ADOPTION OF CLIMATE SMART FISHING PRACTICES BY ARTISANAL FISHERFOLKS IN OKRIKA LOCAL GOVERNMENT AREA OF RIVERS STATE, NIGERIA

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ABSTRACT

The study investigated the adoption of climate smart fishing practices (CSFP) by artisanal fisherfolks in Okrika Local Government Area of Rivers State, Nigeria. Multi-stage sampling procedure was used to select 63 fisherfolks. Data were obtained through the use of questionnaire and interview schedule. Data were analysed using descriptive and inferential such as the mean, frequency count, percentages and Logit model. Results showed that majority (31.7%) of the fisherfolks fell within 50–59 years while 28.6% fell within 40–49 years of age with a mean age of 45 years. Also, 63.5% of the fisherfolks were males while 23.5% were female and a mean of 11 years of schooling. Results further revealed that 76.2% of the fisherfolks did not adopt climate smart fishing practices while only 23.8% adopted climate smart fishing practices. Coefficients of age, household size, level of education, fishing experience and distance from the river were significant and important determinants of adoption of climate smart fishing practices in the area. The study concluded that climate smart fishing practices have not been widely adopted by the artisanal fisherfolks in the study area. The study recommended that agricultural extension agents should educate and encourage the artisanal fish farmers to adopt climate smart agriculture inorder to combat the devastating impacts of climate change in the study area.

Keywords: Adoption, Climate Smart Fishing Practices, Artisanal Fisherfolks, Okrika, Logit Model

INTRODUCTION

Climate change has been variously defined by several authors. Pant (2011); Intergovernmental Panel for Climate Change (2007) define climate change as the persistent change in the mean and variability of climate parameters due to unimpeded growth of anthropogenic greenhouse gas emissions (GHGs) observed and recorded over a long period (30 years or more) that a given region has experienced. Though the time length it takes the changes to occur matters, the level of deviation from the normal and its impacts on the ecology are most principal. Climate change has become a global issue affecting to varying degree various aspects of economic activities in different parts of the world. Its effects are being felt in different extent and nature by many countries, triggering change in economic response to the impacts. "Climate change is the complete variation or average state of the atmosphere over time scales, ranging from decades to millions of years in a region or across the entire globe, and is caused by processes internal to the earth, external forces from space or human activities" (Lemke, 2006). Thus, anthropological activities have influenced climate change causing increased effects on different sectors of agriculture and livelihoods in many communities of the world. The major human related cause of climate change is the increase of Greenhouse Gases (GHG) in the atmosphere resulting from gas flaring, fossil burning and deforestation arising from clearing of land for agricultural and industrial uses (Intergovernmental Panel on Climate Change, IPCC, 2007).

Increasing average temperature of the earth is the primary effect of climate change which leads to a variety of secondary effects (IPCC, 2007). The need for an integrated approach to climate issues with sustainable food security gave rise to climate smart agriculture. Climate Smart Agriculture is seen as “agriculture that sustainably increases productivity, enhances resilience (adaptation), reduces/removes Green House Gases (mitigation) where possible, and enhances achievement of national food security and development goals” (FAO, 2008; Lipper *et al.* 2014). Essentially, the principal goal of climate smart agriculture is food security and development. This goal is to be achieved through productivity, adaptation and resilience. Nevertheless, climate change does not only affect crop production but also fisheries and aquaculture. These effects are felt through the gradual warming, acidification of charges in ocean circulation, sea-level rise and associated ecological changes and changes in the frequency, intensity and location of extreme events (Cochrane et al. 2009). According to Nzeadibe et al. (2011) “Agriculture is more vulnerable to the increasing effects of climate change than any other economic sector, and it uses almost 80 percent of the world’s freshwater a vanishing resource in some parts of the world”. However, for the purpose of this work, these practices when adopted by fisherfolks are referred to climate smart fishing practices. If climate smart fishing practices is not being adopted by these artisan fisherfolks, the amount they carter for tends to drop with time due to prevailing occurrence of climate change.

There is increasing concern over the consequences of global warming for food security and livelihood of about 36,000,000 fisher folks of the world and nearly 1.5 billion consumers of fish products and variation in climate and other man activities are posing a threat to fish production and aquaculture development all over the world, and Nigeria is not exempted; such that impact of climate change produced in fish and its environment will influence the fisheries and the artisan fish farmers (Daw et al. 2009). However, the fish farmers have adopted some practices to adapt to the effects of the changing climate. These practices include construction of more water outlets, stocking of pond when the favourable weather condition is noticed, provision of alternative water outlets, planting trees to reduce the effect of wind action on fish ponds. Arimi (2014) identified frequent seeking for early warning information about climate change and avoidance of areas susceptible to flooding as adaptation strategies. Works on mitigation practices in fish farming as pointed out by Oyebanjo (2010), include promoting the use of fuel-efficient fishing vessels and methods, removing such disincentives to energy efficiency as fuel subsidies and reducing overcapacity in global fishing fleets. Effective adaptations and mitigation strategies will depend on the prevailing regional conditions associated with human needs in the context of socio-economic necessities and stakeholders' pressures on fisheries. Capacity building and resilience through awareness, enlightenment and initiatives will be starting point for adaptive strategies to mitigate the impact of climate smart practices on artisanal fisheries. Thus, this study sought to examine the adoption of climate smart agriculture by fisherfolks in Okrika local government area of Rivers State, Nigeria with the following objectives: to describe the socioeconomic characteristics of the artisanal fish farmers, ascertain their adoption of climate smart fishing practices and to determine the factors influencing the adoption of climate smart fishing practices in the study area.

METHODOLOGY

The study was carried out in Okrika Local Government Area of Rivers State, Nigeria. Okrika is situated on a small island just south of Port Harcourt, making it a suburb of the much larger city. The average elevation of Okrika is 452 meters. Okrika lies on the geographical coordinates of 4°44′23″N 7°4′58″E". It lies on the north of the Bonny River and on Okrika Island, 35 miles (56 km) upstream from the Bight of Biafra. The town can be reached by vessels of a draft of 29 feet (9 meters) or less. Formerly a small fishing village of the Ijo (Ijaw) people in the mangrove swamps of the eastern Niger River delta. Okrika is characterized by two major seasons' wet and dry seasons. The wet season begins in March and ends in October, with a peak in June and July. There is a period of little or no rain in August, popularly called 'August Break' with annual mean rainfall of over 3000mm.

Multi-stage random sampling procedure was employed in sample selection. In the first stage, two (2) communities (Kirike and Koniju Town) were selected by simple random technique. In the second stage, three (3) villages (Oba Polo, Kalio Polo and Green-Ama) were further selected randomly. In third stage, a total of 72 fisherfolks were selected using simple random technique but only 63 fisherfolks who supplied sufficient data through the administered structured questionnaire and scheduled interviews were used in data analysis. The sampling frame 120 fisherfolks which is the list of all artisanal fish farmers in Oba Polo, Kalio Polo and Green-Ama as compiled by the Agricultural Development Program (ADP) extension agent.

Data were analyzed using descriptive and inferential statistics such as the mean, frequency count, percentages, and Logit model.

The Logit model is expressed as: $Ln\left[\frac{Y}{1-Y}\right] = \alpha + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + U$... **eqtn 1**

Where,

Y_1 = probability that a household would adopt to climate smart agricultural practices

Y_2= probability that a household will not adopt to climate change

The explanatory variables will be; X_i, where i = 1,2,3,4,5,6,7,8,9, and 10

X_1 = Gender (1= male, 0= female)

X_2 = Age measured (in years)

X_3 = Marital Status (Dummy:1= Married; 0= Single)

X_4= Household size (Number

X_5 = Educational level measured in years

X_6 = Fishing experience measured in years

X_7= Access to credit measured in Naira (₦)

X_8 = Income Level measured in Naira (₦)

X_9= Exposure to mass media (exposure per annum)

X_{10}= Distance from river

e = Error term

Results and Discussion

Socioeconomic Characteristics of the Artisanal Fisherfolks

The socioeconomic characteristics of the fisherfolks is presented in Table 1.

Table 1: Socioeconomic Characteristics of the Artisanal Fisherfolks in the study area.

Variables	Frequency	Mean	
Age (years)			
20-29	7	11.1	
30-39	9	14.3	
40-49	18	28.6	
50-59	20	31.7	
60-69	6	9.50	
70-79	3	4.80	
Gender			
Male	40	63.5	
Female	23	36.5	
Marital status			
Single	15	23.8	
Married	39	61.9	
Divorced	8	12.7	
Widowed	1	1.6	
Household Size(No)			6 years
1-5	30	47.6	
6-10	28	44.4	
11-15	2	3.2	
16-20	3	4.8	
Level of education			11years
No formal education	9	14.3	
Primary education	7	11.2	
Secondary education	29	46.0	
NCE	12	19.0	
HND/B.SC	6	9.50	
M.SC/PHD	0	0	
Fishing Experience			18years
1-10	17	26.9	
11-20	27	42.9	
21-30	8	12.70	
31-40	9	14.3	
41-50	2	3.12	
Amount per Catch (in 1000)			₦163,618.92/annum
0 – 100	22	34.9	
101 – 200	25	39.7	
201 - 300	7	11.1	
301 – 400	1	1.58	
401 – 500	2	3.17	
501 – 600	2	3.17	

601 – 700	0	0	
701 – 800	1	1.58	
Distance from House(Miles)			
			178.11 miles
1 - 100	17	26.9	
101 – 200	13	20.6	
201 – 300	18	28.6	
301 – 400	5	7.93	
Access to Extension			
Yes	53	84.13	
No	10	15.87	
Total	**63**	**100**	
Source: Field Survey	**2018**		

The result in Table 1 shows that majority (31.7%) of the artisanal fisherfolks fell within 50 – 59 years while 28.6% fell within 40 – 49 years of age with a mean age of 45 years. This result shows artisanal fisherfolks in the Okrika Local Government Area is dominated by youths. Young people are very active and strong enough to enable them adopt climate smart fishing practices. Majority (63.5%) of the fisherfolks were males, while the remaining 23.5 % were females. This implies that males are more involved in artisanal fishing in the study area. The dominance of male in artisanal fishery sub–sector has been reported by (Goetz, 1997). The risk associated with such off – shore fishing activities may be responsible for the low female participation in the activity. Also, 61.9% of the farmers were married, 23.8% were single and 12.7% were divorced and 1.6% was widowed. This result implies that the study area was dominated by artisan fisherfolks who are married. Married people have higher family responsibilities which makes them engage more in artisanal fishing. Again, majority (57.8%) of the artisanal fisherfolks fell within the household size of 6 and 10 persons while 2.0% of the farmers fell within 11-15 persons. The mean household size was 6 persons. The implication of this finding is that there are too many people to feed even though they provide enough labour to enable the farmers adopt climate smart fishing practices in the study area. Forty-six percent of the artisan fisherfolks had secondary education while 19% of the farmers had NCE education and 14.3% had no formal education. The mean year of schooling was 11 years. This implies that majority of the artisanal fisherfolks have acquired enough education that would help them to adopt smart fishing practices. The Table also shows that majority (42.90%) of the fish farmers had 11 – 20 years of experience in fishing business; while 3.12% had 41 – 50 years of experience. The implication of this finding is that most of the fisherfolks in the study area are experienced which encourages increased production. This is in agreement with that of Arimi, (2014) in survey of brackish water aquaculture status in Rivers State.

The annual income revealed that majority (39.7%) of the fish farmers earned between the ranges of ₦ 101,000 – ₦ 200,000 while 38.0% earned below ₦ 100,000 annually. The average amount per catch for an annum is ₦163, 618.92. The implication of this finding is that fishing in the study area is not a lucrative business. This could be due to migration of species and low yield of returns. From the table the distance from house to the fish site was found to be 28.6% leave 201 – 300 miles away from their fishing sites while 26.9% leave at a distance of 0 – 100 mile and 20.6% leave a distance of 101 – 200 miles away from their fishing areas. Table 1 also shows that 84.13% of the fisherfolks in Okrika LGA do not have access to extension agents while only 15.87% have access to agricultural extension services. This may be due to negligence of the duties of extension agents and inadequate awareness of the fish farmers of the relevant agencies and ministries they need to acquire information about extension agents in order to make necessary requests for their services, if needed.

Adoption of Climate Smart Fishing Practices

The adoption of climate smart fishing practices is presented in Table 2.

Table 2: Adoption of Climate Smart Fishing Practices in the area

Adoption	Frequency (n = 63)	Percentage (%)
No	48	76.2
Yes	15	23.8

Source: Field Survey, 2018

The results from Table 2 shows that 76.2% of the fisherfolks did not adopt climate smart fishing practices while 23.8% are aware of the climate smart fishing practices. This could be attributed to the poor access of the artisanal fisher folks to agricultural extension services in the study area.

Determinants of adoption of climate smart fishing practices

Results of the determinants of adoption of climate smart fishing practices is presented in Table 3

Table 3: Determinants of Adoption of Climate Smart Fishing Practices in the study area.

Variables	Coefficients	Std. Error	t-Value
Gender	1.633613	0.9449002	1.7288
Age	1.011963	0.0263305	38.4331***
Marital Status	2.048752	1.381486	1.48331
Household Size	1.122338	0.1000743	11.2184***
Education	1.003565	0.0615905	16.2942***
Experience	0.927976	0.040643	2.2832**
Access To Credit	1.077941	0.7841422	1.3746
Income Per Catch	0.999998	0.0000181	1.8678
Access to Mass Media	0.708231	0.5351292	1.3234
Distance From River	1.005099	0.0040862	9.271***
Constant	0.055354	0.1084027	0.508
Number of obs	63		
LR chi2(10)	7.02		

Source, Computer printout, (2018) *** sig. at 1% ** sig. at 5%

The result in Table 3 shows that the likelihood Chi-square test statistic of 7.02 is significant at 1% indicating that the model gave a goof fit to the data. However, coefficients of age, household size, level of education, fishing experience and distance from the river are the important determinants of adoption of climate smart fishing practices in the study area. The coefficient of age of farmers was positive and significant at 1%, implying that the farmer's young age motivated their likelihood of adoption of various climate smart fishing practices in the study area. Household size was positive and significant at 1%. This suggests that the larger the household size, the more the likelihood of adopting climate smart fishing practices in the study area. Level of education was positive and significant at 1%. This suggests that the more education acquired by a fisher folk, the more the likelihood of adopting climate smart fishing practices in the study area. The implication is that educated farmers readily adopt improved climate smart agricultural artisan fish farming practices. Formal education enables farmers obtain useful information from bulletins, agricultural newsletters and other sources (Bates et al. 2008). The formal education usually aid farmers and lead them to accept new farming innovations more readily to enhance their income than those farmers without formal education. Fishing experience was positive and significant at 5%. This indicates that experienced fishermen have more likelihood of adopting climate smart fishing practices in the study area. Distance from the river was positive and significant at 1%. This is not expected and could be attributed to the fact that most of the rivers are distant form their residence thereby discouraging farmers to adopt climate smart fishing practices. This result can be attributed to infected water, low yield, migration of species and pollution around the immediate environment of the fish farmers. The Okrika axis has been known for high level of illegal refineries and polluted water from crude oil as disclosed by farmers.

CONCLUSION

The study showed that the socioeconomic characteristics of the artisan fish farmers play a significant role in the adoption of climate smart agricultural practices. This could be attributed to the fact that majority of the parameters were found to be significant (age, gender, household size, education and distance from river were significant). Majority of the artisanal fish farmers acquired enough education that would help them to adopt smart agriculture practices.

RECOMMENDATIONS

The following recommendations were made:

1. Agricultural extension services should be extended climate smart fishing practices to the local artisanal fish farmers in the area to combat the challenges and negative impacts of climate change in their localities.
2. The relevant stakeholders should provide agricultural credits or loans that can be accessible to artisanal fish farmers to enhance effective adoption of climate smart fish farming practices in the study area.

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