

**ECONOMICS OF FISH HARVESTING IN NIGERIA: A CASE STUDY OF YOLA NORTH
LOCAL GOVERNMENT AREA OF ADAMAWA STATE**

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ABSTRACT

The fishery sub- sector is very crucial in meeting the protein requirement of the Nigerian people and at the same time it is a foreign exchange earner. Fish production is a source of livelihood for millions of Nigerians both as primary and secondary income provider. From time immemorial, capture fish has been the major area of fish supply in the country. The study examined the economics of fish harvesting in Yola North Local Government Area of Nigeria with the objectives of examining the socioeconomic status of the fishers, determining the gross margin of fish harvesting, examining the variable influencing fish harvesting and identifying the constraints to fish harvesting in the study area. Primary data were collected from 40 randomly selected fishers. The data were subjected to descriptive statistics, gross margin and multiple regression analyses. Majority (67.5%) of the fishers are below the age of 30 years with 45% having at least 3 years experience in the job. Thirty five percent (35 %) have no formal education. The result shows that the venture is profitable with the average Gross Margin of N27, 434.38 (\$166.27), and an average net income of N 22,367.88 (\$135.56) per month. The result of the regression model revealed that labour input and age of the fishers are significant at one percent level each while the cost of fishing gear was significant at five percent level. This shows that these variables are the major determinants of the fish harvesting in the study area. The major constraints to fish harvesting include; high cost of fishing gear, lack of capital and uncertainties associated with the venture. It is recommended that inputs such as fishing gears, trap feeds should be made available and at subsidized prices.

Key words: Economics, Fish, Harvesting, Nigeria, Adamawa State

INTRODUCTION

Fisheries production is essential to the economic well- being of millions of rural people in the developing world. Capture fisheries and aquaculture provide direct employment for some 200million people, the vast majority of whom work in the traditional small scale sector, which account for about 70% of fisheries production (FAO, 2008-2013). Fish and other aquatic species are also vital to food security; they provide almost 30% of the animal protein consumed in Asia and the Pacific, and more than 20% in low- income food –deficit countries. Both men and women engage in fishery production, in Africa, as much as 80% of sea food is marketed by women, post harvest, processing, and marketing is done by them. Fish consumption in Nigeria accounts for 35-50% of animal protein consumption and domestic production cannot keep pace with the huge demand, this has led to over 60% of fish consumption being imported. Presently over N97billion is being spent on fish importation, this is a huge drain on the hard earn currency. It was reported that, If import is substituted in Nigeria, 70,000 jobs can be created per year. The long run solution as suggested is to boost domestic production through artisanal improvement. The fish industry in Nigeria can be divided into three broad categories; these include the artisanal, industrial fishery and fish farming .The artisanal production continue to provide the bulk of domestic fish consumption but it's bedeviled with many challenges. It is against this background that this study is designed to examine the socioeconomic status of the fish harvesters, estimate the determinants of fish output and identify the problems of fish harvesting in the study area.

Importance of fishery sub-sector

The importance of the fishery sub- sector cannot be overemphasized. Fish, many times has been described as rich food for poor people. It provides excellent high quality proteins and has a concentration of calcium and phosphorus in the bones. Fish oil lowers blood pressure and fin fish has been shown to reduce the risk of blood cancer and reduces insulin resistance in skeletal muscle. According to Adebayo and Anyanwu (2013) fish supplies as much as 80% of animal protein in coastal areas, it supplies micronutrients such as irons, iodine, calcium, vitamin A, and Vitamin B in the diets of people in these areas.

The fact that fish is cheaper and is readily available makes it a consumable for both the rich and the poor. Generally in Nigeria, the consumption of fish accounts for 50% of the total animal protein intake (USAID, 2010). Fish is also available in different forms as fresh, dried ,smoked, canned, frozen, etc. Fish consumption cuts across religion for it is free from any religious taboo. Fish is the best food for human consumption according to USAID (2010) as it is low in fat, calories, and cholesterol (Table 1).

Table 1: Comparison and Nutritional Values of Different Sources of Animal Protein per 100g Serving

S/N	Source of protein	Calories Kcal	Protein (g)	Total (g) Fat	Cholesterol (mg)	Cost N/Kg
1	Egg	199	13.5	15	459	350
2	Beef	289	24.1	20.6	90	500-700
3	Chicken	173	30.9	4.5	85	500-950
4	Pork	206	30.9	8.1	96	300
5	Sheep	191	28.3	7.7	89	600
6	Fish	140	26.6	2.9	41	350-400
7	Soybean	416	36	19.9	0	40-45

Source: USAID (2010)

Fish harvesting is a veritable venture people engaged in. Fish is used in production of feeds, animal rations and fish oil in the industries. Fishing is central to the livelihood and food security of 200million people all over the world, especially in the developing world and one in five people on this planet depends on fish as primary source of protein (Adebayo and Anyanwu, 2013).In Akwa Ibom state of Nigeria, artisanal fisheries contribute about 95% total fish output to the numerous communities in and out of the State. The fishery sub-sector as at 2007 employed about 8.23million people in the primary sector while the secondary sector employed 18.27million people. The population of artisanal fishermen is made up of 1.6million. Others work as processors, transporters, cold room operators, marketers, net menders etc. Fish harvesting and marketing has the potential for foreign exchange earnings through export of processed fish and shrimps. In 2007 for example, Nigeria exported over USD 38m shrimps.

FISHERIES RESOURCES IN NIGERIA

Nigeria as a country is blessed with numerous water bodies ranging from the marines, through brackish-waters to inland fresh waters. According to Ekpo and Essien-Ibok (2012) the inland water bodies in Nigeria are estimated to be over 14million hectares that are being fished predominantly by artisanal fishermen. The nation has a coastal line of about 900km, a continental shelf area of 37,934km² and an exclusive economic zone area of 210,900km² and thus has the sovereign rights for the purpose of exploiting, conserving and managing its fisheries and natural resources within the Exclusive Economic Zone (Omotayo, 2007).

The country is also blessed with a rich diversity of fin- fish and shellfish resources. The fish/ shrimp resources are shown in Table 2.

Table 2: Fish/Shrimp Resources and Yield Potential

S/N	Category of Resources	Potential Yield Estimate/annum (MT)
1	Coastal Inshore (Fin fish)	Coastal resources 142,000 Inshore Resources 16,620
2	Offshore (finfish)	Demersal Resources 6,370 Tuna and Pelagic Fish Resources 15,000
3	Coastal Artisanal (shellfish)	48,000
4	Industrial (shellfish)	3,760
5	Fresh water Resources	Rivers/Flood Plain 226,550 Lake Chad 160,000 Kainji Lake 30000 Aquaculture 2.5m

Source: Federal Department of Fisheries, 2007.

According to Adebayo and Anyanwu (2013) the trend of aquaculture production in Nigeria and its implication for food security revealed that capture fish will continue to provide the bulk of fish food supply in Nigeria as the bulk of fish being consumed still comes from the artisanal sector. The sub-sectoral contribution is shown in Table 3. It shows that artisanal production still formed the bulk of fish production in the country.

Table 3: Fishery Sub-sectoral percentage contribution in Nigeria

Year	Artisanal %	Aquaculture & Industrial %
1995	86.5	13.5
1996	86.9	13.2
1997	87.2	12.8
1998	89.6	10.4
1999	89	11
2000	89.5	10.5
2001	89.1	10.8
2002	88.1	11.9
2003	87.4	12.6
2004	85.4	14.6
2005	84.7	15.3
2006	81.4	18.6
2007	81.9	18.1
2008	74.7	25.3
2009	76.62	23.38
2010	72.76	27.24

Source: Federal Department of Fishery (2007), Adeoye et al., (2012), modified by the author.

As seen in Table 3, the artisanal sub- sector still produced the largest percentage of fish consistently from 1995 until it started declining from 2002. The aquaculture and industrial sub-sectors do not have proper pattern. However, what is important is that increasing local capacity can potentially turn the country from being a net importer of fish and fish products to a net exporter.

As shown in Table 4, there is a high demand for fish in Nigeria, leading to good market opportunities (Peter and Heijden van der, 2012). Presently, the Nigeria fish production from capture cannot supply the

demand of fish by the large population (Adeoye *et al* ,2012) estimated that Nigeria will need 4.84million tones of fish consumption by the year 2025 and the Federal Government of Nigeria intend to ban imported fish. With this intention, the Aquaculture and Inland Fisheries (AIFP) was started in 2003 followed by the National Programme for Food Security (NPFS).

CONSTRAINTS FACING CAPTURE FISHERY DEVELOPMENT IN NIGERIA

According to FAO (2014) capture fisheries Development in Nigeria has been faced with different constraints including the following:

-Inadequate supply of inputs to the artisanal fishermen. Since fishing grounds are located far away from the sources of those inputs and the fact that those inputs are very costly and most of the artisanal fishermen are poor, it becomes very hard to obtain the needed inputs.

Table 4: Projected Fish Demand 2006-2025

Year	Fish Demand (Million Tonnes)
2006	2.66
2007	2.75
2008	2.83
2009	2.92
2010	3.02
2011	3.11
2012	3.22
2013	3.32
2014	3.42
2015	3.53
2016	3.65
2017	3.76
2018	3.88
2019	4.01
2020	4.13
2021	4.27
2022	4.40
2023	4.54
2024	4.69
2025	4.84

Adeoye *et al* ,2012

- The changing nature of the seasonal streams, rivers and pools leading to low catch and hence low income and poor living standard of the fisher folks. Most of the time, some full- time fishermen have to look for other jobs for alternative income.
- Poor water bodies' management by the government leads to low productivity and resultant low catch by the fishermen; this is as a result of lack of fisheries edicts in most inland states or inability to enforce the edicts by the authority where such exist.
- Shortage of trained manpower at different levels of the profession for effective and efficient capture fish project implementation, development planning and administration. There is also the problem of inadequate dissemination of information on fisheries activities and resource potentials as well as processing, marketing and resource management.

- Lack of access road in most fishing communities making marketing and distribution very difficult. Most of these places also lack basic amenities such as electricity, water supply, health facilities etc.

FDA (2007) listed the factors militating against fish production in Nigeria are:

- Natural constraints of infrequent up swelling and narrow continental shelf of the country's shores
- High cost of fishing inputs and construction equipments
- Lack of access to affordable credit and insurance cover
- Low level of private sector participation and investment in artisanal fishing and aquaculture
- Lack of effective institutional support and linkages
- No system and exhaustive stock assessment of Nigerian water bodies.

According to Ekpo and Essien-Ibok (2012) the problems or challenges facing artisanal fisheries include;

- Overfishing, use of obnoxious /illegal fishing methods, siltation, oil pollution, fear of sea pirates, high cost of fishing gears, climate change, post harvest losses among others. Others include poverty, illiteracy, uncertainties, and attack on trawlers which reached 107 in 2007.

The characteristics of the artisanal fishers which also reflect the challenges and constraints they face , according to Onuoha (2009) are;

- Labour intensive activities
- Poorly developed infrastructure
- Involves very low capital investment/outlay
- Numerous fishing units generally scattered in remote hardly accessible settlements
- Lack of formal credits
- Low level of income

METHODOLOGY

The study Area

The study was carried out in Yola North Local Government Area (LGA) of Adamawa State, Nigeria. Yola North LGA lies between latitude $9^{\circ} 13'$ and $9^{\circ} 18'N$ and longitude $12^{\circ} 24'$ and $12^{\circ} 29'E$ (Mahmud, 2013). The local government area lies at southern bank of river Benue. Fishing is common along the Benue river, Chouchi river and in Lake Gerio located beside the Benue river. The LGA has a population of 198,247 (NPC, 2007) the total land area is $109,00\text{Km}^2$. The area lies within the hot climatic northern guinea savannah zone of Nigeria with distinct dry and wet seasons. The area has a mean annual rainfall of 988.99mm and a maximum temperature range $30-40^{\circ}\text{C}$. The major occupation of the inhabitants includes fishing, cattle rearing, crop farming trading, and civil service.

Data collection

The data for this study were collected with the use of well structured questionnaire from the fisher folks who were randomly selected from the fishing communities in Lake Gerio and Doubeli areas of the study area. Data were subjected to descriptive, gross margin and inferential statistics (Multiple regression analysis). Four functional forms were tried, these include linear, semi log, exponential and double log functions. The specification of the functions is as follows

Linear function:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + U_i$$

Semi log function:

$$Y = \beta_0 + \beta_1LX_1 + \beta_2LX_2 + \beta_3LX_3 + \beta_4LX_4 + \beta_5LX_5 + \beta_6LX_6 + \beta_7LX_7 + U_i$$

Exponential function:

$$LY = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + U_i$$

Double log function:

$$LY = \beta_0 + \beta_1LX_1 + \beta_2LX_2 + \beta_3LX_3 + \beta_4LX_4 + \beta_5LX_5 + \beta_6LX_6 + \beta_7LX_7 + U_i$$

Where:

Y = Total fish harvested in Kg

X₁ = Cost of fishing gear in Naira

X₂ = Amount spent on trap food

X₃ = Labour use in man days

X₄ = Cost of transportation

X₅ = Age of fishermen in years

X₆ = Experience of the fishermen in years

X₇ = Household size

U_i = Error term

β₀ = Constant

β₁- β₇ = Coefficients of independent variables

RESULTS AND DISCUSSION**Socio - economic status of the fishers**

The socioeconomic characteristics of the respondents are shown in Table 5, the age distribution shows that majority (67.5%) are between 20 to 29 years of age, 27.5% are between 30 to 39 years. The results indicate that all the respondents are still in their active ages and are likely to be agile and able to cope with the rigor involved in fishing and allied activities.

Many (35%) of the respondents have no formal education as shown in the table while most (50%) of them have secondary school education. The result shows that about 65% of the respondents have one form of education or the other meaning that they are more likely to effectively adopt modern techniques to boost their production.

The same Table shows the household size of the respondents, it indicates that most (52.5%) of them have more than 2 people in their households. This means that they are responsible people who are likely to provide for the family out of their meager income from fishing. Gillnet formed the highest form of fishing gear being used by the fishers this is followed by hook and use of cast net. The gill net is shown to be more effective and economical based on the fact that its catch is larger than the other gears.

Table 5: Socioeconomic Status of The Fishers

Variable	Frequency	Percentage
Age of Respondents		
20-29	27	67.5
30-39	11	27.5
40-49	02	05
Total	40	100
Educational Level		
No formal education	14	35
Primary education	05	12.5
Secondary education	20	50
Tertiary education	01	2.5
Total	40	100
Household size		
1-2 people	19	47.5
3-4	11	27.5
5-6	07	17.5
More than 6	03	7.5
Total	40	100
Types of fishing gear		
Gill net	36	90
Hook	03	7.5
Cast net	01	2.5
Total	40	100

Source: Field survey, 2011

Gross margin analysis

The gross margin (GM) is the difference between the gross income and the total variable cost of an enterprise. For the fishermen, there is an average GM of N27, 434(\$166.27) and a net income of about N22, 367(\$135.56) meaning that the business is profitable.

Result of the multiple regression analysis

The result of the multiple regression analysis indicates that the double log gave the best fit based on the economic, statistical, and econometric criteria. It was therefore used as the lead equation.

Three variables were significant, these include the cost of the fishing gear (X_1), amount of the labour use (X_3) and age of the fishermen (X_5). Variable X_1 is significant at 5% level, X_3 and X_5 are statistically significant at 1% level each. The result indicates that fishing gear is a very important variable in fish harvesting. The more money a fisher has to purchase the fishing gear, the higher the catch, in the same vein, the more the labour expended in the business, the more the output. Age goes with experience of the fisher in contributing positively to the total output and this implies that majority of the fishermen are within the productive age. The R^2 of 42% indicates that 42% of the variability in fish output was accounted for by the variable included in the model. The magnitude of the F statistics shows that the R^2 is significant and the function is in good fit.

$$LY = 0.525 + 0.016X_1 - 0.004X_2 + 0.314X_3 - 0.007X_4 - 0.81X_5 - 0.02X_6 - 0.03X_7$$

**

(2.35)
(-0.45)
(4.43)
(0.85)
(3.68)
(0.29)
(0.49)

$R_2 = 42\%$ $F = 33.10$ ** significant at 5% *** significant at 1%

Problems of fish harvesting in the study area

There is no business without challenges. Some of the problems of fish harvesting in the study area include lack of capital which top the list of the problems of the fishers. This is followed by tear and wear of the fishing gears. Others include flooding and uncertainties and high cost of fishing gears.

CONCLUSION AND RECOMMENDATIONS

The study examined the economics of fish harvesting in Yola north local government of Adamawa State. It identified the socioeconomic status of the fishermen, determined the variables influencing fish catch and identified the problems militating against fish harvesting in the study area. The result shows that all the respondents are male, aged 20-29 (67.5%) while more than 39 constitute 27.5%. Many (35%) have no formal education while most (50%) have secondary education. Many (52.5%) of them have more than 2 people in their households. The gross margin shows that the business is profitable. The result of the regression analysis indicates that cost of fishing gear, labour and age are the variables determining the output of the fishermen.

Based on the findings of this study, the following recommendations are proffered;

- i. Soft loans should be granted to fisher folks to enable them purchase quality fishing gear to enhance their catch, income and subsequently improved standard of living.
- ii. Law should be enforced to regulate catches and offenders should be dealt with appropriately.
- iii. The government should lower the tariff on nets to make them affordable to fishermen, to enhance their productivity and ensure food security.
- iv. Artisanal should form themselves into cooperatives to be able to access credits and other inputs.
- v. Government should boost production through artisanal capture fishery

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