

Survey of the Parameters Driving the Diversification of Livelihoods of Fishing Communities around Kainji Dam, Nigeria

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ABSTRACT

This study surveyed the Parameters Driving the Diversification of Livelihoods of Fishing Communities around Kainji Dam, Nigeria. Questionnaire was used to collect data from 460 respondents. Multi-stage and proportionate sampling techniques were used in selecting the respondents. Descriptive and inferential statistics were used for data analysis. The results of the study demonstrated that four of the ten factors in the model (Age, sex, level of education and membership of association) were found to be significant in determining livelihood diversification of the fishers in the study area. Age of the fishers was found to be statistically significant at 1% level of significance with t-value 4.10. This indicates that as age of the fisher increases so also the likelihood of increased livelihood diversification activities. Increase in age goes with increase in experience, therefore age is very crucial in determining livelihood diversification activities. Sex of the fishers was also found to be a significant factor in determining livelihood diversification activities at 1% level of significance with a t-value of 9.47. The implication of this is that sex is a determining factor in diversifying into non-farm activities. The findings of the study on the extent of livelihood diversification indicated that the household level of livelihood diversification (SDI = 0.63) was obtained for high level of diversification with a group of fishers (85.43%), (SDI = 0.38) representing medium level of diversification (11.96%) of fishers and low level of diversity (SDI = 0.26) constituting (2.39%) fishers. Lastly, (SDI = 0.005) representing 0.22% fishers who had no diversification at all. In conclusion, the study showed that, artisanal fisheries activities are an important livelihood activity in the lives of the fishers as it enhances food security and income of fishers. The study therefore recommended that government should give financial assistance to the fishers to enable them to seamlessly undertake their livelihood activities. Fishery extension agents should advise fishers to join membership association so as to access credit facilities and other benefits with a view to diversifying into many livelihood activities for improved standard of living. Government should provide subsidy on fishing inputs such as modern fishing gears to fisher

Key words: Determinants, Livelihood diversification, Fishing communities, Artisanal fisheries, Kainji dam

INTRODUCTION

Fisheries production in Nigeria especially from marine is important for the socio-economic development of Nigerians and it contributes to the nation's economic growth through the Gross Domestic Products (GDP) (Anyanwu et al., 2009). Adedamola (2016) posits that Nigeria is blessed with enough marine fisheries resources that could enhance increased fish supply/production. Degefa (2017) posits that 43.5 million people were directly engaged in primary production of fish, either by artisanal fishing or in aquaculture. Most of the 43.5 million people who engaged in artisanal fishing are small-scale artisanal fishers, operating in coastal and inland waters. Artisanal Fisheries and aquaculture play an essential role in the livelihoods of millions of people around the world and contribute to food security and poverty alleviation. The demand for fish has been rising rapidly in Nigeria as a result of increase in population, per capita income and prices of alternative sources of animal protein (Bryceson, 2018). However, the domestic supply of fish does not satisfy the demand. Attempts to meet the demand have seen the country resorting to importation of fish. Nigeria's current annual national fish demand is in excess of 3.2 million metric tonnes. The national production is about 1.1 million metric tonnes from all sources, including aquaculture, artisanal and industrial fishing sectors, leading to a supply shortfall/ supply gap of about 2.1 million metric tonnes (Aruwajoye and Ajibefun, 2013). Fish makes up around 40 per cent of Nigeria's protein intake. Nigeria imported over 2 million metric tonnes of fish before 2015. Hence, fish catch and fish production had doubled by 600,000MT in the last three years, after government restricted food importation by directing fish importers to embrace backward Integration through artisanal fishing and commercial aquaculture. Artisanal fishing consists of various small-scale, low-technology, low-capital, fishing practices undertaken by individual fishing households. Artisanal fishery has a great economic, social and cultural value, and is characterized by local systems composed of professional small-scale coastal fishing communities (Amurtiya, 2015).

Rural Livelihood of artisanal fishers is an evolving issue especially in the developing economies of the world given the increasing level of poverty, hunger, starvation, economic backwardness and poor agricultural systems prevalent in the region. Following the scholarly work of Adepoju and Abayelu (2013), a livelihood comprises of the capabilities, assets and activities required for a means of living. He also asserted that, livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities. Hence, a livelihood constitutes of adequate stocks and flows of food and cash to meet basic needs of life and it comprises people, their capabilities and means of living including income and assets. The assets could be tangible or intangible in nature.

METHODOLOGY

Description of Kainji Dam

Kainji Lake is located between latitudes 9°5' and 10°55'N and longitudes 4°21' and 4°45'E. It cuts across the Niger and Kebbi states, and is mostly located in Niger state. Kainji is the second largest lake in Africa and the largest man-made lake in Nigeria (Devereux, 2001). It was created in 1968 following the impoundment of the Niger River by the construction of the Kainji Dam at New Bussa, in Borgu Local Government Area of Niger State. The total annual rainfall for the Lake ranges between 1,100 mm and 1,250 mm, spreading from April to October. The highest (about 30°C) and the lowest (about 25°C) monthly temperatures are recorded in March and August, respectively. As shown by the studies conducted on the Lake basin, the socio-economic characteristics of the people are as follows: the majority of the

fishers are *Sarkawa* sub-tribe of Kebbi Hausa, while others belong to such tribes as *Laru*, *Gungawa*, *Lopawa* and *Nupes* (Alamu, 2000). Fishing is the major traditional occupation of these people whereas other occupations include: farming, livestock breeding and local entrepreneurship such as pottery, mat weaving, gear/craft making and servicing (Degefa, 2017). A dam of 8 turbines that gets its water supply from Guinea highlands through Jos Highlands flowing through River Niger.

Data Collection

Both primary and secondary data were used for the study. Primary data was obtained using structured questionnaires designed in line with the study objectives. The copies of which were administered to the respondents selected for the study. Data collected included information on determinants of livelihood diversification, extent of livelihood diversification, artisanal fisheries activities etc. Secondary data were collected from relevant text books, internet data bases, journal articles, seminar documents, conference papers, annual reports and other relevant materials.

Sampling Procedure and Sample Size

The study employed multi-stage and proportionate sampling techniques. Firstly, two dams in North central region where artisanal fisheries activities are widely practiced were purposively selected. The dams are Shiroro and Kainji. Secondly, 30 Villages were randomly drawn along Kainji dam and 20 along Shiroro dam, thereby giving a total number of 50 villages for the study. Thirdly, proportionate sampling technique was then employed to select 10% of the fishing population from each of the selected villages, thus making 240 fishers along Kainji dam and 220 along Shiroro dam, thereby giving a sample size of 460 fishers for the study. The study identified 296 fishing villages along Shiroro dam and 550 fishing villages along Kainji dam. The fishing villages have a fishing population of about 3,632 along Shiroro and 3,823 along Kainji. These figures (3,632 and 3,823) represent the sampling frame out of which the sample size of the study was drawn.

Data Analysis

Data collected were analyzed using Simpson Diversification Index (SDI). Simpson index was used to measure the diversity of strategies adopted by households in the study area. The Simpson index was used because the index is simple to compute, robust and widely applicable. The formula for Simpson Index is given below:

The value of the Simpson index lies between 0 and 1. The value of the index is zero when there is a complete specialization and it approaches one as the level of diversification increases.

The formula for Simpson Diversification Index is given as:

$$SDI = 1 - \frac{\sum n-1}{N(N-1)} \dots\dots\dots (4)$$

Where, SDI is Simpson Diversification Index, Pi is the proportion of livelihood income sources N is the total number of livelihood sources.

The values of SDI ranges from 0 and 1, where 0 depicts no diversification (complete specialization), and it approaches 1 as the level of diversification increases. Based on the SDI values, the level of livelihood diversification is defined as:

- No diversification (SDI = 0)
- Low level of diversification (SDI = 0.00001 - 0.2500).
- Medium level of diversification (SDI=0.2501-0.4500)
- High level of diversification (SDI= >0.4501)

RESULTS AND DISCUSSION

Table 1: Logistic Regression Estimates of the Parameters driving Livelihood Diversification (n = 460)

Variables	Parameters	Coefficient	Std. Error	P-value
(Constant)	X ₀	1.334	0.764	0.082
Age	X ₁	0.083***	0.020	0.000
Sex	X ₂	2.818***	0.297	0.000
Fishing experience	X ₃	0.002	0.023	0.946
Marital Status	X ₄	-0.230	0.167	0.169
Household Size	X ₅	0.0116	0.019	0.396
Level of Education	X ₆	0.497**	0.265	0.062
Membership of association	X ₇	-0.112***	0.022	0.000
Access to Extension	X ₈	-0.138	0.338	0.683
Access to Credit	X ₉	-0.623	0.476	0.191
Income per month	X ₁₀	1.003E-06	0.000	0.633
R ²		22.3		
F		14.190		
Number of observations		460		

*significant at 10% level, **significant at 5% level, ***significant at 1% level Source: Field Survey, 2023

Table 2: Distribution of Fishers into Different Levels of Livelihood Diversification (n = 460)

SDI Range	SDI Index	Frequency	Percentage	Level of Livelihood Diversification
<0.01	0.05	1	0.05	No
0.01 - 0.25	0.26	11	2.39	Low
0.26 - 0.50	0.38	55	11.96	Medium
0.51- 0.75	0.63	393	85.43	High
Total		460	100	

Source: Field Survey, 2023

Estimates of the Parameters driving livelihood diversification

The correlation analysis in Table 1 indicates the parameters driving livelihood diversification among the fishers. The model predicted the parameters of livelihood diversification at 22.3 percent accuracy, according to the results of the regression provided in table 1 in terms of predictive efficacy. The results also demonstrate that in understanding the drivers of livelihood diversification, the model was adequate. Four of the ten factors in the model (Age, sex, level of education and membership of association) were found to be significant in determining livelihood diversification of the fishers in the study area. Age of the fishers was found to be statistically significant at 1% level of significance with t-value 4.10. This

indicates that as age of the fisher increases so also the likelihood of increased livelihood diversification activities. Increase in age goes with increase in experience, therefore age is very crucial in determining livelihood diversification activities. Sex of the fishers was also found to be a significant factor in determining livelihood diversification activities at 1% level of significance with a t-value of 9.47. The implication of this is that sex is a determining factor in diversifying into non-farm activities. It was observed from the field work that women carried out some diversification activities such as pottery and tailoring while men carried out some other activities like transportation, bricklaying, barbing and many more. Anyanwu *et al.*, (2009) observed that sex was significant to local trade, formal employment and migratory wage services in Ogun state, Nigeria. The result also implies that age determines diversification into these non-farm activities. Most of the fishers diversify into non-farm activities in the area and were carried out by more of the younger household heads than the older ones. These activities include transportation, trading, civil service, barbing, driving, bricklaying, tailoring and mechanical work. Level of education had significant relationship with non-farm activities at 5% level of significance with a t-value of 1.87. Level of education an individual possesses determines his ability to diversify into farm and non-farm activities. Adedamola (2016) asserts that better-educated members of rural populations have better access to any non-farm businesses. The analysis also reveals that membership of association was negative but statistically significant at 1% level of significance with a t-value of -5.02. The role of fishers' cooperative associations through the provision of service to its members could have positive influence on livelihood diversification activities. It is expected therefore that, fishers who are members of the cooperatives to be relatively more productive in terms of livelihood diversification activities.

Extent of livelihood diversification among fishers in the study area

Table 2 shows the extent of livelihood diversification among fishers. Simpson diversification index was used to measure the diversification status of the household's livelihoods. Although, there are several indicators and indices that could be used to estimate livelihood diversification, Simpson diversification index was used because it is simple to compute, robust and widely applicable. Table 2 illustrates the distribution of fishers into different levels of livelihood diversification. The findings showed that the diversification index ranges from 0 (SDI= 0.00) to above (SDI = 0.53). The findings on the extent of livelihood diversification indicated that the household level of livelihood diversification (SDI = 0.63) was obtained for high level of diversification with a group of fishers (85.43%), (SDI = 0.38) representing medium level of diversification (11.96%) of fishers and low level of diversity (SDI = 0.26) constituting (2.39%) fishers. Lastly, (SDI = 0.005) representing 0.22% fishers who had no diversification at all.

The study conforms to that of Amurtiya (2015) who in his study titled evaluation of choices of livelihood strategy and livelihood diversity of rural households in Ondo State, Nigeria showed that 73.3% of the respondents had more than one livelihood sources while 26.7% relied on one livelihood. The livelihood diversification index stood at 0.64. This is an indication of the moderately diversified nature of rural livelihood. That is, an average rural household is likely to have at least two livelihood sources. It also depicts that as much as rural household heads take part in livelihood diversification efforts; they are mere survival strategies and have not been able to take rural households out of poverty. The result is similar to the findings of Adepoju and Obayelu (2013) who stated that an average Nigeria rural household is risk neutral with diversification index of 0.53. The reasons for the low level of diversification among the fishers in the study area cannot be unconnected to the fact that they

were more into fishing activities than any other livelihood activity and the insecurity issues prevalent in the study area especially around Shiroro LGA coupled with lack of access to credit to set up other small businesses contributed to low level of livelihood diversification among the fishers. The findings of Aruwajoye and Ajibefun (2013) are in tandem with the findings of this study. The results suggested that the household on-farm livelihood diversification index (SDI = 0.05) is low, with 87.4% of the respondents reporting no diversification at all, and only 3.2% having a high livelihood diversification index. The respondents reported that they were more into non-farm livelihood activities than on-farm activities due to several challenges facing the latter, ranging from climate change to poor institutional support (missing rural markets, poor extension and lack of credit to support on-farm livelihoods activities).

Conclusion/ Recommendations

Simpson Diversification Index (SDI) was used to determine the level of diversity in livelihood activities of the fishers. The index provided clear dispersion of activities in the area. The computed Simpson diversification index suggests a high level of diversification among the fisher. It is recommended that Fishery extension agents should advise fishers to join fisheries membership association so as to access credit facilities and other benefits with a view to improving productivity in terms of fish catch. Trainings and seminars on livelihood diversification strategies should be provided by private organizations with the necessary support of the government. This will enlighten the fishers on how best to distribute their eggs among baskets and withstand shock that could arise from the failure of their major livelihood source. Government should also make formal credit available at one digit interest rate. More extension officers should be recruited by government to provide more extension services to fishers that could boost artisanal fisheries practices around the two dams and in the country at large.

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