



An Appraisal of Artisanal Fishery Enterprises in Andoni Local Government Area of Rivers State, Nigeria

Tasie, C.M.; Wilcox, G.I.

Agricultural Economics and Extension Unit, Department of Agriculture, Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt, Rivers State, Nigeria.

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*Corresponding Author

Tasie, C.M.

E-mail: tasiechimezie@gmail.com

Phone: +234 8038726818

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ABSTRACT

This study appraised the artisanal fishery enterprises in Andoni L.G.A of Rivers State. A survey method involving random sampling technique was used in selecting 100 artisanal fishing folks for the study. Structured questionnaire was used to elicit information from 100 artisanal fisher men and women which were randomly administered. Percentage, mean and multiple regression were used for analyses of data. The result shows that the mean age of respondents was 37 years, while the mean house hold size is 7 and that majority (58%) of fishing folks were experienced in the fishing enterprise. The result also showed that most of the respondents (45%) had primary education and also majority of respondents (93%) never had access to credit facilities to enable them purchase fishing crafts and gears whose prices have gone beyond the reach of an average fisherman. The findings of this study further showed that artisanal fishing enterprise in Andoni Local Government Area of Rivers State is profitable. The regression analysis also revealed that the output of individual fishing households is significantly influenced by variables, namely, capital, labour, operating costs, fishing experience and education. The study also showed that the fishing folks had never received extension service which should have exposed them to better fishing techniques and training. It is therefore recommended that relevant agencies, public and private should encourage this fishing folks by providing the needed capacities to boost fish production to curb hidden hunger and promote food security.

INTRODUCTION

The agricultural sector has continued to play a vital role in Nigeria's economy, and is a key part of the government's plans to attain sustainable economic growth. Within the sector, the fisheries segment delivered a 5.9% rate of growth in 2015. However, in the second quarter of 2016, it contracted for the first time in over five years (NBS, 2017). This is not surprising at all given the overall macroeconomic challenges of the country which resulted in a general economic slowdown across all sectors. NBS (2017) also showed that the fisheries unit had recovered by 0.8% as shown in the GDP figures (fourth quarter of 2016). Data from CBN shows that artisanal fishing production accounted for around 76.8% of the 1.04 million ton. of fish produced in 2015. Meanwhile, industrial (trawling) fish farming accounted for only 8% of the total, indicating that a commercial fishery is still largely untapped. More recent data from the Federal Ministry of Agriculture and Rural Development showed that annual national supply of fish has increased to 1.1 million metric ton (mmt) from 800 metric ton. The supply gap has reduced slightly to 1.0 million metric ton (mmt). Fisheries play a significant role in food security and hidden hunger eradication, livelihoods improvement and income generation in the fishing communities of Nigeria (Akinrotimi *et al*, 2007). The demand and consumption for fish in Nigeria has been on the upward rise due to increasing human population, the health benefits of fish consumption, etc. Apart from being an income earner for fishing folks, artisanal fisheries has a value chain in areas such as fish processing, marketing, recreation, tourism, sport, medicine, fisheries research, etc.

Fish production in Nigeria comes from three main sources. These sources are artisanal (inland rivers, lakes, coastal and brackish water), aquaculture (fish farm) and industrial fishing (Otubusin, 2011). Majority of the fishes supplied to the markets in most cases comes from the artisanal sub-sector. Artisanal fishery refers to traditional or crude or non-mechanized system of fishing and low level of technology is being employed by the fishermen and women, with low economic and social statuses and is often referred to as Small-scale fishing with low level of production (Inoni and Oyaide, 2007).

In general, artisanal fishing is a small scale fishing operation which is usually family-based, using canoes, small or no boats and employing simple and/or traditional methods which involve the use of traps, hook and line, throw nets, small gill nets, harpoons, bow and arrows, diving, and beach seines. The fishes caught can be either for the family consumption (subsistence) and/or for commercial purpose. In some advanced countries, trawlers, draggers, small gill-netters, or lobster tenders are also considered artisanal or small-scale fishing. In developing countries like Nigeria, the fisheries sector has shown to be instrumental in meeting key development goals, especially in combating hunger and malnutrition (Thorpe, Whitemash, Sandi, Baio, Lebbie and Lebbie, 2013).

The efforts of fishermen and women involved

in artisanal fishing enterprises contribute immensely to food and nutrition security and curbing hidden hunger in Nigeria. Food and nutrition security a condition in which all people at all times have physical, social and economic access to sufficient (right quantity and quality), safe and nutritious food to meet their dietary needs and food preferences, and is supported by an environment of adequate sanitation, health services and care, allowing for an active and healthy life (Gahukar, 2011). Food security includes freedom from both famine and chronic malnutrition and freedom from fear of what to eat next in the right quality and quantity. It is also linked with increased agricultural production, environmental protection, natural resource management and trade policies. Hidden hunger is a situation where the quality of food people eat does not meet their nutrient requirements, which implies that the food is deficient in micronutrients such as the vitamins and minerals that they need for their growth and development (WHO, 2014).

Rivers state is situated along the vast coastline which is endowed with marine, brackish and fresh waters of varying ecological zones with numerous fish species. The state has comparative advantage over most other states in fish production and could provide a great deal of fish demanded in the whole country if resources are adequately employed. Therefore, the researchers seek to appraise the artisanal fishery enterprises in Andoni L.G.A in Rivers state.

MATERIALS AND METHODS

The study was conducted in Andoni Local Government Area of Rivers State, Nigeria. Its headquarters is at Ngo town. It has an area of over 233 km² and a population of about 311,500 (NPC, 2006). The choice of the area is because fishing is the main business enterprise of the people of the local government area. A survey method involving random sampling technique was employed in selecting respondents for the study. Both primary and secondary data were used for the study. A set of structured questionnaire was used to collect the primary data on socio economic variables such as age, level of education, household size, fishing experience, access to extension services, and availability of credit facilities, etc.

Data were also collected on distance to fishing sites, fishing site ownership, types of fishing gears and crafts, membership of fishing association, cost of gears and crafts, cost of other inputs, availability of market facilities, availability of storage facilities, output per season, rent on fishing site, amount and interest on credit, problems and solutions to these problems facing fishermen in the study area. Secondary data were obtained from existing publications by Central Bank of Nigeria (CBN), Food and Agriculture Organisation (FAO), World Health Organisation (WHO), Rivers State Agricultural Development Programme (RSADP), Federal Office of Statistics, Rivers State Fisheries Department, Journals as well as other published and unpublished materials relevant to the study on artisanal fish production. Data was analyzed using descriptive

statistics, cost and returns analysis and multiple regression analysis.

RESULTS AND DISCUSSIONS

Socio-Economic Characteristics of Respondents.

The socio-economic characteristics analyzed in this section include; age, household size, educational status, fishing experience, use of credit and extension services, major and minor occupations of respondents, means of transportation to fishing sites, number of fishing gears used and constraints associated with artisanal fishing.

Age of Respondents

Age is a vital socio - economic characteristic in fishing because it affects fishing output, productivity and adoption of fishing technology. The age distribution of the respondents as shown in table 1 shows that most of the fisher folks fall between 20 and 49 years of age with a mean age of 37 years. This indicates that most people engaged in artisanal fishing enterprises in the study area are active and physically strong to paddle the canoes. The implication is that the respondents are within the productive and economic active age, and are able to increase fishing productivity and improve livelihood of the fishing households. This is consistent with other fisheries studies such as Sharma and Leung (1999) and Squires, *et al* (2003), Olaoye (2010), Unongo (2010) and Okeowo, Bolarinwa and Ibrahim (2015).

Household Size of Respondents.

Table 1 also shows that the household size of respondents. It shows that 38% of the fishing folks have 1-5 members in their households, 45% have 6-10

members in their households, 11% have 11-15 members while 6% have above 15 members. The mean household size of the respondents was 7 (seven) members. Large household size is associated with the availability of timely, free and cheap labour for the fishing households; in this case larger families are likely to be more effective and productive. This helped to increase the output of fish produced, a large quantity of which was consumed by the household causing a reduction in the overall households' income. This is in line with Nlerum and Bagshaw (2015) and Unongo (2010).

Fishing Experience

Experience is very important in every enterprises, especially artisanal fishing. The view of the role of experience in fishing comes from the fact that it enables heads of household to have information on fishing ground, where fish go and span, and water current. The respondents had a mean of 15.8 years of experience in artisanal fishing activities. This indicates that they were well experienced because the more the years, the more the experience a person acquires in a given activity.

Level of Education

Table 1 also show that 33 percent of the respondents had no formal education, 45 percent had primary education or spent between 1-6 years in school, 17 percent had secondary education or have spent between 7-12 years in school, and 5 percent of the respondents had tertiary training with more than 12 years in school. This low level of education implies that the demand and access of the respondents to bank credit and contact with extension agents would be affected. This finding supports Nlerum and Bagshaw (2015) which shows that 33.6% of artisanal fishers had at least primary education.

Table 1: Frequency Distribution of Respondents by selected Socio-economic characteristics.

Socio-Economic characteristics	No of Respondents	Percentage %	Cumulative percentage
<u>Age (years)</u>			
Less than 20	10	10.0	10.0
20 – 34	48	48.0	58.0
35 – 49	34	34.0	92.0
50 – 64	8	8.0	100.00
Total	100	100	-
<u>Household Size</u>			
1-5	38	38.0	38.0
6-10	45	45.0	83.0
11-15	11	11.0	94.0
>15	6	6.0	100.0
Total	100	100.0	-
<u>Fishing Experience (years)</u>			
1-5			
6-10	9	9.0	9.0
11-15	19	19.0	28.0
>15	30	30.0	58.0
	42	42.0	100.0
Total	100	100.0	-
<u>Level of Education (years in School)</u>			
No formal education (0 years)			
Primary education (1-6 years)	33	33.0	33.0
Secondary education (7-12 years)	45	45.0	78.0
Tertiary education (> 12 years)	17	17.0	95.0
	5	5.0	100.0
Total	100	100.0	-

Source: Field survey, 2017.

Fishing Activities of Respondents

The activities of respondents considered for this study include; fishing practices employed, storage facilities used, use of credit and extension services.

Fishing Practices Employed by Respondents

Table 2 shows that 43% of the respondents used a combination of three fishing gears of nets, hooks and

traps. About 7% of the respondents also used a combination of plant extracts, nets and traps for fishing. Fishing with nets and traps has 31%, while fishing with nets alone has 7%, fishing with hooks and nets 9%. The least group practice fishing with hooks alone which has 3%. The high percentage of respondents using nets, hooks and traps is not unexpected as fisheries studies by Unongo (2010) indicate that they are common gears used by artisanal fishermen.

Table 2: Distribution of Respondents by Fishing Practices Used

Fishing Practice	No of Respondents	Percentage %	Cumulative percentage
Nets alone	7	7.0	7.0
Hooks alone	3	3.0	10.0
Nets and hooks	9	9.0	19.0
Nets and traps	31	31.0	50.0
Nets, hooks and traps	43	43.0	93.0
Nets, traps and plant extracts	7	7.0	100.00
Total	100	100.0	-

Source: Field Survey, 2017.

Use of Storage Facilities, Credit and Extension Services by Respondents.

Fish is sold in the study area mainly as processed or smoked fish because of inadequate market for fresh fish. Some fishermen however, store their catch in iron or fibre cages in protected locations close to landing sites in rivers. There are no modern storage facilities such as cold rooms in the study area. Table 3 shows that 59% of the respondents have no storage facility for fresh fish while 41% store their fresh fish in secured cages and baskets or containers

submerged in waters.

Credit is important for the acquisition and maintenance of fishing crafts and gears. Table 3 shows that 7% of the respondents borrowed from friends, relatives and local money lenders, while 93% used personal savings. Also, all the respondents (100%) never benefited from extension service. Absence of extension services has a negative impact on fishing as there will be no extension guides on sustainable exploitation of fishery resources in the study area.

Table 3: Distribution of Respondents by Use of Storage Facilities, Credit and Extension services.

Facility	No of Respondents	Percentage %	Cumulative percentage
Storage:			
Yes (cages/baskets)	41	41	41
No	59	59	100
Total	100	100	-
Credit			
Yes	7	7	7
No	93	93	100.0
Total	100	100.0	-
Extension			
Yes	0	0	0
No	100	100	100.00
Total	100	100.00	-

Source: Field Survey, 2017.

Costs and Returns Analysis in Artisanal Fishing Enterprises:

The cost and return in artisanal fishing enterprises for this study are presented in table 4

Table 4: Cost and Return Analysis.

Item	Total Quantity (kg)	Unit Cost	Total Values
1. Revenue Total Revenue,	205.67kg	750	154,252.50
2. Variable Cost i. Hired Labour ii. Crafts/Gear repairs and Maintenance. iii. Running Costs	7 mandays -	2500	17,500.00 15,650.00 12,460.00
Total Variable Cost			45,610.00
3. Fixed Cost i. Fishing crafts (depreciated cost) ii. Fishing gears (depreciated cost) iii. Interest on credit			16,235.60 25,567.00 40,680.00
Total fixed costs			82,482.60
4. Profit = Total Revenue – Total Costs = 154,252.50 – (43,110.00 + 82,482.60) = 154,252.50 – 128,092.60 = 26,159.90			

Source: Analysis of Field Data, 2017

Table 4 shows that the total average household fixed costs of the artisanal fishing enterprise is higher than the variable costs. The fixed costs accounted for ₦82,482.60 which is 64.36% of the total cost per fishing season. Hired labour cost is high and it accounted for ₦17,500 or 38.37% of the total variable cost per household. The high cost of hired labour may be due to the absence of sufficient family labour that may be engaged in fishing enterprise hence the need to engage hired labour. The benefit cost ratio of the artisanal fishing enterprise was determined to be 1.20. This is an indication that artisanal fishing enterprise in the study area is profitable.

Multiple regression analysis showing the relationship of Socio-economic Variables/Fishing inputs and output

Analysis of factors that determine fish output in artisanal fishing enterprises are presented in Table 5. The independent variables used in this study include, labour (X_1), capital (X_2), operational cost (X_3), fishing experience (X_4) number of years spent in school by household head (X_5) and household size (X_6). Three functional forms were tried and these forms are Linear, Semi-log and Double-log functions. The lead equation was chosen based on the values of R^2 , F-statistics and number of significant variables.

Table 5: Regression Result of Factors that Influence Fishing Output

Variables	Linear	Semi-Log	Double-Log
Labour (X ₁)	0.4830 (0.964)	0.5964 (2.167)*	1.0341 (3.411)*
Capital (X ₂)	0.2256 (7.540)*	1.453 (0.562)	0.6425 (3.765)*
Operating Cost (X ₃)	0.0476 (5.536)*	0.276 (3.261)*	1.2603 (3.413)*
Fishing Experience (X ₄)	1.235 (3.110)*	8.058 (3.369)*	0.0943 (2.981)*
No of years spent in school (X ₅)	0.2347 (3.854)*	0.008 (2.291)*	0.5780 (3.473)*
Household size (X ₆)	2.005 (0.7471)	0.0359 (1.348)	2.0132 (1.108)
Constant	49.35	37.35	0.481
R-Squared	0.549	0.614538.3	0.8467
F- cal.	27.46*	1*	45.78*

Source: Analysis of field survey data, 2017

Note: The numbers in parenthesis are the significant t-values. The values asterisks are significant at 0.05 probability level.

Analysis of the factors that influence fishing output shows that the double – log function gave the best fit because of its high R^2 of 0.8467, more significant variables and a significant F – value. The R^2 of 0.8467 shows that the significant explanatory variables or regressors explain or influence the criterion variable or regressand by 84.67%. The remaining 15.33% is influenced by other factors not included in the model. The significant F – value of 45.78 implies that the joint effect of all the included variables were significant. From the regression result also, the coefficients of labour (X₁), capital (X₂), operational costs (X₃), fishing experience (X₄) and number of years spent in school by household heads (X₅) were all significant at 5%. Coefficient of household size (X₆) has a positive sign and suggests that the output of fishermen and their household size are moving in the same direction. The t-value is however not significant at 5% level. This suggests that an increase in the available labour source from household members will not necessary facilitate output increase.

The coefficient of labour (X₁) is significant at 5% and positive showing that labour is directly related to fish output indicating that increased and efficient labour increases fish output. Capital (X₂) and operational costs (X₃) are significant at 5% and positive. This suggests that these two factors are important determinants of quantity of fish catches. It means the more the investment, the higher the fishing output. Fishing experience (X₄) was significant at 5% and positive. This implies that fishing experience is directly

related to the output of the enterprise. This result is not surprising because fishing experience appears to be an important human capital for increasing fishing productivity. Number of years spent in school by household heads (X₅) was significant at 5% and positive. This suggests that number of years spent in school is directly related to the output of fishermen. According to Tasie (2013), education produces a skilled and adaptable labour to the needs of a changing economy. It helps to unlock the natural talents and inherent enterprising qualities of a fisher man or woman. It enhances the fishing folk's ability to understand and evaluate new production techniques. Also, Unongo (2010) stated that formal education will facilitate the keeping of proper fishing records, ability to read instructional materials and effectively communicate with extension agents. This will give fishermen the knowledge of how to use their inputs effectively.

The significant variables and their signs are in line with a-priori theoretical expectations. The implication of these findings for the fishing folks is that future policies on fishing folks and fishing communities should take adequate consideration of these variables which have significant effect on the fishing folks.

Constraints to Exploitation of Natural Fishing Sites

The study identified several constraints militating against the full exploitation of the potentials associated with natural fishing sites in the study area. These constraints as listed by the respondents in their multiples include; high cost of fishing gears, lack of

credit facilities, low income arising from poor fish catch, high cost of processing/storage facilities, pilfering of set nets/traps, inability to construct/fix nets and traps, inability to manoeuvre/handle gears effectively, lack of modern storage facilities, absence of processing facilities such as kilns, depletion of fish stocks as a result of destruction of aquatic life by use of toxic

chemicals and absence of extension services. The fishery sector is affected by these constraints, which increase fishers' vulnerability and negatively impact on their livelihoods through income and profit reduction. During analysis of data, the numbers of fishermen affected by each constraint were calculated and the percentages of respondents presented in Table 6.

Table 6: Frequency distribution of Constraints associated with artisanal fishing in Andoni LGA.

S/No	Constraints	No of fishers being affected by each constraints	Percentage
1	High cost of fishing gears	94	94.00
2	Inadequate credit facilities	93	93.00
3	Low income from poor catch	71	71.00
4	High cost of processing/storage	90	90.00
5	Pilfering of set nets/traps	24	24.00
6	Inability to construct/fix nets and traps	80	80.00
7	Inability to manoeuvre/handle gears effectively	27	27.00
8	Absence of storage facilities	88	88.00
9	Absence of processing facilities	91	91.00
10	Depletion of fish stocks	96	96.00
11	Inadequate extension services	92	92.00

Source: Field survey, 2017.

CONCLUSION AND RECOMMENDATION

The findings of this study showed that artisanal fishing enterprise in Andoni Local Government Area of Rivers State is profitable. The regression analysis also revealed that the output of individual fishing households is significantly influenced by variables, namely, capital, labour, operating costs, fishing experience and education. The study also shows that farmers do not receive adequate extension service which should have exposed them to better fishing techniques and training. The study also revealed that most respondents have no access to credit facilities to enable them purchase fishing crafts and gears whose prices have gone beyond the reach of an average fisherman.

It is therefore recommended that relevant agencies, public and private should encourage this fishing folks by providing the needed capacities to boost fish production to curb hidden hunger and promote food security.

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