



**Full Length Article**

# Examining Socioeconomic Characteristics and Adoption Trend of Artisanal Fishers of Akwa Ibom State in West Africa

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## ABSTRACT

One of the foods domestically available to Nigeria is fish. But for the fishers to continue to produce to feed the teeming population they must be exposed to fishing innovations in order to adopt them. However, the fishers are constrained to adopt the innovations. A study to examine the fisher's socioeconomic characteristics and adoption trend by artisanal fishers was conducted in Akwa Ibom State of Nigeria. A result of multiple regression analysis shows that increase in age of the fishers did not increase the rate of adoption of innovation. Increase in household size as well did not increase the level of adoption. However, increase in income, increased the level of adoption and experience in fishing also increased the level of adoption of fishing innovations. More extension workers should be employed by government to reach out to all the fishers.

**Key Words:** Socioeconomic; Adoption; Artisanal; Fishers; Extension

## INTRODUCTION

Fish is one of the cheapest sources of animal protein in the diet of most Nigerians and the Eastern Nigerians in particular. Apart from the fact that more than 40% of animal protein consumed by the average Nigerian comes from fish, at present about 70% of the total fish demand is from domestic production. Fishing constitutes the major occupation and the principal income source to the communities that inhabit the area of the Nigeria coastline between Oron in Akwa Ibom State and Akasa in Rivers State (Antai, 1991). Bonga fish (*Ethmalosa firmbriata*) for example, is one of the most important commercial pelagic fish in Nigeria and is distributed throughout West Africa from Mauritania to Angola (Moses, 1991). It is noted that ocean fishes have traditionally been open-access activities. As a result of this, anyone belonging to the appropriate social category (native or social) is allowed to participate in fishing in the area.

Fishing has substantial social and economic importance. It is estimated that 12.5 million people are employed in related fishing activities and value of fish traded internationally has been estimated at US \$40 billion per annum for the early 1990s. The total production from capture fisheries and aquaculture during the same period reached a total mass of 100 million tones (FAO, 1995). Artisanal fishery is mainly practised in Akwa Ibom State. It involves less of skill in the production and the cost to obtain the input is quite reduced, compared to industrial and inland fishery production. Artisanal fishery is widely practiced both for commercial and for subsistence; the reason why

there are fishing ports and fish markets in the area. Funding in artisanal fish production is one of the major constraints in Nigeria. This is as a result of increase in the price of fishing inputs. The inputs include boats, outboard engine, nets, etc. The rise in fishing inputs with other constraining factors in artisanal fishing has made initiative worthwhile to fishers.

Also, food consumption in Nigeria has been found to be inadequate both in quality and quantity. According to FAO (1995) recommendation, the minimum food requirement to be consumed is 2440 kcal and 65 g of protein per day. But in Nigeria estimated average calorie and protein supplies are 2198 kcal and 58 g of protein per day, while the average consumption in 1980 was 194 cal and 48.7 g of protein. These figures show that there is a serious deficiency of nutrition in Nigeria and the result of this inadequate food intake is a problem of under-nutrition and malnutrition. Therefore to abridge this gap, food producers especially the fishers need more innovative and resourceful inputs to increase the production.

FAO (1995) maintained that the world fish catches appear to be leveling off below the estimated maximum sustainable yield to 100 metric tones per annum. For example, it is projected that developing countries needed an additional 22.5 million metric tones of fish in the year 2000, which highlighted the need to increase the food production. But the obstacles in artisanal fish production have been identified to be increase in prices of fishing inputs and low income level of fishers. Therefore, this study examines the socio-economic characteristics and adoption trend of artisanal fishers.

Examining the fishers' economic condition will

enhance to evaluate avenues for increasing production through the use of appropriate technologies. The main objective of this research work is to examine the socio-economic characteristics and the adoption trend of artisanal fishers of Akwa Ibom State in the southeastern Nigeria of West Africa. The findings from this study will assist government in policy formulation and help the extension agencies meet the appropriate ways of delivering innovations to the artisanal fishers thereby raising their standard of living.

**MATERIALS AND METHODS**

This study was conducted in Akwa Ibom State (Latitude 4° 30' & 5° 53' North & Longitude 7° 25' & 5° 25' East) in the south-eastern part of Nigeria. Akwa Ibom State is a maritime state with an abundant fishery resource. Both men and women are engaged in artisanal fish production. However, this group of people is at the lowest socioeconomic stratum.

There are 138 fishing respondents in Akwa Ibom State. A rapid appraisal (RA) was conducted in 50 out of 138 fishing communities to ascertain the social, economic and ecological dimensions of the respondents. Twenty seven out of the 50 respondents who took part in the RA were randomly selected for the study. Seven were selected from 25 respondents and five selected each from the remaining two respondents making a total of 185 respondents that took part in the study.

Both descriptive and quantitative analyses were used in the analysis of data. The general form of the regression equation used is given thus:

$$Y = f(x_1 + x_2 + x_3 + x_4 + x_5 + x_6).$$

Where Y = adoption of innovation

- x<sub>1</sub> = age
- x<sub>2</sub> = household size
- x<sub>3</sub> = income
- x<sub>4</sub> = number of extension visits
- x<sub>5</sub> = experience
- x<sub>6</sub> = education.

To obtain estimates for the parameters in the relationship, two common functional forms of the Ordinary Least Square (OLS), namely, ordinary and double log were applied. The two functional forms can be expressed explicitly as follows:

$$Y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 + U$$

Double log function (Cobb-Douglas).

$$\ln y = \ln b_0 + b_1 \ln x_1 + b_2 \ln x_2 + b_3 \ln x_3 + b_4 \ln x_4 + \ln x_5 \ln x_5 + b_6 \ln x_6 + U$$

Where Y = adoption of innovation

b<sub>0</sub> = constant parameters representing the intercept

- b<sub>1</sub> = coefficient of the variables
- x<sub>1</sub> – x<sub>6</sub> = have their usual meaning as described before
- U = error term.

**RESULTS AND DISCUSSION**

**Socioeconomic Characteristics of Respondents**

**Sex.** Sex plays a very important role in fishing and agriculture, in terms of property acquisition, for example, fixed assets like land and machines in Akwa Ibom State are mostly inherited by the male descendants. Most or 98% of the respondents who engage in fishing activities in the sea were males. This is because the job of fishing in the open waters is tedious for the females to withstand hence over 70% of women are involved in processing and marketing of fishing products. Of course, these are very important segments of the industry.

**Age.** It is generally believed that the farming population in general and the fishing population in particular in Nigeria is declining. This is based on the fact that young school leavers do not want to go to the farm instead they prefer going to increase the population in the urban area in search of white-collar jobs. A 35.1% of the respondents fell between the ages of 20 – 40, 62.2% fall within 41 – 50, while 2.7% of the respondents fall over 50 years of age (Table I). The fishers within the ages of 20 – 40 years of age were mature and able to withstand stress in fishing operations. They put in more time and other resources in the business, thereby resulting in increased output of fish. However, the respondents falling within the age range of 41 – 50 years form the modal age group. This group still formed a part of the group that had been in fishing operations for years with a wealth of experience. It is then obvious that the fishing business was dominated by middle age men who were still active and could increase their output.

**Household size.** Farm households are characterized by high number of members or rather with a high dependency ration (Udoh, 1999). Similarly, the household size of the fishers is also noted with a high dependency ratio. For instance, only 14.1% of the respondents had less than 5 members per household, while the modal group of 50.3% had between 6 – 10 members per household, 35.6% had 11 and above (Table I). It is obvious that a large household size offers free and cheap labor for the fishing households. Though this helps to increase the output of fish production, a substantial amount of fish is also used for household consumption and therefore reduction in overall household income.

**Education.** Table I shows the level of education of the respondents. About 73% of the fishers had no formal education. Those that had primary education were represented by 16.29% with secondary education were about 10%, while those who attended higher institution were 1.08%. The bedrock of development is education. Educated farmers and fishers can increase production

**Table I. Demographic characteristics**

Age (yrs)	No	%
20 - 40	65	35.1
41 - 50	115	62.2
> 50	5	2.7
Total	182	100.0
Household size		
Below 5	26	14.1
6 - 10	93	50.3
11 and above	66	35.6
Total	185	100.0
Educational attainment		
No formal education	135	73.0
Primary education	39	16.2
Secondary education	18	9.72
Tertiary education	2	1.08
Total	185	100.0
Fishing experience (yrs)		
Below 5	20	10.8
5 - 10	45	24.3
11 - 14	40	21.6
15 and above	80	34.2
Total	185	100.0

Source: Field work, 2006

**Table II. Respondents on adoption of fishing innovation**

Adoption	No	%
Adopters	50	27.0
Non-adopters	135	73.0
Total	185	100

**Table III. Distribution of respondents on annual income**

Occupation	No.	%	Mean Income per week	Mean Income per annum
Full time fishing	132	71.4	2,000.00	106,000.00
Fishing and trading	38	20.5	5,000.00	80,000.00
Fishing and civil	15	8.1	7,000.00	84,000.00
Servant				
Total	185	100	14,000.00	270,000.00

Source: Computed from fieldwork, 2006

**Table IV. Problems in fishing operation**

Types of Problems	No.	%
Natural disaster due to bad weather	20	10.8
Inadequate fund	80	43.2
Shortage of labour	40	21.6
Inadequate of fund/labour	45	24.3
Total	185	100

Source: Fieldwork, 2006

**Table V. Distribution of respondents on fishing inputs**

Input	No.	%	Cost of Inputs (N'000)
Outboard Engine	002	1.08	740
Canoe	185	100	700
Net	185	100	153
Paddle	185	100	51
Lead	185	100	74
Anchor	185	100	55
Hook and line	180	97.3	370

Computer from fieldwork, 2006

through the use of improved methods by reading extension leaflets. Most respondents were without formal education or form the modal class, because the people living in the riverine area of Akwa Ibom State do not have educational institutions in the fishing settlements and therefore most of them embrace the occupation of their forefathers right from school age. Sitting primary schools in the fishing settlements will enhance the educational standard of the residents. However, early marriages as observed by Udoh (2003) also directly affect the opportunities to develop one's education. Instituting Adult Education Agency in the fishing settlements will also help to improve the educational standard of the people.

**Experience.** This is the act of gaining knowledge through constant practices of skill, which brings about specialization. The sum of these then results in increase in output. A 10.8% of the respondents had less than 5 years of experience in the fishing occupation followed by 24.3% of the respondents with 5 to 10 years, 21.6% with 11 to 14 years and 43.2% with 15 or more years of fishing experience. As a result, the respondents with the highest number of years of experience should have good skill and better approaches to fishing operations. Through experience, the fishers could read the weather and water current and were able to pull their resources together to enable them increase their output. The respondents with longer years of experience were also able to forecast market situation in which they sell their products at higher prices. Those with less years of experience, especially with less than 5 years depend on and mostly inherit their fishing tools from their parents. They faced many risks in the early days of their fishing operations. It was observed that since they were inexperienced their production was remarkably lower and they had to associate with their parents and elders to build up their base in the business. Introducing cooperative societies will help to prop up the beginners and improve their business techniques and sustainability.

**Sources of inputs.** Inputs are those items used in further production of goods and services and particularly in this case related to those equipment used in fishing operations. Sources of fishing inputs include: parents, personal purchase, hired and government. A 64.9% of the respondents obtained their inputs through inheritance from their parents, which was closely followed by 21.6% who obtained their inputs through purchase (Fig. 1). Those who hired the inputs were 12.4%, while those who obtained inputs from government were only 1.1%. A low percentage of getting from government was due to the ignorance of the fishers on how to tender their problems appropriately to the government to obtain the inputs. This actually shows that cooperative societies are still in their infancy in Akwa Ibom State, since it would have been more feasible for the fishers to get inputs from the government if they had formed themselves into cooperative societies. Besides this most of the respondents who obtained inputs from their parents indicated that fishing in the study area was operated as a

**Table VI. Result of multiple regression analysis**

Functional Forms	Constant terms	Age years $x_1$	Household Size (Number) $x_2$	Income (N) $x_3$	Number of extension visit (years) $x_4$	Experience (years) $x_5$	Education (years) $x_6$
Linear	46.041 (1.850)	-0.172 (0.576)	-1.043 (0.576)	+6.233 (0.576)	-9.401 (1.260)	+0.549 (0.728)	-0.146 (0.111)
Double	2.469	0.103	0.073	0.424	0.271	0.06890	0.107
Log	(1.980)	(0.571)	(0.696)	(2.011)	(1.423)	(0.599)	(0.683)

Computed from fieldwork, 2006

family business. This is synonymous to children inheriting farmlands from their parents in crop farming.

**Fishing period.** About 60% of the respondents were engaged in fishing during dry and 24.3% during wet seasons. However, 16.2% of the respondents engaged in fishing during both seasons (Fig. 2). The dry season spans from November to April, while the wet season starts from May to October. Most fishers preferred fishing during the dry season. This is because water volume and tides are reduced. According to the respondents, most species of fishes caught at this period include catfish, bongafish and both large and small sardines. There is also a high demand of fish as a result of many festivals or ceremonies, which are always common at this period; and there is always enough fuel wood for fish smoking at this period.

During the rainy season the fishers normally go home to engage in late season farming. Moreover, during heavy rainfall, fishes migrate to creeks to lay eggs and they return to the open waters in the dry season. The period of rainy season contributes to low output of fish and fish products, which results in very high prices of fish products.

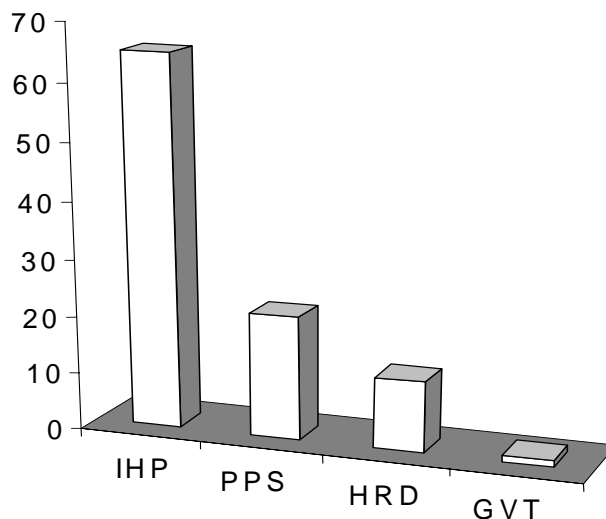
**Adoption.** Adoption as a mental process involves learning about a new idea, nurturing the idea and trying to decide on what to do and then taking an action over a period of time. In the adoption of an innovation, an individual may choose a new alternative or those previously in practice. The respondents that adopted fishing innovation were 27.0%, while non-adopters had the highest percentage of 73.0% (Table II). This high percentage of non-adopters was the result of low level of education among the fishermen who did not go to school to acquire education but rather prefer to embrace the methods and occupation of their forefathers. However, this high rate of non-adopters can be reduced if extension contact with the respondents is intensified.

**Income.** Income of the fishermen on full time and part time basis. Those involved in fishing on part time basis are traders and civil servants. Those on full time had income of ₦106,000.00 per annum (Table III). Since they remained busy in fishing throughout the year and fetched their best income. The civil servants only engaged in fishing when they are on holidays and while traders engaged in other businesses. The level of engagement in fishing, full-time or part-time was reflected in their income from fishing. However, the part time fishers help in making fish and fishery products available to consumers.

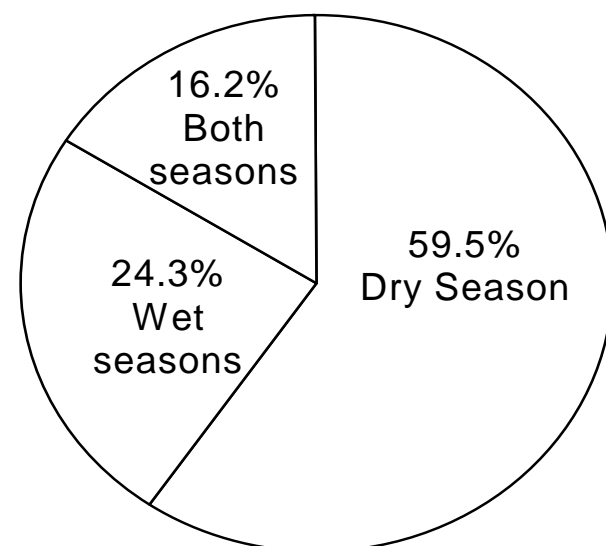
**Problems in fishing operation.** Fishing operation is a tedious job and also requires much energy and inputs like funds, labour and insurance service in case of losses

**Fig. 1. Distribution of respondents according to sources of inputs**

IHP: Inherited from parents; PPS: Personal purchase; HRD: Hired, GVT: Government



**Fig. 2. Distribution of respondents according to fishing periods**



incurred in natural disasters. Table IV indicates some of the problems encountered by the fishers in their fishing operations. As high as about 43.2% of the respondents had inadequate funds as their major problem. Since fishing inputs are expensive and the fishers find it difficult to

procure them, which also results in low output. About 24.3% of the respondents had complaints of inadequate funds and labor, which also resulted in low efficiency of catch. A 21.6% of the respondents had complaint of shortage of labor as major problem. Twenty or only 10.8% complained of natural disaster or bad weather, which resulted in loss of property and life.

**Fishing inputs.** Though the purchase of fishing tools and equipment and other inputs is spread over the years and some of the inputs inherited or hired, fishing inputs in recent times are extremely costly with regards to the low resource level of the fishers. Table V shows the inputs, the costs and the distribution of the respondents according to inputs. As a result of the high cost of outboard engine, only 1.08% had outboard engine at the cost of ₦740,000.00. Hook and line were owned by 97.3% at the rate of ₦370,000.00, while the rest of the inputs, canoe, net, paddle, lead and anchor were owned by 100% of the respondents each at the rate of ₦700,000.00, ₦153,000.00, ₦51,000.00, ₦74,000.00 and anchor ₦55,000.00, respectively.

**Result of regression analysis.** The relationship between the dependent variable (Y), which is the adoption of innovation and the independent variables ( $x_1, x_2, x_3, x_4, x_5, x_6$ ) was estimated through multiple regression analysis carried out using two functional forms of ordinary least square (OLS) namely: linear and double log (Table VI). The equations were used to show the effect of the independent variables on the dependent variable, which was the rate of adoption of innovation. Linear functional form has  $R^2 = 0.151$  and  $F = 1.278$ , which Double – log has  $R^2 = 155$  and  $F = 0.038$ .

Therefore in this regression analysis, linear function was selected as the lead equation. The linear production function is shown below:

$$Y = 46.041^* - 0.173x_1 - 1.043x_2 + 0.233x_3 \\ (-1.260) (-0.576) (-1.173) (2.211) \\ - 9.401x_4 + 0.54x_5 - 0.14x_6 \\ (-1.260) (0.728) (-0.111).$$

Figures in parenthesis are t-values

\*\* Statistically significant at 5%

\* Statistically significant at 10%.

$R^2 = 0.151$  meaning that about 15% of the total variation in the dependent variable is explained by the variable included in the model, while 85% of the variation is explained by other variables not included in the model.

$F = 0.038$  and it is not significant at both 5% and 10% level of probability.

**X<sub>1</sub> (Age).** This decreases as Y (output) increases. This means that increase in age of the artisanal fishers did not increase the level of innovation and production by the fishers.

**X<sub>2</sub> (Household size).** This also decreases as the output increases. This means that increase in household size did not increase the level of adoption of innovation by the artisanal fishers.

**X<sub>3</sub> (Income of the fishers).** This increases as the level of output increases and it is highly significant at 1% level. This therefore means that increase in income level of the fishers increases the level of output produced, because they will be able to use their money to buy engine (outboard engine) and other fishing inputs and hire labour, which helps in increasing output.

**X<sub>4</sub> (Number of extension visit).** This decreases as the output decreases this means that the number of extension contact with the fishers did not increase their level of adoption of innovation. This may be related to the method of extension used.

**X<sub>5</sub> (Experience in fishing).** This increases as output increases. This therefore means that the years of experience of the fishers will help to increase their level of output. This is because the fishers with the highest number of years of experience have good skill and better approaches to fishing production since they have the ability to read the weather and water current and are able to pull their resources together to enable them increase their output.

**X<sub>6</sub> (Education).** This decreases as output increases. This shows that increase in educational level of the fishers did not increase the level of output. This is so because increase in output in artisanal fishing depends more on experience and not as a result of advance in education. However, more education coupled with experience will enhance adoption.

## SUMMARY, CONCLUSION AND RECOMMENDATIONS

Age is a major factors affecting fish production. Fishers around 50 years and above age were found to have been involved in fish production. Fishers with the above age range are old and inactive and un-able to withstand the stress in fishing operations. However, cumulative experience in the fishing business tends to support increase in production. But people with age range from 20 to 40 years of age were found to be more energetic and able to withstand problems in fishing operations.

Experience in fishing also affects fish production, it was observed that fishers with longer experience had the highest percentage of 43.2 and fell under 15 years and above. Fishers in this category were able to increase their output, because of their skill and approaches to fish production. Through their experience they were able to read the weather and water current; they were also able to forecast market situation for their products.

Household size is one of the factors that affect fish production prominently. Though labor was cheap and readily available as the household size increases, the household consumption also increases and actually reduces the output for sales. Constraints like labor, natural disasters due to bad weather had also significant impact but with adequate funds all other constraints can be contained.

In conclusion, the level of adoption depends on the awareness and other factors like education, though the

regression run did not show any fitness of good by most of the variables used but through simple percentage it was found out that the rate of adoption in fishing business was very low. More so, old men are still involved in the fishing business. These men cannot withstand the stress in fishing operations.

It is recommended that government should provide nomadic education to fishers. This will help them to improve in their fishing business. Inputs in a subsidized price should also be provided for the fishers. More extension workers should be employed to reach out to all the fishers. Government should establish fish processing industry in the fishing settlements. This will attract the young people since some of the infrastructures will be provided. Besides, the industry will generate more revenue for the state and the living standard will be raised hence improvement in national economy.

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