INTERNATIONAL JOURNAL OF SCIENCE AND NATURE

www.scienceandnature.org

SOCIO ECONOMIC CHARACTERISTICS AND RETURNS TO RURAL ARTISANAL FISHERY HOUSEHOLDS IN ASA AND PATIGI LOCAL GOVERNMENT AREAS OF KWARA STATE, NIGERIA

Oladimeji, Y. U., Abdulsalam, Z. & Damisa, M. A.
Department of Agricultural Economics and Rural Sociology, Faculty of Agriculture, Ahmadu Bello University, P.M.B. 1044, Zaria, Kaduna State, Nigeria.

ABSTRACT
The study present empirical findings on the socio-economic characteristics and returns among the artisanal fishermen households in two randomly selected fishing LGAs, from a total of four fishing LGAs in the State. The study utilized primary data collected between 2011 and 2012 through a multistage random sampling technique. Data were collected using structured questionnaire administered on a total sampled 160 fishermen households. Descriptive statistics, net margin and multiple regression results were used to analyze the data. The results showed that the country's self sufficiency ratio in fish consumption of 49.64% was below average and as low as 29.4% in 1993 while domestic production fluctuates downward. Results also showed that artisanal fisheries in two LGAs are profitable with ANR/Kg and ANR/fisherman/annum averaged ₦85.3 and ₦356278.8 respectively. Regression results indicated that costs of family labour, hired labour and depreciation as well as fishing experience, fishing trips and hours were significant determinants of net income of fishermen. It is recommended therefore, that artisanal fishermen in the State should be given adequate training to ensure proper understanding of new fishing method and adopt technology capable of increasing not only the profitability of the enterprise but also make efficient use of fishing resources.

KEY WORDS: Artisanal fishermen, Fishing settlements, Self-sufficiency ratio, Multi-stage, Net returns.

INTRODUCTION

Agriculture is the main stay of Nigerian economy, providing the food need of the teaming population of about 163 million and employing close to 70% of the people who are mostly rural dwellers. Agriculture is sub divided into food, livestock and fishery sub sectors. The fishery sub sector are very much an integral part of Agriculture sector which maintain a steady contribution of 3.5 to 4% to total Gross Domestic Product (GDP) in 2008 to 2012. This translates to about 10% of agricultural GDP, which itself contributed between 35 and 40 percent within the same period (NBS, 2012; FAO, 2013). The Nigerian fisheries industry consists 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 constitutes the most significant sub sector in term of number of people employed and contribution to total fish output in the country. Available records from Federal Department of Fisheries statistics and Food and Agricultural Organization reveal that the total fish production in Nigeria for 25 years period 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 to 534,690 with a standard deviation of 97,745.08 during the 1981 to 2005 decades (Table 1). But, the estimated demand for fish ranged from 510,000 to 1,230,000 tons with annual average of approximately 870,000 and standard deviation of 220,794.02 tons. Table 1 also shows the country's self- sufficiency ratio in fish production ranged from 29.4% in 1993 to 98.8% in 1983 with an annual average of 49.6% and standard deviation of 19.1. But in spite of contributing the lion share to domestic fish output in Nigeria, artisanal fisheries remain the most impoverished fisheries sub sector with fishermen generally living at the subsistence level. Several reasons had been offered for the poor standard of living of artisanal fishermen namely: the use of archaic fishing methods which are labour intensive; inability of the fishermen to acquire the basic infrastructure facilities such as cold storage for proper fish handling, processing, marketing and distribution network; lack of adequate finance and basic human needs such as proper housing, good/hygienic drinking water and sanitation. Suffice to note however that Nigeria is endowed with coastline of about 800 km, a continental shelf of about 256,000 km^2 and exclusive economic zone of 321.4 km. The topography of the coastal area is straddled by the drainage systems of Rivers Niger and Benue as well as their main tributaries (Oladimeji, 1999). The country is also blessed with over 14 million of hectares of reservoirs, lake, ponds, and major rivers capable of producing over 980,000 tons of fish annually (FDF, 2007). The major rivers and lakes estimated at about 11,666,000 ha make up about 12.0% of the total surface area of Nigeria which is estimated to be approximately 98,300,000 ha (Ita, 1985; FAO, 2013). However, Nigeria's abundant fisheries notwithstanding, the country is still largely a protein deficient nation. Total protein consumption is below the UN/FAO'S estimated minimum of 75 gm of daily per caput intake. The average protein consumption in Nigeria which is about 19.38 gm per caput consumption per day is less than one-half the

protein intake of estimated 75 gm while the contribution of 7 gm from animal source is below the expected level. However, per caput consumption per day of fish is higher than that of any other livestock product in Nigeria. It was estimate that the per caput consumption of fish per day which was 29.1 gm, yielded 2.6 gm of animal protein and represent 35.0% of the per caput consumption of livestock products and 30.8% of ingested animal protein. This has increase at an average rate of 3.5% per annum from 6.970 kg in 1975 to 9.096 kg in 1985 and a downward trend to total per capita consumption of about 7.52 kg in 2011 (Oladimeji, 1999; Awoyemi and Ajiboye, 2011). Statistical surveys have shown that the demand for fish in Nigeria exceeds supply and also the domestic production is very low despite the abundant water resources and available man power. The annual fish consumption/demand in Nigeria has been estimated to be over 1.3 million tons and the total domestic production is just about 450,000 tons per annum (Tsadu *et al*., 2006; FAO, 2007). The implication of these is that the national demand has not been met which culminates in fish imports of 560,000 tons estimated at over ₦60 billion annually. The shortfall is said to be closed by the importation of 680,000 tons annually consuming about ₦50 billion in foreign exchange earnings (Odukwe, 2007). As at 2013, with a population of about 163 million, based on 2006 census, the national requirement is about 1.5 million tons per annum but total estimated fish potential resources was estimated at about 2.5 million tons. Therefore, it can be concluded that Nigeria is endowed with abundant fishery resources to produce enough fish products not only for domestic consumption but also for export.

During the second National Development Plan (1970-74), there was drought in the sahelian savanna zone of the country which caused great decline in agricultural and livestock production. The outbreak of rinderpest disease in the 1980s' further worsened livestock production in the country, especially because the contribution from poultry dwindled rapidly beginning from middle of 1980s due partly to high and rising costs of livestock feed of which led to increased fish consumption. With the recognition by the Nigerian Government of increased fish consumption and the demand-supply gap in fish production and products (Table 1), more attention are given to production of fish and fish products in its fisheries development policy objectives of the 3rd and 4th National Development Plans. Emphasized on increase exploration of Nigeria's fishery resources to meet the rapidly increasing demand for fish and encouragement of the development of fishery based- industry. It was planned that the objectives would be achieved through a number of fish production projects and programs contained in the subsequent plans (3rd and 4th) and the corresponding increase in the financial allocations to the fishery sub-sector. For instance, the sector allocation to the fisheries sub- sector rose from ₦11.6 million in the second National Development Plan (1970-74) to ₦101.55 million in the third National Development Plan (1975-80) and N170.99 in Fourth National Development Plan (1981-85) was 68.4% over and above that of third plan. The allocation to this sub-sector in the First National Rolling Plan (1992) increased to ₦166.68 million out of a total allocation of ₦7.432 billion earmarked for the agricultural sector. The projects and programs embarked upon in 3rd and 4th as well as subsequent plans includes the National Accelerated Fish Production Project (NAFPP), an offshoot of National Accelerated Food Production Project, which was designed to bring benefits of modern fishing technology to artisanal fishermen along the country's coastline, lagoons and the inland waters. It also involved organizing small scale fishermen into fishery cooperatives, the provision of credit and the supply of fishing inputs at subsidized rates. Other programs 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 Fisheries 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 Equipments 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 fishermen in the use of mechanized canoes/vessels; the provision of Integrated Rural Fisheries Development Project and UNDP/FAO Artisanal and Inshore Fisheries Project (Oladimeji, 1999). Budgetary allocation to agriculture in Nigeria has been historical low, for example, the allocation to agricultural sector as whole as of 2009 was about 4% (₦119.8 billion) of total budget expenditure of ₦2.87 trillion. This is in contrast to the contribution of the agriculture sector to national output which has ranged from 23% to 42% of total GDP since 1990 (BGL, Agriculture 2009). The agriculture spending falls below the 10% goal set by African leaders in the 2003 Maputo agreement.

In term of research, there are several research institutes carrying out investigation and studies applicable to fisheries in the country. These include: The Nigerian Institute for Oceanography and Marine Research, Lagos established in 1975; the Lake Chad Research Institute, 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, there are number of semi-private sector programs 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 Nigeria waters as well as those on international waters where fishing right is obtained. On international scene, the FAO-Assisted Fisheries Development Projects were implemented through modernization of fish production, handling, preservation, storage and marketing through better extension services and vocational training. The activities carried out include training of boat builder and local fishermen on mechanized boat operations and demonstrations on fish handling using wooden box and ice. But in spite of all these programs and financial commitments, the fishery sector has been suffering a lot reverse since the early 1980's as presented in Table 1. The table shows that although Nigeria's estimated demand for fish and fish product rose steadily during the 1981-2005 while her domestic production of fish commodity

fluctuates downwards (Table 1). Reasons for fluctuation and downward trend in domestic fish production and, hence, in fish self- sufficiency included very high and escalating costs of fishing vessels and spare parts; under capacity utilization of water resources and available manpower; inadequate finance and credit availability; insufficient storage facilities and market constraints. Although the importation of fish and fish products had been used partially to fill the growing deficits in the past and presently, its continuation constitutes avoidable drain on the country's scarce foreign earnings, especially during the periods of economic depressions. For instance, the Nigeria foreign exchange expenditure on fish import ranged from about ₦48 billion in 2005 to over ₦60 billion in 2007. As of 2009, the Nigeria foreign exchange expenditure on total expenditure on food import was value at Ś 3 billion while proportion of fish import alone amount to about Ś 1.3 billion or 43.33% (USDA, 2009). The combination of low domestic production, increasing incomes and high poultry and beef prices, are driving import demand for frozen fish in Nigeria. The average price of a kilogram of poultry meat is approximately Ś5.00 compared to just Ś1.6 for imported frozen fish.From the foregoing considerations, it is very important to undertake in depth economic studies into artisanal fisheries in the study area. This will enable us to accumulate adequate, sufficient and reliable data for analysis geared towards meaningful policy formulation for the fisheries sector especially artisanal fisheries in the country. This study therefore attempt at gathering and analyzing economic data on returns to the fishing efforts among artisanal fishermen in the study area. Specifically, to describe socio-economic characteristics of artisanal fishermen; determine the profitability and compute returns to scale to identify the stage of production at which artisanal fishing was being under taken in the study area.

TABLE 1: Nigeria's Estimated Fish Demand, Domestic Production and Self-sufficiency Ratio

Year	Estimated Demand (a)(projected) tons	Domestic Production (b) (Actual) tones	Aquaculture Production (tons) (c)	Artisanal Fishery as % of Domestic production (d)	Self sufficiency Ratio (%) (e)
1981	510,000	491,870	18900	96.2	96.5
1982	540,000	516,089	19500	96.2	95.6
1983	570,000	562,972	20,476	96.4	98.8
1984	600,000	406,665	22,012	94.6	67.8
1985	630,000	242,525	15,000	93.8	38.5
1986	660,000	307,059	14,881	95.2	46.5
1987	690,000	289,108	15,221	94.7	41.9
1988	720,000	348,996	15,764	95.5	48.5
1989	750,000	362,706	25,607	92.9	48.4
1990	780,000	316,360	7,297	97.7	40.6
1991	810,000	343,352	15,840	95.4	42.4
1992	840,000	343,078	19,770	94.2	40.9
1993	870,000	255,523	18,703	92.7	29.4
1994	900,000	284,000	18,104	93.6	31.6
1995	930,000	371,053	20,755	94.4	39.9
1996	960,000	355,934	19,490	94.5	37.1
1997	990,000	413,188	25,265	93.9	41.8
1998	1,020,000	483,482	20,458	95.8	47.4
1999	1,050,000	479,663	21,738	95.5	45.7
2000	1,080,000	467,098	25,720	94.5	43.3
2001	1,110,000	474,000	47,000	90.1	42.7
2002	1,140,000	504,000	50,000	90.1	44.2
2003	1,170,000	524,700	52,000	90.1	44.9
2004	1,200,000	518,620	50700	90.2	43.2
2005	1,230,000	534,690	53000	90.1	43.5
Mean	870000	407869	25328.040	93.932	49.636
SD	220794.022	97745.079	13466.703	2.236	19.073

Source: (i) (b) and (c) FDF and FAO Yearbooks Various Volumes; Oladimeji, 1999 & Inoni, (2007) and (ii) (a) is projected and d & c are calculated by the author.

MATERIALS & METHODS

Area of study

The study was conducted in laduba/afon and Gbaradogi / Ella-mawogi in Asa and Patigi Local Government Areas in Kwara State, Nigeria. The State is an inland water state naturally blessed with large volumes of water where fishermen provide food for an estimated population of about 2, 365,353 (NPC, 2006). The population is projected in 2012 to be 2,857,420, representing 3.2% annual growth rate in population and an average density of eighty eight persons per square kilometre (NPC, 2006). The fishermen are predominantly in the fishing settlements/villages which are scattered along the River Niger area of the State with narrow inlets of stream, reservoir, dams and rivers such as River Niger in Patigi, Lafiagi, Jebba and their inlets (Oladimeji, 1999). It is located between latitudes 7^0 45$^{'}$N and 9^0 30$^{'}$N and longitude 2^0 3$^{'}$ E and 6^0 25$^{'}$ E. The minimum average temperature throughout the state ranges from 21.1^{0}C and 25.0^{0}C while maximum average temperature ranges from 30^{0}C and 35^{0}C. The rainfall regime receive in most part along river Niger of the state encourages fishing in the state throughout the year (Figure 1). The riverine area of the state is endowed with rivers, streams and flood plains, which offer great opportunity in

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 a few trawlers and outboard engine boats.

FIGURE 1: Map of Kwara State Showing Fishing and Non-fishing LGAs (Adapted from Kwara ADP)

The main fish species found in the study area are *clarias anguillaris*, *barilius nilotcus*, *hemichromis fasciatus*, *hyperopsis bebe occidentalisopsis* and *tilapia melanopleura*. The Nupes dominate Edu, Patigi and part of Moro Local Government Areas where artisanal fishery practices are rampant. Artisanal fishery in the study area is contributing immensely to the socio-economic factors of the entire populace due to economic influx of people in search of fish and fish products from the adjoining communities. The economic importance of this to the community include source of food, provision of income, tool to rural development and source of raw materials to manufacturers. There is also Pategi fishing regatta which is an annual festival featuring boat displays, fishing and swimming competitions.

Sampling Procedure and Sampling Size

Primary data were collected from 160 artisanal fishermen selected from four fishing settlements in the study area through a multi-stage random sampling procedure using a structured questionnaire. Two Local Government Areas (LGAs) were randomly selected from the list of four fishing LGA in Kwara state (figure 1). The list of fishing settlements in the two LGAs selected was drawn from which two fishing settlements each were randomly selected. Then, the list of artisanal fishermen in each settlement was compiled through co-operatives for random selection. From these, forty fishermen from each of the list of settlements were randomly chosen for interview. Therefore, a total of 160 fishermen were randomly selected in the four fishing settlements. The selected fishing villages/ were Laduba-asa; Afon-asa; Gbaradogi-patigi and Ella-mawogi/patigi settlements.Primary data was 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, their fishing experience, size of households as well as their major and subsidiary occupations. Other include information on quantities, acquisition of inputs such as nets, canoe and outboard engines, baits and economic life span as well as fish output in kilogramme of fresh catches and their value in Naira. The survey was carried between October, 2011 and March, 2012.

Analytical Technique

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. Gross margin analysis forms an alternative basis for farm profitability analysis. It involves accurate collection of different costs of variable inputs and the gross income obtained from a particular enterprise in order to obtain the net returns (Bernard, 2003). Farm budgeting technique is one of the simplest and oldest tools of analysis in farm management and production economics studies. 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. The Average Net Return per Kilogramme and Net Return per Fisherman were estimated using equations (1) and (2 below:

$$\text{ANR (TN)}^{-1} = \left(\sum_{I=1}^{M} TR_{IJ}\right)\left(\sum_{I=1}^{M} TN_{IJ}\right)^{-1}\left(M_J\right)^{-1} - \left(\sum_{I=1}^{M} TC_{IJ}\right)\left(\sum_{I=1}^{M} TN_{IJ}\right)^{-1}\left(M_J\right)^{-1} \quad \text{.....(1)}$$

$$\text{ANR} = \left(\sum_{I=1}^{M} TR_{IJ}\right)\left(M_J\right)^{-1} - \left(\sum_{I=1}^{M} TC_{IJ}\right)\left(M_J\right)^{-1} \quad \text{.....(2)}$$

Where:

ANR $(TN)^{-1}$ =Annual net return/kg;

ANR = Average net return; i.e. net return per fisherman,
TR = Total sales revenue accruing to the ith fisherman in the jth LGA (N);
TCij = Total cost incurred by the ith fisherman in the jth LGA (N);
TNij = Quantity of fish caught by the ith fisherman in the jth LGA (kg) and
Mj = Total number of fishermen in the jth LGA.

Costs involved in artisanal fisheries operations are made up of total cost. Total cost consists of total variable cost (TVC) and total fixed cost (TFC). Total variable costs in artisanal fisheries depend essentially on the fishing effort. For a fishing unit, fishing effort is the number of fishing trips done and fishing power used to harvest fish during a given period of time FAO, 2004; Njifonjou, 1998). Unlike fixed costs, operating costs depend on the volume of production, and they included of hired labour, imputed cost of family labour, fuel and lubricants expenses, food, ice, servicing and maintenance charges while Total fixed cost was made up of the depreciation costs or loss in value on fixed items as a result of their use in one production year. Items of fixed costs identified in the study included canoes, outboard engines, fishing gears , includes cast net, seine net, gill net and traps; tax levies and interest charge on borrowed capital. Depreciation values were estimated using straight line method under the assumption that canoes and engines are used for a period of 5 years before being scrapped without salvage values. Other fixed items such as boot and nets are depreciated base on estimated life span suggested by fishermen.. Labour was standardized with adult male member of household having one labour day for working 6 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 fishermen's household. The unit of measurement was majorly a standardized baskets which, on average, weighs 5kg and 10kg.

Model specification and estimation

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

$\text{Log NEY}_{ij} = \beta_0 + \beta_1 \text{LogFEX}_{1ij} + \beta_2 \text{LogCHL}_{2ij} + \beta_3 \text{LogFHS}_{3ij} + \beta_4\text{LogNTS}_{4ij} + \beta_5 \text{LogCFL}_{5ij} + \beta_6\text{LogDEP}_{6ij} + \mu_i$ ………………………………….. (3)

Where:

NEY_{ij} = Net fishing income of the ith fisherman in the jth LGA (N);
FEX_{1ij} = Fishing experience of the ith fisherman in the jth LGA (years);
CHL_{2ij} = Cost of hired labour employed by the ith fisherman in the jth LGA (N)
FHS_{3ij} = Fishing hours per season spent by ith fisherman in the jth LGA;
NTS_{4ij} =Number of fishing trips made by the ith fisherman in the jth LGA;
CFL_{5ij} =Cost of family labour by the ith fisherman in the jth LGA (N);
DEP_{6i} =Depreciation of fixed inputs and cost of baits used ith fisherman in the jth
LGA (N);
μ_i =error term associated with data collection from the ith fisherman in the jth LGA which was assumed to be normally distributed with zero mean and constant variance.
β_0 is a constant
β_1- β_6 are regression parameters that were estimated.

RESULTS & DISCUSSION

Structure of Artisanal Fishery in Asa and Patigi LGAs

The artisanal fishing is an important and most predominant fishing enterprise in the areas of study. The fishing season spans over seven months from the end of rainy season, usually in October to the beginning of another rain, mostly in April. At the onset of the rain, most fishermen prefer to retire to farming which accounted for 43.8% of their subsidiary occupation (Table 2). Farming as a subsidiary occupation was low in Asa LGA because some of the fishermen were able to venture into other menial jobs due to proximity to urban centre and State capital. Majority of the pooled fishermen had subsidiary occupations which served the dual purpose of alternative income and job opportunities. Engagement in subsidiary occupation in the fishing community implies that rural areas have diversified enterprise oriented economy (Olayide *et al*., 1982; Oladimeji, 1999; Adewumi *et al* 2012).

Artisanal fisheries in Afon and Laduba fishing settlements (Asa LGA) relatively rely heavily on the use of non-motorized canoes as presented in table 3. For instance, only 3 canoes out of the total of 80 canoes used by artisanal fishermen in Asa LGA were motorized. The table also shows that the bulk (88.9%) of motorized canoes were limited to Gbaradogi and Ella-mawogi fishing settlements in Patigi LGA. Thus, the bulk of artisanal fishermen and fish output in the State were concentrated in non-yoruba speaking areas comprising Edu, Patigi and Moro LGAs. The three aforementioned LGAs are situated along the Northern part of the State with river's Niger flowing along most of their boundaries (Figure 1). Similar finding was documented by Abiodun and Oshungade, 2009.

TABLE 2: Subsidiary Occupations of Artisanal Fishermen in Asa and Patigi LGAs, Kwara State, Nigeria

Occupations	Frequency	Relative frequency (%)	Cumulative Frequency
Farming	70	43.8	-
Wood Carving/Carpentry	27	16.9	97
Blacksmith	36	22.5	133
Govt. Employee	20	12.5	155
Others	07	04.3	160
Total	160	100.0	-

Source: Field Survery, 2012

TABLE 3: Structure of Artisanal Fishery in Asa and Patigi LGAs, Kwara State, Nigeria

Fishing settlement/villages	LGAs	No. of non-motorised Canoes	No. of motorised Canoes
Afon	Asa	38(28.6)	02(7.4)
Laduba	Asa	39(29.3)	01(3.7)
Gbaradogi	Patigi	29(21.8)	11(40.7)
Ella-mawogi	Patigi	27(20.3)	13(48.2)
Total		133(100.0)	27(100.0)

Source: Field Survey, 2012

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

TABLE 4: Distribution of Amount of Production Loans Received by Artisanal Fishermen in Asa and Patig LGAs, Kwara State, Nigeria

Amount of Loan (₦)	Frequency	Relative Frequency (%)	Cumulative Frequency
<50,000	20	16.5	-
50,001-100,000	65	53.7	85
100,001-150,000	18	14.9	103
150,001-200,000	08	6.6	111
200,001-250,000	06	5.0	117
>250,000	04	3.3	121
Total	121	100.0	-

Source: Field Survey, 2012

TABLE 5: Source of Production Loans for Artisanal Fishermen in Asa and Patigi, Kwara State, Nigeria.

Source*	Frequency	Relative Frequency	Cumulative Frequency
Friends/Relative	25	20.7	-
Co-operative Societies	30	24.8	55
Agricultural Credit Co-operative Bank	63	52.0	118
Commercial Banks	-	-	-
Others	03	02.5	121
Total	121	100.00	-

Source: Field Survey, 2012; * a fisherman has only option of one major source

The artisanal fisheries in the State are characterized by low capital investment and high labour intensive practices. For instance, the LGAs investment in canoes had a ranged of ₦25, 000.00 to ₦50, 000.00 while that of fishing net had a ranged of ₦5000.500 to ₦20, 000.00 respectively. The LGAs average for the fishing gears and equipment are in the main unsophisticated comprising hooks and line, fish traps, cast, net, net, gill net and other similar devices that are operated by 3-6 persons with fishing craft mostly paddled canoes and a few motorized canoes Result consistent with Inoni and Oyaide, 2007. There were no storage facilities in the canoes hence the fish caught are not adequately preserved. The wastage resulting from this can be as low as 10% of fish caught and as high as 20% depending largely on ready market and available labour for the local preservations. Both family and hired labours were used in fishing operations in the four fishing settlements. Labour costs accounted for approximately 70% of AVC for paddled canoes and less than 50% for motorized canoes and 55% and 28% respectively of Total cost. Hired labours were rewarded by cash and daily payment of ranged of ₦400 to ₦600 per labour day depending on quantity of fish caught and number of hours spent. However, hired labour was found to be scarce in Asa LGA due to proximity to urban centre Few hired fishermen preferred a share of fish caught as reward for their labour as proxy for cash which was difficult to quantify in weight and monetary terms. The fishing season average 210 days yearly running from October, 2011 to April, 2012.The fishing trips and hours had a range of 5-7 trips per week and 5-10 hours per trip respectively. The daily fish catch rates per canoe ranged from 12.50kg to 45.50kg with a State average of 16.50kg. Although Sagua (1975) obtained average daily catch rates per boat of 11.49kg in the state, and Inoni and Oyaide (2007) recorded 12.36kg in Delta State. The relative high average of 16.50kg was attributed to improvement in level of technology such as acquisition of improved nets, gears, canoes both paddled and motorized. However, Abiodun and Oshungade, (2009) recorded an average daily catch as low as 3,1kg/canoe/day in Jebba lake, which suggest that the southern part has been heavily fished and the fish stock in the area were extremely skewed toward smaller immature fishes. The number of fishing trips per week ranged from 3-6, with mean value of 4.30 trips per week. About 75 percent of the respondents made at least minimum of 3 or 4 trips per week. However, increasing fishing frequency may be an indication of more dependent on fishing as a mean of livelihood which may lead to overfishing and dwindling fisheries resources. Results also

showed that 85 fishermen (70.20%) of pooled fishermen received various amount of productive credit (Table 4) from the sources presented in Table 5. Approximately 24.0% of sample fishermen did not seek for any production credit while (63)52% received production credit from formal institution. This result was contrary to Lawal (1992) and similar study conducted in Edu and Moro fishing settlements, a claimed that most artisans in Kwara State particularly fishermen do not have access to production loan from formal credit institutions. The high production credit from formal institution was largely due to proximity of Agricultural bank in Afon area. Table 6 also revealed that (85)70.2% of the fishermen who obtained loan had the size of the loan ranging from N50000 to N150000.

TABLE 6: Socio-Economic Characteristics of Artisanal fishermen in Asa and Patigi LGAs

DISTRIBUTION	FREQUENCY	RELATIVE FREQUENCY (%)	CUMMULATIVE FREQUENCY
*Gender			
Male	152	95.0	-
Female	08	05.0	160
*Marital status			
Married	149	93.1	-
Single	11	06.9	160
*Age (years)			
18-27	16	10.0	-
28-37	20	12.5	36
38-47	58	36.3	94
48-57	40	25.0	134
Above 57	26	16.2	160
*Educational Level			
No Formal Schooling	65	40.6	-
Primary Education	47	29.4	112
Secondary Education	43	26.9	155
Tertiary Education	05	3.1	160
*Household Size(persons)			
None	07	4.4	-
1-5	79	49.4	52
6-10	45	28.1	131
11-15	25	15.6	156
16-2	04	2.5	160
*Fishing Experience(years)			
0-10	30	18.8	-
11-20	64	40	94
21-30	48	8.1	142
31-40	13	30.0	155
Above 40	05	3.1	160
*Subsidiary Occupation			
Farming	89	55.6	-
Wood carving	08	05.0	97
Government Employee	45	28.1	142
Others	18	11.3	160
Total	160	100%	

Source: Field Survey, 2012

Socio-economic Characteristics

Analysis of socio-economic characteristics of the artisanal fishermen presented in Table 6 indicates that males dominate the ownership of artisanal fishing venture in the State. Only 8 women (5%) of pooled fishermen owned and engaged in fishing. Therefore women do not usually engage in fishing operation particularly when it involves

actual fish caught in the study area. Rather, women are engaged in processing and marketing of the fish and fish products (Oladimeji, 1999; Inoni and Oyaide, 2007; Kareem *et al.*, 2008); Adewumi *et al*., 2012. Further analysis revealed that bulk 141(88%) of the pooled fishermen operate on a family unit bases that is, the fishermen prefer sole proprietorship. This perhaps explained why most fishermen in the study area operated non-motorized canoes. A similar finding was made by Kareem *et al*., (2008). Table 6 shows that the majority 74% of the pooled fishermen had ages ranging from 28 to 47 years with the modal age interval being 38-47 years which accounts for 36.3% of the sample. Other things being equal, labour productivity is a function of age. It is believed that old people tend to adhere strictly to traditional method of production while young people tend to be more willing to adopt new production methods in order to increase production. If old fishermen are defined as those who are above 57 years of age, 16.2% of fishermen can be said to be old. In addition, if productive age group is defined as 18 - 57 years, the age distribution indicates that majority of fishermen (about 84%) 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 Oladimeji, 1999; Kareem *et al*., (2008). The literacy rate was very low among the fishermen (Table 6). Two-fifth (41%) of the pooled

fishermen did not have formal schooling while 29.4% attended primary school only. This implies that artisanal fisheries operations in the State were performed mostly by illiterate and semi-illiterate fishermen. This could affect 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 education 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 productivity. Results are synonymous with Oladimeji, 1999; Inoni and Oyaide, 2007; Adewumi *et al*., 2012; Kareem *et al*., 2008

The marital status shows that majority 149 (93%) of the fishermen are married while the remaining 11 (7%) were single. Further analysis revealed that two-third 107 fishermen (67%) had at least 2 wives while approximately 23.0% of fishermen had only one wife. Marrying more than one wife is common in rural setting either to ensure supply of additional family labour or to raise the status of the man in an illiterate setting. Oladimeji, 1999; Adewumi *et al*., 2012 and Kareem *et al*., 2008 confirmed the result. On the household size, the average numbers of persons per fishermen were approximately 8 with 6-10 children as modal class. Table 6 shows that 4.4% of fishermen had no child, 79(49.4%) had household size of 6-10 children. The result shows that most of the population explosion occurs in rural areas. However, they are important in the supply of family labour after schooling hours particularly in post harvest activities such as fish processing, distribution, and marketing. Similar finding was reported by Inoni and Oyaide, 2007. The length of time during which fishermen had been engaged in fishing is a measure of his is experience and also a reflection of his skill in fishing. From Table 6, the average period of fishermen experience were approximately 19 years with the modal class being 11-20 years. It is seen that only 5 fishermen in the sample had above 40 years of fishing experience. The implication is that people tend to withdraw from active fishing operation as they grow older. The majority of the respondents 112 (70%) had fishing experience of 11-30 years point to the fact that fishing is practiced by relatively young people. Kareem *et al*., (2008) confirmed the result.

Estimate Costs Returns (₦) per Kilogram of Fish Caught

Net Margin Analysis

The net margin per kilogram of fish caught and per fisherman in the study area has shown that artisanal fishery is profitable. These are presented in Table 7 and 8 below. The table shows that AFC per kilogram (AFC/Kg) ranged from ₦30.0 in Afon fishing settlement to ₦36.0 in Ella-mawogi fishing settlement with a State average of ₦33.0/kg and a standard deviation of ₦2.24/kg. The relatively high AFC/kg in Patigi LGA was due to the fact that some of the fishermen in the area acquired 89% of motorized boat compare to only 3 motorized canoes in Asa LGA fishing settlements. The fixed assets such as motorized boats were acquired at relatively high price because of the prevailing high rate of inflation in the country. On the other hand, AVC/kg had a range of ₦74.5 in Ella-mawogi to ₦132.0 in Laduba study area. The State's AVC/kg was ₦103.8 with a standard deviation of ₦27.39/kg. Table 7 also shows that on state wide basis, AFC/kg and AVC/kg accounted for approximately 24% and 76% of ATC respectively. The AR per kilogram (AR/kg) from fish caught varied from ₦178.5 to ₦265.0 and had a state average of ₦222.3 with a standard deviation of ₦40.62. Average net return per kilogram (AN/kg) of fish caught was lowest in (₦68.0) in Ella-mawogi settlement couple with fact that it has the highest AFC/kg. Similarly, Asa LGA settlements recorded the highest ANR/kg because of their proximity to urban centre which enable them to have higher bargain for their product. An ANR/kg of ₦85.3 was obtained for the State with a standard deviation of ₦15.12kg. This is synonymous with Oladimeji, 1999; Inoni and Oyaide, 2007 and similar survey on Edu and Moro artisanal fishery (2012).

TABLE 7: Estimated Average Costs and Returns **(₦)** Per Kilogramme of Fish Caught by Artisanal Fishermen in Kwara State, Nigeria

Fishing settlements	Average Fixed Cost (AFC)	Average Variable Cost (AVC)	Average Total Cost (ATC)	Average Revenue (AR)	Annual Net Return (ANR/KG)*
Afon	30.0(18.7)	130.4(81.3)	160.4(100)	260.0	99.6
Laduba	32.0(19.5)	132.0(80.5)	164.0(100)	265.0	101
Gbaradogi	34.0(30.2)	78.5(69.8)	112.5(100)	185.0	72.5
Ella-mawogi	36.0(32.6)	74.5(67.4)	110.5(100)	178.5	68.0
Mean	33.0	103.8	136.9	222.3	85.3
SD	2.24	27.39	25.39	40.62	15.12

NOTE Estimates were for the seven months during fishing took place figures in bracket are as percentages OF ATC/TC
SOURCE: Data Analysis, 2012.

The AFC per fisherman ranged between ₦62400.0 in Afon settlement and ₦86750.0 in Gbaradogi settlement – giving an average of ₦74163.8 per fisherman for the State as presented in Table 8. The table also shows that AVC per fisherman had a range of ₦254500.8 in Afon to ₦268009.0 in Gbaradogi with a value of ₦260502.6 per fisherman for the State. The standard deviations for AFC and AVC per fisherman were ₦4871.99 and ₦10608.67 respectively. The standard deviation for the AVC per fisherman was smaller than that of the AFC because the former depended on the quantity of fish caught within the same season while the latter was invariant to the quantity of fish caught. Table 8 also shows that the ANR per fisherman was highest ₦378560.0 in Ella-mawogi and lowest ₦338050.0 in Laduba settlement. The ANR per fisherman for the State was ₦356278.8 with a standard deviation of ₦15124.61 The revenue accrued to fishermen was not only dependent on the kilogram of fish caught and price per kilogram, but also dependent on the variable costs. Results are consistent with findings by Oladimeji,

1999; Inoni and Oyaide, 2007; Adewumi *et al*., 2012 and similar survey on Edu and Moro artisanal fishery (2012). However, Inoni and Oyaide (2007) recorded a net loss for about 18% of sampled respondents. Note that 1 USD=₦ 158.00k as at the time of study.

TABLE 8: Estimated Average Costs And Returns **(₦)** For Per Artisanal Fisherman in Kwara State, Nigeria

Fishing settlements	Average Fixed Cost (AFC)	Average Variable Cost (AVC)	Average Total Cost (ATC)	Average Revenue (AR)	Annual Net Return*
Afon	62400.0 (19.7)	254500.8 (80.3)	316900.8 (100)	664905.8	348005.0
Laduba	65005.0 (20.0)	260600.4 (80.0)	325605.4 (100)	663655.4	338050.0
Gbaradogi	86750.0 (24.4)	268009.0 (75.6)	354759.0 (100)	715259.0	360500.0
Ella-mawogi	82500.0 (24.2)	258900.0 (75.8)	341400.0 (100)	719960.0	378560.0
Mean	74163.8	260502.6	334666.3	690945.1	356278.8
SD	10608.67	4871.99	14549.68	26531.22	15124.61

NOTE: * Estimates were for the seven months during which fishing season lasted, Figures in bracket are percentages of ATC per fisherman.

SOURCE Data Analysis, 2012

Estimated Factors Affecting/Influencing Net Incomes of Artisanal Fishermen Patigi and Asa LGAs

Results showed that in Patigi LGAs, the included independent variables in equation 2 explained about 75.9% in the variations in the fishing incomes earned by the fishermen in Patigi fishing settlements. The F-test with a value of 61.34 revealed that the model was significant at the 5.0% level. Although all the estimated co-efficient carried the *a-priori* signs, that of hired labour was not statistically different from zero at the 5.0% level (equation 2). Results also showed that fishing experience accounted for approximately 62% in the variation in the fishing income while cost of hired labour, though not statistically significant accounted for 12,3% variations in the dependent variable. Fishing hours per season and number of trips per season also carried 4.4% and 3.0% respectively in variation in income earned by fishermen in Patigi LGA fishing settlements.

$\text{Log } Y_i = 3.794^* + 0.376^* \text{ LogFEX}_{1ij} - 0.075 \text{ LogCHL}_{2ij} + 0.142^* \text{ LogFHS}_{3ij} + 0.164^* \text{LogNTS}_{4ij}$ ……(4)

(0.076) (0.048) (0.018) (0.052) (0.068)

$R^{-2} = 0.759$; F=61.34*

On the contrary, equation 3 for Asa LGA shows that the coefficients of all the variables carried *a priori* signs which supports the hypothesized that cost of family, hired labours and cost of depreciation are expected to bear a negative sign with fishermen income while number of fishing hours per season make positive contribution to the net income of fishermen. Although, cost of hired labour carried the *a priori* sign, the variable was not statistically different from zero at the 5.0% level. The F-test also revealed that the model was significant at 5.0%. However, the negative sign on the coefficient of Log CHL showed that an increase in the use of this input caused net income to declined, *ceteris paribus.* Small scale is very labour intensive and every activity in the business, from going to the inland water through to harvesting and processing as well as marketing of fish required adequate amount of human effort. The result indicates that if cost of labour increases ceteris paribus, net income of fishermen will reduced. A similar result was documented by Oladimeji, 1999; Adewumi *et al*., 2012.

Results showed that the fishermen's fishing incomes were inelastic with respect to the explanatory variables.

$\text{Log}Y_i = 4.559^* - 0.127^* \text{LogDEP}_{1ij} + 0.278^* \text{LogCFL}_{2ij} + 0.140^* \text{LogFHS}_{3ij} - \text{Log}0.002\text{CHL}_{4ij}$…… (5)

(0.056) (0.023) (0.091) (0.047) (0.019)

$R^{-2} = 0.805$; F= 30.07*

* Indicates that estimated co-efficient were significant at 5.0% level. The standard errors of the co-efficient are in parenthesis.

Estimated Resource-use Efficiency for Artisanal Fishermen in Edu and Moro LGA

The results of the estimated resource-use efficiency were derived with respect to family and hired labour and as well as fishing nets and bait in table 9. The table shows that Marginal Value Product (MVP) of each production input was less than its acquisition cost implying that each of the input in artisanal fishing was over utilized. The excessive uses of labour resource in rural areas tend to be a common occurrence due to rather low opportunity cost for the input (Ladipo *et al*., 1992). Family labour cannot sensibly be 'laid off'. For instance, in agricultural activities even when it is making a negative contribution because it still has to be catered for whether it is employed or not. Besides, the existence of disguised unemployment and under-employment of labour in rural areas of the country necessarily promote excess labour in agriculture and fishing enterprises. In addition, artisanal is a rising enterprise in that under the prevailing technology in the country, fish catches depend more on chances that on mandays of labour employed.

However the MVP of all resources used are positive, hence they all contribute positively to total output. To maximize profit the ratio must equal one.. When the ratio is less than one, it is an indication of over-employment of the resources beyond the point of optimum profit. Profit can be increased by reducing the rate of use of the resources. When the ratio is greater than unity, it indicates that the rate of utilization of the resources is too small; increasing the rate of use would increase profit.

From the results obtained it was clear that the optimization condition was not attained for the given level of technology in the fishing operations. The MVPs obtained are less than unity Results are consistent with findings by Mbanasor and Obioha, 2003; Olagunju *et al*., 2007; Awoyemi and Ajiboye, 2011 but contrary to Anene *et al*.,

2010. In the case of labour, the low figure obtained might be due to the fact that the fishing crew average 6 in number are too many. This seems to be consistent with the belief that many people in developing countries are under employed (Ladipo *et al*., 1992).

TABLE 9: Estimated Resource-use Efficency for Artisanal Fishermen in Asa and Patigi LGAs

	Estimated MVP of Input (₦)		
Fishing settlement/ Unit price	Hired Labour	Family labour	Fishing nets & baits
Afon	0.26	0.31	0.04
Laduba	0.29	0.03	0.22
Gbaradogi	0.26	0.16	0.23
Ella-mawogi	0.18	0.21	0.33
Unit Price of Inputs (₦)	600	Imputed= 500	6,000

Source: Data Analysis, 2012.

CONCLUSION

The study examined the socio-economic characteristics and economic returns of rural artisanal fishing in randomly selected two fishing Local Government Areas of Kwara State, Nigeria. The results indicated that Nigeria's demand for fish and fish products rose steadily during the 1981-2005 decades while her domestic production of fish commodity fluctuates. Although, the artisanal fishery in the State is profitable, productive resources are not efficiently utilized because they are over committed. It is recommended, therefore, that artisanal fishermen in the State should be given adequate training to ensure proper understanding of new fishing method and adopt technology capable of increasing not only the profitability of the enterprise but also make efficient use of fishing resources.

REFERENCES

Abiodun, J. A. and Oshungade, I. O. (2009) A Statistical Survey of the Fisheries of Jebba Lake, Nigeria. Nigerian Journal of Fisheries, Science and Technology, 1(1): 110-118.

Adewumi, M. O., Ayinde, A. H., Adenuga, S. T. and Zacchaeus, S. T. (2012) The Profitability Analysis of

Artisanal fishing in Asa River of Kwara State, Nigeria. International Journal of Development and Sustainability, 1(3).

Akinwumi, F.O., Akinwumi, I.O. and Ogundahunsi, O.A. (2011) Characterization of Artisan Fishery in the Coastal Area of Ondo State, Nigeria. International Research Journal of Agricultural Science and Soil Science, 1(3): 83-89.

Anene, A., Ezeh, C. I. and Oputa, C. O. (2010) Resources Use and Efficency of Artisanal Fishing in Oguta, Imo State, Nigeria. Report and Opinion 2(7) Pp. 10-16.

Awoyemi, T. T. and Ajiboye, A. J. (2011). Analysis of Profitability of Fish Farming Among Women in Osun State, Nigeria. Journal of Economics and Sustainable Development 2(4) Pp. 1-8.

BGL Agiculture Report (2009) www.bglplc.com

Federal Department of Fisheries (2005) Fisheries Statistics of Nigeria, FDF Publication, Abuja, Nigeria.

Federal Department of Fisheries (2007) Fisheries Statistics of Nigeria, FDF Publication, Abuja, Nigeria. 11-24PP.

Federal Department of Fisheries (Year books) Fisheries Statistics of Nigeria, Various FDF Publications, Abuja, Nigeria.

Food and Agriculture Organization, (2007) The State of World Fisheries Aquaculture 2006.Food and Agricultural Organization of the United Nations, Rome. Pp:162.

Food and Agriculture Organization, (2013) FAO Country Programming Framework (CPF) Federal Republic of Nigeria, Fiat Panis, pp 1-41.

Food and Agriculture Organization, (2007) The State of World Fisheries Aquaculture 2006. Food and Agricultural Organization of the United Nations, Rome. Pp:162.

Food and Agriculture Organization, (2004) The State of World Fisheries Aquaculture 2004.Food and Agricultural Organization of the United Nations, Rome.

Food and Agriculture Organization, (Year books) Food and Agricultural Organization of the United Nations, Statistics Division, various year books, Rome.

Ibrahim, B. U., Auta, J. And Balogun, J. K. (2009) A Survey of the Artisanal Fisheries of Kontagora Reservoir, Niger State, Nigeria. Bayero Journal of Pure and Applied Sciences, 2(1) : 47-51.

Ita, E. O. (1985). Investment Prospect in Inland Capture Fisheries with special reference to small reservoirs. The exclusive fishing right licence model. Conference paper.

Inoni, O. E. (2007) Allocative Efficency in Pond Fish Production in Delta State, Nigeria: A Production Function Approach. Journal of Agricultura Tropica ET Subtropica 40(4). Pp 127-132.

Inoni, O. E. and Oyaide, W. J. (2007) Socio-economic Analysis of Artisanal Fishing in the South Agro-ecological Zone of Delta State, Nigeria. Agricultra Tropica et Sub-tropica 40(4) Pp. 135-149.

Kareem, R. O., Dipeolu, A. O., Aromolaran, A. B. and Akegbejo-samson (2008) Analysis of Technical, Allocative and Economic Efficiency of different Pond

Systems in Ogun State, Nigeria. African Journal of Agricultural Research. 3(4):246-254.

Kimenta, J, (1971) Elements of Econometrics. Macmllan inc, New York, Pp. 197-213.

Kwara Agricultural Development Project (KWADP) (2008) House Journal and Bulletin, July, 2008.

Ladipo, O. O., Adesimi, A. A. and Moses, B. S. (1992) Economic Analysis of Resource Productivity in Motorized Canoe Fishing in Selected Villages of Cross River State. Ife Journal of Agriculture. 2(1) Pp. 103-112.

Lawal, F. (1992) Fishing Efforts and Earnings in the Niger State Artisanal Fisheries, A Case Study of Mokwa and Bussa LGAs of Niger State. Bullion 1(3).

Mbanasor, J. A. and Obioha, L. O. (2003) Resource Productivity under Fadamas Cropping System in Umahia North Local Government Area of Abia State, Nigeria. Tropical and Sub-tropica Agriculture 2:81-86.

Njifonjou, O. (1998) The Awasha Fising Fleet in the Cameroon Coastal Area. Profitability Analysis of the Purse Seine Units Activity, In: Eide, A. Vassdal, P. (eds,): Proceedings of the 9th International Conference of the International Institute of Fisheries Economics and Trade. Tromso, Norway.

National Population Commission (NPC) (2006) Population Census of the Federal Republic of Nigeria. Analytical Report at the National Population Commission, Abuja, Nigeria.

Olagunji, F. I., Adesinyan, I. O. and Ezekiel, A. A. (2007) Economic Viability of Catfish Production in Oyo State. Journal of Human Ecology, 21(2): 121-124.

Oladimeji, Y. U. (1999) An Economic Analysis of Artisanal Fisheries in Kwara State, Nigeria. Unpublished MSc Thesis. Federal University of Technology, Akure, Nigeria.

Olukosi, J.O. and Ogunbile, A.O. (2004) Introduction to Agricultural Production Economics: Principle and Applications. Agitab Publishers Limited Zaria, Nigeria. Pp. 97 – 111.

Omijoyin, S.A. (2010) Credit Utilization in Ameliorating the Impact of Climate Change for Food Security among Artisan Fisheries in Lagos, Lagoon, Nigeria. PDF Commerce Special Edition, 2010.

Olayide, S. O., Essang, S. M., Ogunfowora, O. and Idachaba, E. S. (1982) Element of Rural Economics. Ibadan Universiyy Press.

Ovie, S.I. and Raji, A. (2006) Food Security and Poverty Alleviation through Improved Valuation and Governance of River Fisheries in Africa. Fisheries Co-management in Nigeria: An Analysis of the underlying Policy Process, World Fish Centre, Nigeria,

Sagua, M. (1975) Analysis of Costs and Returns of Artisanal Fishery Enterprise in River Niger near Kainji. KLRI Press, Pp 43-50.

TN/RL/GEN/57/REV (2005) 1 (Fiji; Jamaica; Papua; New Guinea and the Solomon Island 2005 16(11), Pp. 4

USDA (2009) Gain Report Global Agricultural Information Network. Fish Imports to Nigeria.