Asian Journal of Agricultural Extension, Economics & Sociology
4(2): 137-145, 2015; Article no.AJAEES.2015.014
ISSN: 2320–7027

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Role of Women in Artisanal Fishery: Implication for Food Security in Rivers State, Nigeria

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Authors' contributions

This work was carried out in collaboration between both authors. Author FEN designed the study, wrote the protocol and supervised the work. Author AB carried out all laboratories work and performed the statistical analysis. Author AB managed the analyses of the study. Author AB wrote the first draft of the manuscript. Author FEN managed the literature searches and edited the manuscript. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJAEES/2015/13186
Editor(s):
(1) Chrysanthi Charatsari, Aristotle University, Greece.
Reviewers:
(1) Anonymous, University of Ibadan, Nigeria.
(2) Anonymous, Federal University of Agriculture, Abeokuta, Nigeria.
Complete Peer review History: http://www.sciencedomain.org/review-history.php?iid=710&id=25&aid=6537

Original Research Article

Received 7th August 2014
Accepted 16th September 2014
Published 17th October 2014

ABSTRACT

Aims: The aims of the study were to describe socio-economic characteristics of respondents, determine their roles in artisanal fishery, identify their marine food resource outputs, analyze contributions of artisanal fishery to food security and determine constraints of women artisanal fishers in fish production.
Study Design: A survey method involving the random sampling technique was used in selecting respondents for the study.
Place and Duration of the Study: The study was carried out in Akuku-Toru Local Government Area of Rivers State, Nigeria and it was conducted from 1st of March, to 31st of August, 2012.
Methodology: The sample size of the study was made up of 116 women artisanal fishers which constituted the respondents of the study. Data were elicited from women fisher-folks with a structured interview schedule which were randomly administered by trained enumerators. Percentage, mean and multiple regressions were used for analyses of data.
Results: Result shows that the mean age of the respondents was 38.4 years, while the mean

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years spent in schooling was poor (6.5 years). Contact with extension agents per month was poor (0.2 times). Further, results indicate that, actual fishing for marine food resources (93.1%) and sales of fishing gears (87.9%) were the major roles performed by the respondents. Their mean performed rate index of 31.5% was poor. Results of multiple regression shows significant relationship between the roles performed and socio-economic characteristics of respondents such as age (0.001), educational level (0.089) and monthly contact with extension agents (0.001) at p $\angle$ 0.05 level of significance. Periwinkle harvesting was the major (70.7%) marine food output in the study area. Artisanal fish production was the primary (75.7%) source of livelihood of the respondents. Water pollution by crude oil and gas spillage constituted the major (75.9%) constraint to artisanal fishery in the study area.

Conclusion: Poor mean performed role recorded in the study may have been caused by poor contact of respondents with extension agents and water pollution by oil and gas spillage. In order to improve the role performed by artisanal fisher folks, the study recommends enhanced contact of extension agents with respondents and stopping of water pollution by crude oil and gas companies in the study area.

Keywords: Role of women; artisanal fishery; food security; Rivers State; Nigeria.

1. INTRODUCTION

Artisanal fishery is referred to as traditional or small-scale fishing which is characterized by those fishery activities which are mainly non-mechanized, but with low level of production [1]. Artisanal fishery is the predominant fishing in tropical developing countries. In Nigeria for example, the coastal artisanal fishery make use of traditional dug-out canoes, ranging from three to eighteen metres in length, while the gears used include cast nets, handlines, baskets, traps, long lines, set gill nets and beach and purse seines. Artisanal fishing includes coastal, brackish water and all inland fishery sources such as rivers, reservoirs, dams, lakes, lagoons as well as the flood plains of Niger Delta and other major rivers in Nigeria. In practice however, the scope of artisanal fishing varies between countries, example from gleaning or a one-man canoe fishing in poor developing countries, to long-liners in developed ones. Artisanal fishery can be subsistence or commercial in nature, providing fish for local consumption or export.

Fish supply from three subsectors namely, artisanal, aqua culture and industrial on the average had not met 30% of the required fish demand in the last 20 years in Nigeria [2]. Importation of frozen fish has therefore been the source of meeting the fish demand for consumption in the country. Statistics of the Federal Department of Fisheries [3] has shown that artisanal fishery production has continued to be the major source of fish to Nigeria over the past two decades. Fishery sector is an important source of food and livelihood for many people around the world. Fish produces a vital source of protein and cash income for many families in the developing countries. Up to about 200 million people throughout the world are estimated to depend on fish for all or part of their income [4].

Artisanal fishing accounted for more than 80% of the total fish production in Nigeria for 20 years from 1985-2005, while aquaculture accounted for less than 8% of the production and industrial fishing fluctuates with a peak of 13.9% and minimum of 5% for the period under review [2]. Although artisanal fishery production is the main stay of Nigeria domestic fishing industry, researchers have paid little attention to the experiences of the artisanal fishers [5] and especially the role played by women in its development.

Artisanal fishery, which accounts for the major fish supply in the developing world is however characterized with low technology, lack of modern equipment and low fund for expansion, resulting in labour intensiveness of the sector, with little or no opportunities to expand. These problems have however forced the artisanal fisher women to seek for additional income in non-fishing activities [6]. Artisanal fishery is often thought to be backward, sometimes because of lack of data in understanding its socio-economic impact. Another set of its constraints are threats by the high pressure exerted by manifold coastal activities causing water pollution, destruction of fish habitats, increasing competition and high prices of coastal land. Pollution affects human health and safety as well as fish product quality.
Although fish production is traditionally considered a masculine enterprise, women's role

in fishing is complementary and crucial. The fishing activities of women include unloading of fish from landing canoes, fish processing, fish marketing, actual fishing of marine food resources, production of fish drying cards, canoe hiring and sale of fishing gears. Earlier studies in Nigeria have shown that women do participate in artisanal fishing as seen among Ijaw women of the Niger Delta [7], Nupe women along the Benue river basins [8] and women along the Kainji lake region [9]. Also in Brittany France, the wives of fishermen were known to play important roles within the fishery enterprises by realizing different tasks such as administration, repairing of fishing gears and selling of fish [10]. In a number of low-income countries, the fisheries sector has been shown to be instrumental in meeting key development goals, especially in combating malnutrition [11]. The efforts of women in artisanal fishing is contributory to the enhancement of food security globally.

Food security has rightly been described as condition in which all people at all times have access to sufficient, safe and nutritious food to maintain a healthy and active life [12]. Food security includes freedom from both famine and chronic malnutrition. It is very much linked with increased agricultural production, management of natural resources, environmental protection and trade policies. Women play important roles in food security as food producers, keepers of indigenous knowledge scheme, preservers of biodiversity, food processors, preparers and providers for their families. Rural women in particular are responsible for half of the world's food, producing between 60% and 80% of food in most developing countries [13]. The research problem of this study is based on the assertion of [14] that women's substantial contributions to artisanal fishery and food security continue to be under-valued in conventional agriculture, economic analysis and policies.

The tested hypothesis was that, there is no significant relationship between the socio-economic characteristics of the respondents and the roles performed in artisanal fishing activities.

2. METHODOLOGY

2.1 Study Area

Asari-Toru, a Local Government Area (ASALGA) of Rivers State, Nigeria, was the area of this study. Its headquarters is in Buguma. It has an area of 113km^2 and population of 220,100 people in the 2006 census. The study area is made up of 16 major communities. The communities are Abalama, Angulama, Belema, Buguma, Elem-Oporoma, Ido, Ifoko, Krakrama, Minama, Okpo, Omekwe-Tariama, Omekwe-ama, Oporoma, Sama, Sangama and Tema. The ASALGA logo is made up of an unbroken double circle divided into three parts. One contains a palm tree, the other derrick and the last a fish. The fish and the palm tree symbolized the agricultural economy of the people, while the derrick symbolized oil exploration and industry. The major economic activity of the people of Asari-Toru is fishing with a little arable and tree cropping. The area has huge potential for fishing which is yet to be fully harnessed. The undeveloped fishing activities of the area, paved way for intensive artisanal fishing operations. Asari-Toru has approximately one third of its area covered by water which is made up of rivers and creeks of saline nature with about nine months of rainfall in a year. The study area is located along the confluences that formed the Niger Delta. The remaining land mass is made up of thick mangrove forest as well as arable land called *duokiri.*

2.2 Population of the Study

The population of this study was made up of all artisanal women fishers in the 16 communities of the area. Multi-stage sampling method was used in selecting the respondents used for the study from 1st March to 31st of August, 2012. The sample size used was 116 respondents. Simple random sampling method was adopted in selecting eight out of the 16 communities of the area. The selected communities were Abalama, Angulama, Buguma, Ido, Omekwe-kalama and Omekwe-Tariama, Sama and Oporoama. Furthermore, simple random sampling technique was also used in selecting 14 respondents each from the seven communities, while 18 respondents were selected from one of the communities because of higher fishing activities of the area. Data for the study were elicited from both the primary and secondary sources. Primary data collection were done with the aid of a structured interview schedule, while secondary data collection were obtained from relevant sources, such as journals, textbooks and internet. The survey instrument was administered by trained enumerators and one of the authors. The questions of the survey instruments were close ended type and were targeted to achieve the various objectives of the study.

Both the descriptive and inferential statistics were used to analyze the data collected. Descriptive statistics involved the use of frequency, percentage and mean. These were applied in analyzing all the objectives. Multiple regression analysis was used in the test of hypothesis. Four functional forms of the regression analyses namely, linear, semi-log, double-log (Cobb-Douglas) and exponential were used. The lead equation was selected based on its performance with respect to the R^2 value, F-ratio and conformity of most of the coefficients sign to the *a priori* expectation as used by [15]. The explicit form of the regression model is mathematically presented as:

$$Y = a + b_1X_i + b_2X_2 \ldots b_7X_7 \quad (1)$$

Where:

Y = Dependent variable (Role performance index)
a = intercept
b_1 - b_7 = slope of the equation
$X_1 – X_7$ = Independent variables
X_1 = Marital status
X_2 = Age
X_3 = Educational level
X_4 = Household size
X_5 = Fishing experience
X_6 = Monthly contact with extension agents
X_7 = Monthly income
e_1 = Stochastic error term

The mean role performed index (Y) for each respondent was obtained by dividing the total number of artisanal fishing roles performed, by the total number of roles under consideration and multiplied by 100. This is mathematically expressed as:

$$Y = d/y \times 100 \quad (2)$$

Where:

Y =Mean role performed index
D =Number of roles performed by respondent
y =Total number of roles expected to be performed by the respondent

3. RESULTS AND DISCUSSION

Table 1 shows the various socio-economic characteristics of the respondents in the study area. The result shows that some (41.4%) of the women fishers were married. Widows were 25.9%, while 19.8% were single and 12.9% were divorced. This result indicates that married women were more involved in artisanal fishing in the area. They do this to assist their husbands and hence contribute to the general upkeep of the family. The widows were engaged also in artisanal fishing to help their families as single parents. The fact that the divorcees and even the singles were also involved in artisanal fishing means that it is a major source of activity to all classes of women in the area. Further results show that the mean age of the respondents was 38.4 years. This shows that more of the women fishers were within their youthful age and are still very active.

This result agreed with that of [16] which shows that the age distribution of most women involved in fishing activities along the Benue River of Nigeria was between 31 – 40 years. The mean number of years spent in schooling was 6.5years which indicates that more of the respondents were of the primary level of education. This low level of education has the implication of affecting the respondents in seeking for bank credits and contact with extension agents.

The low educational level is consistent with the results of [17] which shows that 67.5% of artisanal fishers had at least primary education.

Household size of women fishers was noted with high tendency ratio as 50% of the respondents fell between 1 – 4 persons, 43.1% was for 5 – 8 persons, while 6.9% was for 9 persons and above. Large household size offered free and cheap labour for the fishing households. Although this helped to increase the output of fish production, substantial amount of fish was also consumed by the household causing a reduction in the overall households' income. The result however shows that the mean household size of 5 people was in consistent with that of [18].

The respondents had a mean of 16.6 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 acquire in a given activity. Monthly contact with extension agent was very poor with as much as 89.7% of the respondents showing no contact with extension service. This was an indication that the respondents were still practicing their traditional methods of fishing, because there were no contacts with extension agents to teach them new techniques of fishing.

Table 1. Frequency distribution of respondents according to their socio-economic characteristics

Characteristics	Frequency	Percentage (%)	Mean
Marital status			
Single	23	19.8	
Married	48	41.4	
Widow	30	25.9	
Divorced	15	12.9	
Total	**116**	**100.0**	
Age range(years)			
Less than 24	9	7.8	
24 – 30	16	13.8	
31 – 36	17	14.7	
37 – 42	21	18.1	38.4
43 – 48	8	6.9	
More than 48	45	38.7	
Total	**116**	**100.0**	
Educational status			
Primary education	39	33.6	6.5
Secondary education	38	32.8	
Tertiary education	4	3.4	
No education	35	30.2	
Total	**116**	**100.0**	
Household size (persons)			
1 – 4	58	50.0	
5 – 8	**50**	**43.1**	5.0
9 and above	**8**	**6.9**	
Total	**116**	**100.0**	
Artisanal fishing			
Experience (years)			
0 – 4	2	1.7	
5 – 9	20	17.3	
10 – 14	23	19.8	
15 – 19	31	26.7	16.6
20 – 24	9	7.8	
25 and above	31	26.7	
Total	**116**	**100.0**	
Contact with extension agents			
None	104	89.7	
Once	10	3.6	0.12
Twice	2	1.7	
Total	**116**	**100.0**	
Income N(naira) per month			
Less than ₦18.000	47	40.5	
₦18,000 – ₦28,000	41	35.3	24,293,10
₦29,000 – ₦39,000	21	18.1	
₦40,000 and above	7	6.1	
Total	**116**	**100.0**	

Source: Field survey, 2012. One United State dollar ($1.00) = ₦158.03 as at 31st August, 2012

The mean result of 0.12 times of visits per month confirmed how poor the contact was. This result confirmed that of [19] in Micronesia which shows that despite women's involvement in harvesting, processing and marketing of marine resources they have had little or no training in these areas. The monthly income analysis of the respondents depended on their volume of catch. From the fact that 40.5% of the respondents earned less than N18,000.00 per month, meant that as much as 50.95% of them earned income which was equal to N18,000.00 and above. The mean net income of N24,239.10 ($153.38) per month by the respondents connote that they earned more than the national minimum wage of N18,000.00 which is earned by the civil servants in the country. One United State dollar ($) exchanged for N158.03 as at 31st of August 2012 when the

survey for this study was conducted. The fact that the respondents earned this mean net income per month meant that they earned above five dollars per day. This is an indication that they lived above the global poverty level which is one dollar per day. This shows that artisanal fishing is economically rewarding and could be useful in tackling poverty and food insecurity problems in the study area.

Table 2 shows that actual fishing for marine food resources was the major role of respondents with 93.1%. This was followed by sales of fishing gears with 87.9%.

This result is an indication that women were directly and actively involved in artisanal fishing. The result however shows that the mean role performed by an average woman in artisanal fishing in the area was 31.5%, indicating low role performed.

Table 3 shows the result of the test of hypothesis that, there is no significant relationship between the socio-economic characteristics of the respondents and the role performed in artisanal fishing. The semi-log model depicted more signs of better fitness than the other three (linear, double-log and exponential) in that it had the highest R^2 value of 0.250. R^2 shows that 25% of the variation in the role performed was as a result of the explanatory variables included in the model.

F-ratio explained the joint effect of the independent variables of the model. Since it was significant at 1%, it implied that the model was fit and that the socio-economic factors in the model had significant joint effect on the role performed. Specifically, age (0.001) and monthly contact with extension agent (0.001) at 1%, and educational level (0.089) at 10% were the most significant socio-economic variables influencing the role performed by the women. Negative value of coefficients in marital status, age and household size meant that a unit increase in these variables would lead to decrease in the dependent variable (role performed). This means that when the respondents are married, their role decreases. Also as the respondents' age increases, their role in artisanal fishing reduces. In addition, as household size increases, the role of the respondents decreases.

Table 2. Percentage distribution of role performance of the women fishers (n=116)

Roles	Frequency	Percentage (%)
Actual fishing of marine food resources	108	93.1
Mending of fishing gear	12	10.3
Processing and preservation of marine food resources	17	14.7
Production and sales of fishing cards for fish drying	13	11.2
Hiring of canoes	3	2.6
Sales of fishing gears	102	87.9
Unloading of fish from landing canoes	1	0.9
Total percentage role performed		220.7
Mean percentage role performed		31.5

Source: Field survey, 2012. Multiple responses were recorded

In view of this result, the null hypothesis which was that there is no significant relationship between the respondents' socio-economic characteristics and the roles they performed in artisanal fishery in the study area was rejected for the significant variables (age, educational level and extension contact) and accepted for the non-significant variables of (marital status, household size, fishing experience and income).

Table 4 shows the distribution of respondents' output of marine food resources of artisanal fishing. It shows that periwinkle (*isam*) ranked the highest with 70.7%. This was followed by fish (*nji*) with 30.2%, while whelk (*Odoko*), squid (*buruminjiya*) and turtle (*insi*) ranked the least with 0.9% each.

Table 3. Multiple regression analysis showing relationship between Socio-economic characteristics and role performed

Socio-economic characteristics	Linear function	Semi-log function	Double-log function	Exponential function
Constant (intercept)	0.008	0.000	0.000	0.000
	(2.688)***	(17.790)***	(29.750)***	(6.436)***
Marital status (X_1)	0.973	0.454	0.935	0.644
	-(0.033)	-(0.751)	-(0.809)	-(0.463)
Age (X_2)	0.001	0.008	0.015	0.021
	-(3.193)***	-(3.454)***	-(2.464)**	-(2.326)**
Educational level (X_3)	0.089	0.241	0.095	0.034
	(1.716)*	(1.177)	(1.683)*	(2.140)*
Household size (X_4)	0.178	0.259	0.143	0.131
	-(1.353)	-(1.133)	-(1.471)	-(1.521)
Fishing Experience (X_5)	0.989	0.914	0.889	0.910
	(0.013)	(0.108)	(0.139)	(0.112)
Monthly contact with extension agent (X_6)	0.001	0.000	0.000	0.000
	(3.381)***	(3.943)***	(4.115)***	(3.244)***
Monthly income (X_7)	0.239	0.188	0.250	0.267
	(1.183)	(1.324)	(1.156)	(1.113)
R^2	0.225	0.250	0.232	0.186
F-Statistics	0.000	0.000	0.000	0.000
	(4.500)	(5.150)	(4.669)	(3.536)

Source: Field survey, 2012 (***) = significant at 1%, (**) = significant at 5%, (*) = significant at 10%. Figure in parentheses are t-ratios

Table 4. Percentage distribution of respondents' output of marine food resources of artisanal fishing (n=116)

Marine Food resources	Frequency	Percentage (%)
Fish (*Nji*)	35	30.2
Crab (I*koli*)	18	15.5
Shrimp/prawn (*Oporo*)	16	13.8
Crayfish (*Ansa*)	8	6.9
Oyster (*Ngbe*)	19	16.4
Perinwinkle (*Isam*)	82	70.7
Water snail (*Minji Osin*)	-	-
Cockle (*Offingo*)	-	-
Whelk (*Odoko*)	1	0.9
Squid (*Buruminjiya*)	1	0.9
Octopus (*Alapa*)	2	1.7
Turtle (*Insi*)	1	0.9

Source: Field survey, 2012. Multiple responses were recorded

The finding connote that majority of the respondents were involved in periwinkle harvesting. This would be because periwinkle harvesting or business is generally referred to as feminine business. Table 4 further shows that whelk, squid and turtle were not harvested by these respondents.

Table 5 shows that the provision of means of livelihood to rural households was the major (75.9%) contribution of artisanal fishing to food security in the area. This was followed by reduced cost of fish production with 14.7%. This result is an indication that artisanal fishing is contributing reasonably to food security by providing means of livelihood to the rural women of the study area. Besides this, it has offered to the women a reduced cost of fishing. Furthermore, the result has shown that more source of protein intake was made available to the rural poor by artisanal fishery.

Table 6 represents the constraints encountered by the artisanal women fishers.

The result shows that pollution by oil and gas spillage was the major problem with 75.9% in the study area. Many (20.7%) of the respondents indicated poor mobility to distant creeks. Poor mobility confines the respondents' fishing activities to shallow waters and closer creeks resulting to over fishing of a particular location. The end result of over fishing a spot is poor catch. These constraints may have contributed to the poor mean role performed by the respondents.

Table 5. Distribution of contributions of artisanal fishing to food security (n=116)

Contributions	Frequency	Percentage (%)
Increased fish production	6	5.2
Enhanced fish protein intake	10	8.6
Reduced cost of fish consumption	10	8.6
Provision of means of livelihood	88	75.9
Inexpensive technologies are used	2	1.7
Reduced rural-urban migration	5	4.3
Reduced cost of fish production	17	14.7

Source: Field survey, 2012. Multiple responses were recorded

Table 6. Distribution of the constraints faced by artisanal women fishers (n=116)

Constraints	Frequency	Percentage (%)
High cost of fishing gears	11	9.5
Poor storage facilities	11	9.5
Poor mobility to distant creeks	24	20.7
Low technology for improved catch	10	8.6
Lack of modern equipment for fishing	2	1.7
Poor fund for expansion	8	6.9
Lack of extension services	3	2.6
Water pollution by water hyacinths	2	1.7
Destruction of fish habitats	3	2.6
Pollution by oil and gas spillage	88	75.9

Source: Field survey, 2012. Multiple responses were recorded

4. CONCLUSION

The study has shown that artisanal fishing in the area was dominated by married women who were within their active working age. The income per month of respondents was reasonably rewarding. However, the respondents lacked contacts with extension agents. The major role performed by respondents was fishing of marine food resources. The mean of role performed was low. This low mean role was largely due to poor contacts with extension agents and pollution from crude oil and gas spillages. Despite these constraints, artisanal fishing made contributions to food security in such areas as provision of means of livelihood and offered a lesser financial option to fisheries production for the respondents. In order to improve the role performed by women and hence improve their output in artisanal fishing, the study recommends enhanced extension contacts and control of water pollution by crude oil and gas companies in the area.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sciencedomain.org/review-history.php?iid=710&id=25&aid=6537