kakwani, (1993), Poverty is pronounced deprivation in wellbeing. In any society, some people obviously enjoy higher levels of well-being than others. Poverty is viewed here as the lowest level of well-being, which is experienced by those people in the society who are so deprived that they are unable to function with dignity. As stated in the WDR (2002) in UNDP, (2006), to be poor ‘’ is to be hungry, to lack shelter and clothing, to be sick and not cared for, to be illiterate and not schooled’’. Well-being is most commonly used in philosophy to describe what is ultimately good for a person. It is a state of being healthy, happy, or prosperous, it rather synonymous with welfare.

Poverty is defined as the state of long-term deprivation of well-being, a situation considered inadequate for a decent life. Poverty is thus synonymous with lack. It is characterised by absence in the face of identifiable need. Poverty is long term deprivation; the term does not generally describe individual in temporary difficulty. It has to do basically with those who are unable to be integrated into a socio-economic system for a variety of reasons. Poverty also relates to income or expenditure of those in the bottom deciles of income or expenditure distribution. It is not exactly the same as inequality.

From the angle of physical and material deprivation, inability to meet basic and essential needs of life is a form of poverty. Ben (2003) asserts that poverty is a complex phenomenon which encompasses alongside low income; other concepts such as illness and lack of education, social exclusion, entitlement failure, vulnerability to shocks and political powerlessness. Though poverty and vulnerability are often equated, they are different. Poverty can be reduced by borrowing and investing, but such debt makes households more vulnerable to poverty (Chambers, 1995).

Thus, literature on poverty can broadly be divided into material or money-metric approaches and multi dimensional approaches. The use of materialistic approach to poverty measure considers asset owned by an individual in relation to a societal accepted norm or standard. The money metric approach however involves the use of monetary measures as a means of welfare assessment. Common among this is the use of income or consumption expenditure as a measure of welfare. The multidimensional approach to measurement of poverty on the other hand, requires the use of non-parametric or parametric measure of poverty such as the use of fuzzy theories. The money-metric measure of poverty assessment, though heavily criticised has been found useful in its ability to adequately quantify the identified variables in poverty assessment and for ease of comparison among socio-economic groups. The money-metric quantitative measures as well as some social indicators like health status, asset owned, hours of work and leisure were used in assessing the possible disadvantages among rural artisanal fishery households in Kwara State.

### 2.1.5 Other approaches to concept of poverty

The word poverty translated into other languages carries different connotations. Poverty could be viewed as dimensions of bad life included not only income poverty and material lack but web of poverty disadvantages such as poverty of time, living and working in bad places, insecurity, worry and anxiety; and pervasively powerlessness. It is seen from perspective of development as good change from ill-being to well-being. The many ideas of well-being and the good life to which people aspired had striking commonalities- material well-being, having enough; bodily well-being, being and appearing well; many aspects of social well-being include being able to settle children, and being able to help other; security; and freedom of choice and action. On the other hand, ill-being encompasses material lack; bad social relations; powerlessness; insecurity and physical weakness. Therefore, Robert (2006) concluded that development can be seen as shifting from ill-being to well-being with equity and intervention to enhance well-being.

### 2.1.6 Human Poverty Index (HPI) and Human Development Index (HDI)

The Human Poverty Report (1996) introduced the Human Poverty Index (HPI). It is a composite measure set in the capability and human development space, drawing on the several important perspectives that enriched our understanding of poverty. In this framework, poverty is the deprivation side of human development- the denial of basic choices and opportunities to lead a long, healthy, creative and free life; to enjoy a decent standard of living; and to participate in the life of community including political freedom and cultural choices (Sakiko, 2006). HPI is a measure of capability deprivation; it aims to capture human 'poverty' as distinct from 'income poverty', that is failures to achieve the

basic capabilities needed for human functioning rather than any given level of consumption or income. But like Human Development Index (HDI), the HPI is a highly incomplete measure and does not capture many of the dimensions of full life, nor the social conditions that are necessary. Sen in Sakiko, (2006) refers to five 'instrumental freedoms' as essentials to a life of dignity, namely economic facilities, social opportunities, political freedom, security and transparency guarantees. Neither the HPI nor HDI includes indicators of political freedom, security and transparency.

The challenges of measuring human poverty are considerable, starting with selection of key dimensions, their weighting and a search for appropriate data sets. Important aspects of human poverty, notably those relating to participation such as political freedom and cultural choices, are simply not quantifiable or lack data and thus not included. Still, HPI is a more adequate measure of deprivations in human lives than the income poverty measure. HPI focuses on three of the four key dimensions of HDI: the capability to (i) survive, measure by vulnerability to early death defined as before 40 years; (ii) be knowledgeable, measured by the adult illiteracy; and (iii) have access to private income as well as public provisioning, measured by the percentage of malnourished children under five and by the percentage of people without access to safe water.

Therefore, the correlation between income poverty and human poverty is weak, and there is a large spread in the levels of human poverty among countries with similar levels of income poverty. Some countries with high levels of human poverty around 40% such as

Pakistan and Yemen have relative low levels of income poverty around 15- 17% like Ecuador and China, which have reduced human poverty to around 10% ( Sakiko, 2006).

## 2.2 Methodological and Analytical Concepts

### 2.2.1 Typology of poverty

Poverty differs in type, range and space. Based on deprivation of basic needs, there are relative and absolute poverty. Relative deprivation is deprivation that results from comparing one's level of living with that of a reference group with higher incomes or consumption. This basically relates to inequality that could be found among members of the same society. However, not all poverty resulting from average income is relative. Absolute poverty is a condition of failure to meet the barest essentials of physical existence, which means being unable either to produce sufficient food or to have remunerative work in order to purchase enough for oneself and one's family. It is almost entirely a measure of inadequate nutrition (Cutler, 1984). Poverty can be an absolute notion in the space of capabilities, though relative in that of commodities or characteristics (Sen, 1984). Poverty needs to be defined, however, to include more than a set of minimum nutritional requirements to include measures in certain basic needs. Every family deserves to have adequate food and a balanced diet, water and sanitation, clothing and housing, and access to public transport, good health, education, productive employment, and income {International Labour Office, (ILO) 1976}; (Abbas, Saboor, Sarwar and Magbool (2005). These needs are basically the same everywhere, although the ways they are satisfied differ depending on the climate, culture, and the economic situations prevalent in an area.

According to Loughhead, Mittal and Wood (2000), poverty could also be described in terms of location in which case we have rural and urban poverty. Rural poverty can be associated with isolation, lack of roads, poor infrastructure and limited institutional presence. While urban poverty is generally associated with poor quality housing, overcrowded, unsanitary slum settlements, ill health related to spread of infectious diseases, exposure to environmental hazards and fear of eviction from illegal squatter settlements.

Olorunsanya (2009); Lanjouw and Ravallion, (1994) classifies rural poverty into five categories: Interstitial, peripheral alienation and overcrowding, traumatic or sporadic and endemic poverty. Material deprivation and alienation result in interstitial poverty, or pockets of poverty surrounded by power, affluence and ownership of assets. This phenomenon makes it difficult to target development benefits at the rural poor without their being pre-empted by the non-poor. When material deprivation combines with isolation and alienation, it leads to peripheral poverty, which is found in marginal areas. Material deprivation arising from population pressure and limits on resources breeds alienation and overcrowding poverty. Vulnerability to natural calamities such as drought, pestilence and disease outbreak; or labour displacement and insecurity produce traumatic or sporadic poverty which could be transitory but often ends up being endemic isolation, alienation, technological deprivation, dependence and lack of assets are also signs of endemic poverty.

Poverty is also described in spatial dimension. Spatial poverty traps result from low endowments of ‘’geographic capital’’ (the natural, physical, social and human capital of an area), with one household’s poverty reinforcing another (Jalan and Ravallion, 1997; Ravallion and Wodon, 1999). Poverty can also be referred to as capability deprivation, which pertains to non-income dimensions of poverty and focuses on unmet basic needs in health, housing and education. Poverty seen as deprivation of basic capabilities has continued to be significant in developing countries. According to Dhanani and Islam, (2002), capability poverty, is however, not captured by the available consumption-based indicators of deprivation.

Goodhand (2003); Mckay and Lawson, (2003) distinguishes between the transient and the chronic poverty. The transiently and chronically poor are overlapping but distinct groups. Chronic poverty is usually distinguished from transitory poverty by its duration. The chronically poor are identified not so much by income in a year as by low variation in income over a period of several years. Chronic poverty is often conceptualized as poverty that is transmitted from one generation to the next, usually meaning that children from poor households are likely to become poor adults, whose children will in turn risk remaining in poverty, and so on (Aliber 2003). The intergenerational poor are defined as those who tend to live on the margins of the global economy in the most chronically insecure region and benefit least from current development policy (Goodhand, 2003).

The chronic poor are categorized into five-always poor whose poverty score (income, consumption, nutritional status and human deprivation index) in each period is below a

defined poverty line; the usually poor whose mean poverty score over all periods is less than the poverty line but are poor in every period: the churning poor with a mean poverty score around the poverty line but who are poor in some periods but not in others; the occasionally poor whose mean poverty score is above the poverty line but have experienced at least one period in poverty; and the never poor with poverty scores in all periods above the poverty line (Hulme and Shepherd, 2003). These categories can be further aggregated into the chronic poor (always poor and usually poor), the transient poor (churning poor and occasionally poor) and the non-poor (the never poor continuing through to the always wealthy).

The concept of poverty dates back to 1899, when one of the earliest and most famous studies of poverty was conducted by Seebohm Rowntree in York. Rowtree (1902) used a concept of subsistence poverty and drew a poverty line in terms of a minimum weekly sum of money, which was necessary to enable to secure the necessaries of healthy life. Poverty is more easily recognized than defined. Hence a universally acceptable definition of the term has remained elusive. However, World Bank (2001) defined poverty as an unacceptable deprivation in human well-being that can comprise both physiological and social deprivation. Physiological deprivation includes the non-fulfilment of basic material or biological needs, including inadequate nutrition, health, education and shelter. The concept of physiological deprivation is thus closely related to but can extend beyond low monetary income and consumption levels. Social deprivation widens the concept of deprivation to include risk, vulnerability, lack of autonomy, powerlessness and lack of self-respect.

In the decomposition of poverty, total poverty (Pi) is defined as the expectation overtime of the poverty measured at each point in time $P_{it}$, that is,

$$Pi = \sum (P_{it})$$

Where $P_{it} = \left[\left(\frac{z-y_i}{z}\right)^{\alpha} \begin{matrix} if\ Y_{it} < Z \\ if\ Y_{it} > Z \end{matrix}\right]$ ---------- (1)

Where z is the poverty line and $\propto$ represents the poverty aversion parameter in the FGT measure. Poverty can be chronic (Structural) or transitory, depending on how long poverty is expressed by an individual or a community. Chronic poverty is long term, persistent, the causes of which are largely structural and endemic, while transitory poverty is temporary, transient and short term in nature. Chronic poverty is defined as $C_i = P\sum(y_{it})]$, which for the FGT class of measures can be written as equation 2:

$$C_{it} = \left[\left(\frac{z-y_i}{z}\right)^{\alpha} \begin{matrix} if\ Y_{it} < Z \\ if\ Y_{it} > Z \end{matrix}\right]$$ ---------- (2)

Transitory Poverty (Ti) is defined as total poverty (Pi) minus chronic poverty ($C_i$). Since the nineteenth century when rigorous studies on poverty began, researchers have tried to establish a fixed yard stick against which to measure poverty. Ideally, such a yardstick would be applicable to all societies and should establish a fixed level, usually known as the poverty line, below which poverty begins and above, which it ends. This concept of poverty is known as absolute poverty.

Absolute poverty is a situation of lack of access to resources required to obtain the minimum necessities required to maintain physical efficiency. Relative poverty, on the

other hand, is the inability to attain a given minimum contemporary standard of living. Poverty can also be subjective. This poverty is closely related to relative poverty since those who are defined as poor in terms of the standard of the day will probably see and feel themselves to be poor. The concept of subjective poverty is important since to some degree, people act in terms of the way they perceive and defined themselves.

### 2.2.2 Concept of poverty status

Hulme (2003) asserts that a number of terms have entered the development lexicon to identify those who experience poverty most intensely, to deepen understanding and to ensure that key groups are not neglected in analysis and action. Among the most common are ultra poor, hardcore poor, moderately poor, destitute, poorest of the poorest, declining poor and non-poor. The poor can also be categorised into as always poor whose poverty score such as income, consumption nutritional status in each period is below a defined poverty line; the usually poor whose mean poverty score over all periods is less than the poverty line but are poor in every period; the churning poor with a mean poverty score around the poverty line but who are poor in some periods but in others.; the occasional poor whose mean poverty score is above the poverty line but have experienced at least one period in poverty; and the never poor with poverty scores in all periods above the poverty line (Hulme and Shepherd, 2003).

Analytically however, the following four concepts of poverty measures are widely used to delineate the poor from non poor. These are the subjective measure of poverty, the dollar a day method, the relative poverty approach and the absolute poverty method. The

subjective measure of poverty requires the individual to assess what they consider to be decent or minimally adequate standard of living. It is also known as self assessed level poverty. This method is less widely used as people tend to overstate what they perceived to be a personal poverty level.

The dollar a day method is mostly used for international comparison of well being across countries (NBS, 2005). It is defined in terms of deflated Dollar per day and involves adjustment of a dollar to reflect the purchasing power parity of the country of interest with modification for inflation and for foreign exchange rate changes. It is subject however to variation in petrol dollar and is kind of extraneous benchmark for poverty assessment when international comparison is not intended. Rural poverty assessments are better done with the use of absolute or relative poverty measure to capture those on the lower ladder of income or consumption in a society of interest. A sizeable chunk of rural households' consumption is made from home-grown food and self-provided services that are least affected by changes in petrol dollar.

The absolute poverty approach requires that some minimum nutritional requirement be defined and converted into minimum food expenses. To this is added some considered minimum non-food expenditure such as clothing and shelter. A household is considered poor if its income or consumption level is below this minimum threshold. The food energy intake (fei) and the cost of basic needs (cbn) methods are variants of the absolute approach. The two methods are based on estimating the cost of attaining predetermined level food energy or calorie intake. The problem with the absolute approach is in

definition of what constitutes the 'basic needs'. For the relative approach, a proportion of mean income or consumption is taken as the poverty line. One third (1/3)) and two-third (2/3) have been commonly used. The former defines the core poverty line and later defines the moderate poverty line. The relative approach was used in this study following Canagarajah, Ngwafon and Thomas, (1997); Federal Office of Statistics, FOS, (1999a); NBS, (2005; 2010); Olorunsanya, (2009); Etim and Ukoha, (2010) and Etim and Solomon, (2010). The advantage of this method over the absolute lies not only in its simplicity but in the fact that the line is determined in relation to the general living standard of the whole target population and the ability to assess changes in the living standard of the people over time.

Also in relation to other members of a community there would always be relative poverty. The uses of 1/3 or 2/3 to determine the poverty line is however arbitrary since some other fraction could easily have been used. The need to test for the robustness of the choice of poverty line cannot be overemphasised. For this study, this was achieved with the use of dominance analysis by plotting the poverty incidence and poverty deficit curves with the use of stimulated poverty lines obtained from the estimated poverty line from the survey. The poverty incidence curves plot the headcount index on the y-axis against different poverty lines expressed as multiples of the original poverty line on x-axis.

### 2.2.3 Determination of poverty line

The poor are defined as those who lack command over basic consumption needs, including food and non-food components. Thus, the poverty line is obtained by specifying

a consumption bundle considered adequate for basic consumption needs and then by estimating the costs of these basic needs. In other words, the poverty line is generally considered to be the income or value of consumption that is needed to meet the minimum food requirement and attainment of some basic non-food essentials for an individual or household to be acceptable in the community. Once a household consumption is computed, it is mandatory to determine whether that amount places the household in 'poverty'', or defines the household as 'poor''. It is sometimes argued that the notion of poverty line implies a distinct 'turning point' in the welfare function. That is, by rising from just below to just above the poverty line, household move considerable from misery to adequate minimum amount of well-being.

However, given that wellbeing follows a continuum, and given how arbitrary the choice of poverty line is, the notion of such a 'turning point' is not compelling. Poverty is increasingly seen as multidimensional phenomenon, which includes market based consumption (or income) as well as the publicly provided goods and services, access to communally provided resources and to intangible goods such as good health, clean air, dignity and employment. Poverty could be analysed quantitatively or qualitatively. The qualitative approach makes it possible to identify and weigh the dimension of poverty which is relevant to given population.

Quantitative approach however offers framework to measure and to compare living standards for different social groups. Income and consumption have been mostly used for quantitative measure of poverty. Income/ consumption measure is also seen by some as

the best single proxy for poverty since it can incorporate non-market goods and services like education and health and a wide range of other utilities and disutility through shadow prices into monetary equivalent that could be easily compared over time and across contents. Consumption has however been preferred to income in money-metric measures of poverty because of its ability to incorporate consumption of home grown food which is an important factor in agrarian based economies of developing world. Poverty line is measured as either:

Per Capita Income or Expenditure $= \frac{Total\ household\ monthly\ income\ or\ expenditure}{Household\ Size}$ -------- (3)

And Mean per capita household income or

expenditure$= \frac{Total\ per\ capita\ household\ income\ or\ expenditure}{Total\ number\ of\ households}$ ---------- (4)

The poverty lines are generally considered to be the income or value of consumption that is needed to meet the minimum food requirement and attainment of some basic non-food essentials for an individual or household to be acceptable in the community. Poverty is increasingly seen as a multidimensional phenomenon, which includes market-based consumption (or income), as well as the publicly provided goods and services, access to communally- provided resources and to intangible goods such as good health, clean air, dignity and employment. Poverty could be analysed quantitatively or qualitatively. The qualitative approach makes it possible to identify and weigh the dimensions of poverty which are relevant to a given population. Quantitative approach however offers a framework to measure and to compare living standards for different social groups.

Income and consumption have been mostly used for quantitative measure of poverty normalized for prices and demographic factors. Income/consumption measure is also seen by some as the best single proxy for poverty since it can incorporate non-market goods and services, like education and health and a wide range of other utilities (clean air, democracy) and disutility (noise, pollution), through " shadow prices'', into a monetary equivalent that could be easily compared over time and across contexts. Consumption has however been preferred to income in money-metric measures of poverty because of its ability to incorporate consumption of home grown food which is an important factor in agrarian based economies of developing world. Critics of this notion have argued that common property resources and state-provided commodities have usually been ignored in practice and the consumption of non traded goods has also been underestimated (Baulch and McCulloch, 1998). It is also questionable whether shadow prices can adequately translate the different kinds of values that are embodied in non-market goods and services into monetary equivalents that are comparable.

The criticisms of the income/consumption method as opposed to other alternative methods or approaches to measurement of poverty and well-being also stem from the fact that the income/consumption method determines levels of well-being in an *a priori* fashion, as physical needs deprivation through private consumption shortfalls measured in the household. The income/consumption based on measures has also not been able to provide answers to intra-household distribution of income, expenditure and asset. In the absence of a better alternative however, the income/consumption approach is still preferred above other methods in its ability, through econometric modelling, to provide quantifiable

measure of poverty and its determinants and the ability to compare the values of its measure over time and space.

Other methods of poverty assessment such as the participatory approaches to poverty determination have been suggested in the literature. The proponents argue is capable of determining the constituents and the sources of well-being through an iterative process involving the participatory rural appraisal method (Chambers, 1998). They posit that participatory methods enable the local people themselves (in this case the poor illiterate women and the marginalized) to appraise, analyse, plan and act. Critics of this method have queried the willingness of the poor to divulge truthful and accurate information in participatory research exercises as well as the suitability of developing a model of participation that is applicable anywhere (Jackson, 1997). There are also doubts about the possibility of subjective perceptions of ill or well being adequately revealing all that is required about individual welfare, considering the ideological parameters under which perceptions take place (Sen, 1985).

Capability framework, another method of poverty assessment, put forward by Sen (1985), is based on alternative notion of well-being. It directly concerns with a person's quality of life which embraces both basic ''functioning's'' such as longevity and adequate nutrition as well as more complex ones such as freedom and autonomy. The proponents of this approach have tended to concentrate on the first set of functioning, which is measurable on the individual through a range of social indicators. They have therefore used "objective'' criteria for assessing well-being. But rather than use income or consumption

to determine individual welfare, they have focused on actual outcomes of ill-being in terms of mortality, malnutrition, educational levels and basic needs indicators. Generating data for these studies are however difficult compared to the quantitative method of income or consumption. Social indicators while useful for revealing gender bias in well-being outcomes are limited in the kind of causal analysis of gender differences that it can generate.

UNDP (1996) collated four different approaches to the determination of a poverty line as found in literature. These are:

(i) The biological line which refers to minimum conditions necessary for the physical survival of the individual health is in danger. This absolute line varies with natural environment in which the person lives.

(ii) The normative line which includes not only biological needs but also social needs. This line defines a list of goods and services deemed necessary by the community under study. It is normative because the list varies according to the values, the habits, the priorities and the average living standard of each community.

(iii) The notion of relative line is based on the principle that poverty is above all a relative phenomenon among socio-economic categories in the same society. There are two categories of relative measurements. A purely relative measurement consists in defining as poor, a certain percentage of the population. That is all those who are found in the lower quintile of income or spending distributions. A quasi-relative measurement uses a

given percentage of the average as the demarcation line between the poor and non-poor.

(iv) The mixed line which combines the normative and relative approaches. It determines a line which measures a basket of goods deemed necessary to which is added a certain percentage which will make it possible to generate an overall poverty line.

Empirically, poverty range can be divided into three lines, the food poverty line, non-food poverty line and the overall poverty line. The food poverty line refers to the minimum amount necessary for an individual or a household to spend for a basket of foodstuffs that meets the nutritional norms of a balanced diet as well as the consumption habits of the surrounding community. The non-food poverty line refers to the minimum spending necessary in order for an individual or household to acquire the non-food products and public services considered essential by the community in which they live. Therefore, the overall poverty line is the sum of the food and non-food poverty line (UNDP. 1996).

### 2.2.4 Approaches to determination of poverty line

Poverty line is the first stage of the poverty analysis which defines the minimum level of income or consumption required for living; an individual falling below the threshold is considered to be poor. It is the value of income or consumption expenditure necessary for a minimum standard of nutrition and other necessities. There are currently three main methods of setting the poverty line:

(i) The subjective measuring method

The most satisfactory approach to building up a poverty line, while remaining in the spirit of trying to ensure that the line covers basic needs, proceed as follows:

- Stipulate a consumption bundle that is deemed to be adequate, with both food and non-food components; and
- Estimate the cost of bundle for each sub group {fishing settlements and Local Government Areas (LGA)}
- Pick a nutritional requirement for good health, such as 2,100 Calories per person per day. This standard is widely used, and has been proposed by the Food and Agriculture Organizations of the United Nations.
- Estimate the cost of meeting this food energy requirement, using a diet that reflects the habits of households near the poverty line (e.g. those in the lowest, or second lowest, quintile of income distribution; those consuming between 2,000 and 2,200 Calories). Call this food component $z^F$.
- Add a non-food component ($z^{NF}$). Then select a subjective poverty line of 1/3 or 2/3 depending on your focus (World Bank, 2005).

(ii) The cost of basic needs (cbn)

Poverty line is given by

$$Z^{BN} = Z^F + Z^{NF} \quad (5)$$

Where $Z^{BN}$ is the cost of basic needs; $Z^F$ and $Z^{NF}$ are food component and non-food

component respectively. The cbn approach has the advantage of ensuring consistency treating individuals with the same living standards equally (World Bank, 2005).

(iii) The food energy intake (fei) method

The basic need approach outline above requires information on the prices of the goods that the fishery household consume. When price data are not available, a number of researchers have used an alternative method to construct the poverty line- the food energy intake method. As before, the goal here is to find the level of consumption expenditure (or income) that allows the household to obtain enough food to meet its energy requirements. Note that consumption will include non-food as well as food items; even underfed households typically consume some clothing and shelter, which means that at the margin these 'basic needs' must be as valuable additional food.

This is express in calorie income function; as income (or expenditure) rises, food energy intake also rises, although typically more slowly. Given some level of just-adequate food energy intake *k*, one may use this curve (food energy intake vs income or expenditure) to determine the poverty-line level of expenditure, *z.* formally, shows

$$k = f(y) \quad \text{---------- (6)}$$

So, given the monotonicity,

$$Y = f^{-1}(k) \quad \text{---------- (7)}$$

or, given a minimum adequate level of calorie $k_{min,}$ we have

$$Z = f^{-1}(k_{min})$$ ---------- (8)

Where, z is the poverty line.

Food energy intake approach has the advantage of specificity reflecting better the actual food consumption behaviour of individuals around the caloric threshold given their tastes, preferences and relative prices. This approach is parsimonious in that it does not require any information about the prices of goods consumed (World Bank, 2005).

## 2.3 Concept of Artisanal Fishery

Omijoyin (2010) confirmed that artisanal fishery occupied a significant position in the Nigerian economy providing employment for about 4.3% of Nigerian population and supplying 88.1 percent of the total domestic fish production. Artisanal fishing refers broadly to small underdeveloped and often severely impoverished fishing communities whose immediate survival depend on their abilities to continue benefitting from local fisheries that in many cases are centuries old.

In this study, rural fisherfolks are defined as independent fish harvesters whose livelihood is based on fishing on a full time basis, using low capital, low technology fishing techniques, and employing family or community/hired labour, often on a sharing basis, for harvesting in riverine habitats. The fish caught are normally sold in the local market, usually through haggling and middlemen, although some are for home consumption. However, TN (2005) defines rural fisherfolks as fisheries activities usually carried out on individual basis, performed at an inshore basis with non-automatic net retriever devices,

and the basic scope of the activities encompasses both family livelihood and a small profit. There is no employer- employee relationship on the activities carried out. United States of America (2005) also define rural artisanal fisherfolks or fisheries as small scale fisheries that employ labour intensive harvesting, processing and distribution technologies to exploit marine and inland fishery resources. Such fisheries typically targeted local rather than export markets. However, it is suffice to note that Webster dictionary define fisherfolks as household whose occupation is fishing. The inland fisheries resources usually employ labour intensive harvesting, processing and distribution methods and essentially target local market rather than export. Thus, The artisanal fishing sector regardless of any technical debate over its precise definition provides employment to tens of millions of people and indirect employment to tens of millions more, mostly women who engaged in fish processing {United Nations Environmental Programme (UNEP), (2004)}.

Artisanal Fishery also involves using small boat and canoes; it comprises 90% of all fishing jobs worldwide, approximately 45% of the world fisheries and nearly a quarter of the world catch. They provide critical income and edible protein to hundreds of millions across the globe. It accounts for more than 25% of the world catch and comprises 90% of all fishing jobs worldwide. It is the source of more than 40% of the fish used for human consumption (FAO, 1992; UNEP, 2004).

### 2.3.1 Overview of artisanal fisheries in Nigeria

Agricultural sector played a significant role in the history of Nigerian economic development before oil boom in the early 1970s by providing the food of teaming

population, employing close to 75% of the people who are mostly rural dwellers, foreign exchange earnings and poverty alleviation (NBS, 2005). Fishery is an integral part of Agriculture sector which maintains a steady contribution of 3.5 to 4% to total GDP in 2008 to 2012. This translates to about 10% of agricultural GDP, which itself contributed between 35 and 40 percent (NBS, 2012; FAO, 2013). Over the years, output of artisanal fisherfolks has been consistently high, accounting for more than 80% of the domestic fish production. Suffice to note that the sub- sector are among the most socially disadvantage groups in the country, as a result of the remoteness of their habitations, which is conditioned by the location of the resources. However, there is high demand for their product and this translates to potentials for sustaining their livelihoods. In Nigeria, the artisanal sector both (coastal and inland) supplies the highest volume of fish with an average 356.2mt yearly and the sector is a principal source of livelihood for over 6 million people in Nigeria (CBN 2000; FAO, 2007; Ekunwe and Emokaro, 2009). Nigeria Artisanal fishery represents the lowest level of fishing organization, but it employs millions of people at all levels from capture, landing, processing to marketing, and support services (FAO 1992).

Nigeria is a typical coastal country with 800km of coastline and marine area of 46,000km$^2$ (0-20m depth), an Exclusive Economic Zone (EEZ) area of 210,900km$^2$ and a narrow continental shelf between 4.81 and 27.78km in the Gulf of Guinea (Udolisa *et al.*, 1994). Adesula and Syndenham (2002) observed that Nigeria is made up of large population of artisanal fisherfolks who relies on the prominent use of small fishing gears around the

coastal line. This group of fisherfolks commonly operates in inland rivers, lagoons and creeks; extending to about five nautical miles of the sea shore.

### 2.3.2 Historical perspective of fishery in Nigeria

Ladipo, Adesimi and Moses (1982) in Oladimeji *et al*. (2013a) traced the importance of fish in Nigeria to the second National Development Plan (1970-74) when there was drought in the Sahelian Savannah zone of the country which caused great decline in agricultural and livestock production. The outbreak of rinderpest in the 1980s further worsened livestock production in the country, especially because the contribution from the poultry dwindle rapidly beginning from the middle of 1980s due partly to high and rising costs of livestock feeds of which led to increase fish consumption. Thus, Nigerian government began to give more attention to the production of fish and fish products in its fisheries development policy objectives of the third and fourth National Development Plans which emphasized increased exploration of Nigeria's fishery resources to meet the rapidly increasing demand for fish and encouragement of the development of fishery-based industries.

It was planned that these objectives would be achieved through a number of fish production projects and programmes contained in the subsequent plans (3$^{rd}$ and 4th) and the corresponding increased in the financial allocation to the fishery sub-sector. For instance, the sectoral allocation to the fisheries sector rose from N11.60 million in the national development plan (1970-74) to 10.55 million in the Third National Development Plan (1975-80) and 170.99 million in Fourth National Development Plan (1981-85) was

68.4% over and above that of the third plan. The allocation to this sub-sector in the first National Rolling Plan (1990-92) increased to N166.68 million out of a total allocation of 7.432 billion earmarked for the agricultural sectors {Federal Government of Nigeria (FGN), 1992}. The projects embarked upon during the fourth plan included among others, the National Accelerated Fish Production Project (NAFPP), UNDP/FAO artisanal and inshore fisheries project (IFP), Integrated Rural fisheries Development project (IRFDP) and Fish Storage Processing and Marketing Scheme.

One of the major programmes aimed at boosting fish production in the third and fourth development plans was the National Accelerated Fish Production Project (NAFPP) which was designed to bring the benefits of modern fishing technology to artisanal fisherfolks along the country's coastline, lagoons and the inland waters. It also involves organising small scale fisherfolks into fishery co-operative, the provision of credit and the supply of fishing inputs at subsidized rates. Other programmes in the artisanal sub –sector included Inshore Fishing Project (IFP) to bring a change from small canoes to medium sized inshore fishing vessels, the special fishery development project for the supply of fishing and fish pond construction equipment at 50.0% subsidy and the provision of fish storage processing and marketing equipment with a view to reduce losses due to spoilage in the distribution of the commodity in the country and mechanized fishing extension and training project for training of fisherfolks in the use of mechanised canoes/vessels (Oladimeji *et al*., 2013a).

A major strategy for increasing fish production through the aquaculture sector was the fish seed multiplication scheme which was aimed at producing high quality fish seed for distribution to the various fish farms in the country. Others including the establishment of fish feed mills and building of fish ponds and reservoir all over the country (Adesimi and Aderinola, 1983).

In terms of research, there are four research institutes carrying out investigations and studies applicable to fisheries in the country. These include: The Nigerian Institute for Oceanography and Marine Research (NIOMR), Lagos established in 1975; the Lake Chad Research Institute (LCRI), Maiduguri (1975); National Institute for Freshwater Fisheries Research, New Bussa, (1976); Federal Department of Fisheries, Lagos ( Full autonomous in 1976) and the Fisheries Departments in some tertiary institutions in the country . In addition to these public sector programmes mentioned, there are a number of semi-private sector programmes owned jointly by the government and private ventures. Such include the Nigerian National Shrimps and Fish Resources of the inshore waters and the Nigerian National Fish Company Limited which exploits more distant fish resources on Nigerian waters as well as those on international waters where fishing rights are obtained (Oladimeji *et al*., 2013a).

On international scene, the FAO- assisted fisheries development projects were implemented through National Aquaculture and Strategy Plan (NASP) and modernisation of fish production, handling, preservation, storage and marketing through better extension services and vocational training. The activities carried out include training of boat

builders, training of local fisherfolks on mechanised boat operation and demonstrators of fish handling using wooden box and ice (Oladimeji, 1999; FAO, 2010).

But in spite of all these programmes and financial commitment s, the fishery sector has been suffering a lot of reverse since the early 1980-2006. The estimated demand for fish ranged from 787,000 to 1,560,000 tonnes while domestic production ranged from 234,000 to 563,000 tonnes with annual averages of approximately 1, 000,600 and 400,500 and 107,300 tonnes respectively (FDF, 2007; FAO, 2007). Although the importation of fish and fish products had been used partially to fill the growing deficits in the past, its continuation would constitute avoidable drain on the country's scarce foreign exchange earnings, especially during this period of economic depression in the country (Oladimeji *et al*., 2013a).

### 2.3.3 The importance of fishes and the fishery sub-sector in Nigeria economy

Fish is a diverse group of animal that lives in water, swims around by means of its body movement and different shaped and sized organs, located at different parts of body called-fins, respires by absorbing oxygen dissolved in the water by means of its special organ called gills (Helfman, Collette and Facey, 1997). The importance of food include fish consumption in the socio-economic development of any country cannot be over-emphasized. Increasing domestic food supply has been the major food policy objective of successive Nigerian governments since the 1970s (Rahji *et al*., 2011). Such policy objective has been translated into many agricultural programmes and projects (Rahji *et al*., 2011). The emphasis on increased domestic food production capability can be justified

in view of the poor performance of the food sub-sector of the Nigerian economy. The consequences of food demand-supply gap are declining per capita production, high and rising food prices, increasing food import and a growing deterioration in the nutritional status of the average Nigerian (Falusi, 1995).

Fisheries are crucial to the Nigerian economy, contributing 3.5 to 4% to total GDP in 2008 to 2012 (FAO, 2013). From available literature, fish is not only the cheapest source of protein the world over (FAO, 1993; FDF, 2006; Ovie and Raji, 2006), it is also the highest source of animal protein in human diets in terms of gramme/dry weight (Alabaster, 1981). A review of the data of food supplies available in different countries from FAO statistics indicates that Nigeria is comparatively low in food protein supply. Not only is the total protein supply deficient but the quality of dietary protein available is inferior to that consumed in developed countries. In addition, the bulk of foods consumed in Nigeria are carbohydrates which are obtained mainly in the form of starch.

In Nigeria, the authors of the Fourth National Development Plan (1981-85) claimed that fish provides the highest amount (53.4%) of animal protein per caput per day in 1980 and that 40.0% of animal protein consumed by average Nigerians came from fish. However, in recent time, the protein consumption by Nigeria is about 53.8 g with only 6 g/head/day of fish as against total consumption of animal protein put at 13.3 g/head/day (Esobhawan *et al*., 2008). Therefore, it can be concluded that fish provides a substantial proportion of animal protein in the diet of an average Nigerian with estimated present consumption average 1.5 million tons annually (Oladimeji, Abdulsalam, Damisa and Galadima, 2013b).

A field survey conducted by Food and Agricultural coordinating units (FACU), (2003), in some southern states of Nigeria (Ogun, Osun, Rivers, Akwa-Ibom and Edo) confirmed that the most significant animal protein in the rural area of those states was fish. Domestic fish production was estimated to be about 350,000 tonnes per annum from all sources (Obikan, 1998), contributes about 40% of the animal protein intake of an average Nigerian presently, with an estimated population of 160 million (NPC, 2006). The demand for fish and other animal protein are fast out spacing the supply. Animal product consumption grows fastest in countries with rapid urbanization, population and income growth (Delgado and Courbols, 1998).

FISON, (1992) enumerated the importance of fish in human nutrition as follows:

- Food fish has a nutrient profile superior to all terrestrial meats (beef, pork and chicken) being an excellent source of high quality animal protein and highly digestible energy;
- Fish is a good source of sulphur and essential amino acids such as lysine, leucine, valine and arginine. It is therefore suitable for supplementing diets of high carbohydrates contents.
- Fish is a good source of thiamine as well as an extremely rich source of Omega-3 poly saturated fatty acids, fat soluble vitamins (A, D and E) and water soluble vitamins (B complex) and minerals (Potassium, Calcium, Phosphorus, Iron, Iodine, Fluorine and Selenium).
- It has a high content of poly unsaturated (Omega III) fatty acids, which are important in lowering blood cholesterol level and high blood pressure. It is

able to mitigate or to alleviate platelet of (cholesterol) aggregation and various arteriosclerosis conditions in adults populations;

- It reduces the risk of sudden death from heart attacks and reduces rheumatoid arthritis;
- Omega-3 fatty acids also lower the risk of age related muscular degeneration and vision impairment; and:
- It decreases the risk of bowel cancer; and reduces insulin resistance in skeletal muscles.

Another importance of fish lies in its contribution to employment generation in the country. Millions of Nigerians directly or indirectly depend on fisheries as a means of livelihood, especially in the coastal riverine and the lake areas of the country. According to FISON (1992) more than 2.5 million depend directly or indirectly on artisanal fisheries alone in Nigeria. Other sub-sectors in which many Nigerians are gainfully employed are the aquaculture and industrial fishing. Apart from employment in direct fishing activities, many Nigerians earn their living from fish processing and /or marketing while some others are engaged in fishing research projects and manpower training in the country. According to the author of the fourth National Development Plan (1981-85), about four million people were engaged in the fisheries directly or indirectly. In terms of contribution to Gross Domestic Product (GDP), the fisheries recorded the fastest growth rate during the 1987-95 periods with regards to the relative contribution of the agricultural sector to the GDP. For instance the contribution of fisheries to the GDP at current factor cost from ₦1.01 billion in the 1986/87 fiscal year to ₦17.33 billion in the same period to ₦521.00

billion 1994/95 fiscal year. That of crops also rose from ₦20.44 billion during the same period to ₦521.00 billion {Central Bank of Nigeria (CBN), 1995}.

It is estimated that over 10 million Nigerians are engaged in primary and secondary fisheries activities as fishers, fish farmers, fish processors, marketers, fishing gear builders, gear fabricators, and menders, operators on board industrial fishing fleet, terminal/jetties motors, in-and-outboard engines repairers and a host of other ancillary actors that derive their livelihoods from the fisheries. The fisheries, therefore, contribute immensely to the development of business organization in the country by supporting domestic processing industry and encouraging the acquisition of a wide range of business skills in marketing and distribution of fish products (Ojo, 1984).

### 2.3.4 Global importance of fishes and the fishery sector

Globally, employment in the fisheries sector has grown faster than the world's population and then employment in traditional agriculture (FAO, 2010). The 44.9 million people engaged in the sector in 2008 represented 3.5 percent of 1.3 billion people economically active in the broad agriculture sector worldwide, compared with 1.8 percent in 1980. The majority of fishers and aquaculturists are in developing countries, mainly Asia, which has experienced the largest increase in recent decades, reflecting in particular the rapid expansion of aquaculture activities. In 2008, 85.5 percent of fishers and fish farmers were in Asia, followed by Africa (9.3 percent), Latin America and the Caribbean (2.9 percent), Europe (1.4 percent), North America (0.7 percent) and Oceania (0.1 percent). China is the

country with the highest number of fishers and fish farmers, representing nearly one – third of the world total (FAO, 2010).

Although the highest concentration of people employed in the primary sector is in Asia, average annual production per person is only 2.4 tons, where it is almost 24 tons in Europe and more than 18 tons in North America. This reflects the degree of industrialization of fishing activities in Europe and North America, also the key social role played by small scale fisheries. The differences are even more evident in the aquaculture sector, where, for example, fish farmers' average annual production in Norway is 172 tons per person, while in Chile it is about 72 tons, in China 6 tonnes and in India only 2 tonnes (FAO, 2010).

(FAO, 2010) analyses indicate that the global fishing fleet is made up of about 4.3 million vessels and that this figure has not increased substantially from an FAO estimate of a decade ago. About 59 per cent of these vessels are powered by engines. The remaining 41 per cent are traditional craft of various types, operated by sails and oars, concentrated primarily in Asia (77 per cent) and Africa (20 per cent). Those non-motorised boats are engaged in fishing operations, usually inshore or on inland waters. Of the total number of fishing vessels powered by engines, the vast majority (75 per cent) were reported from Asia and the rest mostly from Latin America and the Caribbean (8 per cent), Africa (7 per cent) and Europe (4 per cent).

FAO (2010) also revealed that in 2008, nearly 81 percent (115 million tons) of world fish production was destined for human consumption, while the rest (27 million tons) was used for non-food purposes. Seventy-six percent of the world fish production destined for non-food purposes (20.8 million tons) was reduced to fishmeal and fish oil; the remaining 6.4 million tonnes was largely utilized as fish for ornamental purposes for culture (fingerlings, fry, etc), for bait, for pharmaceutical uses as well as raw material for direct feeding in aquaculture, for livestock and for fur animals.

In developing countries and supported by cheaper labour, processing is still focused on less sophisticated methods of transformation such as filleting, salting, canning, drying and fermentation. These traditional labour intensive fish processing methods are means of providing livelihood support to large numbers of people in coastal areas in many developing countries. For this reason they are likely to continue to be important components in rural development and poverty alleviation. From the foregoing, it is evident that fish and fisheries are crucial to the economy and health of the nation.

Global capture fisheries production in 2008 was about 90 million tonnes, with an estimated first-sale value of US $93.9 billion, comprising about 80 million tons from marine waters and a record 10 million from inland waters. World capture fisheries production has been relatively stable in the past decade, with the exception of marked fluctuations driven by catches of anchoret – a species extremely susceptible to oceanographic conditions determined by the El Nino Southern Oscillation in the Southeast pacific (FAO, 2010).

Therefore, inland fisheries are vital component in the livelihoods of people in many parts of the world, in both developing and developed countries including Nigeria. However, irresponsible fishing practices, habitat loss and degradation, water abstraction, drainage of wetlands, dam construction and pollution often act together, thus compounding one another's effects. They have caused substantial declines and other changes in inland fishery resources.

## 2.4 Stochastic Dominance

Stochastic dominance is a form of distribution for ranking alternatives where consumers are treated as a continuum so as to eliminate individuals whose consumption is less than hypothetical amount *x*. Assuming *x* to be continuous distributed in the population with Cumulative Distribution Function (CDF) f(x), comparison can be made between two welfare measures with CDFs $F_{1(X)}$ and ($F_{2(X)}$. A first order stochastic dominance arises when a distribution with CDF $F_{(X)}$ stochastically dominates another with distribution CDF $F_{2(X)}$ in the first order, if and only if, for all monotones non-decreasing function $f_{(x)}$. Such that;

$$\int f(x)dF_1(x) \geq \int f(x)dF_2(x) \quad \text{---------- (9)}$$

Where, the integral is over the whole range of x. If $f_{(X)}$ is taken as a value function and monotonic to mean more is better or at least not well off. Equation 9 is interpreted to mean that the average value of f is at least as large in distribution 1 as in distribution 2 if not larger no matter how x is valued (FAO, 2005; Duclos and Davidson, 2006). Hence

distribution 1 is better and stochastically dominates distribution 2 since it has more value of x.

An alternative presentation of equation 9 is given as:

$F_2(x) \geq F_1(x)$---------- (10)

Here for all $x$, the CDF distribution of 2 is always large as distribution 1. Distribution 2 always has more in the lower part of the distribution; any monotone increasing function will rank distribution 1 over distribution 2.

The second order stochastic dominance is however a weaker concept in that when first order stochastic dominance exists, the second order stochastic dominance automatically holds true, the converse is not however not true. This means that if the inequality in 3 or 4 holds true, then the distribution $F_{1(X)}$ stochastically dominates distribution $F_{2(X),}$ at second order, for all monotones non-decreasing and concave function $f_{(X).}$ Since monotone non-decreasing and concave function are member of the class of monotone non-decreasing functions (FAO, (2005); Duclos and Davidson, (2006), first order dominance signifies second order stochastic dominance. It has positive first order derivative and negative second order derivative.

The dominance of $F_{1(X)}$ over $F_{2(X)}$ in the second order is given as;

$F_2(x) \geq F_1(x)$ ---------- (11)

Using equation 11, second order stochastic dominance is checked by comparing the area under the CDFs and by comparing the CDFs. For poverty study however a restricted form of stochastic dominance in which $Z_0 \; x \; Z_1$ is used.

Higher orders of stochastic dominance can be defined following the established sequence. The third order stochastic dominance function $f_{(x)}$ has positive first derivative, negative second derivative and positive third derivative.

### 2.4.1 Poverty application of stochastic dominance

Relative poverty benchmarks are usually arbitrarily chosen as 2/3 or 1/3 of the mean consumption expenditure or average income for the population. This therefore necessitates the test for the robustness of these measures to changing in poverty lines. The stochastic dominance analysis provides a method for exploring the sensitivity of these measures to the choice of the poverty line.

The first dominance criterion was related to the most common poverty measure, the headcount ratio HC. The headcount ratio was directly expressed by the Cumulative Distribution Function (CDF) measured up to the poverty line. The cumulative distribution function F(x), for any given expenditure level x, gives the proportion of people who have expenditure below the level. Therefore, if the expenditure level is taken to be the poverty line *z*, the cumulative distribution function $F(_Z)$ gives the proportion of people who have incomes below z, i.e. the proportion of poor people.

Suppose there are two different expenditure distributions, A and B relating to sub groups of fisherfolks, having the same poverty line z. Therefore, $F_A(z)$ measures the proportion of people in poverty expenditure distribution A, while $F_B(z)$ measures the same proportion in expenditure distribution B. If the following condition holds:

$$F_A(z) > F_B(z) \quad \text{---------- (12)}$$

For all x<z (i.e. if the CDF of expenditure distribution A is everywhere above the CDF of income distribution B up to the income level z) the headcount ratio will always be higher in A than in B for all poverty lines up to z. If there is disagreement about the right location of z, we can test dominance criteria up to the maximum conceivable poverty line, say $z_{max}$. If the dominance occurs up to that point, the headcount ratio of the dominating distribution will be higher for all poverty lines up to that point. If the dominance of distribution A over B extends over the whole CDF, the result will hold for any arbitrary poverty line. This shows that the poverty ranking of the two distributions in relation to the proportion of the poor is robust to all possible choices of poverty line, if and only if, one distribution stochastically dominates the other at first order. Also, irrespective of poverty line selected within the range, the sub group with lower CDF will have lower poverty incidence, depth and severity than sub group with higher CDF.

### 2.4.2 Dominance criteria for poverty gaps

Dominance criteria may also be established for the poverty gap and is related to the Generalised Lorenz (GL) curve. Given two income distributions, A and B, if the GL curve of income distribution A is <<everywhere>> above the income distribution B, the poverty

gap of income distribution B will always be higher than the poverty gap of income distribution A. In other words, GL dominance implies less poverty as measured by the poverty gap. In this case, unlike welfare analysis, it is necessary that dominance occurs for a subset of the income distribution, corresponding to the income level just above any conceivable poverty line.

Intersection between the cumulative distribution functions of any two sub groups of fishermen render ranking invalid if not impossible and necessitate second order stochastic dominance test. The test may be achieved through Poverty Deficit Curve (PDC). Poverty deficit curve is defined as cumulated sum of normalised poverty gaps which the area under the CDF up to some poverty line z, that is,

$PD = \sum_{i=1}^{h}(1 - \frac{y_i}{z})$ h=1,....., p ----------(13)

Where y is the individual income, z is the poverty line; p is the number of poor. It should be noted that ranking income distributions by ascending incomes is equivalent to rank income distributions by descending poverty gaps. The individual with the lowest income indeed has the highest poverty gaps. The dominance criterion can therefore be stated as follows: if the PDC of income distribution A is everywhere below the PDC of income distribution B, poverty as measured by the poverty gap will always be lower in A than in B. And that is only if the GL curve of B is everywhere below the GL curve of A. Both criteria lead to more poverty in B than A as measured by the poverty gap (FAO, 2005).

### 2.4.3 Dominance criteria for severity of poverty

The Generalised Lorenz dominance criterion can also be used in relation to the Foster-Greer and Thorbecke (FGT) poverty index with α=2. In particular, if an income distribution A generalized Lorenz dominates an income distribution B, poverty as measured by FGT with α=2 is always lower in income distribution A than in income distribution B. FAO, (2005) observed that the generalized Lorenz curve dominance conditions extends to a wide class of poverty indexes that are decreasing and convex with respect to income. If we define this class by C, analytically the generalised Lorenz $\frac{\delta c}{\delta y} < 0; \ \frac{\delta c2}{\delta 2y} > 0$ dominance condition applies to all members c of this class. The first condition means that the poverty index should decrease, if income of poor individuals increases; the second condition means that the decrease in the poverty is higher if a given amount of income is added to relatively poorer individuals.

## 2.5 Theoretical Model of the Study

There are several theories on poverty and these include: The Culture of poverty developed by Lewis (1959); Social Darwinian Theory elucidated by Kerbo (1996) and Theory of social change. However, this study is premised on the theoretical concept of social change. Rogers and Svenning (1969) defined social change as the process by which alteration occurs in the structure and functions of a social system. Any change that occurs either in ideas, norms, values, roles, and social habits of a people or in composition or organisation of their society can be referred to as social change. Ekong (2003) said social change may be planned or unplanned. A planned change entails the direct human

intervention in shaping and direction of change toward some predefined goals while unplanned change is that which happens accidentally. The concept of social change assumes the introduction of 'change material' into a society by the presentation of alternative practices or choices to change or supplement the existing ones (Yahaya, 2005). Whatever is obtaining from this study can be used to formulate better policies and strategies that can help to reduce poverty and improve the standard of living of rural artisanal fishery households.

## 2.6 Determinants of Poverty

Age, dependency ratios and poverty

Historically, poverty rates have been significantly higher among households headed by the elderly than among those headed by those in their prime working age for obvious reasons (Etim and Ukoha, 2010). Those in the Prime working age are likely to be agile, virile and may be educated and thus can engage in off-farm activities or be self employed. There is also the likelihood of people in this age category to have ample energy for farming or to provide labour on other people's farm. Age is expected to be positively related to poverty because of high physical energy required in agriculture (Bogale, Hagedorn and Korf, 2009). On the other hand, households with more dependants (children and adults dependants in relation to the household size) tend to be poorer. Household composition has a role to play in the poverty status of a rural family (Handa, 1993; Snyder, McLaughlin and Findeis, 2006; Etim and Patrick, 2010).

Poverty and Household Size

Household in relation to consumption is defined as people living and feeding together under the same roof for certain period of time usually at least six months. This excludes households where members live under the same roof but do not feed together even when such household members have blood ties (Handa, 1993). In other word, A household is defined as a group of persons sharing a home or living space, who aggregate, and share their incomes, as evidenced by the fact that they regularly take meals together (Marshall, 1994).

Household size is a major determinant of poverty status of farming households in Nigeria (Dudek, 2006). The incidence of poverty is usually higher for those households with low education, high unemployment and larger household size (Milcher, 2006). Consumption expenditure increases as household size increases *a priori*. Hence large household size is expected to be positively correlated with poverty status of the rural farming households when income is constant. The use of cross sectional data establishes household size as a correlate of poverty but no causality can be inferred. It is impossible to know whether a family is poor because it is large or whether a household is large because it is poor. On the contrary, determinants of poverty provide information on the causes of poverty and can be analysed looking at households over time and analysing their welfare changes in the light of their characteristics. The dependency ratio is calculated as the ratio of the number of family members not in the labour force (young or old) to those in labour force in the households. The ratio allows one to measure the burden weighing on member of the

labour force within the household. It is expected that a high dependency ratio will be associated with greater poverty.

Indicators of household size and structure are important in that they show a possible correlation between the level of poverty and the household composition. Household composition, in terms of the size of the households and characteristics of its members (such as age), is often quite different for poor and non-poor. World Bank (2005) reported that the Cambodian Social Economic Survey of 1993/94 shows that the poor tend to live in larger households, with an average family size of 6.6 persons in the poorest quintile compared to 4.9 in the richest quintile; similar patterns are found in most countries. The poor tend, to live in younger households- with the bottom quintile having twice as many children under 15 per family as the top quintile and slightly fewer elderly people over age 60. Better-off households also tend to have heads that are somewhat older.

Poverty and dependency ratio

According to findings reported by Schubert (1994) and FOS (1999a & b), a unit increase in the dependency ratio will raise poverty by 30.06%. This is obvious because most dependents particularly children contribute less to family labour and income. The family on the other hand, spends money in educating and training them in school and craft respectively. Similar results had been reported by Lipton (1983), World Bank (1991), Etim, Esu, Edet, Okon and Solomon (2008) and Etim and Edet, (2009a) that a larger sized household is associated with greater poverty incidence. In another study conducted in Nassarawa State, increase in household size, number of non-working females and

expenditure on education increase the vulnerability of the farming households to poverty. On the other hand, increases in the number of literate adult males, number of households employed outside agriculture, number of income sources of household head and farm size are likely to decrease the vulnerability of the farming households to poverty (Ibrahim and Umar, 2008).

Poverty and Average Years of Schooling of Adult Household Members

Average years of schooling of adult household members are determinant of poverty status of rural farming households. Households with members having more years of schooling tend to be less poor *ceteris paribus* (Fuwa, 2003; Milcher, 2006; Martins and Fernandes, 2008). Literacy and schooling are important indicators of the quality of life in their own right, as well as being key determinants of poor people's ability to take advantage of income- earning opportunities. However, in rural areas, education does not appear to explain expenditure per capita levels very much (World Bank, 2005). There is also a clear correlation between literacy rates, poverty and agricultural sector (Dudek, 2006). The percentage of people who can read and write English language in Nigeria is 52 percent while that of rural dwellers is less than 40 percent. Farming households with no education have more prevalence of poverty (68%) than their counterpart with tertiary education, 35% (NBS, 2005). Weir and Knight (2004) found significant externality benefits of schooling in lifting up agricultural productivity, but they did not compare this with household consumption levels.

Poverty and labour

Generally, one of the most common reasons for being poor is the inability to obtain an adequate return from one's labour. Where people depend primarily on the sale of their labour for their income, the absence or lack of employment opportunities is a principal cause of poverty (Fuwa, 2003; Milcher, 2006). The economy's inability to grow is a major reason for the slow rate of labour absorption in the economy. An economy's growth record is characterized by periods of moderate expansion alternating with severe contractions that can be credited for generating only unstable employment at best, or open unemployment at worst. Employment in formal or regulated sector is related to the level of poverty of a household. Households with head fully engaged in agriculture or informal sector tend to be poor while those in regulated sector are least poor (Bird and Shepherd, 2003). For many households in Nigeria, especially in the rural areas, agriculture is the main activity. Participation in agriculture is more predominant in rural areas, with about eight-six percent of households engaging in agriculture (NBS, 2005). Coupled with this, is the acclaimed low labour productivity in agrarian based livelihood (Belshaw, 2002).

Poverty and Inequality in the Distribution of Wealth and access to Resources

Bogale *et al*. (2005) found that cultivated land per adult equivalent and geographical location to be important determinants of rural poverty. The most glaring example of inequality is the unequal ownership of agricultural land and other farm inputs despite several reforms by many past governments. This, combined with limited opportunities for off-farm employment is an important explanation for the poverty of a significant segment of rural population. Inequality in the ownership of the land also lead to lack of

opportunities for agricultural credits since land is usually used as collaterals for such facilities.

Poverty and access to Basic Livelihood Services

Access to some basic livelihood services such as potable water, electricity, sewage and waste disposal mechanism can affect, positively or negatively, the poverty status of a rural household. The scourge of poverty goes beyond mere measurement of a household's expenditure or welfare. Poverty has many dimensions and may include inadequate access to government utilities and services, environmental issues, poor infrastructure, illiteracy and ignorance, poor health, insecurity, social and political exclusion (Deere and Leone, 2003).

Poverty and Access to and Use of Remittance

Access to and use of remittance from friends and relations reduce the level of poverty of rural households. Regular transfer of income from kith and kin could help off-set part of rural households' expenditure and cause an improvement in their well being (Etim and Patrick, 2010).

Poverty and Nutrition Intake

Nigeria per capita daily protein intake for instance is estimated to be 45.4g as against the FAO recommended minimum of 65g (FAO, 1992). Similarly, the International Conference on Nutrition,(ICN,1992), reported that low income rural dwellers in Nigeria consumed less than 60% of their calorie (energy) needs and less than 40% of their

protein needs. During the 1980-1995 periods, the daily calorie per capita intake of an average Nigerian was estimated to be 2130 kcal as against the recommended minimum requirement of 2500 kcal for moderate activity (CBN 1996).

Addo in a 2005 survey presented more scaring scenario of the level of Nigeria's protein malnutrition and under- nutrition (Addo, 2005). According to report, Nigerian children below the age of 18 years, who make up 47% of the nation's population, are still victims of stunting and under weight, all of which are evidence of poverty and under- nutrition. The report further revealed that, only 26.6% of fewer than 5 year old children met their Recommended Daily Allowance (RDA) while 18.5% were severally deficient. With the recent global rise in food prices the situation in Nigeria even appears to have worsened. On a global chart, Nigeria is now one of the two African nations listed among the 20 countries responsible for 80% of malnutrition in children, with the states in the North rated as the major contributors to the country's poor rating (Iyangbe and Onowa, 2009). The nutrition indices, according to the United Nation's Children Fund (UNICEF) recent report, include 14% low birth weight, 13% exclusive breastfeeding, 14% stunting and 27% under-weight.

The average animal protein intake in Nigeria was said to be low the recommended rate as far back as 1989 and trend does not seem to have abated. Ado, (2005) also noted that the average animal protein intake, which is identified as the indication and determinant of dietary quality in Nigeria, is low, about 45g/capita/day which is far below 75g/capital/day by Food and Agricultural Organisation (FAO) for maintenance of good health.

Poverty and Gender

It is widely believed that the gender of the household significantly influences household poverty, and more specifically, households headed by women are poorer than those headed by men. Women have low level of literacy, are paid lower wages and have less access to land or equal employment, According to report based on a joint conference between the Cambodia institute for cooperation and peace and the World Bank (2005), 43% of women are illiterate and 90% of these women are poor.

Ministry of Women's and Veteran's Affairs in World Bank, (2005) in addition to Bevan and Sseweya (1995), emphasize the important role of non-economic forms of capital, such as social and human capital as well as entitlement rules, such as access rights to productive resources, political voice, inheritance rules and access to community support in determining household poverty. Sharp and Devereux (2004) found that destitute households in Wollo region of Ethiopia face constrained access to land, labor, livestock, social networks and transfers. Dercon and Krishnan (1998) survey's results indicated that households with better human and social capital as well as better access to roads and towns have both lower poverty levels, are more likely to improve their poverty status over time and are less prone to seasonal fluctuations in welfare. Education was also found to be a central factor: Weir and Knight (2004) found significant externality benefits of schooling in lifting up agricultural productivity, but they did not compare this with household consumption levels.

## 2.7 Past studies on Determinants of Poverty among Households

Olorunsanya and Omotesho (2011) used 510 represenative households to profile poverty status of the rural farming households in North Central Nigeria. The Foster, Greer and Thorbecke class of weighted poverty indices as well as social indicator were used as analytical tools. The results of the study showed that the female-headed households were disadvantaged in all counts with poverty incidence of 63% as against 59% of male-headed households. In term of asset ownership, they were equally disadvantaged; only 33% had access to farmland s against 81% for their male-headed counterparts. The widow sub-group of female-headed households was particularly disadvantaged despite remittances from friends and relations. Monthly emolument as safety net was recommended for this particularly vulnerable sub-groups of households.

Etim and Solomon (2010) examined factors that determined rural poverty among broiler farmers in Uyo in Nigeria. It was reported that the poverty status of household headed by married people was higher than households headed by un-married people. It was also found that the poverty depth is decreased for individuals in families, whose heads have formal education, the reason being the fact that educated household heads has the ability to adopt improved farming techniques faster than the non-educated ones. This however increases the productivity and incomes of the educated heads with subsequent improvement in welfare amongst them. The results which emanated from the study revealed that the exogenous variables such as access to extension service, stocking density, access to improve breeds of day old chicks improve productivity and income of

the broiler farmers. The study recommends increase in the number of birds per floor space as a means of increasing income and sustaining welfare improvement.

Etim and Ukoha (2010) investigated poverty among rural farming households using Foster, Greer, Thorbecke (FGT) weighted poverty index. Farm land survey data from 150 farming households were obtained using structured questionnaire. The households were selected through multi-stage random sampling procedure. The result revealed that the monthly mean per adult equivalent household was ₦1652.82 out of which poverty line of ₦1108.88 was estimated. Results of FGT decomposition revealed that poverty incidence for the study area is 0.57. Poverty incidence, depth and severity increase with increase age of household heads. Poverty incidence is highest (0.69) and lowest (0.31) when household heads are headed by persons with the age of 61-80 and 21-40 years respectively. Results further revealed that poverty incidence and severity increase with increase in size of household members. Training and education were recommended which will enable the farmers to imbibe new innovations, hence increase yield and income.

Omotesho *et al*. (2010) examined food security and poverty of the rural households in Kwara State, Nigeria using discriminant analytical tools. The households were selected through random sampling procedure. Using the basic calorie and protein requirement per capita of households, Results revealed that accessibility to health facilities; household size, farm size and household expenditure on food were the major determinants of household's food security status. Non-farm income, education level, ownership of house, age and adjusted household size were the major determinants of probability of a

household being non-poor. The study suggests family planning and specific programmes targeted at the rural poor and food insecure as policy options.

Amaza, Abdoulaye, Kwaghe and Tegbasu (2009) in their study, Promoting Sustainable Agriculture in Borno State (PROSAB) shows a strong interrelationship between food security and poverty. Probit regression technique was used to determine factors that influence poverty status and food security among participating PROSAB farmers and Non- participating famers in selected communities in the study area. Using a participatory approach to promote improved varieties of cereals and legumes, the study suggests that PROSAB has made a significant contribution towards improving food security and poverty status of the PROSAB communities. The regression results suggested that participation in PROSAB activities had a negative and statistically significant effect ($p=0.05$) on household poverty status. Furthermore, households that participated in PROSAB activities had the incidence of poverty decreased from 67% in 2004 to 49% in 2008, an indication of 18% reduction in poverty level among beneficiary households in the project area. A comparison of household poverty between PROSAB communities and non-participating communities in the state indicate that the incidence of poverty is lower in PROSAB communities in the State by 14%. Therefore, participating in PROSAB project reduced household poverty in the project area.

Bolarin (2009) conducted a quantitative analysis of poverty in Nigeria. He employed an exponential and a fixed regressions model to estimate the determinants of welfare among rural Nigerian households using panel data. The dependent variable was measured as the

ratio of per capita expenditure to poverty line. He used a pool sample of famers to estimate the factors of poverty. The study estimated factors across gender and the six geopolitical zones. The study showed changes in poverty status and their determinants between the year 1996 and 2004 among rural households. Education was found to be a key factor in reducing poverty irrespective of the gender of the household heads and the geopolitical zones. Household size was found as the second most important determinant of poverty. It was found to reduce the level of welfare irrespective of the household head gender and geopolitical zone. The study also revealed that the estimation of separate models of welfare across gender and the geopolitical zones was justified using Chow test. The reason was attributed to significant agro-ecology differences as one moved from the South to the North.

Food and Agricultural organization, FAO (2008) verified the determinants of poverty and living conditions among male and female-headed households in Vietnam. Multivariate analysis was conducted for all households. The results revealed that productivity and incomes from occupations and livelihoods were important factors for reducing poverty in the study area. Socio conditions such as health, nutrition, education and housing influenced productivity, thus affecting poverty status of the households. These in turn were influenced by poverty, affecting the ability of households to gain access to adequate social conditions to improve their productivity. The study recommended the need for complete intervention scheme, not simply in economic aspect but including social dimensions for a meaningful poverty reduction in the area.

Sunderji (2007) used data from a household survey conducted for an Indian Non-Governmental Organization between March and August 2004 to model household poverty in a village in the western state of Gujarat, India. The study sought to answer the economic and demographic characteristics as well as associated increased in household income. Two models were estimated for the study, the first treated fertility as exogenous to household income and the second used an instrumental variable in a two stage least square regression that considered fertility as endogenous. The result which emanated from the study revealed that large planted areas of cash crops and large productivity of cash crops significantly increase income in at least one of the two models. Both models show that the farm areas planted to sesame and the productivity of the sesame crop had association with income of the household. The demographic variables associated with income are age of the household head, the number of non-productive and productive extended household members. The model with fertility as endogenous variable showed that increase in the household's total number of children decreased household per capita income.

Fagernas and Wallace, (2007) model the determinants of poverty in Sierra Leone based on the 2003 household income and expenditure survey. An ordinary least square regression model of poverty determinants was developed incorporating war-related variables in the analysis. The survey revealed that about 80% of individuals in rural households in Sierra Leone were poor, and urban poverty outside the capital city of Freetown had significant value of 71%. Poverty was more in very remote districts. The analysis suggested that the poor were less likely to be educated and more likely to work in agriculture, particularly in

rice production. Cocoa farmers were also very likely to be poor, which could be explained by neglected state in which the war left the plantations of this once income generating export crop. Over 98% of households in the poorest quintile of the population indicated that they were affected by war compared with 87% in the richest households. The study recommended increased production and education as immediate panacea for the war ravaged country. Sierra Leone views the war as key factor in their poverty, despite the fact that the country was under developed prior to the outbreak of the war.

Snyder *et al.* (2006) examined race and residential variation in the prevalence of female-headed households with children and how household composition was associated with several key economic well-being outcomes using United States census data in year 2000. About 5% Public Use Micro data Sampled of the U.S. Census. The study paid special attention to cohabiting female-headed households with children and those that were headed by a single grandmother caring for at least one grandchild. These types of households were becoming more common living arrangements among female headed households with children in United States of America. It was found in year 2000 that cohabiting and grandmother female headed households with children comprised over one-fourth of all female-headed households with children in the US. Household poverty was also highest for female headed households with children that did not have other adult household earners. Earned income from other household members lifted many cohabiting and grandparental female-headed households out of poverty; as did retirement and social security income for grandmother-headed households. Poverty was high among racial/ethnic minorities and for female-headed households with children in non-metro

compared to central cities and suburban areas. The study concluded that grandmother-headed households had children with better behaviour.

Ellis and Bahiigwa (2003) in Uganda used rural livelihood approach to determine the effectiveness of modernisation of agriculture as a tool for poverty reduction. Using data generated from three rural districts of the country, they found that the well off were distinguished by having land holdings above two hectares, four or more cattle, five or more goats employing non family labour seasonally, sending their children to primary and secondary schools, owning bicycles and possibly a motor cycles, often owning non-farm service sector businesses, and sometimes having salary jobs such as school teaching.

The middle wealth category had correspondingly less of all these assets and can be found to shade into selling rather than buying seasonal labour. For this category, non-farm activities would tend to be in small-scale trading or bicycle taxis. The poorest one or two groups possessed little or no land, no cattle and few small stocks, sold labour to others, were unable to pay school fees, and did not possess bicycles and few non-farm self-employment options among which beer brewing featured most prevalently. They concluded that the poorer groups in Uganda depend principally on food crop agriculture, seasonal wage income and remittances for their livelihoods while the better off combine food crop agriculture with raising livestock holdings and widespread engagement in non-farm self-employment activities.

Dhanani and Islam (2002) carried out a poverty assessment study in Indonesia using capability measure as against money-metric measure of poverty. The study was to assess the poverty status of the people before and after Indonesian financial crisis in 1997. The results show that 25 percent of the people were unable to meet basic needs even before the crisis as against 11 percent incidence of poverty recorded by the consumption-based measure. Over 10 percent of Indonesian aged ten and above were illiterate and this proportion was twice as high for females as for males; 15 and 7 per cent respectively. Rural areas which accounted for two-thirds of the total population experienced considerable poorer housing open spaces for disposing their faeces was nearly 85 per cent, while those using traditional or family birth attendants were as high as 60 per cent. Nearly half of the rural population had less than primary school education and over 80 per cent had primary education or less. The proportion of illiterate women was more than twice as high in rural areas, nineteen percent compared with eight percent in urban areas.

The human poverty index (HPI) was also found to be lower, 25 per cent before the crisis from 35 per cent in 1990. While the level of HPI was high pre-crisis Indonesia, there was a rapid decline over time, entailing significant achievements in each of the four components of the HPI (Life expectancy, Adult literacy rate, access to improved drinking water and proportion of underweight children below the age of five) throughout 1990-1996. They concluded that this might probably be due to rapid and sustained growth under the administration in power.

Aigbokhan (2000) carried out a poverty assessment study in Nigeria using the data generated from three consumer surveys by the Federal Office of Statistics. The working data were 8183 households from 8585 surveyed in 1985/86, 13,574 from 13,801 households surveyed in 1996/97 and 8,955 from 9165 households sampled in 1992/93. The study relied on the Pα weighted poverty index measure suggested by Foster, Greer and Thorbecke (1984), to estimate the poverty changes of the households from 1985-1997. The result revealed poverty to be correlated with educational attainment of the household heads and the social indicators revealed Male literacy rate to be 58 percent compared to 41 percent for females. The results of the Pα measure revealed that 38 percent, 43 percent and 47 percent of the population were living in absolute poverty in 1985, 1992 and 1996 respectively. When the figures were disaggregated by region, the rural areas recorded higher incidence of poverty. The figures were 41 percent, 49 percent and 51 percent as against urban figures of 38 percent, 35 percent and 37 percent for the same period.

The depth and severity of poverty also increased in the period covered. Disaggregating by sex revealed the male-headed households to be poorer (80 percentage) than female headed ones (5-16 percent) on all indicators of poverty, although female-headed households constituted only about 14 percent of the sample studied. Decomposition by geo-political zone highlighted two aspects of the poverty profile. First, the contribution to poverty tended to be higher in the northern part of the country. Thus, both measure poverty and contribution to poverty are higher in the north. The second aspect is that while contributions to poverty tended to decline with the intensity of poverty in the south, they

tended to rise in the north. Both aspects thus suggested that the north constituted the bulk of poverty problems in Nigeria. The study concluded that there was increased poverty, inequality and polarization in income distribution during the twelve-year period of the study. Though there was positive real growth throughout the study period, poverty and inequality worsened.

FOS (1999a) using data generated from National Integrated Survey of Households (NISH) of 1989, 1985, 1992 and 1996 carried out a poverty assessment study in Nigeria. The 1996/97 survey utilised 14,600 households out of the 18,300 households sampled. The three preceding surveys however used 10,000 households. The households whose mean per capita consumption fell below the 2/3 of the mean per capita expenditure were classified as moderate poor while those with less than 1/3 of the MPCE were classified as extremely poor.

The study by FOS (1999a) above relied on the Foster, Greer and Thorbecke (1984) poverty indices (Pα measure) to determine the incidence, depth and severity of poverty. The results of the Pα measures reveal that the incidence of poverty increased from 1980 to 1996 in Nigeria, the figures are 28%, 46%, 43% and 66% for 1980, 1985, 1992 and 1996 respectively. The proportion of households in core poverty increased from 6.3% in 1980 to 29.3% in 1996. Decomposing by location, the study recorded a higher proportion of the poor in rural areas. 22%, 37%, 30% and 38% of the poor resided in rural areas in 1980, 1985, 1992 and 1996 respectively as opposed to 14%, 30%, 27% and 33% respectively in the urban areas. Demographic factors of the households show that the household size has

positive correlation with poverty with one person household having about 12% and households with ten or more individuals having 19% poor. The study revealed that female headed households had lower poverty levels than male headed ones. Educational attainment was correlated to poverty. The determinants of households' poverty in Nigeria were found to be household size, educational attainment, occupation of the household head, gender of the household head, age of the head and regional location.

FOS (1999b) in Nigeria using data from the 1993/1994 National Agricultural Sample Census (NASC) profiled the relationship of the poverty status of farming households with their agricultural practices. With a per capita income of N320 obtained from the NASC survey, a moderate and core poverty lines of N110.66 and N22.33 were obtained using the 2/3 and 1/3 of the per capita income of the average household. Using these figures as the baseline, land holding, farm size, types of crop grown, regional location of farm, educational attainment of household heads, use of improved inputs and farm credit, were found to be correlated with the poverty status of the households. The study revealed 77 percent of the farmers to be poor and 48 percent to be extremely poor. There were more poor farmers in the northern region than in the southern region. The south west had the lowest proportion of poor farmers (62 percent), the north east had the highest (85 percent).

Decomposing by gender of the farm household data head (FOS, 1999b), 77 percent of males as against 72 percent of the female-headed ones was poor. The proportion of people in extreme poverty were also higher in male-headed households (49 percent) than in female headed households, while moderate poor are more in female group (30 percent)

than in male group (29 percent). Education was found to be positively correlated with poverty status of the household head. Farmers with education had lower proportion of poor members. The prevalence of poverty among farmers with lower than primary education training was about 82 percent, while farmers with post secondary education were less than 42 percent. Middle aged farmers between 30 and 60 years of age were poorer in terms of number than younger or older farmers. Farmers between 16 and 30 years of age had lower proportion of poor (about 67 percent) while farmers within 41-56 years of age had close to 80 percent poverty incidence. The household size was also revealed to have positive correlation with poverty. Eighty-five percent of households with more than 20 members were poor while sixty-five percent of those with not more than 4 members were poor and households with only one member had twenty-seven percent poverty incidences.

The study further revealed that land tenure, farm practices and access to credit by the farmers had relationship with their welfare status. Poverty incidence was recorded to be high among farm land owners and those operating on family land 80% and 75% respectively. Farmers operating on rented land and farm squares recorded 66 percent and 67 percent incidence of poverty respectively. Farmers with mixed cash and food crops were poorer than other group of farmers. Food and tree crops mixed farm operators were less poor. Extreme poverty incidence was also more than 50 percent among farmers with mixed cash and food crops. Sole cash crop operators had relatively lower poverty incidence. Poverty incidence was less among farmers who used improved seeds (67 percent), than among farmers who used pesticides (73 percent) and fertilizers (78

percent). Extreme poverty incidence was also low among farmers using credit from cooperative and traditional contributions (FOS, 1999b).

## 2.8 Incidence of Poverty among Rural Households

Like in many developing countries, poverty in Nigeria is essentially a rural phenomenon as most of the impoverished people live in the rural areas, where they derive their livelihood from farming. Though, urban poverty exists and is also becoming an increasing concern, as reflected in the worsening trend in urban welfare indicators (World Bank, 1997), rural poverty is a much wider issue than the former. It is known that about 68% of the extreme poor are dependent on agriculture and live in the rural background (Cleaver and Schreiber, 1994; UNICEF, 1996; World Bank, 1997). As expected poverty in Nigeria is concentrated in rural areas, where about 64 percent live below the poverty line compared to 35 percent in urban areas. While a greater proportion of poor households are found in the North than in the South, the highest incidence of poverty is observed in households engaged in agriculture, that is, about 90 percent poor households in Nigeria are engaged in agriculture {Federal Republic of Nigeria (FRN), (2006)}.

## 2.9 Analytical Framework

### 2.9.1 Tobit regression model

Three crucial methodological issues are involved in the analysis of poverty: the first one relates to the problem of determining an appropriate poverty line and thus identifying those who are classified as poor, the second one relates to the problem of constructing a suitable overall index of poverty, and the third one relates to identification of the proper

econometric model to analyse the correlates of poverty. The standard tools for assessing the correlates of poverty are multivariate consumption expenditure regressions (World Bank, 2000). These regressions can also estimate the partial correlation coefficients between consumption expenditure per adult equivalent and the included explanatory variables.

An alternative to exploring the correlates of poverty by using per adult equivalent consumption expenditure as the endogenous variable is to perform categorical data analysis such as Probit, Logit or Tobit. Such response models are often used when a dependent variable takes one of a number of discrete values and simulations can conveniently demonstrate how much the likelihood of being poor is reduced if an exogenous variable such as land ownership were to change (Bogale *et al*., 2005). These models estimate the probabilities of being poor using Maximum Likelihood Estimation (MLE) while accounting for the discrete nature of the dependent variable (Greene, 2002). Binary response models (e.g. probit, logit) are used where poverty is considered as a "yes" or "no" decision. However, in a study where we do not only consider whether a household is poor or not, but also the intensity or depth of poverty. Therefore, the model needs to consider more than two possible responses. Similar approach has been followed by Alemayehu, Jong and Kimenyi (2001). They focus attention on the hard-core poor, moderately poor and non-poor categories to employ an ordered probit model.

The Tobit model originates from the work of Tobin (1958) and has been extensively used by economist to measure the effect of changes in the explanatory variables ($x_i$) on the

probability of being poor and the depth or intensity of poverty (Mc Donald and Moffit, 1980). The Tobit model can be used to determine the impact of the explanatory variables on the probability of being poor using a function such as:

$$q_i = P_i = X_i\beta + e_i, \ if \ P_i > P_i^* \text{----------} \quad (14)$$

$$= 0 = X_i\beta + e_i, \ if \ P_i \leq P_i^* \text{----------} \quad (15)$$

Where $i$ =1, 2 ……., n.

Where '$q_i$' is the dependent variable, it is discrete when the households are not poor and continuous when they are poor. $P_i$ is the probability of being poor (& the intensity of poverty) and is defined as;

$$\frac{Z - Y_i}{Z} \text{ ----------} \quad (16)$$

$P_i$* is the poverty depth when the poverty line (Z) equals the expenditure per adult equivalent. $X_i$ is a vector of explanatory variable. β is a vector of unknown coefficient and it is an independently distributed error term. The model assumes that many variables have a lower (or upper) limit and take on this limiting value for a substantial number of respondents. For the remaining respondents, the variables take on a wide range of values above (below) the limit. The model measures not only probability that a farmer is poor but also the intensity of poverty (Tobin, 1958 in Etim and Patrick, 2010).

### 2.9.2 The concept of Net Farm Income (NFI)

Profitability of any investment is based on comparison of the returns and costs of the investment. Hence, costs and returns analysis is the basis for measurement of profitability of any enterprise. Profitability stimulates farmers to venture into risky business and also

drives them to develop ways of cutting cost and adopting new technologies always in an effort to satisfy consumer interest. Profit maximization is the most important goal of farm business.

Profit is generally described as the difference between Total Revenue ***(TR)*** and the Total Costs ***(TC)***, the total revenue is the product of output sold and price. Total cost is divided into fixed and variable costs. According to Olukosi and Ogungbile (2004), net farm income gives an overall level of profitability of an enterprise. It involves the determination of total revenue and total costs. The difference between the two constitutes the net farm income. For the purpose of this study, Gross Margin (GM) and Net Farm Income (NFI) techniques were employed to achieve objective 4 of the study.

The two models were presented mathematically as:

$$GM = GFI - TVC \quad \text{---------- (17)}$$

$$NF = GFI - TVC - TFC \quad \text{---------- (18)}$$

Where:
GM = Gross Margin (₦/fisher folk)

NFI = Net Fishing Income (₦/fisher folk)

GFI = Gross Fishing Income (₦/ fisher folk)

TVC = Total Variable Cost (₦/ fisher folk)

TFC = Total Fixed Cost (₦/ fisher folk)

The straight – line depreciation method was used to estimate depreciation value for the fixed assets used for the fishing activities. The assets are canoes, fishing nets, outboard engine and boots.

# CHAPTER THREE

# METHODOLOGY

## 3.1 Study Area

The study was conducted in Kwara State located between latitude $7^0$ 45" and $9^0$ 30"N and longitude $2^0$ 30" and $6^0$ 25"E. It is bounded in the North by Niger State, in the South by Oyo, Osun and Ekiti states, in the East by Kogi state and in the west by Benin Republic. Kwara State has a land mass of 32,500 $km^2$ or 3,682,500 hectares with a topography that is mainly plain lands to slightly gentle rolling. The State's population and farm families were projected in 2014 to be about 3,043,222 and 306,585 respectively with average density of about 90/$km^2$ (NPC, 2006).

The climate of the area is tropical with two main seasons and an intervening cold harmattan period occurring mostly from December to January. The rainfall pattern is bimodal and runs from April through early October with a slight dry period of about a fortnight in August. The annual rainfall ranges from 800mm to 1500mm and varies from 1000mm to 1500mm in the southern western part of the State {Kwara Agricultural Development Project, (KWADP), (2011)}.

Kwara State presently comprises of 16 Local Government Areas (Figure 1) divided into four agricultural zones by the Kwara State Agricultural Development Project (KWADP) in consonance with ecological characteristics, cultural practices and project structure. A humid tropical climate prevails over the State with two distinct seasons, the wet and dry seasons. The minimum average temperature throughout the State ranges between 21.1$^0$C

and 25$^0$C while the maximum average temperature ranges from 30$^0$C and 25$^0$C. The State is primarily agrarian with great expense of arable land and rich fertile soils.

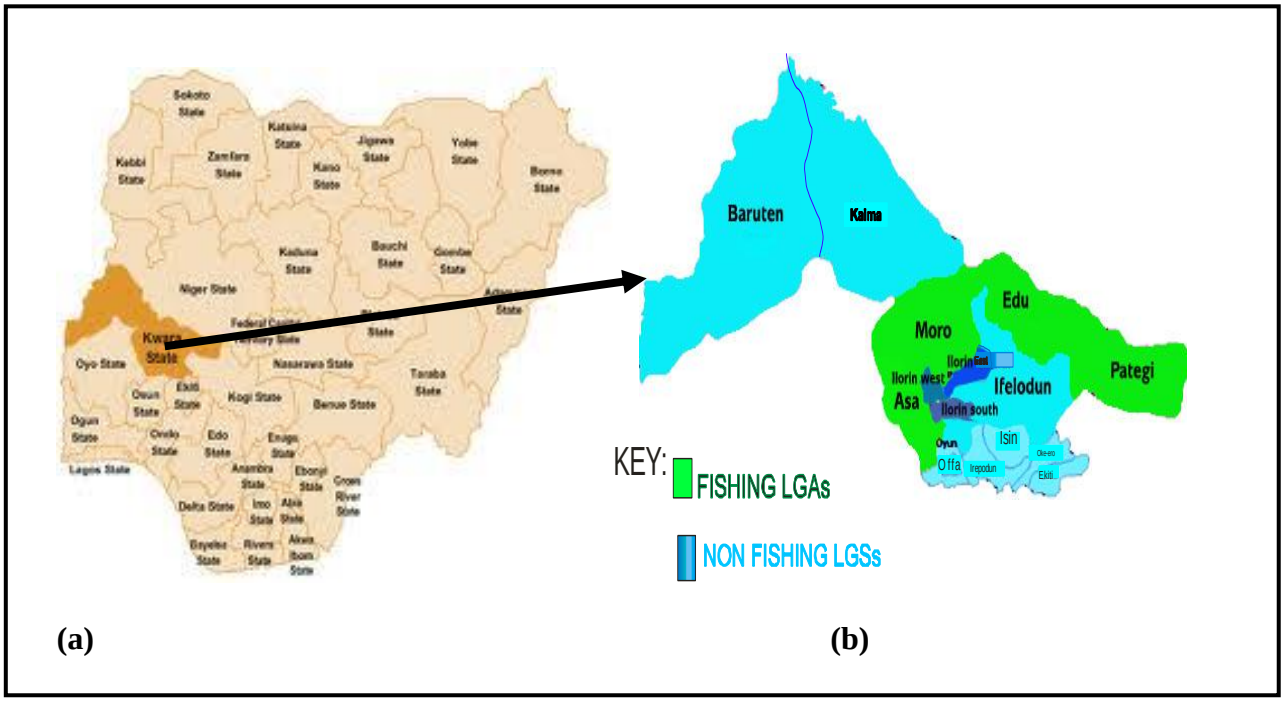



Figure 1: Map of (a) Nigeria showing Kwara State and (b) Kwara State Showing Fishing LGAs {modified from NPC, (2006) and KWADP, (2011)}.

The vegetation in the State consists largely of derived savannah with a great expanse of arable land and rich fertile soil with crops like grains and tubers mostly cultivated in all agricultural zones of the State while tree crops like cocoa and cashew thrive fairly well in agricultural zone D of the State. The State has high potential for livestock rearing especially goats, pigs, sheep and poultry. Kwara State is essentially agrarian with about 80 percent of the population living in the rural areas. More than 90 percent of the rural population engage in farming and agriculture accounts for over 70 percent of the output (KWADP, 2008).

It has relatively abundant surface water resources in the form of rivers. Artisanal fisheries production is much favoured in this North Eastern part of the Kwara 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 LGA) through Shonga/Lafiagi in Edu LGA to Gakpon in Patigi LGA of the State. Therefore, due to its proximity to River Niger, majority of the farming households indigenes in zone B are predominantly artisanal fishery households' fisherfolks and take part in annual fish caching exhibition termed *'Rigata'.* While a sizeable proportion of people in zone C are also artisanal fishery households. The fishery households are predominant in fishing settlements and villages along the River Niger area of the State with narrow inlets of stream, reservoir, dams, and rivers such as Asa, Agba, isin, and Oyun among others. The study area is drained by streams taking their sources from River Niger with ferry facilities that take people across its bank in the study area to adjacent bank with villages in Niger State. In addition, the rivers are sources of water for irrigation, domestic use and transportation.

The rainfall received in most part along River Niger of the State encourages fishing in the State throughout the year. The riverine area of the State is endowed with rivers, streams and flood plains, which offer great opportunity for canoe fishing. Fishing is the major occupation of large number of people in all the riverine areas of the State. These fishing activities are usually carried out by traditional fishing methods such as canoes with paddlers, gill nets, cast nets, long lines, hook and line sets, traps and outboard engine canoes. The main fish species found in the study area are *clarias anguillaris, barilius*

*nilotcus, hemichromis fasciatus, Synodontis filamentosa, Gymnachus niloticus, hyperopsis bebe occidentalisopsis* and *tilapia melanopleura*.

### 3.2 Sampling Procedure and Sample Size

The rural fisherfolks in Kwara State were the target population for the study. A multi-stage random sampling technique was employed for selecting the representative of sample size. The first stage involved the purposive selection of the four fishing Local Government Areas (LGAs) out of the 16 LGAs of the State viz. Asa, Edu, Moro and Patigi LGAs (Figure 1). Two fishing settlements each were randomly selected from the list of fishing settlement in each of the 4 LGAs. Then, random selection of forty percent of fisherfolks in each of the fishing settlement was selected. In all, three hundred and six households were sampled as depicted in table 2.

Table 2: Distribution of Selected Fisherfolks in the Fishing LGAs

| LGA | Fishing Settlements* | Sample Frame* | Sample Size |
|---|---|---|---|
| Moro | Kungu-Jebba | 110 | 44 |
| | Ikpata-Jebba | 130 | 52 |
| Edu | Likpata | 100 | 40 |
| | Chewuru | 120 | 48 |
| Patigi | Gbaradogi | 130 | 52 |
| | Rogun | 60 | 24 |
| Asa | Osin-Asa | 45 | 18 |
| | Laduba | 70 | 28 |
| Total | | 765 | 306 |

**Source: Kwara State ADP Farm Family Estimate*

Suffice to note that the study recognizes that estimates of population parameters from a large sample, where n is greater than 30 are satisfactory estimate of the true population (Koutsoyiannis, 2003). Therefore, a total of 306 respondents were sampled in a multi random procedure, which is large enough to allow satisfactory estimations and allow direct involvement of the researcher in the field data collection.

### 3.3 Method and Sources of Data Collection

Primary data were collected through interviews using a structure questionnaire which was subjected to a pre-survey. This was administered to the fishery households randomly selected to generate information on socio-economic and demographic characteristics of households such as age, sex, marital status, family size, vocational and skill education, their fishing experience, size of households as well as their major and subsidiary occupations. Information on weekly/monthly household's consumption expenditure; income and number of income earners in the households; household expenditure on food and non-food items, household durable and non-durable assets, sources of health facilities, drinkable water, credit facilities available to the households. Households' consumption expenditure includes weekly/monthly/yearly expenses on food, consumables, durable and non-durable assets, schooling, and housing.

Others include information on quantities, acquisition of inputs such as fishing nets, canoe and outboard engines, baits and their economic life span as well as fish output in kilogramme of fresh catches and their value in Naira.

## 3.4 Analytical Tools

A myriad of analytical techniques were employed to analyse the data to achieve the objectives of the study. The following analytical tools were used to achieve the objectives of the study:

(i) Descriptive and inferential Statistics

(ii) Farm Budgeting Technique (Gross Margin Analysis)

(iii) Foster, Greer, and Thorbeke (FGT) weighted poverty index

(iv) Tobit regression model

### 3.4.1 Descriptive and inferential statistics

Descriptive statistics such as frequency counts, mean, standard deviation, percentages, graphs and tables were used to describe the variables included in the model and to achieve objectives i, ii and vi of the study. These were used to describe socio-economic and demographic characteristics, the expenditure pattern and constraints militating against fishing activities.

Inferential statistics such as z and t-tests were used to test the statistical significance of the relationships between variables as well as good fitness of the distribution.

#### 3.4.1.1 *Expenditure pattern estimate*

Gini co-efficient and deciles statistics were used to satisfy part of objective 2. Gini co-efficient, an inequality metrics measured the extent to which the distribution of consumption expenditure deviate among artisanal fisherfolks. Poverty and welfare

measures are closely related and it has been argued that household expenditure, food consumption and income inequality are manifestations as well as a strong cause of poverty (Sabur, Talukder and Kabir, 1997; UNU/WIDER, 2000; Begum, Khan and Farooq, 2010). Hence, this study assessed the level of household expenditure and food consumption inequality among the artisanal fisherfolks.

(i) Gini co-efficient

Expenditure inequality was measured by using Gini-inefficient. Following, Morduch and Sincular (2002) and Bola (2012) where expenditures are ordered so that $y_1 < y_2 < y_3 < y_n$

The Gini-coefficient ($I_{Gini}$ ) was computed as:

$$I_{Gini}\ (Y) = 1 - \sum F_i X_i \text{ ---------- (19)}$$

Where

$X_i$ = Number of respondents

$Y_i$ = Expenditure of the ith fishery households

Thus, a Gini co-efficient of 0 represents perfect equality, while an index of 1 implies perfect inequality.

(ii) Deciles

Deciles statistics was used to rank the welfare measures into various categories by splitting the data into 10 equal parts, to assess the level of household expenditure and food consumption inequality among the artisanal fishery households. Thus:

$$D_i = L + \frac{h}{f}\left(\frac{iN}{10} - C\right)$$ i = 1, 2, ..., 10 .....(20)

Where

L= lower boundary of expenditure deciles group (₦)

h= width of expenditure deciles group (₦)

f= frequency of expenditure deciles group

N= total number of observations (306 respondents)

C= cumulative frequency of expenditure preceding deciles group (₦)

3.4.1.2 Welfare measures

Welfare measures were used to verify the possible differences in fisher folks' household welfares. The welfare measures that were used included the following: Mean consumption expenditure per adult equivalent (Total consumption); food consumption expenditure per adult equivalent; time used/hours of work; time used/hours of work; income and asset owned.

**(i) Mean consumption expenditure per adult equivalent**

Consumption is typically preferred to income as a monthly/yearly metric measure of economic welfare for practical and theoretical reasons. Consumption may be easier to measure in households with their own farms and small business since such households may be more able or willing, to recall what they have spent rather than what they earned, and following the permanent income hypothesis, it should reflect long-term economic status better (Johnson, Mckay and Round, 1990; World Bank, 2005; Begum *et al*., 2010).

Household differ in size and composition, and so a simple comparison of aggregate household consumption can be quite misleading about well being of individuals in a given household. Therefore, the total consumption expenditure per household was converted to adult equivalent using the Organization for Economic Corporation and Development (OECD) Scale, since energy requirement differs by age and sex. The mean was obtained by dividing total household consumption expenditure per month per household by adjusted household size for all the respondents.

**(ii) Food Consumption expenditure per adult equivalent**

Food consumption expenditure per adult equivalent has been claimed to be a better welfare measure than total consumption (Anand and Haris, 1990, World Bank, 2005). The argument is that much non-food consumption such as that of durables (including clothing) and some non-essentials (e.g. entertainments) is a noisy measure of long term welfare, due to campiness of sensitivity to short-term fluctuations of income. The elements of total consumption that are basically for food were compared among artisanal rural fisheries households in Kwara State on per adult equivalent basis.

**(iii) Time used/hours of work**

Work on poverty has tended to stress its multidimensional nature (Bevan and Sseweya, 1995; World Bank, 2005). Since leisure is one of the most valuable items omitted from money metric measures of welfare, the possible differences in the hours of work of artisanal rural fisheries households was verified using descriptive statistics such as mean score hours, and percentages.

**(iv) Assets owned**

Assets owned by households are a measure of their welfare status. Hassan and Babu (1991) have found that the level of asset ownership in a household is an indication of its endowment and provides a good measure of house resilience in times of food crisis, resulting from famine, crop failures, or natural disasters. This is because a household can easily fall back on its assets in times of need by selling or leasing them. Assets owned by the households were compared among the artisanal rural fisheries households to ascertain possible differences among fisheries households.

**(v) Education**

Level of education including fishing training determines the level of opportunities available to improve livelihood strategies, enhance food security, and reduce the level of poverty. The study verified this claim by comparing the mean years of education of artisanal fisherfolks at different level of training.

### 3.4.2 Costs and returns to artisanal fishery

Net Farm Income (NFI) analysis was used to capture objective iii of the study. This involved evaluating the profitability of artisanal fisheries activities. The monetized values of variable inputs and fixed costs were subtracted from Gross Revenue (GR) to arrive at Net Farm Income estimate for artisanal fishery enterprise. It is given by equation (21) below:

$$NFI = \left(\sum_{I=1}^{M} TR_{IJ}\right)\left(M_J\right)^{-1} - \left(\sum_{I=1}^{M} TC_{IJ}\right)\left(M_J\right)^{-1} \quad \text{---------- (21)}$$

Where:

NFI = Net Farm Income per fisher folk (₦),

TR = Total sales revenue accruing to the ith fisherfolks in the jth LGA (₦);

TCij = Total cost incurred by the ith fisherfolks in the jth LGA (₦); and

Mj = Total number of fisherfolks in the jth LGA.

Total Revenue (TR) is the total return or total value product (the total output multiplied by the price per unit of produce). That is;

$Q*P_y$ ---------- (22)

Where,

Q = quantity of output (kg),

$P_y$ = price per unit of output (₦)

Total Cost (TC) was computed using equation 23 below

TCij = TVCij + TFCij ---------- (23)

TVC = Total Variable Cost incurred by the ith fisherfolks in the jth LGA (₦)

TFC = Total Fixed Cost incurred by the ith fisherfolks in the jth LGA (₦)

Profitability ratios such as the profit margin (PM), gross ratio (GR) and rate of return on investment (ROI) were also computed as:

$$PM(\%) = \frac{\text{net margin}}{\text{gross income}} * 100$$ ----------(24)

$$GR(\%) = \frac{\text{total cost}}{\text{gross return}} * 100 \text{ ---------- (25)}$$

$$ROI = \frac{\text{gross income}}{\text{total cost}} \text{ ..... (26)}$$

$$\frac{TC}{KG} = \frac{\text{total cost}}{\text{average output}} \text{ ----------(27)}$$

$$\frac{NM}{KG} = \frac{\text{net margin}}{\text{average output}} \text{ ---------- (28)}$$

$$\frac{NM}{TC} = \frac{\text{net margin}}{\text{total cost}} \text{ ---------- (29)}$$

Where: PM= profit margin; GR= gross ratio and ROI= return on investment.

Depreciation values were estimated using a straight line method under the assumption that canoes and engines were used for a period of 3 years before being scrapped without salvage values. Other fixed items such as boot and fishing nets were depreciated based on estimated life span suggested by fisherfolks. Labour was standardized with adult male member of household having one labour day for working 8 hours while an adult female working for the same period was apportioned 0.75 labour day and grown up child, about 15 years was also assumed to have contributed 0.5 labour day for all kind of fish operations (Oladimeji, 1999). The average revenue (AR) consists of cash receipts from fish caught including the amount give away and consumed by the fisherfolks' household.

### 3.4.3 Foster-Greer-Thorbecke (FGT) indices

Foster-Greer-Thorbecke (FGT) indices were used to capture objective iii of the study. The FGT measure for the subgroup $i^{th}$ $P\alpha_i$ is given as:

$$p_{ai} = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^{a}$$ ---------- (30)

Where:

Pα is the FGT poverty index for the $i^{th}$ sub-groups, n is the total number of households in the $i^{th}$ subgroup households, $Y_i$ is the 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 degree of concern (a co-efficient reflecting different degrees of importance accorded to the depth of poverty and it ranges from 0 to 2. When the aversion to poverty (α) is equal to zero, it implies no concern and the equation gives the head count ratio for the incidence of poverty (the proportion of the fishery households that will be below the poverty line). When it is expressed in percentages, it is the incidence of poverty in the population. The headcount ratio has been criticised for focusing only on the number of the poor and being insensitive to the severity of poverty and to change below the poverty line. That is, it treats all the poor equally, whereas not all poor are equally poor.

That is,

Poverty headcount index (α = 0)

$$P_0 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-yi}{z}\right)^{0} = \frac{q}{n}$$ ---------- (31)

When $\alpha$ is equal to 1, it shows uniform concern and equation becomes

$$P_1 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-yi}{z}\right)^{1}$$ ---------- (32)

This measure the depth of poverty (the proportion of expenditure shortfall from the poverty line) according to Hall and Patrinos (2005), it is otherwise called the poverty gap

or expenditure gap- the average difference between the income and the poverty line. Although superior to the headcount ratio, $P_1$ still implies uniform concern about the depth of poverty, in that it weighs the various expenditure gaps of the poor equally. The poverty gap index $p_1$ was used to measure the depth of poverty of the artisanal rural fishery households in Kwara State.

When α is equal to 2 distinction is made between the poor and the poorest, that is, the severity of poverty (Foster, Greer and Thorbecke, 1984) and (Assadzadeh and Paul, 2003). The equation become

$$P_2 = \frac{1}{n}\sum_{i=1}^{q}\left(\frac{z-yi}{z}\right)^2 \text{ ---------- (33)}$$

The equation gives the concern for incidence and the distribution of the depth of poverty and its relative importance. It gives a distinction between the poor and the poorest artisanal fishery households in Kwara State. That is, the severity of poverty and extent of distribution of poverty among the fishery households in the state. The equation gives a distribution sensitive FGT index of the distribution of expenditure among the poor.

The poverty line that was used for this study was defined as the two-thirds of mean household expenditure per adult equivalent. 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; Bogale and Korf, 2009). Accordingly, a household is considered as poor when household expenditure is insufficient to meet the food and other basic needs of all household members.

Adult equivalent was generated from Organization for Economic Corporation and Development (OECD) Scale adopted by Nathan and Lawrence (2005) and Etim and Ukoha (2010) as follows:

$$AE = 1 + 0.7\,(N_{1adult} - 1) + 0.5N_{2children} \quad \text{---------- (34)}$$

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 FGT measure for the whole group or population was obtained using

$$P\alpha = \sum_{i=1}^{m} \frac{p_{\alpha i}\, n_i}{n} \quad \text{---------- (35)}$$

Where;

Pα is the weighted poverty index for the whole group, m is the number of subgroups, while n and $n_i$ are the total number of households in the whole group's and the $i^{th}$ sub-group respectively.

The contribution of each group, ($C_i$) to overall poverty was determined using:

$$C_i = \frac{n_i p_{\alpha i}}{n p_{\alpha}} \quad \text{---------- (36)}$$

Where $C_i$ is the contribution coefficient of sub-group; $P\alpha_i$ is the poverty index of the sub group; Pα is the total poverty index. The poverty indices are estimate of population, therefore their observed differences will be tested for statistical differences.

The test of significance of $P_{\alpha i}$ (subgroup poverty measure) relative to the $P_{\alpha}$ (whole group poverty measure) was calculated according to kakwani (1993) and adopted by

Olorunsanya (2009); Etim and Ukoha (2010), and Olorunsanya and Omotesho, (2011) as follow:

$$t = \frac{p_{\propto i} - p_{\propto}}{SE\,(p_{\propto i})} \quad \text{---------- (37)}$$

Where SE ($P_{\propto i}$) is the standard error of ($P_{\propto i}$).

$$\delta = \left(\frac{p_{\propto i} - p_{\propto}}{p_{\propto} - p_{\propto j}}\right) \quad \text{---------- (38)}$$

The above was used to test if significant difference exists between the Pα measures of a subgroup i with another j. The weighted poverty measures (Pα) and their corresponding standard error were also calculated.

3.4.3.1 *Stochastic dominance analysis*

The results of poverty measures were tested for robustness to the changes in the estimated poverty line with the use of stochastic dominance. The estimated poverty line, 2/3 of mean per adult equivalent expenditure obtained from the survey was varied at interval of 15% following the Canagarajah *et al*., 1997 adapted by Kyaw and Routray, 2006 and Olorunsanya, 2009 to obtain the proportion of range of expenditure of 0.7 to 1.45 which was used for dominance analysis. For the headcount ratio $P_o$ given two distributions, $F_A$ and $F_B$ for two sub-groups of a particular characteristics ($X_i$) have the same poverty line z, the stochastic dominance for headcount ratio is given as $F_A(z) > F_B(z)$ for all $x<z$ (i. e., if the cumulative distribution function (CDF) of $F_A(x)$ is everywhere above the CDF of $F_B(x)$ up to the expenditure level z). $P_o$ will always be higher for Distribution A than for

distribution B. In addition, if the dominance of distribution A over B extends over the whole CDF, the result will hold for any arbitrary poverty line (WB, 2005).

The test of robustness of poverty line ($P_o$) is carried out by plotting the cumulative distribution functions of the two distributions against the specified range of poverty line, varied at 70% - 145%. The horizontal axis shows the range of poverty line in monetary value (₦/month) while vertical axis shows the cumulative percent of the proportion of the poor households. If the distribution of one lies below the other within varied poverty line, it shows that the choice of poverty line within the range will make no difference to the outcome. It implies that the poverty ranking of the two distributions in relation to the proportion of the poor is robust to all possible lines. The sub-groups with lower CDF will have lower poverty depth and severity than sub-group with higher CDF. However, if there are intersections among the CDFs, then the second order test is carried out.

### 3.4.4 Tobit regression model

Tobit regression model was used to achieve objective V. To estimate the determinants of poverty among the rural fisherfolks, limited dependent variable model, Tobit was selected for this study. The model involved aspect of probit analysis and assumed that the observe dependent variable ($Y_i$) for observation i where i = 1, 2.....n satisfy a condition as stated in equation 39.

$$Y = max\ (Y_i^*, 0) \quad \text{---------- (39)}$$

Where the $Y_i$* is a latent variable. The variable linearly depends on β which determines the relationship between the independent variable $X_i$ and the latent variable $Y_i$*. In addition, there is a normal distributed error term $U_i$ to capture random influences on the relationship. The observable variable $Y_i$ is defined to be equal to the latent variable $Y_i$* whenever the latent variable is above zero and zero otherwise.

Where the value is positive, $Y_i$ is equal to $Y_i$* where $Y_i$* is a latent variable since the value is forced out of 0 and 1, then it is out of probability. The Tobit regression model can be used to determine the impact of the explanatory variables on the probability of being poor. The model assumes that many variables have a lower (or upper) limit and take on these limiting values for a substantial number of respondents. For the remaining respondents, the variables take on a wide range of values above (below) the limit. The model measures not only probability that the respondent's is poor but also the intensity of poverty as observed from equations 40 through 42. That is

$$Y_i^* = \sum X_i\beta + \mu_i \quad \text{---------- (40)}$$

$$Y_i = P_i = (X_i\beta, \mu_i), \text{if } P_i > P_i^* \quad \text{..... (41)}$$

$$0 = (X_i\beta, \mu_i), \text{if } P_i \leq P_i^* \quad \text{---------- (42)}$$

i= 1, 2..., n

Where $Y_i$ is the dependent variable, it is discrete when the households are not poor and continuous when they are poor. $P_i$ 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, $X_i$ is a vector of explanatory variable. β is a vector of unknown co-efficient and $\mu_i$ is an independently distributed error term (Alemayehu *et al*., 2001).

### 3.4.5 t – Statistic

This was used to test hypothesis ii. It is based on comparison of the means of two groups especially when the sample size is larger than 30. It is a useful technique for comparing mean values of two sets of numbers. The one sample t-test was used to evaluate whether the difference between the two means is statistically significant or not.

The t-statistic is expressed as equation 43 as follows:

$$t = \frac{X_1 - \overline{X_2}}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} \quad \text{----------} \quad (43)$$

Where t = calculated t value

$\overline{X_1}$ = Mean expenditure of the non poor fisherfolks

$\overline{X_2}$ = Mean expenditure of the poor fisherfolks

$S_1$= Standard deviation of the non poor fisherfolks

$S_2$ = Standard deviation of the poor fisherfolks

$n_1$= Sample size of the non poor fisherfolks

$n_2$ = Sample size of the poor fisherfolks

**Statistical significance of profitability**

This was used to achieve test of objective i. It was achieved by dividing the average profit by standard error, that is

$$T - value_{profit} = \frac{average\ Profit}{Standard\ error_{profit}} \quad \text{----------} \quad (44)$$

### 3.4.6 Description, a priori expectations and measurement of variables

**Dependent variable**

Y = Expenditure per adult equivalent of rural fisherfolks (₦) per month

**Independent variables**

**Age of the household head ($X_1$)**: This was measured in years and assumed to have a positive relationship with poverty (Roosen, Marette, Blanchemanche and Verger, 2009).

**Fishing income ($X_2$)**: This refers to sum total of the earnings of household in a year from fishing activities. This was measured in Naira and expected to be negatively related with poverty (Etim, 2007).

**Non- fishing income ($X_3$)**: This refers to sum total of the earnings of household in a year from other activities apart from fishing. This was measured in Naira. It was expected to be negatively related to poverty (Haddad and Ahmed, 2003).

**Investment in modern fishing techniques in naira ($X_4$)**: This was measured in Naira and assumed to have negative relationship with poverty (Etim and Patrick, 2010).

**Membership of cooperative ($X_5$)**: Access to agricultural inputs such as loans with these groups depends on membership and was expected that access to credit should increase household ability to diversify more and have higher income and increased production (Olorunsanya, 2009). It was expected to be negatively related to poverty.

**Access to extension services ($X_6$)**: This refers to the number of times respondents have visited or have been visited by extension services. It was measured in number of contacts and expected to be negatively related to poverty (Etim and Solomon, 2010).

**Amount credit available for fishing activities ($X_7$)**: This is the ability of the household to obtain credit for household's production and consumption in Naira per season. This could be from cooperatives, government, friends and relatives and moneylenders. This was expected to be negatively related to poverty (Bird, Hulme, Moore and Shepherd, 2002).

**Clinic Distance($X_8$)**: Distance to medical facility in kilometres was expected to be positively related to poverty. Longer distance to source of medical facility might discourage utilization and result in low level of welfare (Omonona, 2000).

**Level of education and skill training in fishing ($X_9$)** that is, average number of years received in training was expected to be negatively related with poverty (Fagernas and Wallace, 2007).

**Adjusted household size ($X_{10}$)**: Number of persons per fisher folk (Adult equivalent) was expected to be positive in relation to poverty ( Omotesho *et al*., 2010).

The empirical models were used to draw inferences on the probability of and the determinants of poverty of fisherfolks' households. Following a tobit decomposition framework suggested by McDonald and Moffit (1980) and adopted by Olorunsanya, (2009); Bogale and Korf, (2009); Etim and Ukoha, (2010), Etim and Patrick, (2010), the

effect of changes in the explanatory variables ($X_i$) on the probability and depth of the fisherfolks households were obtained. For all observations, if the expected value of the dependent variable is given as $E(s_i)$ and the expected value of $s_i$ for those households that are poor as $E(s_i^*)$ and F is the cumulative normal distribution function at z, that is F(z), where z is the $X'\beta/\sigma$. The relationship between the variables is given as

$$E(s_i) = F(z).E(s^*) \quad \text{---------- (45)}$$

For a change in the level of the independent variables, the effect on rural fishing household poverty could be decomposed into two parts by differentiating equation (45) with respect to the specific poverty characteristics ($X_{is}$) as follows:

$$\frac{\delta E(si^*)}{\delta X} = \frac{F(z)[\delta E(si^*)]}{\delta X_i} + \frac{E(si^*)\delta F(z)}{\delta X_i} \quad \text{---------- (46)}$$

Multiplying equation 46 through by $X_i / E(s_i)$, equation 46 is converted to elasticity forms as follows:

$$\frac{\delta E(s_i)}{\delta X_i}\frac{X_i}{E(s_i)} = F(z).\frac{\delta E(s_i)}{\delta X_i}\frac{X_i}{E(s_i)} + E(s_i).\frac{\delta F(z)}{\delta X_i}.\frac{X_i}{E(s_i)} \quad \text{---------- (47)}$$

Substituting equation (45) into (47) we have

$$\frac{\delta E(s_i)}{\delta X_i}\frac{X_i}{E(s_i)} = \frac{\delta E(si^*)}{\delta X_i}\frac{X_i}{E(si^*)} + \frac{\delta F(z)}{\delta X_i}.\frac{X_i}{F(z)} \quad \text{---------- (48)}$$

This shows that the total elasticity of a change in poverty has two effects:

(i) The change in elasticity of poverty intensity for the poor fishing households.

(ii) The change in the elasticity of the probability of being poor.

Elasticity is compared from equation 48. The presence or otherwise of multicollinerarity among the explanatory variables is verified by examining the correlation matrix for the model and the magnitude of the t- ratios of the explanatory variables.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.1 Socio-economic Characteristics of Fisherfolks

This section presents the socio-economic data of rural artisanal fisherfolks in Kwara State.

### 4.1.1 Sex of household heads

The result of the analysis of the sex of artisanal fishing household heads shows that males dominate the ownership of artisanal fishing venture in the State. Expectedly male-headed households were more than female-headed households in active fishing in the study area. The bulk 92.5% of fisherfolks were males and only 7.5% of pooled fisherfolks were women, who owned and engaged in fishing. The presence of female-headed households in actual fishing was due to death of male heads, migration, divorce and economic reasons. Although the result showed the dominance of artisanal fisheries sector by men, the contribution of the women folk in active fishing cannot be undermined.

According to Williams and Awoyomi (1998), women still use trap and net to catch fish in most fishing communities in Nigeria. However, a number of socio-cultural factors, restricted women from access to water resources and these include, low technical know-how and lack of credit facilities limit women full participation in the small scale fishery sector (Williams, 2002). Therefore women do not usually engage in fishing operation, particularly when it involves actual fish catch in the study area. Rather, women are engaged in processing and marketing of the fish and fish products. This result is synonymous with findings by Suleiman, (2007); Inoni and Oyaide, (2007); Kareem,

Dipeolu, Aromolaran and Williams, (2008) and Adewumi, Ayinde, Adenuga and Zacchaeus, (2012). This shows differentiation of roles and functions based on gender and ensured participation of both male and female in the artisanal fish enterprises, thereby contributing to the alleviation of poverty among both sexes in the State. It also shows the suitability of the enterprise in possible formulation of development programmes aimed at providing employment to rural fisherfolks without gender bias.

### 4.1.2 Age of household heads

The result of the analysis of the age of household heads presented in Table 3 shows that the mean age of fisherfolks was 40 years with standard deviation of 11.00. The standard deviation shows slight variation in the age of fisherfolks in the study area. The bulk 41.80% of the pooled fisherfolks fell within the modal age group ranging from 30 to 39 years. Both the mean and modal age group of the household heads fell within the active and virile age. Other things being equal, labour productivity is a function of age. It is believed that old people tend to adhere strictly to traditional methods of fishing, while young people tend to be more willing to adopt new production methods in order to increase production.

If old fisherfolks are defined as those who are above 60 years of age, 8.2% of fisherfolks can be said to be old from Table 3. In addition, if productive age group is defined as 20 - 60 years, the age distribution indicates that majority of fisherfolks (about 91.8%) fall within the productive age group and, therefore should be able to imbibe new ideas and innovations to enhance increased productivity in the fishing enterprise. Similar findings

were documented by Suleiman, (2007); Kareem *et al*. (2008; 2013) and Oladimeji *et al*. (2013a and b) who recorded the mean active age range of between 40 and 50 years.

Table 3: Distribution of household heads by age (years)

| Age (years) | Frequency | Percentage (%) |
|---|---|---|
| 20-29 | 40 | 13.1 |
| 30-39 | 128 | 41.8 |
| 40-49 | 60 | 19.6 |
| 50-59 | 53 | 17.3 |
| 60 and above | 25 | 8.2 |
| Total | 306 | 100.0 |

Mean (years): 40.0
St. Dev.: 11.0

Therefore, it could be concluded that the preponderance of active and virile heads of households in the study area has a multiplier effects on increased availability of able bodied labour for primary production; ease of adoption of innovations; reduction in the degree of risk-aversion and positive implication to sustainability of fishing enterprise in the State. Therefore age has great potential for increasing agricultural productivity and production and, hence, for improving household income and reducing poverty in the study area.

### 4.1.3 Years of schooling of household heads

The result of the analysis of the years of schooling of households' heads presented in Table 4 shows that the educational status of fisherfolks in the study area is largely skewed towards the informal education. About 72% of the pooled fisherfolks did not have formal

schooling, while 21.9% attended primary school only. Therefore, literacy rate was very low among the fisherfolks with mean year of schooling of 2.059, minimum and maximum values of 0 and 12 years respectively. The estimated mean years of schooling of fisherfolks in the study area, 2.059 years, fell below 2011 UNDP mean education index of 5 years for Nigeria.

Table 4: Distribution of household heads by years of schooling

| **Years of Schooling** | **Frequency** | **Percentage (%)** |
|---|---|---|
| 0 | 220 | 71.9 |
| 1-6 | 67 | 21.9 |
| 7-12 | 19 | 6.2 |
| Total | 306 | 100.0 |

Mean 2.059; St. Dev.: 3.553

This implies that artisanal fisheries operations in the State were performed mostly by illiterate and semi-illiterate fisherfolks. This finding is similar to opinion of many researchers that most farmers in Nigeria are illiterate or semi-illiterates, most of who dropped out from formal school system as evidence from the study of Olaoye, Idowu, Omoyinmi, Akintayo, Odebiyi and Fashina, (2012). This may have affected their chances of using improved and sophisticated motorized canoes and fishing gears which required skilled training and reading manuals to learn modern fishing techniques. Low level of fisheries education in form of training, workshops and enlightens can adversely affect success of fisheries development programmes because education and particularly training enhances adoption of technology and improved methods which are vital means of

achieving higher fish catch levels. Forde, (1994); Oladimeji, (1999); Inoni and Oyaide, (2007); Adewumi *et al*. (2012) and Kareem *et al*. (2008) agree with this assertion, that the low level of fishing education and social status of the artisanal fisherfolks were some of the constraints to their fish catching levels and indeed their development.

However, in terms of literacy in any other language like Arabic language, the mean year of schooling for household heads was higher, 4.8 years as against 2.059 for only formal schooling but approximately equal to 2011 UNDP mean education index of 5 years for Nigeria. Therefore, it suffices to note that the large proportion of formally uneducated fisherfolks has profound ability to communicate and write in Arabic language. It can be concluded that the ability of fisherfolks to write in Arabic language could be seen as positive to development of artisanal fish industry in Nigeria, especially if extension materials are translated into Arabic language.

The implication of this finding is that the level of fishery related education is believed to influence the use of improved technology in fishery, and hence fish catch level and productivity. However, years of formal schooling determine the level of opportunities available to improve livelihood strategies and reduce the level of poverty. It affects the level of skill acquisition, exposure to new ideas and managerial capacity in production and the perception of the household members on how to adopt and integrate innovations into the household's survival strategies. According to Adebayo (2009), the implication of lack of education by the household head is that such a household is more likely to have

higher poverty status than educated farmers. Fishery household heads that lacked formal education as shown in the finding was 71.9%. This has implication in the fisherfolks' ability to understanding some logistics of fishery management which would obviously be lower compared to those that have formal education. However, a higher level of educational attainment may discourage some artisanal folks from participating actively in artisanal fishing operations.

### 4.1.4 Vocational training of household heads

The result of analysis of vocational training of household heads presented on Table 5 shows that all the sampled fisherfolks received informal training in fishing expeditions, processing and sales. About 70% received training between 6-10 years while about 20% got their training for at least a period of 10 years and above. The standard deviation (2.25 years) shows close variation in the years of training undergone by sampled respondents. Furthermore, the majority 91.5% of the respondents affirmed that they got the idea of fishing through inheritance, that is, family involvement in fishing activities, mostly under the tutelage of a close family member, usually the father or uncle while a handful of others (8.5%) got the knowledge through migration or settlement in the riverine area. This implies that fishing is a native and indigenous trade to most of the respondents in the study area and most fisherfolks started fishing expedition right from childhood.

Table 5: Distribution of household heads by years of vocational training in 2013

| Vocational Training (years) | Frequency | Percentage |
|---|---|---|
| 1-5 | 30 | 9.8 |
| 6-10 | 214 | 69.9 |
| 10 and above | 62 | 20.3 |
| Total | 306 | 100.0 |

Mean 7.892
St. Dev. 2.25

The implication of the vocational training in fishing is that although the processes of artisanal fishing training still remains subsistence, primitive and rudimentary, that it is hardly employed as the viable means of commercial fish production in the State. But where the majority of the households in the riverine area can be productively engaged in fishing, this will most likely increase the possibility of the household earnings, bring about food security hence, and reduce poverty. Therefore, artisanal fishery promotes fishery sustainable development, employment; nutritional imbalance and offers an unexploited succour, capable of salvaging the people from poverty. In view of the above, creating renewed awareness and practice of fishing in the rural setting, would go a long way in eradicating rural economic challenges and in creating a self-reliance enterprise that will help reduce the hardship, unemployment and other social vices associated with it.

Further analysis revealed that the majority 98.03% of the pooled fisherfolks operate on a family unit bases, that is, the fisherfolks prefer sole proprietorship. This perhaps explained why most fisherfolks in the study area operated non-motorized canoes.

### 4.1.5 Years of fishing experience of household heads

The result of the analysis of years of fishing experience of household heads in Table 6 shows that the mean fishing experience of artisanal was 19.2 years. Fishing experience ranged between 3-50 years and the modal class had a range of 11-20 years and approximately half, 49.7% of sampled respondents. In addition, 21.6% of fisherfolks have fished for between 21 and 30 years, while only 2.3% of them have been in the fishing business for over 40 years and above. The distribution indicates that the respondents are relatively young in the business, since about 71% of respondents spent less than 20 years in fishing. However, the fisherfolks, particularly those in motorised sector of the artisanal fishing require adequate experience to be able to exploit more valuable fish species in deeper waters.

Table 6: Distribution of fishing experience of household heads

| Range | Frequency | Percentage (%) |
|---|---|---|
| 1-10 | 54 | 17.6 |
| 11-20 | 152 | 49.7 |
| 21-30 | 66 | 21.6 |
| 31-40 | 27 | 8.8 |
| 41 and above | 7 | 2.3 |
| Total | 306 | 100.0 |

Mean 19.2
Stdev 9.7

According to Akinwumi *et al.* (2011); Oladimeji *et al.* (2013a) and Kareem, Dipeolu, Aromolaran and Akegbejo, (2013), fishing experience is an important factor determining fish catch and processing in artisanal fishery in the study area. They posited that the

effects of fishing experience on fish catch and processing may be positive or negative. Generally, it would appear that up to a certain number of years, fishing experience would have a positive effect. After that, the effect may become negative. The negative effects may be derived from aging or reluctance to change from old and familiar practices and techniques to those that are modern and improved.

The result implies that the fisherfolks are experienced. Hence, fishing experience would enhance the catch per unit effort and invariably productivity in output (catch). Akinwumi *et al.* (2011); Kareem *et al.* (2013) and Oladimeji *et al.* (2013a) also asserted in their findings that the fisherfolks gather more experience over time, their efficiency increased and their fish catch level also increased. Therefore, the mean year of fishing experience (19.2 years) ensured transfer of skills, knowledge and sharing of experience which is necessary for growth and development of artisanal fishery industry.

### 4.1.6 Family size of household heads

The result of analysis of family size of households presented on Table 7 shows that the average numbers of persons per fisher folk household were approximately 7 with standard deviation of 1.947 and 4−7 children as modal class. Further analysis shows that 68.9% of sampled respondents had household size of 4-7 children and 15.4% of fisherfolks had a ranged of 12 children and above.

The implication of this is that the households with more members per household would probably have ample labour available for fishing. The availability of more than one

working member per household would also portend higher level of well-being for this category of households. Therefore, the size of the household affects the amount of farm labour, determines the food and nutritional requirements of household and often affects poverty status and household food security. According to Oladimeji, (1999); Inoni and Oyaide, (2007), in subsistence artisanal fishery as practiced in the study area, household size is very important as it determines to a large extent the supply of labour to the fishery activities.

Table 7: Distribution of family size of households

| **Family size** | **Frequency** | **Percentage** |
|---|---|---|
| 1-3 | 3 | 1.0 |
| 4-7 | 211 | 68.9 |
| 8-11 | 45 | 14.7 |
| 12 and above | 47 | 15.4 |
| Total | 306 | 100 |

Mean: 6.542
St dev: 1.947

However, where adult and children dependency ratios are very high, a large family size may be of little or no advantage to the household on the fishery activities. For example, the result shows that the ratios of adult and children dependants were 0.1 and 0.5 respectively. This implies that the number of children dependant with ratio of 0.5 will weigh much burden on members of the labour force within the household compared to a ratio of 0.1 of adult dependency. There is likelihood of low well being particularly if the working members are not earning much. Therefore, indicators of household size structure

are important in that they give a possible correlation between the levels of poverty household composition.

Further implication of large family size in subsistence agriculture particularly artisanal fishery hinges on availability of labour to actual fishing expedition, processing, distribution and marketing of the product, the enterprise is more labour intensive as amount of fish caught depend largely on hours and number of fish trips, though sometime on chances. While this is true only if members of the household partake in the family fishing business, a large household with many members could also get involved in other livelihoods which could be source of wealth to aid the family with income which could be used to purchase fishing inputs for fishing, purchase food, children's school fees and meet some other family needs.

Conclusively, where majority can be productively used in fishing activities, there is every probability of more fish catch and increased income. Ultimately, this will most likely reduce poverty status of the artisanal households. Similarly, where members of the households are involved in some other productive ventures where they can earn incomes, such off-fishery incomes will enhance the food and nutritional requirements as well as non-food expenditure of households, which may be a good pointer towards reduced poverty status.

### 4.1.7 Occupations of household heads

The results of the analysis of the primary and secondary occupations of household heads are presented in Table 8 and 9. The artisanal fishing is an important and most predominant enterprise in the areas of study. The fishing season spans over the whole year but usually seven months from the end of rainy season, from October to the beginning of another rain, mostly in April. Table 8 shows that 86.9% of the respondents engaged in full time fishing while 13.1% of the fishery households took fishing as subsidiary means of livelihood. This confirmed the assertion by Oladimeji, (1999) that fishing is the major occupation of people living in the coastal and riverine areas. This is, in addition, to those associated with preservation and processing of fish caught. Therefore, artisanal fishery is a dynamic and evolving sector employing rural labour for catching fish, processing and preservation, by means of traditional technologies to exploit inland water fishery resources.

Table 8: Distribution of primary occupation of households heads

| Major Occupation | Frequency | Percentage (%) |
|---|---|---|
| Fishing primary occupation | 266 | 86.9 |
| fishing secondary occupation | 40 | 13.1 |
| Total | 306 | 100.0 |

On the other hand, Table 9 presents the result of analysis of secondary occupation of household heads which elucidated the degree of livelihood diversification among the respondents. The families' household livelihood strategy in the study area tends to

combine various ways of earning a living in addition to the primary occupation. The result of the analysis of secondary occupations of fisherfolks in Table 9 shows that at the onset of the rain, most fisherfolks prefer to retire to rice and other arable crop farming, which accounted for 52.6% of their subsidiary occupation. From the table, majority of the pooled fisherfolks had subsidiary occupations which served the dual purpose of alternative income and job opportunities. About 14.7% of respondents were into wood carving/carpentry while only 3.3% and 4.9% of the fishing households engaged in indigenous artisans and government jobs respectively.

Rural fishing households' involvements in civil service (4.9%) were relatively small in the study area. The civil servant as a secondary occupation was mostly security guards with very low income and less available time for full time fishing. Other supplementary activities performed by the sampled fisherfolks include net-making and repair, boat building, engine repair and maintenance, which provide additional fishery related employment and income opportunities in inland fishing communities.

Table 9: Distribution of secondary occupation of household heads

| **Secondary Occupations** | **Frequency** | **Percentage (%)** |
|---|---|---|
| Farming | 161 | 52.6 |
| Fishing | 40 | 13.1 |
| Wood Carving/Carpentry | 45 | 14.7 |
| Government employee | 15 | 4.9 |
| Trading | 35 | 11.4 |
| Other Native Artisans | 10 | 3.3 |
| Total | 306 | 100.0 |

From the above and considering the studies by Oladimeji, (1999); Sulaiman, (2007) and Olaoye *et al*. (2012), it can be concluded that small scale fisheries operate at widely differing organizational levels, ranging from engaging in fishing as primary occupation through informal microenterprise to formal sector businesses. Sulaiman (2007) also confirmed that the cultural setting of fishing communities in Kwara State and adjacent States, Kogi, Niger and Kebbi inclusive encouraged entrepreneurship among male and female fisherfolks of all ages and were found to engage in either actual fishing, processing or fish marketing and other secondary occupations.

The implication of this finding is also similar to what Olaoye *et al*. (2012) pointed out that the rural artisanal fisherfolks have developed capacity to cope with increasing vulnerability associated with fishing, such as diversification, intensification and migration. Engagement in farming as a major secondary occupation in the fishing community implies that rural areas have diversified farming oriented economy. Diversification as a strategy involves the attempt by individuals and households to find new ways to raise income and reduce risk. Ellis, (1998) and Nasai (2008) stated that it is evident that rural households in Nigeria engaged in multiple activities such as trading (marketing or adding value to commodities), small scale business enterprises (carpentry, radio and bicycle repairs), processing of agricultural goods and arts and crafts (weaving, mats and basket making) in order to supplement earnings from agriculture.

### 4.1.8 Households' off-farm activities

The result of the analysis of households' off-farm activities shows that only 24.6% of fisherfolks worked off-farm. The finding on Table 10 shows the specific off farm activities undertaken by the fisherfolks. These off-farm activities are defined as those activities usually undertaken by the fisherfolks during his/her spare time, whether during the rainy season or the dry season, but which do not fall into the category of either primary or ancillary occupations. It was found that 24.6% of fisherfolks were involved in off-farm activities as against 65.4% of fisherfolks who did not participate in any off-farm activities. Among the off-fishing activities, supporting local artisans such as bricklaying and carpentry, and trading were the most dominant off-farm activities as indicated by 10.2% and 9.8% respectively while only 6.1% were involved as motor cycle riders. It suffices to note that the bulk 65.4% of artisanal fisherfolks did not involve in any off fishing activities.

Table 10: Distribution of off farm of household heads

| **Off Fishing Activities** | **Frequency** | **Percentage** |
|---|---|---|
| None | 200 | 65.4 |
| Hunting | 26 | 8.5 |
| Artisans | 31 | 10.2 |
| Comm M. Cycle R. | 19 | 6.1 |
| Trading | 30 | 9.8 |
| Total | 306 | 100.0 |

The implication for this finding is that off-farm activities have the tendency of supporting the financial status of fisherfolks during the off-fishing season and when the secondary

occupation could not be exploited. In addition, the extra income earned from the activity could be used in artisanal fishery to pay hired hands for fishing operations and procure inputs needed in fishing. Therefore, off-farm activities may have enhanced fishing operations and probably led to increased fishing activities and catches.

Consequently, the findings from livelihood strategies in artisanal fishery enterprise had some far reaching implication on poverty status among the fisherfolks. First, it is advisable for rural fisherfolks to engage in fisheries during the peak abundance and main fishing season immediately after rainy season and to combine another productive activity as listed in secondary occupations in Table 9. However, Olaoye *et al.* (2012) is of the view that fisherfolks engaging in secondary occupation might only be considered as part time-fishers or farmers, and as such may be excluded by policy makers from a number of development schemes and benefits.

Furthermore, multiple livelihood sources help to reduce the catastrophic effects fisheries management measures can have, where fishery must be closed or reduced due to the state of resources. This finding is in consonance with previous findings in the area. For example, the study by Abiodun and Oshungade, (2009) on fishery statistics at Jebba Lake in Kwara State, observed a significance reduction in catches by 40.5% from 1950 metric tons in 1983 to 1540 metric tons in 2001. A participatory community based fisheries management system, which improves fish production through the conservation and rational exploitation of fisheries resources is recommended. This can only be possible only if the fisherfolks engage in ancillary job. This suggests also that any policy aimed at

improving the livelihood strategies and standard of living of the rural fishery households in the study area should at least target both primary and secondary occupations.

## 4.2 Institutional Variables of Fisherfolks

This section presents the institutional and infrastructural data of rural artisanal fisherfolks in Kwara State.

### 4.2.1 Sources and amount of production credit

The result of the analysis on fisherfolks' credit in Table 11 showed that only 11% of fisherfolks received various amount of productive credit from the sources presented in Table 12. The result further revealed that the bulk 88.9% of fisherfolks did not have access to nor obtained credit. Therefore, more than half (58.8%) of respondents obtained credit or sourced their finance from Bank of Agriculture and 29.4% of respondents obtained credit from their cooperative society. Less than 9% had their credit from family, friend and relative. This implied that the bulk of fisherfolks did not have access to production loan from both formal and informal sources.

Further analysis also revealed that the bulk of the fisherfolks, 58.8% who obtained loan from Bank of Agriculture, had the size of the loan ranging from less than ₦50, 000 to ₦100, 000 while Table 12 shows that the bulk of loan beneficiaries, though, few of the total the respondents, sourced their loans either from Bank of Agriculture or fisherfolks' cooperative society.

Table 11: Distribution of amount of production loans received

| Amount of Loan (₦) | Frequency | Percentage |
|---|---|---|
| Nil | 272 | 88.9 |
| 10001-50000 | 13 | 4.2 |
| 50001-100000 | 19 | 6.2 |
| 100001-150000 | 1 | .3 |
| 150001 and above | 1 | .3 |
| Total | 306 | 100.0 |

The most dominant source of credit was Bank of Agriculture. The handful production credit from formal institution was largely due to proximity of the Agricultural bank in Asa LGA fishing settlements at Afon area. There was no credit from commercial banks and money lenders since majority of the fisherfolks complained of administrative bottlenecks and high interest rate associated with the former and ridiculous charges by the latter.

Table 12: Distribution of source of production loans

| Source* | Frequency | Percentage |
|---|---|---|
| Friends/Relative | 3 | 8.8 |
| Co-operative Societies | 10 | 29.4 |
| Bank of Agriculture | 20 | 58.8 |
| Commercial Banks | - | - |
| Others | 1 | 2.9 |
| Total | 34 | 100 |

* a fisher folk has only option of one major source

This result was supported by Olaoye *et al.* (2012) and Oladimeji *et al*. (2013a) who observed that non-availability of a credit scheme or near absence of fishing credit to fisherfolks taking into full consideration the peculiar circumstance of small-scale fisheries, militates against capital intensive expansion. Since most of the fisherfolks were artisanal and lack the resources to acquire modern fishing gears for fishing operations, the lack of credit or its inadequacy was most likely to affect fishing operations negatively. This may not assist in reducing their poverty level and may not have enhanced the improvement in the living standards of the fisherfolks.

Generally, lack of financial liquidity and subsistence nature of artisanal fishery in the study area has retarded the growth and development of the industry. The availability of credit facilities for the use of the artisanal fisherfolks could also increase the likelihood of their adopting the use of modern fishing gears, such as outboard engines and sophisticated nets as against the use of traditional, manual propelled boats/canoes. The credit facilities will enable the fisherfolks to acquire the fishing machines, that are capable of reaching far into distant waters and thus increase fish catch levels of the artisanal fisherfolks. This is important because their nearby river waters are usually overexploited and therefore depleted. Again, the target of increasing fish catch levels by the fisherfolks could also make them abandon the manually paddled canoes and adopt the use of modern outboard engines, which reach out far into the water to improve catches.

### 4.2.2 Challenges encountered in accessing production credit

Closely related to source and amount of production credit are challenges encountered by fishing households in their quest to access credit presented in Table 13. The most frequent bottlenecks indicated by respondents were high interest rate (34.3%), charged by both the formal institutional lender and informal lender, such as money lenders. Since most of the fisherfolks' cooperatives are inactive, lending from their association becomes survival of the fittest and delay in obtaining the credit. The next most important challenge was insufficient credit (32.7%), followed by problem of collateral security and delay in obtaining credit with 19.0% and 11.4% respectively.

Table 13: Problems encountered by household heads in obtaining credit

| ***Problem Encountered** | **Frequency** | **Percentage** |
|---|---|---|
| High interest rate | 105 | 34.3 |
| Insufficient Credit | 100 | 32.7 |
| Problem of Collateral | 58 | 19.0 |
| Delaying in obtaining credit | 35 | 11.4 |
| Others | 8 | 2.6 |
| Total | 306 | 100 |

* Only the most sought option per fisher folk was computed.

These findings were similar to those of Olaoye *et al*. (2012) and Kareem *et al.* (2013) in which they found that the bulk of their respondents depend solely on saving, family and friends and could not access credit from formal lenders, with no significant differences between gender, age, education or being members of cooperative groups.

### 4.2.3 Investment in fishing equipments

The artisanal fisheries in the State are characterized by low capital investment and high labour intensive practices. For instance, the Studied areas investment in non-motorised canoes had a range of ₦5500 to ₦12000 and ₦40,000 to ₦120,000 for motorised canoes while that of fishing nets had a range of ₦2500.00 to ₦8000.00 respectively. The common fishing gears and equipments are: hooks and line, fish traps, cages, cast net, gill net, seine and other similar devices that are operated on average by 2-5 persons with fishing craft mostly paddled canoes and a few motorized canoes as shown in Table 16 above. The dominant gears used by fisherfolks across the study locations consist mostly of gill nets (41%), cast nets (38%), hooks and lines (10%) and others such as traps and seine nets (11%). Gill nets were most frequently used in the study area in catching clarias spp, tilapia, lung fish and heterotis. There were no storage facilities in the canoes hence the fish caught are not adequately preserved. The wastage resulting from this can be as high as 30% depending largely on ready market and available labour for the local preservations.

The findings in this study were in agreement with Oladimeji, (1999); Adeyemi, Bankole and Adikwu, (2009) and Akinwumi *et al*. (2011) who reported that gill nets, cast nets, Malian traps and long lines were typical of most Nigerian waters and that their catches generally included small sized fish, notably Tilapia (comprising *Oreochromis niloticus* and *Tilapia zilli*), *Heterotis niloticus, Synodontis filamentosa* and *Clarias* spp.

### 4.2.4 Extension visits

The result of extension visits showed that most of the fisherfolks had insufficient extension visits as presented in Table 14. The mean extension visit per year was 2.34 with minimum and maximum of 1 and 6 respectively. Majority of respondents, 64.7% had access to extension services once or twice per year, while only 4 respondents had opportunity of extension visits at least 5 times a year. However, it is suffice to note that extension service is very essential to the improvement of fishery practices and efficiency among fisherfolks. Extension visits would have a positive effect on fisherfolks' ability to respond to new innovations and techniques as well as to latest technology on fish processing and preservation.

Table 14: Distribution of extension visits

| No. of Extension Visits | Frequency | Percent |
|---|---|---|
| 1-2 | 198 | 64.7 |
| 3-4 | 104 | 34.0 |
| 5 and above | 4 | 1.3 |
| Total | 306 | 100.0 |

Mean - 2.34
St.dev. - 1.016

### 4.2.5 Membership of cooperative societies

Cooperative society involves a social participation that helps fisherfolks to pool their resources together, to have access to fishing inputs including credit finance, to diffuse new innovations and techniques and to have interaction with other as well as sharing information on modern fishing practices. The result of membership of cooperative, which

reflects the number of years of fisherfolks in fishing association or cooperative is presented in Table 15. The result shows that all the sampled fisherfolks in the study area belong to cooperative and fishing associations in their various localities. For example, 38.6% of the respondents had a range of 1-10 years as co-operators while 37.3% were in cooperative for a range of 11-20 years. It suffices to note that the minimum and maximum years of co-operators were 2 and 48 years respectively and 4 respondents had been in cooperative for a range of 41 years and above. Therefore, fishery cooperative in the study area had been established for a long time, but findings have shown that most of these associations like other farming cooperatives are grossly underdeveloped and inactive. This does not enable the group to assess most of the new innovations and have access to inputs necessary to increase their output and improve their standard of living.

Table 15: Distribution of membership of cooperative societies

| **Years** | **Frequency** | **Percent** |
|---|---|---|
| 1-10 | 118 | 38.6 |
| 11-20 | 114 | 37.3 |
| 21-30 | 53 | 17.3 |
| 31-40 | 17 | 5.6 |
| 41 and above | 4 | 1.3 |
| Total | | |

Mean 16.0
Stdev 9.133

Result also revealed that despite the fact that fisherfolks are members of cooperative, most of the fisherfolks (75.0%) operate on individual basis since the associations are passive.

The adverse effect of this may lead to arbitrary and overutilization of water resources, thereby over fishing and depleting the fish species. Although fish is a renewable resource, since their stock can be replenished. However, their renewability critically depends on the quality management they are subjected. Membership of cooperative societies as observed by Olaoye *et al.* (2012) and Oladimeji *et al*. (2013b) is therefore a factor which influences the adoption to improve fishing techniques and apparently poverty alleviation. Suffice to note that a functional and active umbrella organization for fisherfolks is required to handle issues of capacity building of fisherfolks and economy of scale, linkage with input and output dealers, negotiation with credit institutions and various tiers of government and interested non-governmental organization.

### 4.2.6 Production variables

4.2.6.1 *Types of fishing gears used*

The result of the analysis of canoes/boats ownership structure is in Table 16, which shows the pattern of non motorized canoe ownership was as follows: 33.1% were owned by fisherfolks from Moro fishing settlements followed by 27.2% from Edu fishing settlements; while 24.8% and 15.1% were owned by Patigi and Asa fisherfolks respectively. On the other hand, the bulk of motorized canoes (98%) were largely concentrated in Nupe area situated along the Northern part of the State with River Niger flowing along most of their boundaries and these comprise of Edu, Patigi and partly Moro Local Government Areas (LGAs). Therefore, artisanal fisheries in the study area rely heavily on the use of non-motorized canoes as presented in Table 16. For instance, about

88% canoes out of the total of 338 canoes used by artisanal fisherfolks in the study area were non-motorised.

According to Oladimeji, (1999); Olubanjo, Akinleye, and Balogun, (2007) and Kareem *et al.* (2013), ownership and types of canoes and fishing nets determine to a large extent the amount of fish catch. For example, the use of motorized boat and other improved technologies would enable fisherfolks to venture into sheltered river and coastal areas, river mouth and farther out to the continental shelves, relatively shallow ocean plains between the land and the ocean areas.

Table 16: 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

Furthermore, the result of the analysis revealed that a majority of the canoe ownership 93.2% was by men while women owned only 6.8% of the canoes which are all non-motorized. This has implication on fishing since some women may be willing to engage in fishing but do not have means which made them depend solely on their husbands. The few women fisherfolks may be attributed to the tradition and custom of the people in the

study area, where women are mostly restricted from actual fishing but preferred to engage in processing and marketing of fish. They also perform other nonfarm activities as well as domestic activities such as taking care of the family and cleaning of the house. This result was in line with Sulaiman, (2007); Adewumi *et al.* (2012) and Oladimeji *et al.* (2013b) who observed the dominance of men in actual fishing and the dominance of women in fish processing, which shows differentiation of roles and functions based on gender.

#### 4.2.6.2 *Fishing frequency per week*

The result of the analysis of the period of fishing expedition is presented in Table 17 and shows that majority (99%) of the respondents engaged in fishing expedition (number of trips) between 3 and 7 times a week with average and standard deviation of 5.9 and 0.08 respectively. On the average, the respondents spent about 8 hours on each trip per day with minimum and maximum of 2 and 12 hours respectively. The standard variation for number of hours spent is 1.54, which shows that there was slight variation in hours spent among the respondents. Furthermore, the estimated average number of months spent in fishing/year was 9.3 months and this attests to the fact that majority of the fisherfolks operate on a full time basis. The numbers of trips per week (invariably per year), average hours spent and type of gears used are very important determinants of the quantity of fish catch accruable to fisherfolks and it has multiplier effect on income, and invariably the standard of living.

However, increasing fishing frequency as observed by Inoni and Oyaide, (2007) may be an indication of dwindling fishery resources and possible depletion of resources in nearby

fishing grounds. Therefore, in order to sustain their livelihood, fisherfolks should be encouraged to acquire motorised canoes so as to travel further into the river to exploit the distant fishery resources.

Table 17: Fishing frequency per week

| | **No. of Trips/Wk** | **No. of Hours/Wk** | **No. of Days/Wk** | **No. of Month/Year** |
|---|---|---|---|---|
| Mean (X) | 5.9 | 7.93 | 5.22 | 9.3 |
| Minimum | 3 | 2.0 | 1.0 | 2.0 |
| Maximum | 7 | 12 | 7.0 | 12 |
| Stdev | 0.08 | 1.54 | 0.99 | 1.63 |

4.2.6.3 *Distribution of fish catch*

The daily fish catch rates per canoe ranged from 5kg to 45kg with a State average of 13.7kg. Although Oladimeji, (1999) recorded an average daily catch ranged of 14.5kg to 47.50kg with a State average of 17.50kg and Sagua (1975) obtained average daily catch rates per boat of 11.49kg in Kwara State while Inoni and Oyaide (2007) recorded 12.36kg in Delta State. The dwindling average of 13.75kg was attributed partly to increase in number of fishery households which have increased from an estimated 1200 fishery households in 1975 to over 10, 000 in 2010 (KWADP, 2008). This is also coupled with an improvement in the level of fishing technology such as acquisition of improved fishing nets, gears, canoes both paddled and motorized. However, Abiodun and Oshungade, (2009) recorded an average daily catch as low as 3.1kg/canoe in Jebba lake around Kwara

and Niger State border, which suggests that the southern part has been heavily fished and the fish stocks in the area were extremely tilted towards smaller immature fishes.

#### 4.2.6.4 *Durable assets owned by the fishery households*

Table 18 presents the value of assets owned by households covered in the study area. These assets include Mobile phones, Radio sets, Livestock, Bicycles and Motorcycles, Conveyor canoes, extra land, car/pick up and building owned. About 30% of the respondents in the study area have assets valued between ₦60,001 and ₦80,000 and 20% of the fisherfolks have a range of assets valued between ₦40,001 and ₦60,000. However, only 6% of fishing households had assets valued at least ₦100, 000 or above. This implies that the bulk of the fisherfolks (94%) had assets below the value of ₦100,000.

The result also revealed that the bottom 3 assets groups covering about half, 49.3% fishery households own just 20.2% of the assets whereas the top 3 asset classes encompassing 50.7% of fishery households own 79.8% of assets. Furthermore, 29.4% of households in the bottom 2 asset classes possess just 9.7% of the total assets whereas the top 20.3% of households command more than 62.1% of the total assets. It suffice to note that the high value of assets of land and building in the total asset holders could be responsible the high inequality in the distribution of assets in the study area.

According to Hassan and Babu (1991) in Amaza *et al*. (2009), assets ownership by the households measure their endowments and provide a good measure of livelihood resilience in times of food crisis resulting from famine, crop failures or natural disasters.

It is believed that the households can easily fall back on these assets in times of need by outright sales of these assets or by leasing them.

Table 18: Value of households' asset ownership

| Asset value (₦) | Frequency | % of households | Average asset Value (N) | % share in Total asset |
|---|---|---|---|---|
| 1000-20000 | 20 | 6.5 | 17550 | 4.2 |
| 20001- 40000 | 70 | 22.9 | 22800 | 5.5 |
| 40001-60000 | 61 | 19.9 | 43760 | 10.5 |
| 60001-80001 | 93 | 30.4 | 74250 | 17.8 |
| 80001-100000 | 43 | 14.1 | 95700 | 22.9 |
| >100000 | 19 | 6.2 | 163500 | 39.2 |
| Total | 306 | 100 | 417560 | 100 |

Similarly, the level of valuable, disposable assets owned by a household is regarded as a factor determining the degree or vulnerability of the household to food insecurity, poverty incidence, and poverty intensity. This is because these disposable assets can be sold in times of need and, to that extent, constitutes a determinant of the probability of a household being food insecure or poor. These assets could also serve as a measure of household wealth, and hence, the level of their possessions is expected to have a negative relationship with poverty status. That is, given other factors, the higher the value of disposable household assets possessed, the lower the probability of household food insecurity and poverty, and vice versa.

### 4.2.7 Other institutional (infrastructural) variables of artisanal fishery households

This sub section presents the other institutional/infrastructural variables of the rural artisanal fishery household heads in Kwara State. These variables are regarded as service indicators which focus on the housing types, availability and use of drinking water source, light and other energy sources as well as level of sanitation. The fishery household heads had varying features of infrastructural variables as follows:

### 4.2.8 Sources of water supply

The result of the analysis of the water sources of the fishing households is on Table 19. It shows that about two-third (67%) of fishing households had their water source from the river which formed the major source of water for drinking and domestic use. Only 10% of the households had access to borehole water while 6.5% of pooled respondents utilized well water. Pipe borne water include sachet water had 16.3% but mostly restricted to Asa and part of Patigi fishing settlements as a result of nearness to dam and water station situated in Asa and Patigi respectively. Suffice it to note that a few of these fishing settlements had sunk boreholes provided by government but not in working condition.

Table 19: Distributions of source of water

| Facility | Frequency | Percentage (%) |
|---|---|---|
| Well | 20 | 6.5 |
| Borehole | 31 | 10.1 |
| Stream | 205 | 67.0 |
| Pipe borne | 50 | 16.3 |
| Total | 306 | 100 |

Following from the above, the results showed that a little above one quarter (26.4%) of respondents utilize treated water (mainly borehole and pipe borne water) in the study area. Therefore, the bulk (67%) of fishery households that utilized stream as source of water for drinking and domestic use are likely to have higher poverty status compare to households that utilizes either well (6.5%) or borehole (10.1%). This is because utilization of portable as well as treated water prevents sickness and is an indication of higher level of well being for the rural fishery households.

### 4.2.9 Distribution of waste disposal

The result of the analysis of the waste disposal system of fishery households is in Table 20, which shows the various method of disposing material particularly human faeces. The finding reveals that designated land otherwise known as open field was the most important method (about 91%) of human waste disposal system. However, just 6.9% of the fishefolk's households utilized public toilet site for material disposal. Only 2% of the fishing households had access to a pit toilet in their home. The use of open space for faeces disposal had negative implication on the rural households' well being and the environment. Further analysis also shows that the bulk (94.5%) of fishery households also uses open field for non-human material disposal. This finding is in agreement with studies of Dhanani and Islam, (2002); World Bank, (2005); NBS, (2006) and Olorunsanya, (2009), that rural households generally have poor sanitation facilities. Therefore, about 98% of the fisherfolks with open toilet facilities are likely to have higher poverty status compared with the remaining 2% who utilize pit toilet. This is because

exposure to less sanitary environment was likely to prone them to disease attack such as cholera and would contribute to poor health and low productivity of fishery households.

Table 20: Distributions of waste disposal and toilet facilities

| Toilet Facility | Frequency | Percentage (%) |
|---|---|---|
| Public site | 21 | 6.9 |
| Designated land | 279 | 91.2 |
| Pit toilet | 6 | 1.9 |
| Total | 306 | 100.0 |

### 4.2.10 Source of light

The result of the analysis on light source in Table 21 showed that only 4.9% of fishing households used electricity while a vast majority of the fisherfolks (85.6%) depended solely on local source such as "Jango" and "Fitila" (locally made lantern). In addition, 5.6% of respondents used kerosene lantern for lightning as against 3.9% for other lightening source. It is very clear from the result of the analysis of electricity source that the bulk of fishery households depend largely on local or improvised lightning source. The fishery household that uses electricity (8.8%) as a means of lightening portray higher level of well-being and invariably reduced poverty status, because the multiplier effect of electricity may enable the rural households to have access to fishery related information through gadgets such as television, telephone sets and radios. However, the bulk of fishery households (91.2%) who are only exposed to lanterns and local lamps were most

likely to have higher poverty status, since they may be deprived of some privileged fishery information through other means of information other than radio battery.

Table 21: Distributions of source of light

| Sources | Frequency | Percentage (%) |
|---|---|---|
| Local | 262 | 85.6 |
| Electricity | 15 | 4.9 |
| Kerosene | 17 | 5.6 |
| Others | 12 | 3.9 |
| Total | 306 | 100.0 |

### 4.2.11 Housing and accommodation: types and conditions

The result of analysis of housing and accommodation of household heads is shown in Table 22. Only (17.6%) of fishing households lived in cemented blocked buildings, mostly room and parlour. However, majority (about 79%) lived more in single room accommodation compared to just 3.6% who were accommodated in hut and hut-like building. It suffice to note that the bulk of households that lived in non-cemented room otherwise referred to mud house left the floor with bare sand but mostly roofed. These findings were similar to those of World Bank (2005), in which they found a low level of well-being for the Cambodian households.

Table 22: Distributions of housing and accommodation

| Type of Housing unit | Frequency | Percentage (%) |
|---|---|---|
| Cemented Room and Parlour | 54 | 17.6 |
| Uncemented Rooms | 241 | 78.8 |
| Huts | 4 | 1.3 |
| Others | 7 | 2.3 |
| Total | 306 | 100.0 |

### 4.2.12 Access to medical facilities

The availability of health care services such as primary health care centers, maternity facilities, hospitals and pharmacies, basic health care workers, nurses, midwives, doctors and traditional healers, and other medical services and the use of these services by fishing households are indicators of well being and measures of good health. The result of analysis of distribution and uses of medical facilities of households as at the time of the study is on Tables 23, 24 and 25.

Table 23 shows households' distribution based on distance to the public clinic and health centre. 35.9% of respondents travelled between 1 and 2 km before they could obtain orthodox medical care, while about 32% would travel as far as 2 or 3 km to get public health centres. It suffices to note that far distance to health centre could affect access to medical facilities because travelling such a distance may aggravate the ailments.

Table 23: Distribution of distance to the clinic/health centre

| Distance (km) | Frequency | Percentage (%) |
|---|---|---|
| 0.1−1.0 | 87 | 28.5 |
| 1.1−2.0 | 110 | 35.9 |
| 2.1−3.0 | 97 | 31.7 |
| >3 | 12 | 3.9 |

The result of the analysis of amount spent on treatment as a part of household expenditure is on Table 24. The result showed that only 5.5% of fishery households expend at least ₦6,000 per annum on health related matters, while vast majority (64.1%) spent ₦2,000 or less. The analysis further revealed that health care and medication received less than 4% of total expenditure of fisherfolks' household. The finding was contrary to submission by Etim and Ukoha, (2010) who obtained a value of ₦1134.34/month for health expenditure which amounted to 13.73% of total mean expenditure of rural households in Akwa Ibom State.

Table 24: Distribution of amount spent on treatment (₦)/year in 2013

| Amount (₦) | Frequency | Percentage (%) |
|---|---|---|
| 0.00−2000 | 196 | 64.1 |
| 2001−4000 | 75 | 24.5 |
| 4001−6000 | 18 | 5.9 |
| 6001 above | 17 | 5.6 |
| Total | 306 | 100.0 |

Further analysis presented in Table 25 shows that households that had access to clinic and hospital were 8.2% compared to about 43% of respondents who engaged in self and traditional medication such as local herbs and animal products and about 20% who uses modern drugs without prescription. Also, about one-third of respondents' households (29.1%) patronized orthodox medical services (traditional healers) for prescription. In conclusion, fewer respondents patronized the modern medical care. This could be attributed to a number of factors such as distance of the medical facility to the respondents' house (Table 23), high medical charges including cost of drugs, and near absence of adequate health care facilities which include paucity of health personnel in the study area and generally in most of the rural setting in Nigeria. Therefore, non-utilization of modern medical facilities is an indication of low level of well-being.

However, the bulk of respondents who engage in self medication (62.7%) either orthodox or none were likely to have higher poverty status, for they are likely to suffer lack of disease diagnostic, right prescription and drug efficacy. Ojua, (2013); Ajao and Oladimeji, (2014) also observed that over 90% of Nigerians in rural areas depend partly or wholly on trado-medical services. It has become a major source of emerging health hope to rural dwellers due to continuous falling of modern medical services and drug efficacy. This could be attributed to the absence of health care facilities including paucity of health personnel in most of our rural settings.

Table 25: Distribution of source of treatment

| Source | Frequency | Percentage (%) |
|---|---|---|
| Self (orthodox) | 131 | 42.8 |
| Self (modern) | 61 | 19.9 |
| Clinic/dispensary | 25 | 8.2 |
| Orthodox | 89 | 29.1 |
| Total | 306 | 100.0 |

### 4.3 Expenditure Pattern of Rural Artisanal Fisherfolks

This section is based on the expenditure pattern data sets of the sample of rural artisanal fisherfolks in the study area. The major component in the computation of relative poverty measurement is the total household expenditure components. The components of total expenditure for the rural fishery households are food and non-food items. It should be noted that household food consumption covers purchased food and subsistence production by the household itself.

The study used and considered the relative poverty measurement amongst others for a number of reasons. The advantage of this method over the others lies not only in its simplicity but in the fact that the line is determined in relation to the general living standard of the whole target population and the ability to assess changes in the living standard of the people over time. Also in relation to other members of a community there would always be relative poverty. The uses of 1/3 or 2/3 to determine the poverty line is

however arbitrary, since some other fraction could easily have been used. However, the test for robustness of the choice of poverty line was achieved with stochastic dominance.

### 4.3.1 Estimation of relative poverty line

The result of the analysis of expenditure pattern of respondents is presented on Table 26. The Mean per Adult Equivalent Household Expenditure (MAEHE) for all household in the study area was ₦9075.15 with standard deviation of ₦4906.27. This gives a two third of ₦6050.15 per adult equivalent per month which was relative poverty line for rural fishery households in the study area. The mean household expenditure by deciles of the household heads presented in Table 26 considers both food expenditure and non-food expenditure using the per capital expenditure approach. The relative poverty line which was 2/3 MAEHE equal ₦6050.12 per month translates to ₦72601.44 per year and ₦198.91 per day respectively.

More than half, (53%) of sampled fisherfolks fell below poverty line of ₦6050.12. This result of this finding was in line with National Bureau of Statistics (NBS), (2010), who obtained national relative poverty line of ₦5566.85 per month using the same per capital approach. This showed that the fisherfolk's household had a relative higher level of consumption when compared with NBS, (2010) result with the tenth deciles figure of ₦26900.00 per adult equivalent per month. Olorunsanya (2009) recorded ₦2557.11 as the mean per adult equivalent household expenditure for farming households in Kwara State (US$1=150.5 in 2010). The NBS (2010) declared that 74.3% and 25.7% of poor and non poor households in Kwara State compared to national average of 69.0% and 31.0%

respectively. Therefore, it can be concluded that the fishery households in Kwara State have moderate wellbeing compared with State and National average, with 53% and 47% poor and non poor fishery households respectively in 2013.

Table 26: Distribution of per adult equivalent expenditure pattern of respondents (₦)

| Deciles | Total Expenditure | Percentage (%) |
|---|---|---|
| First | 4683.33 | 4.42 |
| Second | 5135.00 | 4.84 |
| Third | 5437.83 | 5.13 |
| Fourth | 5617.33 | 5.30 |
| Fifth | 5867.50 | 5.54 |
| Sixth | 9075.00 | 8.56 |
| Seventh | 13130.00 | 12.39 |
| Eight | 14318.17 | 13.51 |
| Nine | 15829.17 | 14.93 |
| Tenth | 26900.00 | 25.38 |
| Total | 105993.33 | 100 |
| Mean | 9075.22 | |
| Std dev | 4906.27 | |
| 2/3MPEHE | 6050.12 | |

### 4.3.2 Disaggregation of monthly household expenditure: food and non food

The rural artisanal fishery households' food and non-food expenditure by deciles is presented in Table 27. Throughout the ten deciles, the fishefolk's households recorded higher values for food expenditure than the non-food expenditure items. The food poverty line was ₦4695.04 which account for 77.6% of total expenditure of fisherfolks' household, while the non-food poverty line equal ₦1355 and this account for only about 22.40% of total expenditure. The result is in line with NBS (2010) who estimated national food poverty line to ₦3313.0/month {United States Dollar (US$), US$1=150.5 in 2010}.

It can be concluded that the bulk of rural households' expenditure was on food. About 77.7% of total monthly expenditure of fishery households was expended on both stapled and non-stapled food. The left over (22.3%) comprises of payments for energy, clothing, health, education and others.

Table 27: Per adult equivalent of food and non- food expenditure pattern by deciles (₦)

| **Deciles** | **Food Expenditure** | **Non-food Expenditure** | **Total Expenditure** | **Food as % T** |
|---|---|---|---|---|
| First | 3482.50(4.13) | 776.17(3.21) | 4258.67 | 81.77 |
| Second | 3909.33(4.64) | 986.67(4.08) | 4896.00 | 79.85 |
| Third | 4148.83(4.92) | 1120.33(4.63) | 5269.16 | 78.74 |
| Fourth | 4500.00(5.33) | 1365.00(5.66) | 5865.00 | 76.73 |
| Fifth | 4675.00(5.55) | 1827.08(7.56) | 6502.08 | 71.90 |
| Sixth | 6626.00(7.86) | 2415.33(9.99) | 9041.33 | 73.29 |
| Seventh | 10116.67(12.01) | 2850.00(11.79) | 12966.67 | 78.02 |
| Eight | 11275.00(13.80) | 3115.00(12.89) | 14390.00 | 78.33 |
| Nine | 12186.67(14.46) | 3433.33(14.20) | 15620.00 | 78.02 |
| Tenth | 23350.00(27.71) | 6283.33(25.99) | 29633.37 | 78.02 |
| Total | 84270(100) | 24172.28(100) | 108442.30 | 77.71 |
| Mean | 7042.57 | 2032.66 | 10844.30 | |
| Std dev | 4034.65 | 1072.88 | 7814.85 | |
| 2/3MAEHE | 4695.04(77.6) | 1355.11(22.4) | | |

*The figure in parenthesis stood for % of each component.*

### 4.3.3 Disaggregation of monthly household expenditure: food and others

The rural artisanal fishery household's food and non-food expenditure components are presented in Table 28. The result showed the various components and the amount expended on basic consumption items of the households. The total expenditure value was disaggregated into food (about 78 %%) and non-food, (about 22%). More than half of the

total expenditure was captured by staple food items such as rice, maize, sorghum, millet, cowpea and groundnut while non staple food items such as groundnut oil, salt/potash/seasonings consumed about one quarter (23.7%) of the item of expenditure of the fisherfolks.

Table 28: Mean household expenditure per adult equivalent

| **Items** | **Amount(₦)/ AE household/month** | **% Expenditure** |
|---|---|---|
| Stapled Food | 4898.44 | 54.0 |
| Non-stapled Food | 2150.94 | 23.7 |
| Energy | 933.03 | 10.3 |
| Clothing | 470.30 | 5.1 |
| Health | 322.52 | 3.6 |
| Miscellaneous/Others | 300.00 | 3.3 |
| Total | 9075.23 | 100.0 |

Household expenditure on non-food items include energy in form of fuels for lightening and cooking that gulped only 10.4%. Other items of expenditure include clothing (5.1%); health (3.6%) and others including education, transportation, rent (imputed), information technology and communication (3.3%). The result is in line with NBS (2012) that estimated about 65% of the Nigerian total household expenditure in 2009/2010 was spent on food, with balance of about 35% spent on non-food items. It can be concluded that more than half (53%) of rural households' expenditure were below the poverty line, which implies that all fishery households whose expenditure is less than the poverty line were impoverished.

The implication of analysis of expenditure pattern of fishery household shows that in terms of food and non food consumption per adult equivalent, the rural fishery households in Kwara State also had a low level of welfare, with the fishery households expend majority (77.7%) of their expenses on food leaving a small proportion (22.3%) to other household needs. This gave an indication that despite their engagement in both secondary and off farm activities; fishery households in the study area were still unable to meet basic food and non-food needs. The findings of this research could be supported with the studies by Olorunsanya (2009) who observed that the bulk of Kwara State rural households' expenditure is on food (61%) and experienced food shortage, but contrary to the studies of Etim and Ukoha (2010) that recorded about 26% for food as total expenditure components among rural households in Akwa Ibom State, Nigeria. Damisa, Saleh, Lyocks and Aliyu, (2011) also posited that hunger and food insecurity as both cause and manifestation of poverty and slow growth.

### 4.3.4 Gini coefficient measurement

The result of the analysis of Gini Coefficient of household heads in Table 29 shows that the spread of expenditure (GC) among the fishery households obtained was 0.246. This revealed close equalities and low level of inequalities in expenditure pattern among fishery households. The implication is that, there is no much wide gap between fishery households in their consumption pattern. This is expected because the artisanal fishery households in the study area are homogenous and share similar characteristics in socio-economic, cultural and occupational structures. This result supports the observation among various studies such as the findings of Olorunsanya (2009) who obtained GC of

0.45 among Kwara State farmers and NBS, (2004, 2010) also obtained GC of 0.48 and 0.36 in Kwara State and 0.43 and 0.45 for entire nation in 2004 and 2010 respectively.

Table 29: Distribution of expenditure (Gini Coefficient) among respondents (₦)

| No of Respondents | % of X | Cum of X | Average expenditure (Y) | % of Y | Cum of Y | XY |
|---|---|---|---|---|---|---|
| 160 | 52.28758 | 52.28758 | 5201.596354 | 4.24958 | 4.24958 | 222.2003 |
| 25 | 8.169935 | 60.45752 | 6862.85 | 5.606785 | 9.856366 | 45.80707 |
| 20 | 6.535948 | 66.99346 | 10744.75 | 8.778205 | 18.63457 | 57.37389 |
| 55 | 17.97386 | 84.96732 | 14689.03846 | 12.00059 | 30.63517 | 215.697 |
| 36 | 11.76471 | 96.73203 | 16004.62963 | 13.0754 | 43.71057 | 153.8283 |
| 3 | 0.980392 | 97.71242 | 19101.11111 | 15.60515 | 59.31572 | 15.29917 |
| 6 | 1.960784 | 99.6732 | 22898.61111 | 18.70762 | 78.02334 | 36.68161 |
| 1 | 0.326797 | 100 | 26900 | 21.97666 | 100 | 7.181915 |
| 306 | 100 | | 122402.5867 | 100 | | 754.0692 |
| | | | | GC=0.246 | | |

*GC denote Gini Coefficient, X stood for number of households*

### 4.3.5 Disaggregation of mean per adult equivalent consumption expenditure

The rural artisanal fishery households' mean per adult equivalent expenditure disaggregation is presented in Table 30. The result shows that expenditure value had a range of ₦3417.0 to ₦26900 per adult equivalent per month with a mean of ₦9075.22. About two-fifth (41%) fishery households could be considered to have a moderate expenditure pattern because they fell in poverty line expenditure class of ₦5051–₦6050.

Further analysis revealed that about 47% of the fishery households were above the poverty threshold consisting of 39.5% and 7.2% expenditure subgroups respectively.

Therefore, the expenditure subgroup is also another pointer towards poverty status of artisanal fishery households in the study area. For example, expenditure range of ₦3050–₦4050 could be classified as extremely poor; ₦4051–₦5050 as moderately poor; ₦5051–₦6050 as poor while the other two sub-groups, ₦6051−₦7050 and those above ₦7050 may be identify as rich and very rich respectively.

Table 30: Distribution of households by mean/ adult equivalent consumption expenditure

| **Expenditure range (₦)** | **Frequency** | **Percentage (%)** |
|---|---|---|
| 3050−4050 | 13 | 4.2 |
| 4051−5050 | 25 | 8.2 |
| 5051−6050 * | 125 | 40.9 |
| 6051−7050 | 121 | 39.5 |
| Above 7050 | 22 | 7.2 |
| Total | 306 | 100 |

*Note: poverty line= ₦6050.15; * =Poverty class interval*

Alternatively, the expenditure pattern with a poverty threshold of ₦6050.15 drew a demarcation between poor and non poor. While the poor fishery households were indicated by those below poverty line (about 53%), the non poor could be describe as fishery households above the poverty bench mark (47%). This result collaborate the view of Hulme and Shepherd (2003) who posited that analysis of poverty status identifies and groups those who experience poverty most intensely, deepen the understanding of poverty and ensure that key groups are not neglected in analysis and action.

### 4.3.6 Mean per adult equivalent consumption expenditure disaggregated by sex and fishing gears of the households' heads

The proceeding sections showed that the entire fishery households were disadvantaged when assessed by consumption and social indicators. This section extends that analysis by looking at identified sub-groups of the total rural fishery households in the study area. When the entire rural fishery households in the study area were sorted by nature of fishing gears used and gender of the household heads, the study revealed the diversity in the poverty status of fishery households in the study area. Table 31 presents the mean per adult equivalent consumption expenditure disaggregated by gender, and nature of fishing gears of the households which is sine quo non to level of investment in fishing equipments.

The female headed fishery households recorded the mean expenditure per adult equivalent per month of ₦9518.44 which is higher than the mean of all households (₦9075.22) as well as that of their male counterpart (₦7042.57). This may be due to extra earnings or remittance from friends and relations. In the same vein, the fishery household heads that adopt the use of motorised gears had significant higher mean real consumption per adult equivalent, when compared with those who used improvised and manual propelled canoes. Household heads that make used of modern fishing gears as shown in the findings had real consumption per adult equivalent of ₦13643.02 compared to ₦8223.04 for non motorised canoes. The reason could be attributed to fisherfolks' ability to catch more fish and invariably earn more income from the fish business. Based on this result, the need for modern fishing gears and techniques in fishery practices is very important and cannot be

over emphasized. The large variations in consumption per adult equivalent were more vivid based on disaggregation by level of investment of household heads.

Table 31: Disaggregation of consumption expenditure by Sex and nature of fishing gears of household heads (₦)

| Items | Mean (Y) | Minimum | Maximum | St dev |
|---|---|---|---|---|
| **Sex** | | | | |
| Male | 9076.2 | 3416.7 | 26900.0 | 4937.1 |
| Female | 9518.4 | 4700.0 | 21908.3 | 4934.5 |
| **Nature of fishing Gears** | | | | |
| Motorised canoe | 13643.0 | 4623.3 | 26900.0 | 5809.3 |
| Non motorized canoe | 8223.0 | 3416.7 | 17241.7 | 4195.3 |

### 4.4 Profitability Analysis of Rural Artisanal Fisherfolks

The results of net margin and profitability analysis are presented in Table 32. Artisanal fishery may not be for the purpose of only satisfying the household's food need or subsistence. The fisherfolks may be interested in selling their outputs to raise income. Thus, the fisherfolks like any other entrepreneur may have a profit motive. Therefore, efforts were made to determine the costs associated with artisanal fishing and also revenue that accrues to the fisherfolks' efforts. Both the variable and fixed costs of production were considered, because the bulk of artisanal fisherfolks acquired modern gears and a few them used outboard engine. Therefore, the profitability was measured as both the gross and net margins. The Average Variable Cost (AVC) and Average Fixed Cost (AFC) per fisher folk/month had a state average of ₦41,744.62 and ₦48,146.00 respectively.

Table 32: Estimated costs and returns in artisanal fishing

| Items | Motorised | Non-motorised | Entire Study Area |
|---|---|---|---|
| Average Output (kg) | 537 | 285 | 411 |
| A. Gross Returns (₦) | | | |
| Average Gross Income from fish (₦) | 133482.10 | 53701.10 | 60492.60 |
| Less variable Costs | | | |
| Labour | 31600.90 | 33870.80 | 31181.21 |
| Fuel and Lubricants | 37600.00 | – | 8058.1 |
| Others | 29700.50 | 3630.00 | 2505.3 |
| B. Total Variable Costs (TVC)(₦) | 98901.4 | 37500.8 | 41744.62 |
| C.Average Gross Margin (₦) = (A-B) | 34580.70 | 16200.3 | 18748.0 |
| D. Fixed Costs (₦) | 15500.80 | 7850.20 | 8146.00 |
| E. Total Costs (B +D) | 114402.2 | 45351.0 | 49890.62 |
| F. Net Margin/ fisher folk (₦) =(A-E) | 19079.9 | 8350.1 | 10601.98 |
| G. Profit Margin=(F/A*100) | 14.3 | 15.5 | 17.5 |
| H. Gross Ratio (E/A*100) | 85.7 | 84.5 | 82.5 |
| I. Return on Investment (A/E) | 1.17 | 1.18 | 1.21 |
| J. Total cost/Kg | 213.04 | 159.48 | 121.39 |
| K. Net margin/Kg | 35.53 | 29.30 | 25.8 |
| L. Net margin to cost ratio (%) | 16.68 | 18.41 | 21.25 |

The average gross revenue for the State was ₦60,492.60 compared with that of motorised (₦133,482.10) and non-motorised which was ₦53,701.10 as shown in Table 32. Net margin per fisherfolks per month was ₦19,079.9 among motorised units, while the net margin equal ₦8,350.10 for the non-motorised artisanal, and ₦10,601.98 per fisherfolks per month in the entire study area. The net margin difference between motorised and non motorised canoe users was ₦10729.80.The net margin analysis has shown that artisanal fishing operations in Kwara State are profitable. However, from the result obtained, operations in motorised units appear to be more profitable. In fact, average net margin

was about 56% higher among the motorised units than the non-motorised ones and 44% above the State average. The level of profit in motorised unit (₦19,080) is above national minimum wage of ₦18,000 per month and overwhelmingly above average household's expenditure (₦9075.23) obtained in the study area. Although the amount in non-motorised units is lower than the average household's expenditure incurred by fisherfolks as well as State minimum wage of ₦18, 000 in Kwara State during the period of study, it is clear that both fishing sectors are profitable. The results are comparable to studies by Inoni and Oyaide, (2007); Olaoye, (2010) and Olaoye *et al*. (2012) that reported higher profit for motorised users but find both fishery units profitable.

The result also revealed that both family and hired labours were used in fishing operations in the study area. About 61% of the respondents sourced their labour from family members while only 38.2% obtained paid labour. Labour costs accounted for approximately 90% of AVC for paddled canoes and less than 32.0% of motorized canoes and 27.6% and 74.7% respectively of Total cost (Table 32).

### 4.4.1 Profitability ratios

Profitability ratios also in Table 32 showed State average profit margin, gross ratio and return on investment to be 17.5%, 82.5% and 1.21 respectively. The return on investment means that for every one naira invested by a fishery household, a profit of ₦1.21 is made. The value ₦1.21 reflect the returns to the capital investment over the production period. The gross ratio is an indicator of the ability of fisherfolks to control cost of operation. A less than one ratio is desirable for any for any farm business. The lower the ratio, the

higher the return per Naira invested. A rising ratio shows that variable costs are increasing or that revenue is declining due to falling fish prices. The gross ratio in artisanal fish production in the study area was 82.5%; though the ratio was 85.7% and 84.5% respectively for motorised and non-motorised fishing units. According to Gittinger, (1982), enterprises with very high gross ratios in the neighbourhood of 90% have difficulty in making adequate returns on investment, due to triple effects of high operating expenses, dwindling fish catches, and falling prices; while an abysmally low ratio, say 50%, implied that some costs may have been omitted or grossly underestimated.

Table 32 also shows the profit margin which indicates the magnitude of operating margin the fisherfolks have on their fish sale, is another measure of probability in artisanal fisheries applied in this study. This was determined by dividing the net margin by the gross revenue. Profit margin in the study area ranged from 14.3 for motorised unit to 15.5 for non motorised unit with a mean value of 17.5% for the entire area studied. The lower the return on sales, the lower the profit margin thus, the greater the revenue that must be made in order to make an adequate return on investment. The results showed low profit margin in artisanal fishery production in the study area. Inoni and Oyaide, (2007) attributed a condition of this nature to a very high cost of production. The results further imply that profit was only 15.5% of gross revenue on the average. Thus, while the average net margin (₦19079.9) in the motorised segment was better, the non-motorised units had a higher return on investment (1.18>1.17) as well as a higher profit margin (15.55>14.30), than their motorised counterparts.

Net margin per kg was 35.53/kg and 29.30/kg respectively for operators in the motorised and non-motorised segments of the artisanal fishing sub sector; but with an average value of 25.80/kg for the entire study area. The revenue accrued to fisherfolks was not only dependent on the kilogram of fish caught and price per kilogram, but also dependent on the costs. Therefore, the combined effects of low yield and high cost of production, particularly of variable costs components, are implicated for the rather low net margin per kilogramme. The implications of the obtained net margin/kg however, are that for every kilogramme of fish caught, the fisher folk earns a profit of ₦35.53 for motorised operators and ₦29.30 for non-motorised with State average of ₦25.80. The results are at disparity to the average net margin/kg of ₦80.26/kg reported by Inoni and Oyaide, 2007 among fisherfolks in south agro ecological zone of Delta State.

Although the net margin per kilogramme revealed the profit earned per kilogramme of fish catch, it is not a very critical measure because it does not take into consideration the total cost incurred by the fisherfolks to earn that margin. Therefore, the relative profitability of artisanal fishing operations in the different locations, as well as between the two segments of the small scale fisheries cannot be compared. The net margin to cost ratio indicates the relative profitability of artisanal fishing in the segments, because it relates the net margin realised to the total cost of production. The ratio was 16.68% and 18.4% respectively in the motorised and non-motorised segments of the artisanal fisheries sub-sector, but with a value of 21.3% for the entire area as seen in Table 32. The result implies that investments in the small scale fisheries sector earned about 17% return on capital, as was the case among both motorised and 18% for non-motorised segment.

However, Inoni and Oyaide, (2007) obtained a relatively high value of 37% among fisherfolks in Delta State and, Njifonjou (1998) and Oladimeji, (1999) obtained net margin to cost ratio of 25.7% and 29.5% among artisanal fishing units in the Limbe region of Cameroon and Jebba North in Niger State respectively.

Based on the findings in Table 32, as well as indicators computed, it can be concluded that there is a wide gap between motorised and non-motorised segments' net margins (profit). Therefore, artisanal fisherfolks in the study area should adopt improved fishing techniques and motorised gears to increase their income which will ultimately improve their well being and reduce the level of poverty in the study area. The implication of this finding therefore is that motorised fisherfolks who earned higher net returns from their fishing enterprises were most likely to have a reduced poverty status than non-motorised fisherfolks.

### 4.4.2 Test of hypothesis on profit earned by fisherfolks

The data in Table 33 elucidate the result of t-test on returns and costs of artisanal fisherfolks in Kwara State. The result shows that t-calculated (308.195) is greater than the tabulated t-value at 1% level of probability. Since the result of the t-calculated was greater than the critical value for returns and costs variables at all the level of significance and average return is greater than average cost with a significant t- value at 1%. Therefore, the null hypothesis was rejected, which suggests that the artisanal fishery enterprise is profitable in the study area.

Table 33: Test of significance of profitability

| Estimated Variables | Mean Costs (₦) | Mean Revenue (₦) | Mean Profit (₦) | t-value | Sign |
|---|---|---|---|---|---|
| Maximum | 135369.2 | 184750.0 | 70000 | 308.195*** | 000 |
| Minimum | 22858.3 | 29891.7 | 900 | | |
| Mean | 49890.62 | 60492.60 | 10601.9 | | |
| SD | 19309.1 | 27686.1 | 10540.9 | | |
| SE | 63.1 | 90.5 | 34.4 | | |

****P<0.001, SD=Standard Deviation, SE= Standard Error*

This result was supported by the net margin calculated to be ₦19,079.9 among motorised units, ₦8,350.1 for the non-motorised artisanal, and ₦10,601.9 per fisher folk per month in the entire study area. Therefore, either way, the net margin analysis has shown that artisanal fishing operations in Kwara State are profitable.

### 4.5 Poverty Profile of Fisherfolks

This section attempts to achieve objective 4 and therefore presents the decomposition of poverty of the rural fishery households in the study area based on socio-economic and institutional characteristics. The Foster, Greer and Thorbecke (FGT) weighted poverty index was used for the quantitative poverty assessment due to its decomposability of the overall population into sub groups, which allows for comparison. The most important purpose of a poverty measure is to enable poverty comparisons. The Mean per Adult Equivalent Household's Expenditure (MAEHE) for all households in the study area was

₦9075.23 and this gave a two-third of ₦6050.15 per adult equivalent per month which was the relative poverty line for rural fishery households in the study area.

### 4.5.1 Poverty profile of fisherfolks based on socio-economic characteristics

The results of the poverty indices of the rural fishing households in the study are presented in Table 34 based on their socio-economic and demographic characteristics. However, based on the poverty line estimated earlier, the analysis undertaken for the whole sample households yield a poverty headcount ratio of 0.533, that is, 53.3% of the total sample households spend less than what they would need to meet minimum living standard requirements.

(i) **Decomposition of poverty status of fisherfolks based on gender and age**

The result of decomposition of poverty based on gender in Table 34 was contrary to *a priori* expectation. Fifty-four percent of male-headed households live below the poverty line in comparison with female-headed households with headcount of 43%. The results with respect to the depth and severity of poverty also followed similar pattern like that of the poverty incidence. This result is consolidated from the previous finding in this study. Female headed fishery households recorded the mean expenditure per adult equivalent per month of ₦9518.44 which is higher than the mean of all households (₦9075.22), as well as that of their male counterpart (₦7042.57). This may be due to extra earnings and remittance both from friends and relations.

Table 34: Identified poverty sub-groups based on socioeconomic characteristics.

| Variables | $P_0$ | $P_1$ | $P_2$ | n | Share of poverty | |
|---|---|---|---|---|---|---|
| | | | | | q | % |
| **Sex** | | | | | | |
| Male | 0.541*** | 0.075 | 0.0031 | 283 | 153 | 93.9 |
| Female | 0.435 * | 0.060 | 0.0016 | 23 | 10 | 6.1 |
| **Age** | | | | | | |
| 20 – 39 | 0.577 * | 0.064 | 0.0020 | 168 | 97 | 59.5 |
| 40 – 59 | 0.443 | 0.095 | 0.0057 | 113 | 50 | 30.7 |
| >59 | 0.64 | 0.039 | 0.0004 | 25 | 16 | 9.8 |
| **Education** | | | | | | |
| No education | 0.609 *** | 0.010 | 0.0058 | 220 | 134 | 82.2 |
| 6 years | 0.388 *** | 0.076 | 0.0031 | 67 | 26 | 16.0 |
| 12 years | 0.158 ** | 0.012 | 0.0074 | 19 | 03 | 1.8 |
| **Voc. Training** | | | | | | |
| 1– 5 | 0.8 * | 0.089 | 0.0046 | 30 | 24 | 14.7 |
| 6-10 | 0.537 | 0.075 | 0.0030 | 214 | 115 | 70.6 |
| >10 | 0.387 | 0.012 | 0.0109 | 62 | 24 | 14.7 |
| **Household size** | | | | | | |
| 1 – 4 | 0.317** | 0.065 | 0.0019 | 41 | 13 | 8.0 |
| 5 – 7 | 0.521* | 0.071 | 0.0024 | 142 | 74 | 45.4 |
| >7 | 0.618*** | 0.080 | 0.0036 | 123 | 76 | 46.6 |
| **Fishing Experience** | | | | | | |
| 3 – 10 | 0.685 | 0.068 | 0.0023 | 54 | 37 | 22.7 |
| 11 – 20 | 0.493 | 0.076 | 0.0031 | 152 | 75 | 46.0 |
| 21 – 30 | 0.455 * | 0.068 | 0.0021 | 66 | 30 | 18.4 |
| >30 | 0.618 | 0.083 | 0.0042 | 34 | 21 | 12.9 |

*$P_o$ is the headcount index, $P_1$ is the poverty gap index, $P_2$ is the squared poverty gap; ***; ** and * denotes test of significance differences from group total at 1%, 5% &10% respectively*

However, the contribution of the male-headed households to the whole group's poverty incidence was 93.9%, while the female-headed households contribute only 6.1%. The poverty incidence ($P_0$) was significantly different from the whole group index at 1%. The finding of this research is line with study of FOS, (1999b) who recorded poverty incidence of 77% for male-headed farming households as against 72% of the poor female-

headed households. But, contrary to the findings of Kyaw and Routray, (2006); Etim and Ukoha, (2010); Olorunsanya and Omotesho, (2011) who reported higher poverty incidence among female headed households compared to male headed households in their various studies.

The result of decomposition of poverty based on gender was reinforcing in Figure 2. The cumulative distribution function of the female-headed fishing households stochastically dominated that of the male-headed ones. This shows that the male-headed fishing households will always be poorer than the female-headed households within the range of the specified poverty line. This implies that the head count ratio was robust to all possible choices of poverty lines within the specified range. The second order stochastic dominance automatically holds truth.

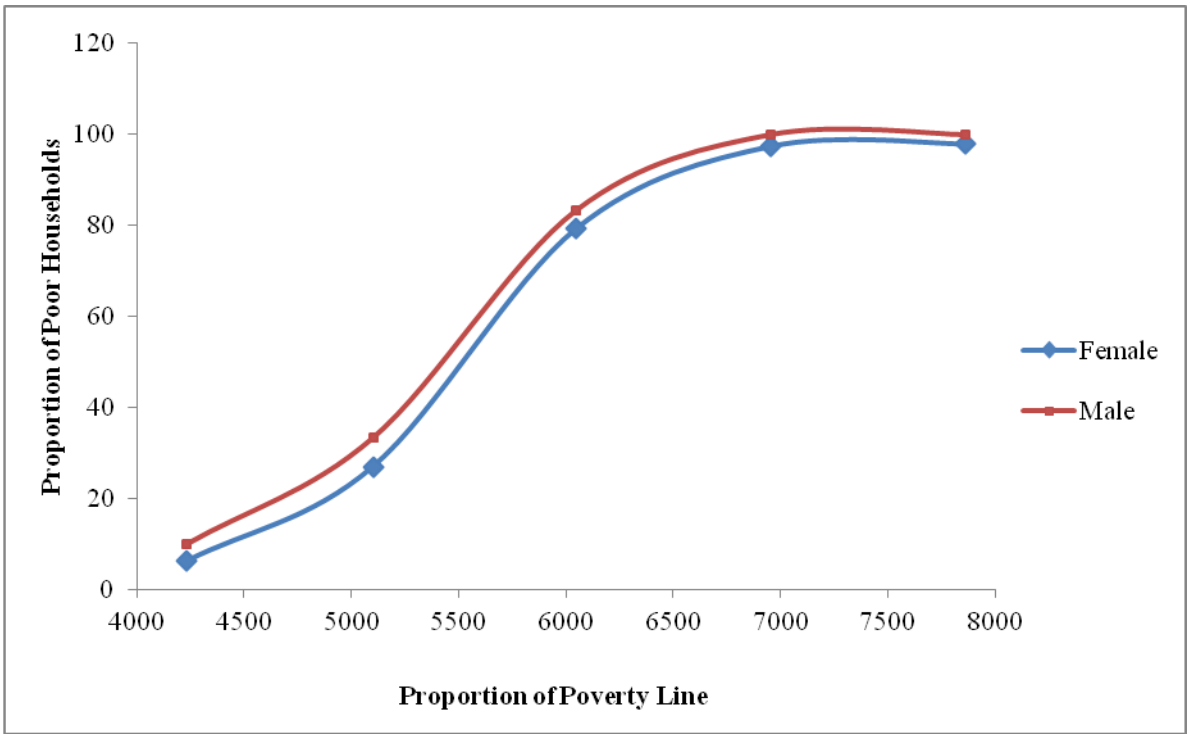



Figure 2: Distribution of dominance analysis by Sex of household heads

Poverty incidence was prevalent (64%) among fishing households with age range of 59 years and above as against approximately 58% for age range of 20-39 years, and 44% for 40-59 years (Table 34). This might be due to the fact that age 40-59 years respondents are stronger and are expected to engage more actively in fishing than older people, while fisherfolks with age range 20-39 years are relatively young and have not acquired enough experience and sizeable family to support them in fishing activities. The poverty gaps and severity followed the same pattern with age group 20-39; 40-59 and above 59 years recording 6%, 10%, and 4% respectively. However, only sub-group 20-39 years had the poverty incidence ($P_0$) statistically significant different from the whole group index at 10%.

In conclusion, it could be said that poverty status of the rural fisherfolks in the study area increased with age of the household heads. This is attributable to the fact that as one increases in age, the ability to do difficult work decreases probably due to the physical strength required in fishing which increase at a prime age in fishefolk's life and decrease as the fisher folk is ageing. Also the number of household members available to work on the fishing expedition decreased as the head's age increased due to schooling and training those children and younger household members. However, the contribution of the households to the whole group's poverty incidence was the highest, about 60% in age range of 20-39 years. The effects of age on poverty status could be supported with study by Dercon and Krishnan, (1998); .Etim and Ukoha, (2010) who affirmed all possible pairs of the age categories have their poverty incidences significantly different from one

another and this implied that age of household heads affects the level of poverty incidence.

(ii) **Decomposition of poverty based formal and informal education**

The results in Table 34 revealed that the average years of schooling of household heads were inversely related to the poverty status of rural fishery households in the study area. For example, the incidence of poverty was highest (61%) among non- formal educated fishing households compared to either fishery households with primary education (39%) or those with at least 12 years of education with 16% poverty incidence. The poverty incidence ($P_0$) sub-groups were significantly different from the whole group index at 1%. 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 households. This might result in increase in output and level of consumption for the rural fishery households. This is in agreement with earlier studies by Dudek, (2006); Fagernas and Wallace, (2007); FAO, (2008); Olorunsanya, (2009) and Etim and Patrick, (2010) that a higher level of educational attainment reduces rural household's poverty. The poverty depth and severity followed the same pattern for the three categories of educational households. The contribution to whole group's poverty also reduced with increase in the years of schooling of the rural households.

Figure 3 presents the CDF for years of education attainment by fishing households. The cumulative distribution function of households with 12 years and above of formal education lay completely below those households with heads having no formal education

and those with less than 6 years education. This implies that households with no formal education and those with less than 6 years education would always be poorer than those sub-groups of households within the specified range of poverty line. However, fishing households with 6 years of formal education will be less poor compared to households without formal education. This may be due to the fact that the educated households may be involved in other activities such as government job to earn additional income.

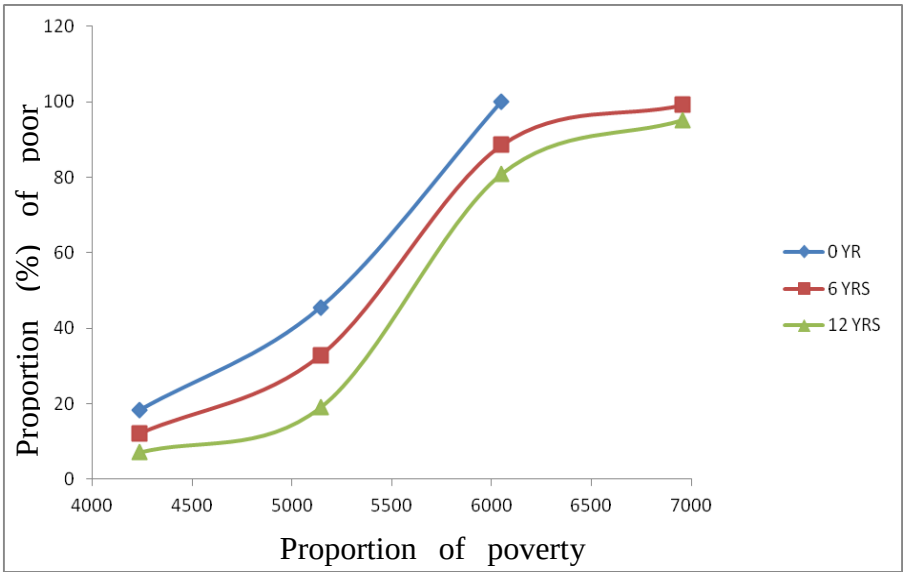



Figure 3: Distribution of dominance analysis by years of Schooling of Household Heads

(iii) **Decomposition of poverty based on vocational training**

Table 34 also presents poverty profile based on years of vocational education of respondents, which followed the same pattern with categories of formal education of the fishing households. The prevalence of poverty was more (80%) in range of respondents who receive vocational training of range of 1-5 years, while the lowest poverty incidence (39%) occurs among the fishery households who received vocational fishery training for

10 years and above. In addition,, only sub-group of fisherfolks who had training between 1-5 years had the poverty incidence ($P_0$) statistically significant different from the whole group index at 10%.

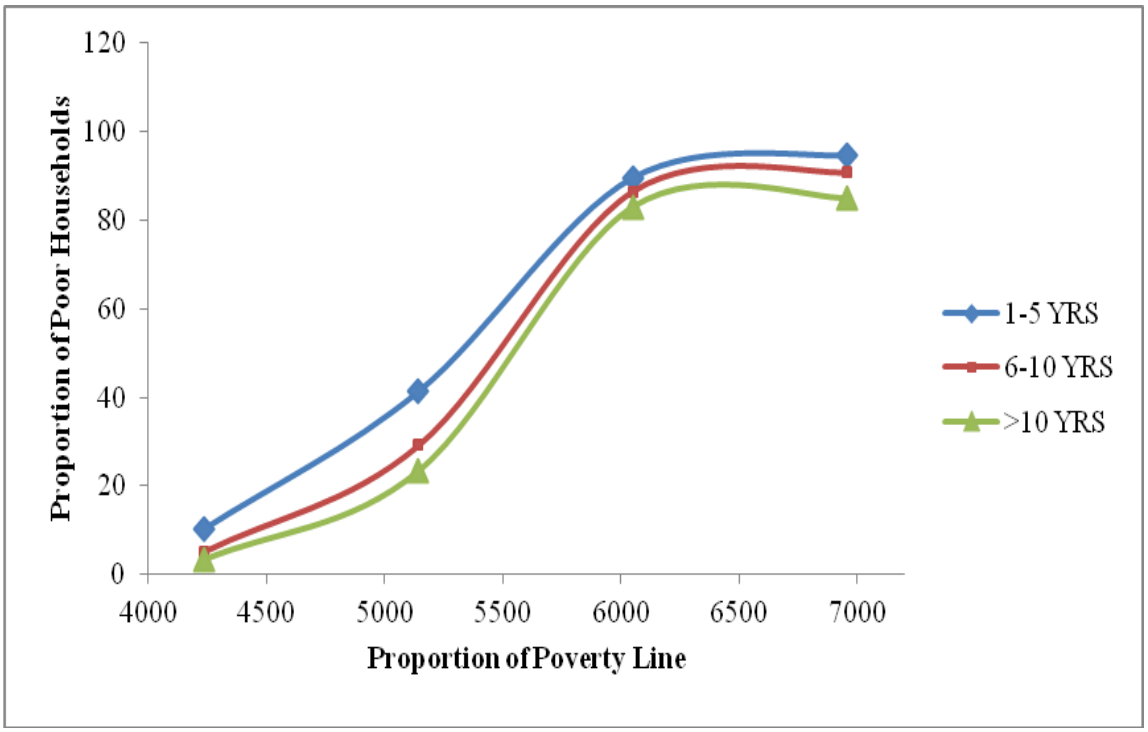



Figure 4: Distribution of dominance analysis by years of training of household heads

Figure 4 presents the Cumulative Distribution Function (CDF) for years of vocational training attained by fishing households. The cumulative distribution function of households with 1-5 years of informal training lay completely above those household heads having 6-10 years and above 10 years of training respectively. This implies that households with 1-5 years of training would always be poorer than those sub-groups of fishing households within the specified range of poverty line in figure 6. However, fishing

households with above 10 years of training will be less poor compared to households with 6-10 years of vocational education. The second order stochastic dominance holds truth.

(iii) **Decomposition of poverty based on household size**

Household size was categorised into 3 sub-groups for poverty comparison in Table 34. These are households with 1-4, 5-6 and, 6 members and above. The headcount for the fishing households with 1-4 persons was 31.7% as against 62% for the fishing households with 6 family sizes and above. The poverty incidences ($P_0$) for sub-groups 1-4 and above 7 household members were significantly different from the whole group index at 5% and 1% respectively. The result further revealed there was 10% level of significant with household size sub-group of 5-7 members per household. 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. The results for all fishing households indicated similar pattern for poverty gaps and severity in Table 34. The results conformed to *a priori* expectation and findings of Etim, (2007), and Etim and Ukoha, (2010).

Figure 5 and 6 present the Cumulative Distribution Function (CDF) of dependency ratios.

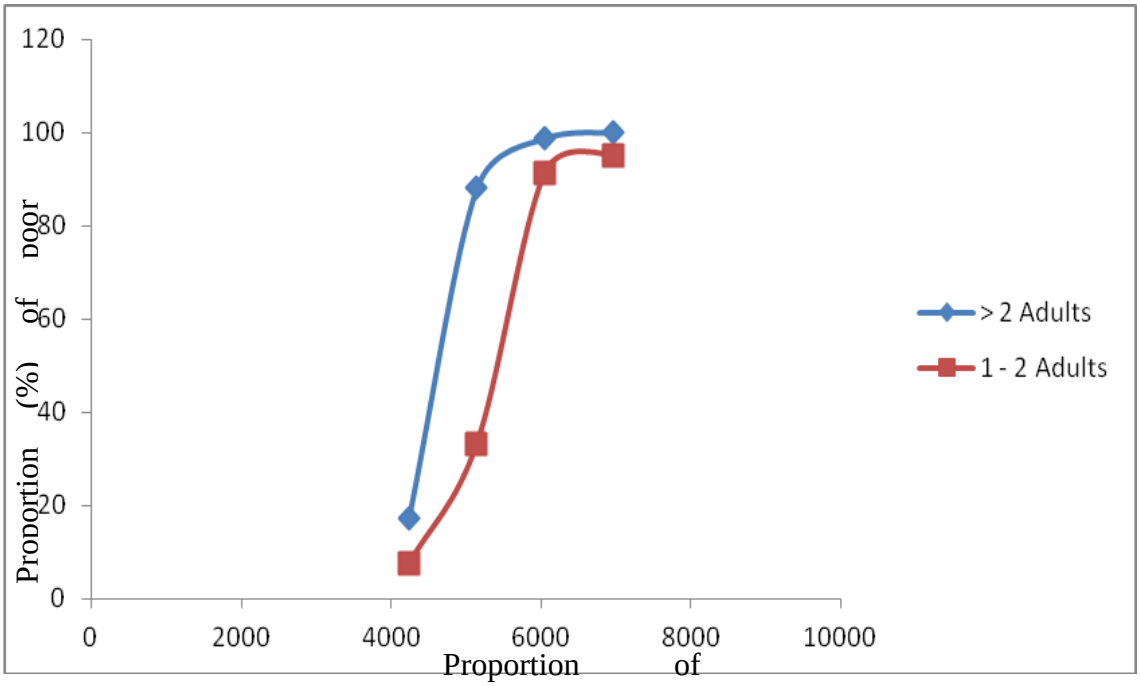



Figure 5: Distribution of dominance analysis by Adult Dependency Ratio

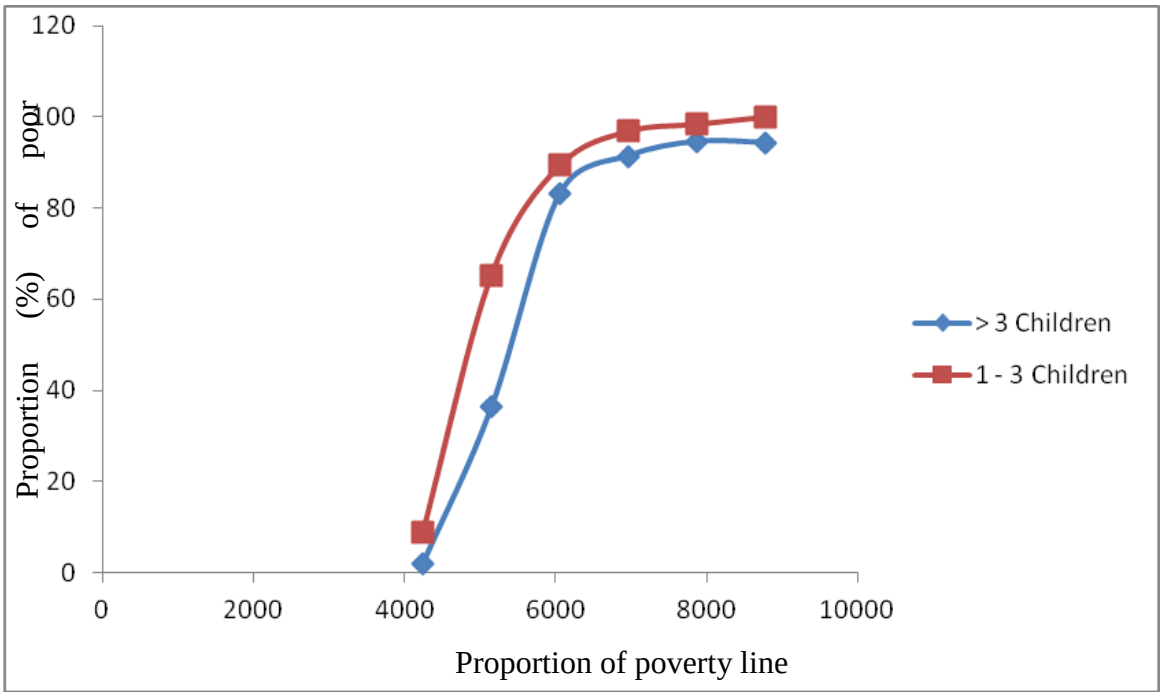



Figure 6: Distribution of dominance analysis by Children Dependency Ratio

The cumulative distribution function of households with 1-2 adult dependency ratios presented in figure 5, stochastically dominated that of households with more than 2 adult dependencies. This indicated that households with 1-2 adult dependants would always be less poor than their counterparts with more adult dependency at the specified range of poverty line. The same is true of the children dependency ratio from figure 6. The cumulative distribution function of households with 1-3 children dependency ratio lay below that with greater than 3 level of dependency. This showed that households with 1-3 dependants would be less poor at the specified range of poverty line. The second order stochastic dominance also holds truth. Dependency ratios rest on the premise that the incomes earned by working members of household are share by both the working and dependants in a household.

(iv)**Decomposition of poverty based on fishing experience**

Table 34 also presents the profile of the poverty status of the rural fishery households in the study area based on fishing experience. The incidence of poverty for fishing households with 1-10 years, 11-20 years and 30 years and above in fishing were 69, 49% and 62% respectively. This was contrary to *a priori* expectation though, households with 21-30 years have poverty index of 45% which was in line with expected result. The implication of fishing households with 30 years and above having relatively high headcount of about 62% is that people tend to withdraw from active fishing operation as they grow older. However, only sub-group 21-30 years fishing experience had the poverty incidence ($P_0$) statistically significant different from the whole group index at 10%.

### 4.5.2 Decomposition of rural fisherfolks' poverty based institutional factors

(i) The incidence of poverty was 56% for all households, with access to extension agents 1 or 2 times a year while the headcount for the households with extension for at least 3 times and above was reduced to 49% as seen in Table 35. The contribution to poverty gaps also followed the same pattern. The t–test analysis revealed that the incidence of poverty of the two sub-groups is statistically different ($P < 0.001$) from that of the whole group.

Table 35: Identified poverty sub-groups based on institutional and production Characteristics

| **Variables** | **$P_0$** | **$P_1$** | **$P_2$** | **n** | **Share of poverty** | |
|---|---|---|---|---|---|---|
| | | | | | **q** | **%** |
| **Extension contact** | | | | | | |
| 1 – 2 | 0.556*** | 0.085 | 0.0041 | 198 | 110 | 67.5 |
| >2 | 0.491*** | 0.066 | 0.0022 | 108 | 53 | 32.5 |
| **Membership of Cooperative** | | | | | | |
| 1– 10 | 0.661* | 0.078 | 0.0005 | 118 | 78 | 47.9 |
| 11 – 20 | 0.535 | 0.072 | 0.0026 | 114 | 61 | 37.4 |
| >20 | 0.324* | 0.063 | 0.0019 | 74 | 24 | 14.7 |
| **Occupation** | | | | | | |
| Fishing only | 0.539 | 0.075 | 0.0030 | 206 | 111 | 68.1 |
| Fishing and farming | 0.675** | 0.079 | 0.0173 | 40 | 27 | 16.6 |
| Fishing & others | 0.417* | 0.064 | 0.0017 | 60 | 25 | 15.3 |
| **Level of Credit (₦)** | | | | | | |
| Nil | 0.581 | 0.063 | 0.0026 | 272 | 158 | 97.0 |
| < 50,000 | 0.231** | 0.071 | 0.0019 | 13 | 3 | 1.8 |
| > 50,000 | 0.095 | 0.075 | 0.0036 | 21 | 2 | 1.2 |
| **Nature of Fishing Gears** | | | | | | |
| Motorised sector | 0.10*** | 0.074 | 0.0030 | 40 | 4 | 2.5 |
| Non-motorised sector | 0.598* | 0.072 | 0.0173 | 266 | 159 | 97.5 |

*$P_o$ is the headcount index, $P_1$ is the poverty gap index, $P_2$ is the squared poverty gap index; *****; ** and *** denotes test of significance differences from group total at 1%, 5% &10% respectively*

Extension contacts would have a positive effect on fisherfolks' ability to respond to new innovations and techniques as well as to latest technology on fish processing and preservation. Therefore, access to extension services signify improved welfare for the rural fishing households in the study area. This is true according to Etim and Solomon (2010) that fisherfolks with access to extension contacts were better exposed to improved fishing inputs and methods, which increase fish catch and capable of raising income and improve welfare.

(ii) **Decomposition of poverty based on membership of cooperative**

Memberships of cooperative were categorized into 3 sub groups and these include 1-10 years, 11-20 years and 21 years and above. Sixty-six percent of households with 1-10 years were poor, about 54% of households with 11-20 years are impoverished, while households who have been co-operators for at least 21 years recorded headcount of about 32.4% as shown in Table 35. This implies that the incidence of poverty is influenced by the years of being in fishery associations as observed also by Etim and Ukoha, (2010). The prevalence of poverty was higher as years of households in cooperative decrease along the ladder. The depth and poverty dispersion followed the same pattern. The study concluded that households with less years of cooperative membership were poorer in the study area. Therefore, membership of cooperative societies is a factor which influences the adoption of improved fishing techniques and apparently poverty alleviation.

**(iv) Decomposition of rural households' poverty based occupations**

Poverty incidence was prevalent among households that combined fishing with arable farming as the means of livelihood that is 67.5% compared to fishing households that engage in only fishing (54%) as means of livelihood. The fishing households that engage in fishing with other occupations such as civil service and trading recorded less poverty headcount of about 42%. The poverty gap and severity followed the same pattern as shown in Table 35. Occupational sub-groups, fishing and farming; and fishing and others were statistically significant different from the whole group index at 5% and 10% respectively. In conclusion, the incidence of poverty was more among households that combined fishing and farming as their occupation than those that combined fishing with non farming as other forms of occupation. This is probably due to occupational diversification which fetched additional income from sources other than farming and fishing. In addition, some of these extra income earned are fixed because it emanates from salary paid from government and non-government organisation. Fagernas and Wallace, (2007); FAO, (2008) and Olorunsanya, (2009) also reported high poverty incidence among farming households in their studies.

(v) **Decomposition of households' poverty based on availability of credit facilities**

The availability of credit facilities for the use of the artisanal fisherfolks could also increase the likelihood of their adopting the use of modern fishing gears such as outboard engines and sophisticated nets as against the use of traditional, manual propelled boats/canoes. The credit facilities will enable the fisherfolks to acquire the fishing machines that are capable of reaching far into distant waters and thus increase fish catch

levels of the artisanal fisherfolks. Thus, a fisher folk that utilize at least ₦50, 000 credits had poverty incidence of about 10% while fishery households that did not have access to credit record poverty incidence of 58% (Table 35). In addition, motorised fishery households was 1% statistically differed from whole group poverty index ($P_0$).

Figure 7 presents the Cumulative Distribution Function (CDF) for households that have access to production credit at different level. The CDF of households with no access to credit stochastically dominated the CDF of households with access to credit. For example, households with ₦50,000 credit lay below households without credit as in Figure 7. This shows that households with no access to credit would have more poverty incidence depth and severity than households with access to credit over the range of the poverty line. The second order stochastic dominance also holds truth.

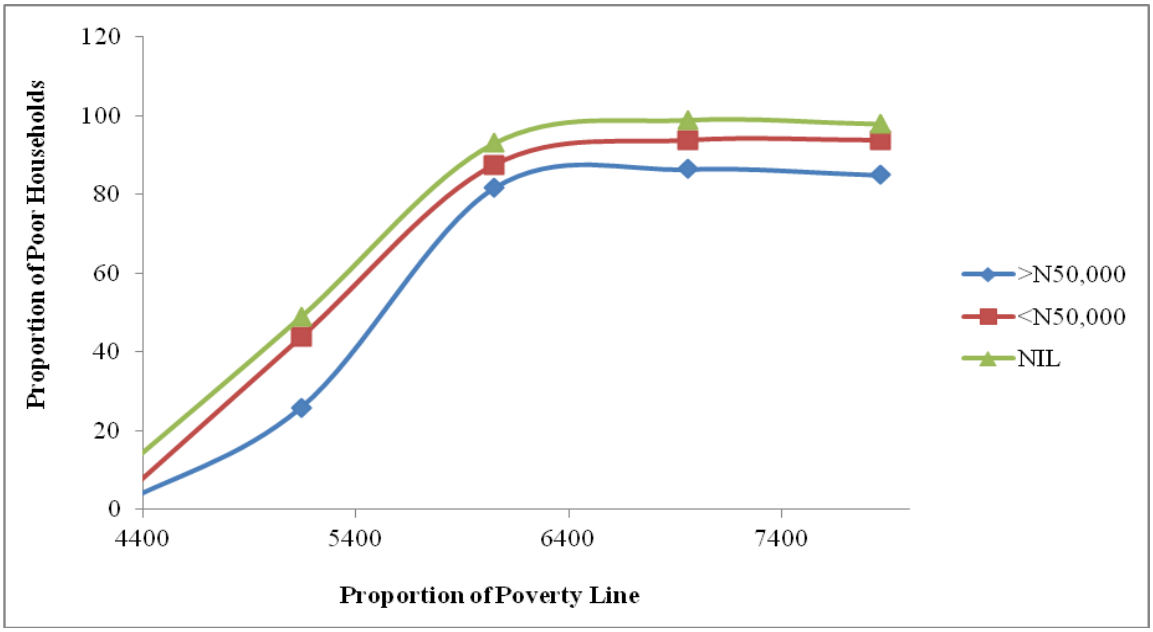



Figure 7: Dominance analysis by level of Credit utilization of Household Heads

(vi)**Decomposition of rural households' poverty based on fishing gears**

Similarly, ownership and types of canoes and fishing nets determine to a large extent the amount of fish catch and invariably the income that accrued to fisherfolks. While the poverty incidence among motorised canoe owners was 10%, that of non-motorised sector recorded about 60% level of poverty incidence. This is reinforcing in Figure 8 above where the Cumulative Distribution Function (CDF) by types of fishing gears of fishing households of paddled canoe users lay above that of households that use motorised canoes. This indicated that there were first and second order stochastic dominance and the households with non-motorised canoes 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 increased income and better welfare of fisherfolks for motorised canoe owners. Etim and Solomon, (2010) documented similar findings that by using improve fishing techniques; fisherfolks' output and income were raised, which subsequently improves household welfare.

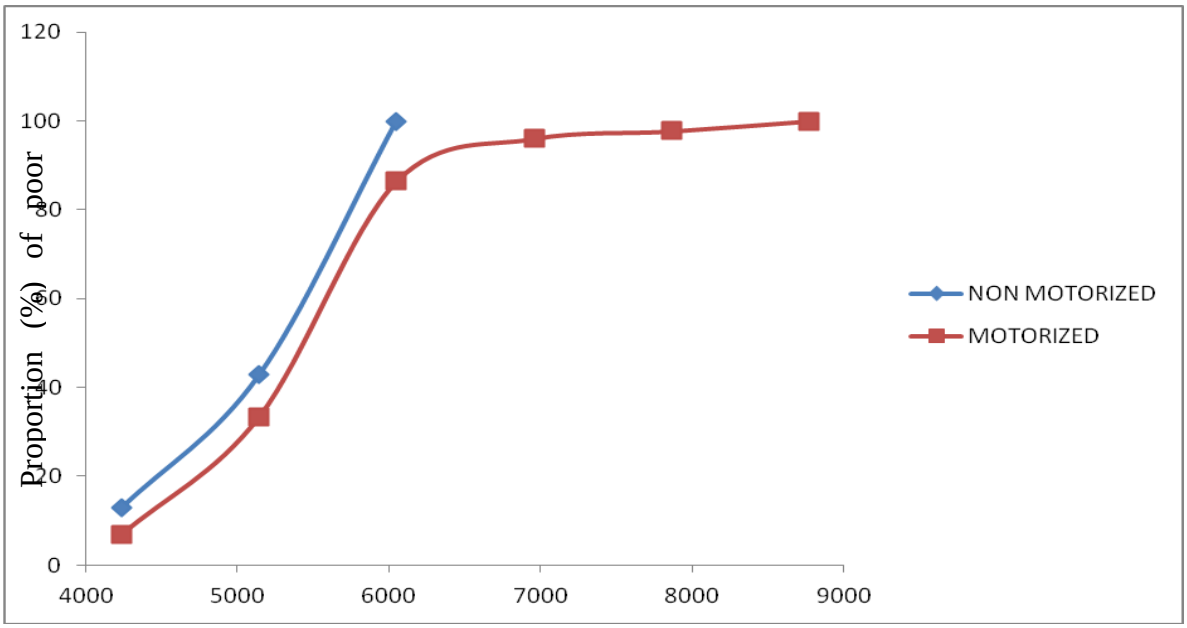



Figure 8: Distribution of dominance analysis by types of Fishing Gears of Household Heads

### 4.5.3 Test of Hypothesis (ii)

Hypothesis (ii) states that there are no poor households among artisanal fishery farmers in the study area. The data in Table 36 shows the result of t-test among poor and non poor fishery households in the study area. The result shows that the t-calculated on poor and non poor households (27.727) was greater than the critical t-value (1.978) at 1% level of probability. Since the average expenditure of non-poor fishery households is greater than average expenditure of poor households with a significant t-value at 1% level of probability, the null hypothesis was therefore rejected suggesting that there are poor households among artisanal fishery farmers in the study area.

Table 36: Test of hypothesis (ii)

| Variables | n | $ME_{exp}$ | SE | t-value | t-critical | Sig |
|---|---|---|---|---|---|---|
| Poor households | 163 | 4082.0 | 355776.7 | 27.73*** | 1.98 | 000 |
| Non poor | 143 | 11387.9 | 8366674.0 | | | |

****P<0.001, SE= Standard Error, ME= Mean expenditure of households*

## 4.6 Determinants of Poverty of Rural Artisanal Fisherfolks

The purpose of this section is to determine which of the variables included in the Tobit regression model used are the determinants of the poverty status of the households in the study area and the level of significance. The results revealed a good fit for the data as reflected by sigma (δ), 0.4938 with a Z-value of 2.9871 which was significant at 1% level. Therefore, the model specified explained significant non-zero variations in factors influencing poverty.

The result of analysis of the tobit regression model for the determinants of households' poverty status is shown on Table 37. The result showed that a number of socioeconomic, institutional and living condition variables affected households' poverty status. These variables include age, fishing income; non-fishing income, membership of a cooperative society, extension contacts, availability of credit facility, distance to clinic and vocational training were found to be statistically significant at different levels of significance. Age, fishing income, non fishing and level of education were statistically significant at 1%.

Table 37: Determinants of fishing households' poverty

| **Variables** | **β** | **SE** | **t-ratio** | **Sig.** |
|---|---|---|---|---|
| Age ($X_1$) | 0.0423*** | 0.0089 | 4.77 | 0.000 |
| Fishing income ($X_2$) | -1.760e-06*** | 6.21e-07 | -2.83 | 0.005 |
| Non-fishing income ($X_3$) | 1.999e-04*** | 5.85e-06 | 3.42 | 0.001 |
| Investment ($X_4$) | 3.310e-06$^{NS}$ | 2.27e-06 | 1.46 $^{NS}$ | 0.146 |
| Cooperative membership ($X_5$) | -0.026** | 0.012 | -2.20 | 0.027 |
| Extension contacts ($X_6$) | -0.111* | 0.065 | -1.71 | 0.087 |
| Credit amount ($X_7$) | -7.24e-06* | 3.70e-06 | -1.96 | 0.051 |
| Distance to clinic ($X_8$) | 0.132** | 0.060 | 2.25 | 0.025 |
| Education ($X_9$) | -0.114*** | 0.032 | -3.58 | 0.000 |
| Adjusted household size ($X_{10}$) | 2.835 | 2.215 | 1.28 $^{NS}$ | 0.315 |
| Constant | -2.947*** | 0.536 | 5.50 | 0.000 |
| **Number of observations** | | 306 | | |
| **LR Chi2 (15)** | | 38.7 * * * | | |
| **Prob > Chi2** | | 0.0008 | | |
| **Pseudo $R^2$** | | 0.3686 | | |
| **Log likelihood function** | | -478.431 | | |

* * *; * *; and * *were statistically significant at less than 1% 5% and 10% probability level respectively.*

Also, the result showed that membership of cooperative society and distance of the house to the clinic was all statistically significant at 5%. In addition, number of extension visits made to fishing households and amount of credit were significant at 10%, while investment in fishing inputs and adjusted household size were not statistically significant. The coefficients of age, non-fishing income, investment in fishing inputs, distance to modern medical facilities and adjusted household size were found to be positive, while

coefficients of fishing income, cooperative membership, extension contacts, credit amount, and education/ training were found to be negative.

### 4.6.1 Result of Maximum Likelihood Estimates of determinants of fisherfolks' poverty

Age ($X_1$) had a regression coefficient of 0.042. The positive and significant coefficient of age means that relatively, the older a household head becomes, the more the poverty status by 0.042. This finding confirms the earlier finding that the older a fisher folk becomes, the less it would undergo vigorous activity and the more he would increase his poverty status. It would not enhance fish production and ultimately the poverty status of the household will increase. However, the expected effect of age on poverty could be positive or negative, depending on whether fisher folk are in his active and virile age or not. Therefore, age has great potential for increasing agricultural productivity and production, and for improving household income and reducing poverty in the study area and vice versa. Amaza *et al*. (2009) and Etim and Solomon, (2010) documented similar findings.

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 marginally by 1.7e-06. In other word, as the income of the fishefolk's increase his poverty level will decrease, *ceteris paribus*. Thus, the larger the total output, the lower the probability of a fisher folk falling below the poverty line. This is however expected due to the fact that the more the fish caught, the higher the

income. An increase in income will decrease the propensity of a farmer falling below the poverty line. Thus, higher income tends to bring about welfare improvement hence reduction in poverty levels. The report is similar to findings by Etim and Solomon, (2010), and Bola, (2012) who did confirmed that farm income plays a significant role in poverty reduction among fishing households.

The coefficient of non-fishing income ($X_3$) was also statistically significant at 1% with 1.99e-5 but contrary to *a priori* expectation. This implies that a unit increase in non-fishing income would also raise the poverty level marginally by 1.99e-05. Though statistically significant, but the expected effect was that a contribution outside fishing income such as income realized from subsidiary occupation and remittances from relations and friends will reduce poverty. Thus, non-fishing activities should complement fishing sources of income, by availing the fishery households' additional resources for both consumption and investment. Investment in turn enhances asset accumulation and opens up additional escape route out of poverty. However, most of non-fishery sources of income in the study area have to do with menial job and unskilled non-farm employments. Despite this, access to a non-fishing income is an important determinant of escape routes from poverty. Omotesho *et al*. (2010); Etim and Solomon, (2010) find negative correlation between non-farm income and poverty level and affirmed that households that have non-farm sources of income tend to easily get out of poverty than households that do not have other sources of income outside fishing or farming.

Suffice to note that the positivity of non-fishing income indicates that, as the proportion of income from economic activities other than fishing grows, fish catch and invariably fish income will fall. In areas where there are more profitable alternative economic activities, increased non-fishing income is a disincentive to fishing. Thus direct participation in fishing will reduce and consequently fish output and net returns. Therefore, the social and economic conditions in some riverine communities in the study area have brought about alternative sources of livelihood to reduce poverty in such communities. For example, the initiation of Shonga Farm, Bacita Sugar Company and citing of College of Education Technical in Lafiagi district and massive irrigated rice farming in Patigi and Kudu-lade district have gainfully employed many of the artisanal fishery households and their acolytes in Patigi and Lafiaji fishing settlements. Inoni and Oyaide, (2007) had a similar observation in agro ecological zone of Delta State where such a strategy of rural poverty alleviation and youth empowerment may have stimulated alternative income generating activities in fishing communities, to the extent that the propensity to fish has reduced.

Membership of a cooperative group ($X_5$) had a regression coefficient of -0.03. The negative and significant coefficient of membership of a cooperative group suggests that membership of a cooperative society will decrease the probability of a household poverty level. This is likely to be so because most cooperative groups in the study area though were passive but would probably make some meaningful impacts to enhance members' access to credit, modern fishing inputs and training. Suffice it to note that cooperative societies are supposed to be a driving engine for development in the rural area, but where such society is inactive, members may be deprived of most benefit attached to it.

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 so because during such visits, households were trained and feedbacks were received on the technology passed to the fisherfolks during the previous visit. This allowed for positive interaction and hence the likelihood that the interaction will assist the fisherfolks to benefit more on the technology being passed. This could be supported with the work of Etim and Solomon, (2010) and Etim and Patrick, (2010) that the negative coefficient tends to reduce the poverty status.

Access to production credit ($X_7$) was also statistically significant at 10% level with negative coefficient, suggesting that access to credit could reduce poverty level. The implication is that poverty would be decreased infinitesimally by -7.24e-06 with access to credit and households that utilized production credit. This confirmed the empirical and theoretical expectations that the judicious utilization of production credit will enhance increased output and apparently reduce poverty level, *ceteris paribus*.

$X_8$ which denotes 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. This corroborates earlier study by Omotesho *et al*., (2010) that find a significant correlation between access to health facilities, and food security and poverty of the rural households in Kwara State, Nigeria.

$X_{9,}$ the proxy for vocational education was measured by years of formal schooling was statistically significant at 1% level with coefficient of -0.114. This means that the poverty depth is decreased by 0.114 for a unit increase in years of educational training. This may be attributed to the fact that the art of fishing required skill training and acquisition no matter your level and years of exposure to formal education. Therefore, the negative and significant coefficient of years of vocational education suggests that education in form of training is prerequisite to art of fishing.

Investment in modern fishing gears and nets ($X_4$) was not found to be statistically significant. This may be as a result of low investments in modern fishing technology since majority of fishery households use crude fishing techniques and backward technology which lead to decreased income and reduction in welfare.

The result of analysis of the tobit regression model for the determinants of households' poverty status showed that a number of socioeconomic, institutional and living condition variables significantly influenced the poverty status of the rural households in the study area, with significant effects on rural households' welfare. Therefore, targeting these variables for poverty reduction would yield positive result among artisanal rural fishery in Kwara State.

### 4.6.2 Test of Hypothesis (iii)

The result of tobit regression model (Table 37) shows that socio-economic, institutional and living condition variables such as age, fishing income, non fishing income, cooperative membership, extension contacts, credit amount, distance to clinic and vocational training were statistically significant at different levels of significance. This suggests that the null hypothesis should be rejected. Therefore, it can be concluded that there is a relationship between socio-economic characteristics and poverty status of artisanal fishery farmers in the study area.

## 4.7 Constraints Faced by Rural Artisanal Fisherfolks in the Study Area

This section examined the nature of constraints faced by fisherfolks in the study area with the aims of suggesting plausible measures to ameliorate the problems encountered by rural fishery households in the study area. The result of the analysis of constraints faced by fisherfolks in the study area ranked from most critical to the least were summarised in Table 38.

**(i) Inaccessibility of credit**

The result of analysis of constraints faced by fishing households in the study area showed that inaccessibility of credit ranked the most critical bottleneck indicated by 15.5%. Credit is some of the policy instruments considered to facilitate technology transfer, stimulate productivity, and generate employment and increase income (Librello and Catalla, 1987). Credit constraints affect fisherfolks' investment behaviours, productivity and expansion of

farms negatively. Loans are given to fisherfolks purposely to enable them to purchase canoes, outboard engine and fishing gears and to pay for major occupational expenses. Accessibility to fishing credit was constrained by certain factors identified in the study area. These include: high interest rate (34.3%), insufficient credit (32.7%), problem of collateral (19%), delaying in obtaining credit (11.4%) and others (2.6%).

Table 38: Constraints encountered by rural artisanal fisherfolks

| **Constraints** | **Frequency** | **Percentage (%)** | **Rank** |
|---|---|---|---|
| Inaccessibility of credit | 89 | 15.5 | 1st |
| Extension visits | 71 | 11.6 | 2nd |
| High Cost of Equipments | 68 | 11.1 | 3rd |
| Inadequate Storage Facilities | 60 | 9.8 | 4th |
| Climatic variability | 50 | 8.2 | 5th |
| Distance of markets | 45 | 7.4 | 6th |
| Scarcity of fishing gears | 43 | 7.0 | 7th |
| Menace of Water lords | 42 | 6.9 | 8th |
| Infestation by hyacinth | 31 | 5.1 | 9th |
| Accessibility to water/river | 30 | 4.9 | 10th |
| High cost of hired labour | 24 | 3.9 | 11th |
| Poor gear design | 24 | 3.9 | 11th |
| Accessibility to fuel | 20 | 3.3 | 13th |
| Tax and Charges | 8 | 1.3 | 14th |
| Others | 7 | 1.1 | 15th |
| Total | 612 | 100 | |

* The first two major constraints per fisher folk were analysed

Although, credit have always been an integral component of the overall government policy to accelerate rural development in Nigeria, but majority of rural farming households including artisanal fisherfolks are constrained due to the factors listed above. In addition, most formal institutional lenders shunned agricultural sector due to risk

associated with agricultural production coupled with the fact that amount given to agricultural sector is small compared with the total loans granted to other sectors of the economy. However, to ensure effective utilization of available sources of credit, establishment of rural and community bank in the rural areas with simple procedures of securing loans is recommended. Also, mobilization of fisherfolks into formidable groups in order to enjoy the benefit of collective investment of group savings otherwise known as social capital is also recommended.

**(ii) Inadequate extension visits**

The results also revealed lack of extension contacts (11.6%) as 2$^{nd}$ most critical constraint that impedes artisanal fishing in the study area. Extension service delivery is a vehicle for spreading scientific and technology progress, and transfer. It also facilitates the dissemination of improved fishing technologies through various methods. The role of agricultural extension agents is very crucial in improving fishery development in Nigeria. It does this by facilitating the education of artisanal fisherfolks to improve their skills, knowledge and attitude as related to sustainable fishery development.

However, the extension service deliveries in Nigeria are hampered by a number of problems. These include low extension agents to farmers' ratio. While FAO recommends a minimum of one extension agents to 800 farmers, the national average stood at 1:1986 (Ihimodu, 2002). They are also poorly motivated in remuneration and provision of transport facilities to visit the farmers. Findings reveal that the few extension agents available in the study area reside far away from the farmers mostly urban areas, thereby

minimizing interaction between them and the fisherfolks. The problem of language barrier between the two actors is another bottleneck. Majority of these extension agents in the study area could neither communicate in local nor Arabic language while the bulk of artisanal fisherfolks could not communicate in English language. In addition, the linkages between research, extension and training are weak and collaboration between public and private partners limited. If these and other similar problems are X-rayed, extension could become an instrument for effective fishery development. Therefore, Omokhaye (2000) reported that the main problem of agriculture development in Nigeria is not the lack of technologies and scientific findings needed for economic and social change, but inadequate information on the usage of the improved technologies.

It is therefore recommended that efficient extension service should be rendered by trained extension agents, who are under continuous training and retraining programmes. This must be supported by a dynamic system of monitoring and evaluation, and good government policy. More extension agents should be recruited to reduce the extension-farmer ratio. Improving on the extension services by strengthening the State and Local Government efforts through provision of manpower and material support will improve extension service delivery. Extension materials could be translated to Arabic language, since the bulk of the respondents could read and communicate in Arabic language.

**(iii) High cost of equipments**

High cost of equipments ranked 3$^{rd}$ (11.1%) constraint that hindered effective artisanal fishing. Artisanal fisherfolks suffered from lack of suitable fishing equipments such as

fishing gears, outboard engine and craft. The bulk (about 87%) of fisherfolks in the study area relied heavily on manually propelled canoes and the fishing gears which are out-moded. This is because modern equipments are costly and the fisherfolks lack the necessary finance to purchase them. This situation is evidenced in the study area by the use of artificial materials such as foams and cork as floats; stones as sinkers; hook and line as fishing gears, and overdue fishing nets and canoes by some fisherfolks. In addition, because of lack of modern and sophisticated equipments in the study area which invariably implies limited range and capacity of the canoes used, the bulk of fisherfolks could only exploit resources close to their villages/settlements.

In addition, fish is landed in small quantity in these settlements and consequently cannot be handled, processed or marketed in bulk as required for maximum efficiency. Fisherfolks are encouraged to mobilize themselves into formidable groups in order to enjoy the benefit of economy of scale, collective investment of group savings otherwise known as social capital and pursue support from government to assess loans with flexible payment conditions.

**(iv) Inadequate storage and processing facilities**

The result also indicates that inadequate storage and processing facilities is an important constraint faced by fishing households in the study area. This constraint gulped about 10% of the problems limiting effective fishery practices in the study area. In Nigeria, fishery sub sector employ about 4.3% of Nigeria population and has potential to produce enough fish for local consumption as well as export (FAO, 2013). However, due to the lack of

needed infrastructure which includes, storage and processing facilities, it still provides a strictly seasonal and subsistence livelihood. Modern storage facilities such as ware house, frozen equipments, canning and processing machines are virtually non-existence in the study area. Although, fisherfolks have devise local measures to reduce fish post harvest loss, which include protecting catch fish from direct sun and rain and cover the fish with leaves as well as immediate processing of the fishes. The local methods of storage and processing such as smoking, sorting, drying and filleting seems to be cumbersome and could not preserve the fish for long time. Therefore, to achieve self sufficiency and discouraging the importation of fish and fish products in Nigeria, the need for modern storage and processing equipments becomes imperative. This will also improve the wellbeing of rural artisanal households.

**(v) Problem of climate variability**

Findings indicate that the fisherfolks have acknowledged existence of a significant of climate variability (climate change). About 8.2% of respondents agree that climate variability such as flood, drought, variation in temperature and change in rainfall patterns, high wind turbulence and duration and variation in seasons hindered fishing activities in the study areas. Hamdan, Kari and Othman, (2011) opined that extreme patterns of climate events affects the rivers water quality which may lead to diseases outbreak and non-conducive environment and threat to fish survival. These resulted into disappearance of some fish species and lowering catches. Therefore, it be concluded that climate variability may increase the incidence of poverty. Based on the climatic variability in the study area, fisherfolks should develop strategies to counteract those adverse impacts in

their livelihoods. The strategies include change in fishing time that is fishing during both day time and during the night; change the fishing gears from using simple fishing tools, going fishing in the deep water.

**(vi) Distance to markets**

Distance to markets is another constraint faced by fisherfolks in the study area. More than 7% agree that distance to markets including lack of roads is a problem in artisanal fishing. Distribution of inputs and outputs to and from farms is the most serious infrastructural bottleneck facing agricultural development in Nigeria. Suffice to note that improved access to input and output markets is a key precondition for the transformation of the fishery sector from subsistence to commercial production. Small scale fisherfolks must be able to benefit more from efficient markets and local-level value addition, and be more exposed to competition. The studied area are characterised by lack of roads, high transport cost, long distances to markets and lack of affordable, appropriate transport and poor or non-existent communications infrastructure for disseminating information on markets, products and prices.

Majority of the fisherfolks sell low immediately after fish expedition (fish catch) and acquired their inputs at unavoidable price with little choice of where they conduct the transactions, with whom and at what price. Therefore, the artisanal fisherfolks need access to competitive markets not just for their produce but also for inputs, assets and technology, consumer goods, credit and labour. In addition, communication infrastructure

for disseminating information on markets, products and prices are also essential for effective input- output market in the study area.

**(vii) Scarcity of fishing gears**

Seven percent of respondents agree that fishing gears, outboard engine and craft is also an impediment to artisanal fishery practices in the study area. Although, the number of fishery households has increased from 1200 in 1975 to over 10000 fishery households in 2010 (KWADP, 2011), the bulk of these fisherfolks lack vessels and gears to exploit far distance resources. The resultant effect leads to over exploitation of near river reef fisheries and resort to cheap but destructive fishing practices. Therefore, fishery households suffered from lack of suitable fishing equipments such as fishing gears, outboard engine and crafts. They relied heavily on manually propelled canoes and the fishing gears which are out-mode.

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 imbibed fishery practices and technology, though that are economical and efficient but play more emphasis on maximum sustainable yield as canvassed by (Tietenberg, 2000). However, result from the study indicates that household heads that make use of modern fishing gears had real consumption per adult equivalent of ₦13643.02 and ₦8223.04 for non motorised canoes. The common gears used in the study area include hook and line, traps, spillers, gill, cast nets and outboard engine.

Therefore, government should encourage local fishery technological development by financing relevant research institutes (such as National Centre for Agricultural Mechanisation) towards mechanising all fishery operations to eliminates drudgery, save labour and time and achieve a technological transformation of the fisherfolks. In the absent of this or as an interim measure, relevant agencies should network with local fisherfolks to import environmental compatible fishing gears and vessels, and other fishing equipments for sustainable fishery development in Nigeria. Such gears and vessels should also place premium on mending materials, efficiency, fisherfolks' knowledge and experience as well as economic and environmental consideration.

**(viii) Menace of water lords**

Artisanal fisherfolks in the study area also suffered from menace of water lords as 6.9% of respondents confirmed hindrance from fishing by water lords. However, the bulks of fisherfolks who complain of molestation and arbitrary charges or hindrances from fishing were mostly immigrant and restricted to few fishing settlements (such as Laduba fishing settlement) in the study area. Artisanal fisherfolks in the study areas bordering with neighbouring State also suffer molestation by other fisherfolks of the neighbouring State. These events have become so regular that some fishery households have deserted these rich fishing grounds thus limiting their fish catch. The fisherfolks should activate their cooperative and liaise with the fishing community and Local Government Authority towards finding permanent solutions to this, to be fully protected by the stakeholders. If this is not done the fisherfolks will be forced to desert the fishing grounds in the "troubled

water" to the detriment of the State's fish production and the nation development goal of self sufficiency fish production.

**(ix) Infestation by hyacinth**

About 5% of the artisanal fisherfolks regard infestation by hyacinth as one of the important problem towards fishery development in the study area. The aquatic macrophyte called water hyacinth (*Eichhornia crassipes*) is not new in the ecological history of man. In fact, it has been popularly described as the most troublesome weed of the world because of its rate of multiplication (Ndimele, Kumolu-Johnson and Anetekahi, 2011). Water hyacinth is a native of tropical South America that has spread to more than 50 countries, five continents and has become a massive problem in waterways on both Africa (Nigeria inclusive) and Southeast Asia (Barret, (1989).

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, 2001) and river reef. In addition, it also increases cost of fishing expedition due to labour and chemical required to remove the weed.

**(x) Accessibility to water and river**

Accessibility to water and river also play a crucial role in fishery development in the study area. About 5% of the respondents opined that their canoes are operated from small and

scattered fishing villages located along the inland water. These villages are not easily accessible from major population centres which create difficulties in the evacuation and marketing of fish products and the development activities by government agencies. The advent of some industries particularly in Asa fishing settlement area has resulted in frequent incidents of industrial waste spillage to part of Asa fishing settlements which have endangered fish fauna and flora, and drastically affected 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 lead to decimation of the fishes in the rivers.

Therefore, environmental pollution and lack of proper water management (water pollution), and scattered fishing settlements 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 sustainable and existing levels.

**(xi) High cost of hired labour**

High cost of labour also account as constraint to about 4% of the artisanal fisherfolks in the study area. The bulk of fishery households' members particularly in Asa fishing settlements are either in school or migrate to urban centres and nearby industrial estate for paid job. Their motive lies either in supplementing their household income or accumulating capital for further expansion of their economic activities. However, this particular job is unstable, unskilled employments opportunity which suggests availability of undeveloped domestic labour market in rural area. Given the limited capacity for labour absorption by the urban and industrial sector, it is advisable for the rural households to utilize the vast potential of agriculture and fishery resources to improve their livelihood. However, government should encourage individuals and corporate organisation to create stable labour intensive agro-allied industries in the rural areas to meet this demand by encouraging location of such industries in the rural areas through provision of needed infrastructure. This will complement agricultural labour which would be highly significant in terms of improved livelihood for rural households and reduce rural-urban migration.

**(xii) Poor gear design and accessibility to fuels**

Gear design and maintenance also hindered effective fishery practices in the study area. About 4% of sampled fisherfolks which consist of 60% of fisherfolks that operate canoe with outboard engine and use sophisticated fishing nets complain of complication in their gears and nets. Fisherfolks lack the needed capacity and technical know-how in maintaining the gears, thus, leading to poor maintenance.

Accessibility to fuel is also a constraint to artisanal fishery production in the study area. More than 3% of respondents mostly motorised engine users complain of arbitrary prices and scarcity of fuel commodity in the study area. Nigeria fuel has been very volatile in oil prices in the last two decades despite the fact that Nigeria is one of the leading net oil exporters in the world. The implication of its volatility was unprecedented increase in prices of petrol and diesel from about ₦3.25K/litre and ₦3/litre respectively in 1993 to ₦97 and 135/litre in 2012 {Petroleum Product Marketing Company, (PPMC), (2012)}. If fishery development is to be encouraged with high capital investment so as to mechanise artisanal fishery operation in Nigeria, government must encourage installation or building of gasoline station in the rural area and sell fuel at affordable price. This will safeguard the future of the mechanised investment and the artisanal fishery development in general.

**(xiii) Taxes and charges, and others**

Taxes and charges was also mentioned by artisanal fishery household as one of the problem hindering effective fishing in the study area. About 1.3% of artisanal fisherfolks complained of multiple charges from Local Government and State staff. Other constraints listed were cumulated into about 1.1% and these include seasonality nature of fishing, drudgery nature of fishing and negative perception of the fisherfolks in society amongst others.

It suffices to note that non-availability of credit and lack of extension contact identified as two most important constraints sum up to over one quarter (27.1%) of the problems of artisanal fishery in the study area. It may be concluded that if these two constraints are

looked into and their fishery cooperative societies are rejuvenate, other impediments such as 3rd, 4th, 7th, 15th, 10th, 5th, and 8th constraints may cease to exists or reduce to the bare minimum in the study area. These major constraints highlighted above have resulted in low production by the artisanal fisheries and a low return for effort as compared with other sources of employment with the result that few coastal and riverine people are interested in getting into the fishery practices, while those already involved are leaving for other more financially rewarding ventures. This has resulted in the shortage of active fisherfolks in the artisanal sector.

# CHAPTER FIVE

# SUMMARY, CONCLUSION AND POLICY RECOMMENDATIONS

## 5.1 Summary

The study analyzed the poverty status using structured questionnaire administered to randomly select 306 rural artisanal fishery fisherfolks in Kwara State. The data were subjected to analysis using descriptive statistics, Gross margin analysis, Foster Greer and Thorbecke (FGT) poverty index and tobit regression to achieve the set specific objectives.

The result revealed that nearly 93% of the bulks of fisherfolks were males and only 7.5% of pooled fishery households were women, who owned and engaged in fishing. The mean age among fisherfolks was 40 years while the estimated mean years of schooling of fisherfolks in the study area, 2.1 years and the pooled sampled fisherfolks in the study area belong to cooperative and fishing associations in their various localities but majority of the fisherfolks (75.0%) operate on individual basis since the associations are inactive.

The result of the analysis of the water sources of the fishing households shows that about two-third (67%) of fishing households had their water source from the river which formed the major source of water for drinking and domestic use and only 10% of the households had access to borehole water while 6.5% of pooled respondent utilized well water. The open field was the most important method (about 91%) of waste disposal system with only 2% of the fishing households had access to a pit toilet in their home.

The mean per adult equivalent household expenditure for all household in the study area was ₦9,075.15 and this gives a two third of ₦6,050.15 per adult equivalent per month as a poverty threshold and relative poverty line for rural fishery households in the study area. The line showed that 53% of fishing households were below threshold line and so deem poor. The fisherfolks' households recorded higher values for food expenditure than the non-food expenditure items. The food poverty line was ₦4695.04 which account for 77.6% of total expenditure of fisherfolks' household while the non-food poverty line equal ₦1355 and this account for only about 22.40% of total expenditure.

The profitability analysis result showed significant difference between fisherfolks' costs and returns with an average gross margin of ₦18747.98 per fisher folk, a profit margin of 31% and a return on investment of 1.21. This means that for every one naira invested by a fishery household, a profit of ₦1.21 kobo is made. It further shows that labour costs accounted for approximately 80% of average variable costs for paddled canoes and less than 32.0% of motorized canoes and 27.6% and 65.9% respectively of total cost.

Fifty-four percent of male-headed households live below the poverty line in comparison with female-headed households with headcount of 43%. This is contrary to *a priori* expectation. The result of decomposition of poverty based on gender was reinforcing with the cumulative distribution function of the female-headed fishing households stochastically dominated that of the male-headed one. In addition, the contribution to whole group's poverty also reduced with increase in the years of schooling of the rural households. Age, education attainment, membership of cooperative, extension contacts

and others were also decomposed to various groups to critically examine their poverty status.

The results of the tobit regression analysis confirmed the fitted variables as the determinants of poverty for fishery households in the study area with the exception of the modern fishing inputs and adjusted household size. The determinants of households' poverty status showed that age, fishing income; non-fishing income, investment and use of modern fishing equipment, membership of a cooperative society, extension contacts, availability of credit facility, distance to clinic and vocational training were found to be statistically significant at different level of significance. The coefficients of age, non-fishing income, and investment in fishing inputs, extension visits and distance to modern medical facilities were found to be positive, while coefficients of fishing income, credit amount, cooperative membership and vocational training were found to be negative. The result further revealed the variance parameters; the sigma (δ) was 0.4938 with a Z-value of 3.4138 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 most important constraints encountered by fishing households in the study area showed that inaccessibility of credit ranked 1$^{st}$ bottleneck with the highest rating as indicated by 15.54% and this was closely followed by the lack of extension visits (11.60%) and by high cost of fishing equipments, such as outboard engine, fishing nets and canoes which ranked 3$^{rd}$ (11.11%). It suffices to note that non availability of credit

and lack of extension contact identified as two most important constraints summed up to over one quarter (27.14%) of the problems of artisanal fishery in the study area. It may be concluded that if these two constraints were looked into, some other constraints mentioned such as inadequacy and accessibility of fishing equipments automatically will vanish.

## 5.2 Conclusion

Based on the analysis of this study, it can be concluded that poverty level among the artisanal fisherfolks was high and that socio-economic and institutional variables were the most important factors influencing poverty status of artisanal fisherfolks in the study area. This implies that effort should be geared towards improving the duo-micro variables to improve the welfares and living standard, and reduce poverty level of the fisherfolks in the study area. The gross margin analysis showed that artisanal fishing enterprise is profitable. But increased fish catch and income can be achieved from artisanal fishing by properly addressing the problem of fishing inputs and mechanisation of the fishery enterprise. The estimation of the determinants of the poverty among fishing households reveals that except for investment in modern fishing equipments and adjusted household size, all other independent variables markedly and aptly contribute to poverty among the fishing households in the state. Hence, the study establishes that poverty can be reduced by assessing these variables as a pointer to poverty alleviation.

An attempt was also made to decompose the poverty status using weighted poverty index, stochastic dominance and Gini-coefficient in order to be able to identify the contribution

to overall poverty status, income and expenditure inequality in the study area. These enable us to decompose poverty into various groups via socio-economic, institutional and living conditions characteristics. Thus, this confirms that the bulk of these variables are crucial in poverty analysis and should be critically examined. Therefore, the study concluded that socio-economic and institutional variables of fishing household heads contributed to poverty status of rural fishing households in Kwara State.

## 5.3 Contribution of the Study to Knowledge

The study established the following:

(i) The bulk of artisanal fisherfolks (65.6%) in the study area engaged in farming as secondary occupation. Therefore, policy aimed at improving the livelihood strategies and standard of living of the rural fishery households in the study area should at least target both primary and secondary occupations.

(ii) The expenditure pattern of artisanal fisherfolks in the study area was tilted towards food expenditure (77.7%) than non-food expenditure (22.3%).

(iii) Artisanal fishing in the study area was profitable with a State average net margin of ₦10,601.98. The fisherfolks were operating at a return on investment of 1.21, that is, a profit of ₦1.21 made for every ₦1 invested. However, investments in motorised canoes were found to be more profitable (₦19,079.9) than non-motorised ones (₦8350.10).

(iv) The results of the Foster, Greer and Thorbecke (FGT) weighted poverty index for the whole sample households yield a poverty headcount ratio of 0.533, implying

that 53.3% of the total sample households spend less than what they would need to meet minimum living standard requirements.

(v) The socio-economic variables such as age, fishing income, non-fishing income and education were statistically significant at 1% and institutional variables such as cooperative membership and extension visits statistically significant at 5% and 10% respectively in tobit regression model. This implies that the variables were the major determinants of poverty status of fisherfolks in the study area.

(vi) The study identified constraints faced in artisanal fishery from most critical to the least. Artisanal fisherfolks in the study area identified non-availability of credit (15.5%); lack of extension contact (11.6%) and high cost of equipments (11.1%) as the most important constraints summed up to about 40% of the problems of artisanal fishery in the study area.

## 5.4 Recommendations

Based on the findings of this study, the following recommendations are made to enhance poverty reduction strategies for rural artisanal fisheries in Kwara State:

(i) The State Ministry of Education through Agency for Adult education in collaboration with extension agents could consider providing basic education training within the fishing communities, considering the fact that education played a pivotal role and found to be significant in determinants of poverty status of artisanal fisherfolks. Fisheries education can impact positively on the success of fisheries development programmes, because

education and particularly training enhance adoption of technology and improve methods which are vital means of achieving higher fish catch levels.

(ii) Fisherfolks should rejuvenate and bring alive their cooperative societies and associations to enable them feel government impact at all levels and to access most of the new innovations and inputs necessary to increase their output and improve their standard of living.

(iii) It is glaring from the result of the analysis of fishing credit that credit has been a serious constraint to fisherfolks in Kwara State. Since there is a growing need for production credit on the fishing enterprise, the promotion of savings among fisherfolks and their groups should be encouraged.

(iv) The National Aquaculture Strategy Plan with support from FAO could incorporate the artisanal fisherfolks into their plan targeted to develop aquaculture practices with the aim of combining both aquaculture and artisanal fishery practices. Fisherfolks should be supplied with all necessary inputs, including training to participate in artificial culture of fish.

(v) In addition, in absence of (iv) above, fisherfolks are advised to combine fishing with other non-fishing activities such as their ancillary occupations, to earn off-fishing income. This suggests also that any policy aimed at improving the livelihood strategies and standard of living of the rural

fishery households in the study area should at least target both primary and secondary occupations.

(vi) The stakeholders in artisanal fishery including fisherfolks should support in provision of the basic infrastructures required for rapid and sustainable business development in fishing settlements in the State. For example, opening up the rural communities roads by self or community effort will encourage other stakeholders' intervention in adding value to the infrastructures for fishing and non-fishing enterprises.

(vii) Finally, a suitable indicator could be developed through community's watchdogs in collaboration with all water users particularly fisherfolks, to measure activities of fisherfolks and other river users too, and to ensure that the water resources are managed sustainably and transparently to support inclusive economic and human development.

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**APPENDIX**

**QUESTIONNAIRE**

**DEPARTMENT OF AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY, FACULTY OF AGRICULTURE,**

**AHMADU BELLO UNIVERSITY, ZARIA.**

Questionnaires on analysis of poverty status among rural artisanal fisheries in Kwara state, Nigeria.

Dear Respondent,

My name ***is*** **Y**usuf, a PhD student in the above named University. The research is on artisanal fishery in Kwara State and is part of my PhD Dissertation. Your personal information and experience will remain confidential and all information provided is purely for academic pursuit. Please, help to supply all information below and do not hesitate to bring forward information that will be useful for this research but not included in the questionnaire. Thank you for your time and I look forward to your cooperation in this study.

Instruction: Kindly tick (√) or fills in blank spaces as appropriate

ARTISANAL FISHERFOLKS

Background Information on the Household Head

$A_1$ Questionnaire No.....

$A_2$ Name: .....

$A_3$ Village: .....

$A_4$ Local Government Area: .....

$A_5$ Date of Interview: ..... 2013

Demographic Characteristics about the Household Head

$B_1$ Age in years.....

$B_2$ Sex: (i) Male [ ] (ii) Female [ ]

$B_3$ Marital Status: (i) Married [ ] (ii) Single [ ]

$B_4$ Indicate the number of years you successfully completed in schools

(i) None [ ] (ii) Quranic education [ ]

(iii Primary certificate [ ] (iv) SSCE/GCE [ ]

(v) NCE/OND/NURSING [ ] (vi) HND [ ]

University [ ] (viii) Others (specify) ....

$B_5$ How many are members of your household?

$B_6$ Give the following information on members of your household?

| Name | Age in years | Sex Male=1 Female=2 |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

$B_7$ Who taught you how to fish? .....

$B_8$ Indicate number of years you successfully completed vocational training in fishing.....years.

Social Factor

$C_1$ How long have you been fishing? .....Years

$C_2$ Did extension staff visit you last fishing season to give you fishing advice and information?

Yes [ ] (b) No [ ]

$C_3$ If yes, how many times did extension staff visit you last fishing season? .....2012

| No of times weekly | No of times monthly | No of times quarterly | No of times yearly |
|---|---|---|---|
| | | | |

$C_4$ How many times had extension staff visit you this current season? .....2013

| No of times weekly | No of times monthly | No of times quarterly | No of times yearly |
|---|---|---|---|
| | | | |

$C_5$ Do you belong to any fishery/farming related co-operative society?

(a) Yes (b) No

If yes, name the cooperative society.....

$C_6$ For how long have you being in the cooperative society? .....years

$C_7$ What benefit did you derive from your membership of the cooperative?

S/no Benefits

To access loan and credit [ ]

To purchase fishing inputs [ ]

To market fishing products [ ]

D OCCUPATIONAL CHARACTERISTICS VARIABLES

$D_1$ what is your (household head) primary occupation? .....

$D_2$ what is the subsidiary occupations of the household head? (i) Artisanal fishing [ ] (ii) Farming [ ] (iii) Trading [ ] (IV) Government salaried job [ ] (v) Private salaried job [ ]

(vi) Crafts and Artisans [ ] (vi) Others..... (vii) No subsidiary occupation.....

$D_3$ Are you the owner of the fishing canoe you operate? (i) Yes [ ] (ii) No [ ]

$D_4$ If No, what is your status in artisanal fisheries operation? .....

$D_5$ How much is it to rent? (i) Per day..... (ii) Per week..... (iii) Per month.....

$D_6$ Please, indicate the following fishing operations:

Average number of trips.....per day

Total hours you spend in fishing per day (from what time to what time).....hours

Numbers of days spend in fishing per week.....days

$D_7$ How many months in a year do you spend in fishing activities? .....

D8 How much do you earn in Naira from your primary occupation (fishing activities)?

| Week | Month | Quarter | Year |
|---|---|---|---|
| | | | |

$D_9$ What do you do when you are not engage in fishing? .....

$D_{10}$ Are there other working members in your household? (i) Yes [ ] (ii) No [ ]

$D_{11}$ If yes, how much did your household earned from

| S/no | Income source | Amount in ₦ per week or per month or per quarter or per year |
|---|---|---|
| I | Self employed ( trading, blacksmith, carpentry, crafts etc) | |
| Ii | Private employed (salaried) | |
| Iii | Government employed (salaried) | |
| Iv | Remittance from children and relatives | |
| V | Gifts | |

$D_{12}$ Tick as many enterprises as your household is into apart from fishing:

Staple food crop [ ] (ii) Livestock [ ] (iii) Cash crop [ ] (iv) Tree crops [ ]

Others specify.....

$D_{13}$ Do you work off-farm? (i) Yes [ ] (ii) No [ ]

$D_{14}$ If yes, what type of activities do you engage in during this off-fishing period?

| S/no | Off- farm season | Activities |
|---|---|---|
| I | Trading | |
| Ii | Artisans | |
| Iii | Hunting | |
| Iv | Farming | |
| V | | |

$D_{15}$ Please indicate the average number of hours you spend on other enterprises per day.....

the number of days per week.....days or monthly.....(Fill as appropriate)

$D_{16}$ If you have benefitted from credit last fishing season, indicate from which source and the

Amount given (if in kind, give value)

Agric. Bank (NACRDB) N :.....

Commercial banks N.....

Cooperatives N.....

Friend/Relatives N.....

Others specify..... N.....

$D_{17}$ What problem did you encounter in obtaining credit?

High interest rate ( )

Insufficient credit ( )

Problem of collateral security( )

Delay in getting credit ( )

E. Health- related factors

$E_1$ State the number of days you lost to illness in the last 30 days.....days

$E_2$ If anybody in your household is sick, which of the following places do you first contact for a solution?

(i) Clinic/Hospital [ ] (ii) Dispensary [ ] (iii) Native doctor/traditional healer [ ]

(iv) Spiritualists [ ] (v) Patent medicine store [ ] (vi) Others, specify.....

$E_3$ What is the distance between your house and clinic or hospital? ..... km

$E_4$ How much in naira do you spend on treating members of your household?

Weekly..... (ii) Monthly..... (iii) Quarterly..... (iv) Yearly.....

F. Expenditure

$F_1$ FOOD EXPENDITURE

Kindly provide information on the following crops (only on those you have purchased or produced).

| Crops | Food purchased last week/month/season for household consumption | | | Amount produced last cropping season(quantity/ units | | | Amount consumed from last season's production | | | Value of prepared food purchased outside household last week in Naira |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Units | Price paid /unit | Qty | Units | Value | Qty | Units | Price paid/ unit | |
| Cereals | | | | | | | | | | |
| Maize Grain | | | | | | | | | | |
| Maize Four | | | | | | | | | | |
| Millet Grain | | | | | | | | | | |
| Millet Flour | | | | | | | | | | |
| Grain | | | | | | | | | | |
| Rice Imported | | | | | | | | | | |
| Rice local | | | | | | | | | | |
| Sorghum Grain | | | | | | | | | | |
| Sorghum flour | | | | | | | | | | |
| Root & Tubers | | | | | | | | | | |
| Cassava Tubers | | | | | | | | | | |
| Gari | | | | | | | | | | |
| Cassava Flour | | | | | | | | | | |

| Crops | Food purchased last Wk/month/year for H/hold consumption | | | Amount produced Last cropping season ( qty/unit) | | | Amount consumed from Last season's production | | | Value of prepared food Purchased outside in ₦ |
|---|---|---|---|---|---|---|---|---|---|---|
| | Qty | Units | ₦ | Qty | Units | ₦ | Qty | Units | ₦ | |
| Cassava chips | | | | | | | | | | |
| Yam Tubers | | | | | | | | | | |
| Yam Flour | | | | | | | | | | |
| Yam chips | | | | | | | | | | |
| Sweet Potatoes | | | | | | | | | | |
| Others, specify | | | | | | | | | | |
| Legumes | | | | | | | | | | |
| Shelled Gnut | | | | | | | | | | |
| Unshelled Gnut | | | | | | | | | | |
| Soybean Grain | | | | | | | | | | |
| Soybeans Flour | | | | | | | | | | |
| Cowpea Grains | | | | | | | | | | |
| Mellon: Shelled | | | | | | | | | | |
| Unshelled | | | | | | | | | | |
| Others, specify | | | | | | | | | | |
| Vegetables | | | | | | | | | | |
| Okra | | | | | | | | | | |
| Tomato | | | | | | | | | | |
| Green Leaves | | | | | | | | | | |
| | | | | | | | | | | |

Units refers to local measures (e.g. Mudu, Shakade, tiya, baskets, etc) and kilograms (kg)

$G_{2.}$ Household expenditure (Non-staple expenditure)

Indicate the amount purchased of the following items for household consumption

| Non-staple expenditure | Item purchased last week or month or last year for household consumption (please, indicate whether for a week or month or year). | | | Item non purchased such as gift and donations from friends/processed from your farm products( input value for quantity eaten last week or month |
|---|---|---|---|---|
| | Yes=1 No=0 | If yes, Qty purchased | Purchased value (₦) | |
| Salt/Potash/Maggi | | | | |
| Groundnut oil | | | | |
| Palm oil | | | | |
| Shea butter oil | | | | |
| Others, specify(i) | | | | |
| (ii) | | | | |
| Fish(fresh/smoked/dried | | | | |
| Fresh milk | | | | |
| Poultry | | | | |

| | | | | |
|---|---|---|---|---|
| Bush meat | | | | |
| Mutton | | | | |
| Others, specify(i) | | | | |
| (ii) | | | | |
| Beverages-sugar | | | | |
| Bread | | | | |
| Others, specify | | | | |

H. Household Expenditure: Non- food Expenditure

Also indicate the amount purchased of the following items for household consumption

| Items | Items purchased last week or month or last year for household consumption (please indicate whether for week or month or year). | | | | | |
|---|---|---|---|---|---|---|
| | Yes=1, No=0 | Value in (N) | Yes=1, No=0 | Value in (N) | Yes=1, No=0 | Value in (N) |
| Cigarettes, tobacco, kola nuts | | | | | | |
| Charcoal, fuel wood | | | | | | |
| Kerosene | | | | | | |
| Shoes(leather, plastic, slippers) | | | | | | |
| Clothing(fabric and cloth) | | | | | | |
| Purchase of motor vehicles | | | | | | |
| Purchase of motor cycles | | | | | | |
| Purchase of bicycles | | | | | | |
| Repairs of vehicles/bicycles | | | | | | |
| Home repairs(painting, roofs, plastering) | | | | | | |
| Kitchen utensils(pots, cups, plates, etc | | | | | | |
| Furniture(beds, tables, chairs, etc) | | | | | | |
| Petrol for vehicles | | | | | | |
| Detergents | | | | | | |

| Items | Items expended/received last week or month or last year for household consumption (please indicate whether for week or month or year). | | | | | |
|---|---|---|---|---|---|---|
| | Yes=1 No=0 | Value in Naira | Yes=1 No=0 | Value in Naira | Yes=1 No=0 | Value in Naira |
| Remittances/Gifts/Donations | | | | | | |
| Education expenses | | | | | | |
| Health expenses | | | | | | |
| Taxes and levies | | | | | | |
| Festivals | | | | | | |
| Funerals | | | | | | |
| Electricity bills | | | | | | |
| Money spent on transport | | | | | | |
| Rents( for tenants only) | | | | | | |
| Others, specify (i) | | | | | | |
| (ii) | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

I. Wealth and Assets: LIVESTOCK

Kindly indicate how many livestock you own and also provide other related information.

| | Number of livestock presently owned | How many did you have last year 2012? | How many have you sold this year 2012? | Amount realize (₦) | How many have you consumed this year2013? | Amount of animal products consumed last week (Qty /unit | Amount of animal product sold last week (Qty/unit |
|---|---|---|---|---|---|---|---|
| Cattle | | | | | | | |
| Cattle meat | | | | | | | |
| Sheep | | | | | | | |
| Sheep meat | | | | | | | |
| Goat | | | | | | | |
| Goat meat | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Chickens | | | | | | | |
| Ducks | | | | | | | |
| Guinea fowls | | | | | | | |
| Others, specify (i) | | | | | | | |
| (ii) | | | | | | | |
| (iii) | | | | | | | |

J. Durable items

| S/no | Items | Date purchased | Yes =1 No =0 | Number | Current value (₦) |
|---|---|---|---|---|---|
| (i) | Radio | | | | |
| (ii) | Television | | | | |
| (iii) | Kerosene stove | | | | |
| (iv) | Wood and Charcoal stove | | | | |
| (v) | Generator for home use | | | | |
| (vi) | Extra land | | | | |
| (v) | Fan | | | | |
| (vi) | Other electrical appliances | | | | |
| (vii) | Others, specify (i) | | | | |

K. Fishing Equipments and Tools

$K_1$ What are the advantages and disadvantages of using a motorised canoe rather than a traditional canoe ?

| s/no | Advantages | Disadvantages |
|---|---|---|
| | | |
| | | |
| | | |

**$K_2$** Please, kindly indicate how many of these items you own and also provide other related information

| | Yes=1 No=0 | Date purchased | Number Owned | Current value (₦) | Expenses incurred last season (₦) | Number Rented | Value of Rented /month or year (₦) |
|---|---|---|---|---|---|---|---|
| | | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Non- motorised canoe/boat | | | | | | | |
| Motorised canoe/ | | | | | | | |
| Gill nets | | | | | | | |
| Seine nets | | | | | | | |
| Cast nets | | | | | | | |
| Outboard engines | | | | | | | |
| Refrigerator | | | | | | | |
| Fish traps | | | | | | | |
| Pack of batteries | | | | | | | |
| Boots | | | | | | | |
| Generator | | | | | | | |
| Warehouses | | | | | | | |
| Plastic /baskets | | | | | | | |
| Lt of petrol used | | | | | | | |
| Lt of kerosene | | | | | | | |
| Torch light | | | | | | | |
| Others, specify | | | | | | | |

L. Artisanal Fishing-specific factors

$L_1$ Kindly indicate the ownership type of the fishing

Individual [ ] (b) Family [ ] (c) Community (d) Rented [ ] (e) Others, specify

$L_2$ State the labour contribution of your family members as well as hired labour during the last fishing season in the following fishing operations

| | Days used (no) | Adult members(no) | Children (no) | Days (no) | Persons (no) | Amount paid per day or week |
|---|---|---|---|---|---|---|
| Fishing expedition | | | | | | |
| Paddling of canoe | | | | | | |
| Actual fishing | | | | | | |
| Harvesting | | | | | | |
| Processing | | | | | | |
| Sales | | | | | | |
| Others, specify (i) | | | | | | |
| (ii) | | | | | | |

$L_3$ Do you use modern fishing gears on your fishing activities? (a) Yes [ ] (b) No

$L_4$ If yes, which among the following fishing inputs did you use in last year fishing operation?

(a)Gill nets [ ] (b) motorise fishing gear [ ] (c) Wooden canoe [ ] (d) Seine nets [ ] (e) Cast nets [ ] (f) others, specify

$L_5$ List most common fishes you capture in your area

..... (ii).....

(iii)..... (iv).....

(v)..... (vi).....

M. Fish Caught, Consumed, Donated and Sold Last Fishing Season, 2012

$M_1$ Please, approximate and give a range such as maximum and minimum catch per week or month.

| S/no | Period | Total Fish Caught in Kg | | Quantity Consumed and Given out as Gift | | Quantity Sold (Kg) | | Estimated Price/ kilogramme or basket |
|---|---|---|---|---|---|---|---|---|
| | | Quantity | Unit | Quantity | Unit | Quantity | Unit | |
| I | Per Fishing Trips | | | | | | | |
| Ii | Per Fishing Day | | | | | | | |
| Iii | Per Fishing Week | | | | | | | |
| Iv | Per month | | | | | | | |
| V | Per Year | | | | | | | |

$M_2$ Is this catch (kg) generally consistent or it fluctuating frequently? (i) Yes [ ] (ii) No [ ]

$M_3$ How do you sell your fish? (i) by household member [ ] (ii) by vendor [ ]

$M_4$ How much do you normally sell your fish? (i) per kilo..... (ii) per basket.....

Per fish.....

$M_5$ Where do you normally sell it? (i) Village market [ ] (ii) road side [ ] (iii) riverside

$M_6$ What is your average daily income from fishing? .....₦

$M_7$ Is this considered a good income? (i) Yes [ ] (ii) No [ ]

$M_8$ Approximately how many kilos do you catch on average each day.....Kg

N. Please, Kindly indicate how many of under listed fishing tools you owned or rent and also provide other related information

| | Number of items Owned | Date of purchase/Life span | Value in Naira | Maintena cost/dy/mth or/ yr | Monthly rent | | Yearly rent | |
|---|---|---|---|---|---|---|---|---|
| | | | | | Number of items | Rent/ Month | No of items | Rent/year |
| Paddle canoes | | | | | | | | |
| Motorised canoe | | | | | | | | |
| Outboard engines | | | | | | | | |
| Gill nets | | | | | | | | |
| Seine nets | | | | | | | | |
| Cast nets | | | | | | | | |
| Pack of batteries | | | | | | | | |
| Fish traps | | | | | | | | |
| Generators | | | | | | | | |
| Refrigerators | | | | | | | | |
| Warehouses | | | | | | | | |
| Boots | | | | | | | | |
| Plastic containers | | | | | | | | |
| petrol/kerosene | | | | | | | | |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Hand paddler | | | | | | | | |
| Others | | | | | | | | |

O. OTHER WELFARE MEASURES:

(a). Do you pay any levies to LGA or State or any other stakeholders in your area?

(b). How much do you pay ... (₦)..... per fishing trip/weekly/monthly/yearly.

(c). What benefits do you receive from paying the levies above.....

(d). what type of housing unit do you have?

Flat [ ] (ii) Room and parlour [ ] (iii) Single rooms [ ] (iv) Hut [ ]

Others (specify)

What type of toilet facility do you have? (i) Flush toilet [ ] (ii) Pit toilet [ ]

Bucket or pail type [ ] (iv) Bush or bare ground [ ]

(f). What is the quality of the construction of your house?

Block and zinc roof [ ] (ii) Mud with zinc roof [ ] (iii) Mud with thatch roof [ ]

Others (specify)

(g). Is the wall of the house plastered? (i) Yes [ ] (ii) No [ ]

(h). If yes, what material? (i) Cement [ ] (ii) Cow dung [ ] (iii) Others (specify).....

(i). How many rooms are used by your household members?.....

(j). If you live in your house, how much would you have paid if it to be rented? N...../month

(k). what is source of your drinking water? (i) Well [ ] (ii) Bore hole [ ] (iii) Stream [

(iv) Running water [ ] (v) others (specify).....

(l). Is the source of water in your house? (i) Yes [ ] (ii) No [ ]

What is the distance between your house and the source of drinking water? .....Km

(m). what is source of lightening at your house? (i) Kerosene [ ] (ii) Electricity [ ]

(iii) Lamp with shade [ ] (iv) Kerosene lamp without shade [ ] (v) Shea butter/palm oil lamp [ ] Others (specify).....

(n). what do you use for cooking? (Tick multiple if use more one for cooking)

Gas cooker [ ] (ii) Firewood/ charcoal [ ] (iii) Kerosene stove [ ] (iv) Others,

(o). Where do you dispose off your waste material? (i) Riverside [ ] (ii) Designated land [ ] (iii) Public waste site [ ] (iv) Others(specify).....

(p). What is the distance between your house and the public waste dumping site?.....Km

(q). What is your general comment about on poverty situation in your community?

THANK YOU FOR YOUR PATIENCE AND ATTENTION.