

## **Livelihood Strategies and Rural Income: The Case of Fishing Communities in Kainji Lake Basin Nigeria**

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**Abstract:** Rural communities in Nigeria have suffered some neglect in terms of development over the years. Most of these communities are isolated and the community members are dependent mostly on the natural resource base for their survival and well-being. Fishing communities in Kainji Lake Basin (KLB) are not exceptional to that fact and their major resource base (fishery) is fast depleting due to poor management and over exploitation. The effect of resource decline does not only stop at poor catch but translates to poor income and poor well-being of fishing households. Livelihood diversification has been identified as a good option that lessens vulnerability, enhance well-being and improve rural economy. This study highlights the contributions of various livelihood activities and the best activity combination from empirical data collected from 30 fishing communities selected from 297 communities using stratification technique. Production function model and descriptive statistics were used for the analysis.

**Key words:** Livelihood strategies, income, fishermen, resources, rural development, Kainji lake

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### **INTRODUCTION**

Fishing communities in Nigerian are still far from developed and the actors are categorized among the poorest of the poor (Araoye, 2002; Williams, 2007). This important sector is faced with the challenge of dwindling resources over the years following exploitation and lack of sustainable management, leading to poor socio-economic well-being of the fishermen.

Kainji lake which is the 2nd most important inland fishery source in the country (Neiland and Ladu, 1997) has suffered deflation of fisheries resources which attests to the above fact. Considerable literature have agreed with the decline trend over the years (Ayeni and Mdaihli, 1996; Abiodun and Niworu, 2004; Raji and Ovie, 2007). Fish yield has dropped from 32,474 MT in 1995 to 9,248 MT in 2004 (Abiodun and Niworu, 2004). This situation affects the livelihoods of thousand of fisheries stakeholders who directly or indirectly benefit from the marketing chain. Therefore, the management of fisheries resources is central in addressing the peoples' vulnerability and thereby improving their livelihoods. This realization necessitated several approaches for resources management over the years by government, donor agencies and NGOs with more recent advocacy on the

concept of livelihood diversification in order to reduce fishing effort. Empirical evidences following some studies on the Lake Basin have shown that livelihood diversification among fishing households is an established fact of the fishers struggles to improve their well-being (Ayanda and Alamu, 1991; Alamu and Mdaihli, 1995; Okomoda, 1995; Ayeni and Mdaihli, 1996). This study moves a step further to the concept of livelihood diversity to look at the contribution of each of the livelihood activities in the communities and their best combination in order to strengthen the effort of the fishers in diversifying into other livelihood portfolios. This is fundamentally to achieve self-sufficiency, improved well-being and enhance rural community development in the areas.

### **MATERIALS AND METHODS**

**The study area:** Kainji lake is located between longitude 4°21' and 4°45' East and latitude 9°5' and 10°55' North. It cut-across Niger and Kebbi states with the greater part located in Niger state. The lake is the 2nd largest lake and the largest manmade lake in Nigeria (Ayeni and Mdaihli, 1996). It was created in 1968 following the impoundment of River Niger by the construction of the Kainji dam at

New Bussa in Borgu local government area of Niger state. The dam was created basically for hydroelectric power generation to boost industrial growth and general economic development in the country. However, the reservoir created secondary economic opportunities, in particular fisheries which attracted fishermen from near and far areas around the state and neighbouring countries of Benin and Niger republics (Ayanda and Alamu, 1991). Frame survey on the lake conducted in 2004 indicated the existence of 297 permanent fishing villages and camps and one temporary fishing camp around the Lake Basin and the islands (Abiodun and Niworu, 2004).

Some studies on the Lake Basin revealed the socio-economic characteristics of the people to comprise of the following; majority of the fishermen are Sarkawa sub tribe of the Kebbi Hausa with other tribes like Laru, Gungawa, Lopawa, Nupes. Majority of them are illiterates (Ayanda and Alamu, 1991). Traditional occupations of the people apart from fishing include farming, livestock and local enterprises such as pottery, mat weaving, gear/craft making and servicing, etc. (Alamu and Mdaihli, 1995). Local fish and general markets abound in the larger villages.

**Data collection and analysis:** The data collection for the study was conducted from Jan to Feb and Aug to Sep, 2008 in order to capture the two flood regimes on the lake (high flood and draw down) which determine fish catch and the two seasons (rainy and dry). The study covered the eight sub-stratums of the lake where thirty villages (10%) were randomly selected using random number generator from 297 (total number of fishing villages on the Lake Basin) and 259 respondents were drawn using stratification technique. Out of the 259 questionnaires administered, only 248 were returned valid for the analysis after sorting. Simple descriptive statistics and production function model were used for the analysis.

**Production function model:** In order to assess the contribution of various livelihood activities to household income, the study employed production function model where total household income is a function of variable inputs of the different production activities engaged by the fishing household. The Production function model is presented in Eq. 1:

$$Y_i = f(X) \quad (1)$$

Where:

$Y_i$  = Total household income

$X$  = Vector of variable inputs

This was later transformed to the Eq. 2 which considered the number of livelihood activities engaged

per household, household characteristics (family size) and variable inputs and tested their contribution to household income. Although, this was not necessarily testing causality, the results still showed association. That is it showed the variables that are associated with high and low household incomes. The Eq. 2 was specified as follows:

$$\ln Y_i = \alpha + \beta_1 \ln X_i + \beta_2 D_i + \beta_3 Z_i + \varepsilon_i \quad (2)$$

Where:

$Y_i$  = Total income for household  $i$

$X_i$  = Vector of cost variable inputs for household  $i$

$D_i$  = Vector of dummy variables for the main household livelihood activity

$Z_i$  = Households

To this effect, log of total household income is regressed against the following independent variables; log of cost of different inputs and dummy variables of primary occupations in which case the dummy variables entered as 1 if the household has the given occupation as a primary occupation and 0 if the household do not use that livelihood activity as the primary activity.

**Optimal livelihood combination:** The most common livelihood activity combinations were identified. Then the different output measures were related to the identified livelihood combinations. The output measures that were used include mean income and income per unit time (i.e., returns to labour). Descriptive statistics was used by comparing means of different livelihood activity combinations. A mean income for each livelihood activity combination was estimated by using the following formula:

$$\bar{Y}_{i...k} = \frac{\sum_{i=1}^k Y_i}{n} \quad (3)$$

Where:

$\bar{Y}_{i...k}$  = The mean income for households with activities  $i$  to  $k$

$k$  = Total number of activities a household is engaged in

$Y_i$  = The income from activity  $i$

$n$  = Total number of households with the given livelihood activity combination

## RESULTS AND DISCUSSION

**Contribution of various livelihood activities to fisher's household income:** While majority of the fishers on the Lake Basin are diversifying in response to the changes in fisheries resources, the diversification trends are demonstrably the same across most communities,

probably due to similarities in other resource availability like land for farming and cultural affiliation of the people in rearing livestock and skills. The study revealed that income from non-fishing activities make up an increasing proportion of overall gross annual income for most households in KLB fishing communities. Fishing and fish processing contribute up to 68.8% of the total income (44.9% for fishing and 23.9% for fish processing (Fig. 1). This has a similar result with a study in the Zambezi Floodplain which reveals that inland fisheries generate more cash for households than cattle rearing in more cases and in some cases more than crop production (Bene, 2006).

Other non fishing activities like crop production form the next most important contribution to household income with 15.8% of the total income followed by livestock with 12.4%.

Trading contribute the least with 3.1% (Fig. 1). However of recent trading and other servicing activities are widely spreading across the fishing communities. Bane and Ellwood (1986) in their study reported that increased earnings of all household members were the primary route out of poverty. The idea here is that irrespective of seasonality for any activity fishing households have access to income following their diversity of livelihood portfolios which they can always roll on for the well being of the family. Importantly, FAO (2004) reported that accumulating body of evidence points to the of diversification process for both people and sustainable natural resources but unfortunately many poverty reduction policies particularly in the developing countries lack these insights.

**Diversification pattern among fishing households:** The unsuccessful nature of fisheries management in Nigeria and the eventual dwindling of the resources have placed considerable constraints to accepting fishing as a viable livelihood option in most of the fishing communities of the Lake Basin. As a natural response to the decreasing returns of fishery production in the lake, the fishers diversified their income source portfolios in an attempt to avoid or alleviate poverty as well as to spread the risks associated with the increasingly vulnerable fishers' livelihood.

Diversification often involves a change in income portfolio either by adding portfolios or by expanding the existing ones. Although, the rural fishing economy is a complex one with various activities, however the majority of the fishers diversify more in fishing, crop production, livestock and other services. These economic activities are often inseparable and form a complex web of rural fishers' income.

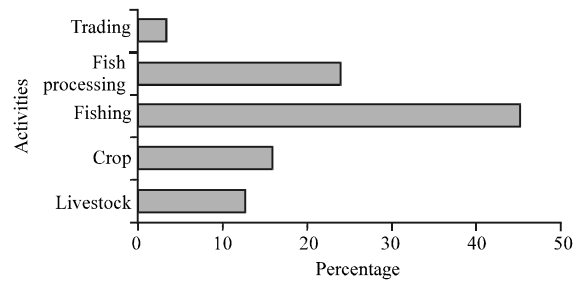


Fig. 1: Contribution of various activities to the overall income

Table 1: Household income sources

Activities	Observation	No. of household obtaining income	Percentage
Livestock	248	215	86.7
Crop	248	214	86.3
Fishing	248	245	98.8
Processing	248	142	53.3
Trading	248	33	13.3

Field survey, 2008

The study revealed that fishing continues to feature as a source of income across the fishing communities of KLB with 98.8% of the households involved in it and 86.7% of the households having some livestock ranging from large ruminants, medium and poultry. Another prominent activity in the communities is farming (crop production) with 86.3% of the fishing households having some income from it while 53.3 and 13.3% are engaging in fish processing (particularly women) and trading, respectively (Table 1). Other upcoming activities in the communities include services such as water and motor cycle transport, barbing and grain milling which the study did not capture because of the insignificant position they occupy.

**Factors contributing to the fishers income:** The multiple regression analysis for the livelihood activities follows; Production function model which explain the relationships between the total income obtained by the fishers ( $y_i$ ) as a function of vector of variable inputs from various activities ( $x_i$ ), dummy variable ( $D_i$ ) of numbers of activities engaged by the fishers and household characteristics ( $Z_i$ ), using household size as proxy.

The values of the 3bs were calculated (using GraphPad InStat) to show the relative contribution of the independent variables in determining the overall income of the fishers (dependent variable). The multiple correlation coefficient which indicate the extent to which the three independent variables predict the total fishers income was found to be significant ( $R^2 = 63.41\%$  that is 63.41% of the variance), the total income being explained by the three variables. Finally, the p values for two

Table 2: Livelihood activity combination (descriptive statistics)

Activities	N	Minimum	Maximum	Sum	Mean	SD
Mean income from hh with one activity	248	0.00	288000.00	535200.00	2158.0645	20387.83910
Mean income from hh with two activities	248	0.00	37352.38	424257.14	1710.7143	6277.42553
Mean income from hh with three activities	248	0.00	20459.18	629537.55	2538.4579	3865.13228
Mean income from hh with four activities	248	0.00	48400.00	1544400.64	6227.4219	8114.95040
Mean income from hh with five activities	248	0.00	194818.18	980918.18	3955.3152	20244.72854
Valid N (listwise)	248	-	-	-	-	-

Field survey, 2008; hh = household

variables, variable inputs and household size (characteristics) showed a significant contribution to the total income with  $p = 0.0001$  and  $0.0331$ , respectively. However, the number of activities represented by the dummy variable was not significant at  $0.8117$ . Impliedly, this shows that the variable inputs used by the fishers and the household size are strong determinants of their income while the number of activities does not count much to their total income. This output further motivated the study to compare means of income from the various activities to see the combination of activities that gives the highest income.

**Best activity combination:** Five groups of different activity combinations in the fishing communities were identified, this was later subjected to a descriptive statistics and compared with the mean income for each livelihood activity combination. The results shows that the fishing households that combine four activities have more income with mean of 6227.42 followed by five activities with mean income of 3955.31. The least is those that have only two activities (Table 2). Therefore, it is recommended that fishing households should engage in four to five activities rather than two. This essentially will allow them to reduce fishing effort and thereby sustain the resources for future generation.

## CONCLUSION

The study assessed the contributions of various livelihood activities of fishers to the rural fishing economy. It also assessed the best combination of activities for more income generation and concludes that multiple activities of four activities can generate more revenue and serve as resilience against vulnerability and poverty among fishing households, hence the tendency for economic emancipation and rural development.

The conclusion equally contrasts with fisheries perspective which tends to focus on single resource enhancement and management and it provides an insight on prioritizing development of infrastructure and access to capital access to facilitate adoption,

expansion and combination of multiple livelihoods activities, hence more income and improved well-being.

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