



EFFECT OF CLIMATE CHANGE ON LIVELIHOOD ACTIVITIES OF ARTISANAL FISHERFOLKS IN COASTAL AREAS OF SOUTHWEST, NIGERIA

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ABSTRACT

The effect of climate change on livelihood activities of artisanal fisher folks was carried out in coastal areas of Southwest Nigeria. Multi-stage sampling procedure was used to select 422 respondents. Data were obtained with the use of structured interviewed schedule and subjected to descriptive and inferential statistical analysis at 0.05 level of significance. Results indicated that 80.8% of the fisher folks were between 31-50 years of age, 92.6% were married, 82.7% had 16 years and above fishing experience. Also, 96.9% of fisher folks do not have access to extension services. Majority (97.2%), (85.8%) and (84.8%) experienced intensity rainfall, flooding, and ocean as effect, respectively. There were significant relationships between effect of climate change on livelihood activities of artisanal fisher folks and their age ($\chi^2 = 11.0$; $P = 0.001$), sex ($\chi^2 = 38.5$; $P = 0.000$), marital status ($\chi^2 = 27.9$; $P = 0.000$), house hold size ($\chi^2 = 11.13$; $P = 0.011$) and income ($\chi^2 = 51.94$; $P = 0.000$). Results also showed that there is significant difference in the effect of climate change on livelihood of artisanal fisher folks ($F = 13.565$; $P = 0.000$) across the selected States in South West Nigeria. The study concludes that Lagos State fisher folks recorded the highest effect of climate change followed by Ogun State and then Ondo State. The study recommended that extension officer should create awareness on climate change and credit facilities should be accessible to fisher folks with the services of good roads, healthcare and market to facilitate their adaptation to the effect of climate variability in fishing communities across sampled States.

Keywords: Artisanal, Climate change, Coastal communities, Fisher folks, Livelihood activities.

INTRODUCTION

In Nigeria, agricultural production remains the main source of livelihood for rural communities in most parts of the country and a significant proportion of the rural population engage in artisanal coastal fishing activities. The fisheries sector is a significant aspect of Nigeria food system accounting for 40% of the population's annual protein intake. Fishing generates income and employment to thousands of poor people and trade in fisheries products contributes to poverty reduction and national economic growth (Adebayo *et al.*, 2014). In Nigeria coastline, virtually all rural coastal communities depend largely on the fish resources for their livelihood. They harvest, process and transport the fish to market and generate income at every stage. According to the Food and Agriculture Organization (FAO, 2014) fisher folks are sometimes referred to as small-scale fisheries. Artisanal fisheries can be subsistence or commercial fisheries, providing for local consumption or export (FAO, 2014). Fishing inputs commonly used include canoe, paddles, hooks, gill nets, cast nets, beach seining and drift nets. Over the years' significant rise in poverty of workers engaged in the agricultural sector including fisheries has been recorded. Climate variability including climate change is a key



factor affecting fish production and the ability of rural communities to achieve their poverty reduction and sustainable development goals

The Intergovernmental Panel on Climate Change (IPCC) recognizes the Nigerian coast as one of the low-lying lagoon coasts in West Africa which is likely to experience severe affects from flooding as a result of rising sea levels and climate change. Increased frequency and intensity of storm surges from the Atlantic Ocean and changes in wave climate observed in recent years have had serious negative impact on fishing activities and well-being of fisher folks. Adelekan and Fregene (2008) opined that storm surges destroy fishing boats and fishing gears including nets where they are kept on the beaches. Affected fishermen are usually incapacitated as they are no longer able to fish until boats and nets are either repaired or replaced. For many fishermen this is not easily achieved. Floods in coastal communities as a result of rising sea levels, storm surges and increased rainfall during raining season months has also become a major threat to coastal dwellers. Other effect is flooding of fish ponds especially those sited in wetlands and farms nationwide. (While the most noticeable impact of climate change is seen in Nigeria's coastal areas as erosion of coastline beachfront, especially in Lagos State.

According to Opele (2012) the potential impacts of climate change on fisheries include water surface temperature rise, sea level rise, increasing water salinity and ocean acidification, changes in primary production and changes in fish stock distribution. Such changes could lead to disruptions in the food chains of aquatic flora and fauna, habitat destruction, depletion in food stock and prey-predator composition, destruction of coastal fish landing, and risk to processing and marketing sites. These negative effects when combined together have adverse impacts on the already strained resource, thereby reducing fish production. Fregene (2002) noted that depletion of fish stock and reduction in fish production could threaten the livelihoods of many vulnerable fisher folks' communities and the food security of many countries in the region.

The general objective of this study was to assess the effect of climate change on the livelihood of artisanal fisher folks in Coastal Areas of Southwest, Nigeria. The specific objectives of this study were to: a) describe the socio-economic characteristics of fisher folks; b) ascertain the livelihood activities of artisanal fisher folks; and c) determine the access of fisher folks to information by extension services. Based on the objectives, these null hypotheses were tested: H_{01} : There is no significant relationship between selected socio-economic characteristics and effects of climate change on livelihood activities of artisanal fisher folks; and H_{02} : There is no significant difference between the effect of climate change on livelihood activities of artisanal fisher folks across the coastal states in South West Nigeria.

MATERIALS AND METHODS

The Study Area

The study was carried out in coastal Southwest of Nigeria which comprises of Lagos Ogun and Ondo States. Southwest coastal area has a marine shoreline of about 330 km and rich water resource for fishing and other aquatic activities.

Sampling Procedure

A multi-stage sampling procedure was used to select the respondents for the study. In the first stage, purposive sampling was used in selecting all the three (3) coastal states and one (1) Local Government Areas namely; Ibeju-Lekki LGA in Lagos State, Ogun waterside LGA in Ogun State and Ilaje LGA in Ondo State were purposively selected and this was based on the fact that these LGAs were the prominent ones where intensive fishing activities take place.



The second stage involved the selection of fishing communities. 20% of the fishing community was selected which gave nine (9) fishing communities from Ibeju/Lekki, five (5) from Ogun waterside and three (3) from Ilaje LGAs. A total of 17 fishing communities were selected for the study. The third stage involved (10%) of the total fisher folks in each of the seventeen fishing communities. Thus, a total of 422) fisher folks were selected for the study (Table 1).

Table 1: Sampling Procedure and Sample Size for artisanal fisherfolks

Table with 7 columns: States, Fishing LGAs, Fishing villages, 20% of fishing villages, Selected villages, Registered fisherfolks, 10% of registered fisherfolks. Rows include Lagos State, Ogun State, and Ondo State with sub-rows for various villages and a Grand Total row.

Source: Cooperative society

Method of Data Collection

Data were collected using structured interview scheduled that was administered to the respondents by the research and the trained enumerator.

Method of Data Analysis

Data were analyzed using both descriptive statistics such as frequency counts, mean, percentage, standard deviation and inferential statistics (chi-square and PPMC).

RESULTS AND DISCUSSION

Results in Table 2 revealed that majority of the respondents were in their active age which implies that majority of the respondents were within economically active age bracket and therefore constitute a good labour force that can cope with the rigours of fishing operations



and is in agreement with Olusegun and Mathew (2016) that this age bracket composed of the innovative, motivated and adoptable individuals and majority was male. This implies that males were involved in the act of fishing because of the strenuous nature of the occupation while majority had one form of education or the other and this implies that they can read and write thus making it easy for extension agents to disseminate information to them.

Table 2: Distribution of respondents on Personal characteristics

Characteristics	Frequency			
	Lagos State (n = 189)	Ogun State (n = 109)	Ondo State (n = 124)	South West (n = 422)
Age (years)				
21- 30	24 (12.7)	5 (4.6)	3 (2.4)	32 (7.6)
31 – 40	80 (42.3)	27 (24.8)	24 (19.4)	131 (31.0)
41 – 50	73 (38.6)	66 (60.6)	71 (57.3)	210 (49.8)
51- 60	12 (6.3)	11 (10.1)	26 (21.00)	49 (11.6)
Sex				
Male	124 (65.6)	65 (59.6)	87 (70.2)	276(65.4)
Female	65 (34.4)	44(40.4)	37 (29.8)	146 (34.6)
Marital status				
Single	6 (3.2)	2 (1.8)	2 (1.6)	10 (2.4)
Married	175(92.6)	94 (86.2)	113 (91.1)	382(90.5)
Widow	6 (3.2)	11(10.0)	9(7.2)	26(6.2)
Separated	2 (1.0)	2(1.8)		4(0.9)
Marriage types				
Monogamy	106 (56.1)	38 (34.9)	42 (33.9)	186 (44.1)
Polygamy	83 (43.9)	71(65.1)	82 (66.1)	236 (55.9)
Tribe				
Ijebu	149 (78.8)	102 (93.6)	23 (18.5)	274 (64.9)
Ilaje	34 (18.0)	7 (6.4)	101 (81.5)	142 (33.6)
Ghanaian	6 (3.2)			6 (1.4)
Educational level				
No formal education	21 (11.1)	3 (2.7)	0 (0.0)	24 (5.7)
Vocational	22 (11.6)	3 (2.7)	0 (0.0)	25 (5.9)
Primary	70 (37.1)	42 (38.5)	32 (25.8)	144 (34.1)
Secondary	73 (38.6)	60 (55.0)	92 (74.2)	225 (53.3)
Tertiary	3 (1.6)	1 (0.9)	0 (0.0)	4 (0.9)
Household size				
1 – 3	2 (1.1%)	2 (1.8)		4 (0.9)
4 – 7	111 (58.7%)	36 (33.0)	37 (29.8)	184 (43.6)
9 – 10	52 (27.5%)	50 (45.9)	64 (51.6)	166 (39.3)
Years of experience				
1-5	4 (2.1)	2 (1.8)	2 (1.6)	29 (6.9)
6-10	23(12.2)	4 (3.7)	14 (11.3)	39 (9.3)
11-15	16(8.5)	9 (8.2)	34 (27.4)	148 (35.3)
16-20	76(40.2)	38 (34.9)	74 (59.7)	200 (47.1)

Note: Figures in parentheses are percentages

Source: Field survey 2021.



The Table 2 results also revealed that majority (64.9%) of the artisanal fisherfolks were of Yoruba ethnic group. This is mainly due to the fact that the Ijebu ethnic predominate Ibeju/Lekki and Ogun waterside LGAs while Ilajes are predominant ethnic group in the coastal areas of Ondo State.

Livelihood Activities of Artisanal Fisher folks

Table 3 showed that (77.3%) of the respondents involved in fish catching. While (63.3%) engaged in fish processing and (73.0%) engaged in fish marketing. This implies that male fisherfolks engaged in fish catching because they have the ability to withstand the tedious operation of canoe paddling. The result corroborated that of Olaoye *et al.* (2012) who observed that women are involved more in fish processing and marketing than other fishery activities.

Table 3: Livelihood Activities of fisherfolks

Livelihood activities	*Frequency	Percentage
Fishing	326	77.3
Fish processing	267	63.3
Fish marketing	308	73.0
Farming	124	29.4
Oil palm processing	132	31.3
Net fabrication and mending	304	48.1
Coconut trading	242	57.3
Boat making	68	16.1
Cassava processing	138	32.7
Petty trading	299	70.8
Outboard engine repair	48	11.4
Fuel wood procurement	115	27.3
Selling of fishing equipment	74	17.5

*Multiple responses exist
 Source: Field survey 2021.

Access of Fisherfolks to Extension Services

Finding in Table 4 shows that majority of the respondent across the three States did not have access to extension services while very few indicated they often had access to extension services. This indicates that artisanal fisherfolks did not readily have access to extension services which can negatively affect their productivity. This finding agrees with the work of Oose *et al.* (2015) who reported poor extension visits to artisanal fisherfolks in coastal communities in Southwest, Nigeria.

Table 4: Distribution of respondents on contact with extension services

Contact with extension agent	Lagos State (n = 189)	Ogun State (n = 109)	Ondo State (n = 124)	South West (n = 422)
Yes	10(5.3)	3 (2.8)	0	13 (3.1)
No	179 (94.7)	106 (97.2)	124 (100)	409 (96.9)

Source: Field survey, 2021



Effect of Climate change on Fisherfolks

Table 5 indicate that climate change has varied socio-economic impacts that are experienced at different levels, individual, households and whole community. Majority (85.8%), (84.8%) and (97.2%) experienced flooding, ocean surges and intensity rainfall respectfully. This implies that floods occur with sea transgressions sometimes with heavy rainfall that cause road tracks inundation, house losses, public health hazards and losses of potable water owing to saltwater intrusions into wells, farmland losses and population displacement

Table 5: Effect of Climate Change in Coastal Fishing Communities

Climate hazard	*Frequency	Percentage
Flooding	362	85.8
Increased waves	294	69.9
Ocean surges	358	84.8
Rainfall intensity	410	97.2
Disease outbreak	315	74.6
Wind storms	310	73.5
Erosion	220	52.1

*Multiple response exists
 Source: Field survey, 2021

Relationship Between Selected Personal Characteristics of Fisherfolks and Effects of Climate Change on Livelihood Activities of Artisanal Fisherfolks Across all Sampled States

The results (Table 6) of chi-square analysis showed that age ($\chi^2 = 8.10$), farming experience ($\chi^2 = 18.13$), household size ($\chi^2 = 18.08$), and income ($\chi^2 = 51.94$), were significantly related to effect of climate change on livelihood activities of artisanal fisherfolks across sampled states. However, the Table 6 results revealed that no significant relationship existed between effects of climate change on livelihood of artisanal fisherfolks and marital status of the fisherfolks across sampled States.

There is no Significant Difference Between Effects of Climate Change on Livelihood Status of Artisanal Fisherfolks Across the Sampled States

Results of ANOVA (Table 7) showed that there is significant difference in the effect of climate change on livelihood of artisanal fisherfolks ($F = 13.565$; $p = 0.000$) across the selected States in South West Nigeria at $p < 0.05$ level of significance. Similarly, results of scheffe’s post hoc test showed that effect of climate change on livelihood status of artisanal fisherfolks were significantly different in Lagos State compared to that of Ogun State and Ondo State. However, Ogun and Ondo States belong to the same homogenous subsets. The results revealed that Lagos State fisherfolks recorded the highest effect of climate change followed by Ogun State and then Ondo State. The implication is that the effect of climate change on livelihood activities of artisanal fisherfolks varies slightly across the sampled States but confirms that there is evidence of significant difference.



Table 6: Chi-Square analysis of personal characteristics of fisherfolks and effects of Climate change on livelihood activities of artisanal fisherfolks across all selected States

Socio-economic characteristics	All selected States (422)		χ^2	Df	p-value	Decision
	Low F (%)	High F (%)				
Age (years)						
30 or less	06(3.7)	26(10.1)	8.10	3	0.04	Significant
31 – 40	47(28.7)	84(32.6)				
41 – 50	88(53.7)	122(47.3)				
51 and above	23(14.0)	26(10.1)				
Sex						
Male	126(76.8)	150(58.1)	15.48	1	0.00	Significant
Female	38(23.2)	108(41.9)				
Marital status						
Single	04(2.4)	06(2.3)	2.58	3	0.46	Not Significant
Married	150(91.5)	232(89.9)				
Widowed	10(6.1)	16(6.2)				
Separated/divorced	0(0.0)	04(1.6)				
Years of fishing Experience						
1 – 5	02(1.2)	04(1.6)	18.13	4	0.00	Significant
6 – 10	10(6.1)	21(8.1)				
11 – 15	18(11.0)	21(8.1)				
16 – 20	76(46.3)	73(28.3)				
Above 20	58(35.4)	139(53.9)				
Household size (Members)						
1 – 3	04(2.4)	0(0.0)	18.08	3	0.00	Significant
4 – 7	57(34.8)	127(49.2)				
8 – 10	66(40.2)	100(38.8)				
Above 10	37(22.6)	31(12.0)				
Monthly income (₹)						
100,000 or less	30(18.3)	42(16.3)	51.94	4	0.00	Significant
100,001 – 150,000	05(3.0)	43(16.7)				
150,001 – 200,000	16(9.8)	61(23.6)				
200,001 – 250,000	25(15.2)	49(19.0)				
Above 250,000	88(53.7)	63(24.4)				

Note: Df – degree of freedom; Significant at $p < 0.05$ level of significance; Not Significant at $p > 0.05$ level of significance

Source: Field Survey, 2021.



Table 7: Test of difference between the effect of climate change on livelihood of artisanal fisherfolks across the selected States in South West Nigeria using ANOVA

Table with 7 columns: Effect of climate change on livelihood activities, Sum of square, df, Mean square, F, Sig., Scheffe' Post Hoc Tests. Rows include Between groups, Within groups, and Total.

Note: Sig. = Significant at p < 0.05 level of significance, df = degree of freedom; the Means for Ogun and Ondo are in homogenous subset.

Source: Field Survey, 2021.

CONCLUSION AND RECOMMENDATIONS

Sequel to the outcome from the study, it could be concluded that artisanal fisherfolks mainly use, gill nets, siene nets, surrounding nets, cast net for their fishing activities. Other livelihood activities of the fisherfolks are farming, oil palm processing, petty trading, out board engine repair and coconut trading.

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