



Livelihood strategies and rural income among fishing communities in Kainji lake basin Nigeria

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ABSTRACT: This paper examines livelihood strategies and rural income, particularly the various rural enterprises and their contributions to the overall household income, the best livelihood enterprise combination and factors determining income generation from empirical data collected from 30 fishing communities in Kainji Lake Basin and among 248 Fishermen (respondents) drawn using stratification technique. Production function model, multiple regression and descriptive statistics were used for the analysis. The result revealed that fishing contributes 44.9% of the total household income followed by fish processing, crop production, livestock and trading with 23.9%, 15.8% 12.4% and 3.1%, respectively. The result equally revealed that multiple enterprises of four generate more income with a mean of N6,227.42 followed by five enterprises with a mean income of N3955.33. The study concludes that multiple activities generate more income to rural household and could serve as resilience against vulnerability and poverty and guarantees livelihood security and resource sustainability. Diversification of livelihood portfolios is therefore a critical turning point for sustainable livelihood, which calls for aggressive adoption by all fishermen.

Keywords: Livelihood; Income; Fishermen; Resources; Kainji Lake

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INTRODUCTION

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 Nigeria are still far from developed and the actors are categorized among the poorest of the poor (Araoye, 2002; Williams, 2007; Tafida *et al.*, 2009). Kainji Lake fishery 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 (Raji and Ovie, 2007).

Kainji Lake has suffered depletion of its fisheries resources, which attests to the above fact. Considerable literatures have agreed with the declining trend over the years (Ayeni and Mdaihli, 1996; Abiodun and Niworu, 2004; Raji and Ovie, 2007). Fish yield in the Lake has dropped from 32,474MT in 1995 to 9,248MT 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. The effect of resource decline does not only stop at poor catch but translates to poor income and poor well-being of fishing households. 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 Non Governmental Organizations (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 showed 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 Mdaihl, 1995; Okomoda, 1995, Ayeni and Mdaihl 1996; Tafida *et al.*, 2010). 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 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 enterprises, however, the majority of the fishers diversify more into fishing, crop production, livestock and other services. These economic enterprises are often inseparable and form a complex web of rural fishers' income.

This paper moves a step further to the concept of livelihood diversity to look at the contribution of each of the livelihood enterprises and their best combinations in order to strengthen the effort of the fishers in diversifying into other livelihood portfolios. This is fundamentally to achieve self-sufficiency/resilience, improved well-being and enhance rural community development in the areas. Against this background, the present study is an attempt to examine the issues relating livelihood strategies and rural income in Kainji Lake Basin fishing communities with the following specific objectives to:

- i) assess the contribution of each livelihood enterprise
- ii) examine the factors determining fishers' income generation and
- iii) identify the best combination of livelihood enterprises

MATERIALS AND METHODS

The study area

Kainji Lake is located between longitude 4° 21 and 4° 45 East of the equator and latitude 9° 5 and 10° 55 North of the equator. It cuts-across Niger and Kebbi States, with the greater part located in Niger State. The Lake is the second largest lake and the largest man-made Lake in Nigeria (Ayeni and Mdaihl, 1996; Neiland and Ladu, 1997). It was created in 1968 following the impoundment of River Niger by the construction of the Kainji Dam at New Bussa, Borgu Local Government Area of Niger State. The Dam was created 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 within and outside the state and neighbouring countries of Benin and Niger republics (Ayanda and Alamu, 1991). The Lake has two distinct flood regimes (High Flood and draw down), which largely determines fish catch. Baseline survey on the lake conducted in 2004 indicated the existence of two hundred and ninety seven (297) permanent fishing villages and camps and one (1) 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 illiterate (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 provision of services (Alamu & Mdaihli, 1995).

Data collection and analysis

The data collection for the study was conducted from January-February and August-September, 2008 in order to capture the two flood regimes on the Lake (high flood and draw down) and the two seasons (Rainy and Dry), which determine fish catch. This was essentially to capture seasonality and income variations. The study used two different sampling; the villages and the respondents, which covered the eight sub-strata of the Lake. First, 30 villages (approximately 10% of the total number of fishing villages) were randomly selected using random number, generated from 297 (total number of fishing villages on the Lake basin). Secondly, 259 (approximately 60%) of the fishermen (respondents) from the selected 30 villages with total number of 433 fishermen were drawn using stratification technique and served as sample size (Akogun, 2000). Out of the 259 questionnaires administered, 248 were returned valid for the analysis. Simple descriptive statistics, production function model and multiple regressions 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 enterprises engaged by the fishing household. The production function model is presented below:

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

Where:

Y_i = dependent variable (total household income)

X_{i-n} = vector of variable inputs

This was later transformed to equation 2, which considered the Number of livelihood enterprises 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. It showed the variables that are associated with high and low household incomes. The transformed production function model is 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 main livelihood enterprises (primary occupation) in the communities

Z_i = are the households number

ε = error term

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 enterprise as a primary occupation and 0 if the household do not use that livelihood enterprise as the primary occupation.

Optimal livelihood combination

The most common livelihood enterprise combinations were identified. Then the different output measures were related to the identified livelihood enterprise combinations. The output measures that were used include mean income and income per unit of enterprise. Descriptive statistics was used by comparing means of different livelihood enterprise combinations. A mean income for each livelihood enterprise combination was estimated by using the following formula:

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

Where $\bar{Y}_{i,\dots,n}$ is the mean income for

households with enterprises i to k where k is the total number of enterprises a household is engaged in, Y_i is the income from enterprise n and I is total number of households with the given livelihood enterprise combination.

RESULTS AND DISCUSSION

Contribution of various livelihood activities to fisher' household income

The study revealed that income from non-fishing enterprises make up an increasing proportion of overall income for most households in Kainji Lake fishing communities. From Figure 1, fishing and fish processing contribute up to 68.8% of the total income (44.9% for fishing and 23.9% for fish processing. 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% (Figure 1). This result is similar to a study in the Zambezi Floodplain, which revealed that inland fisheries generated more cash for households than cattle rearing in most cases and in some cases more than crop production (Bene, 2006). 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 e.g. availability of land for farming and cultural affiliation of the people in rearing livestock and skills. However, of recent trading and other servicing activities are widely spreading across the fishing communities. Bane and Ellwood (2004) 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 fall back for the well-being of the family.

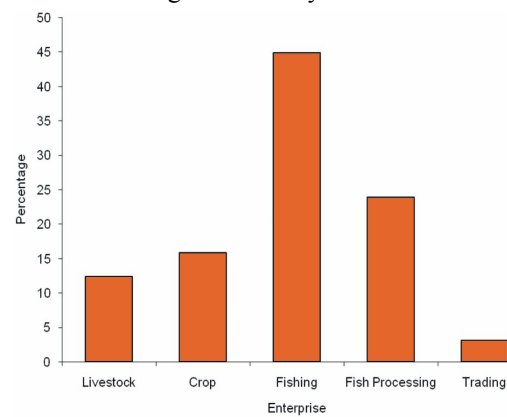


Figure 1: Contribution of various activities to the overall income

Diversification pattern among fishing households

The study revealed that fishing is still an important household enterprise generating income across the fishing communities of Kainji Lake Basin 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 enterprise in the communities is crop production with 86.3% of the fishing households having some income from it, while 53.3% and 13.3% are engaged in fish processing (particularly women) and trading respectively (Table 1).

Table 1: Household Income Sources

Enterprise	Observation	No of Household obtaining Income	%
Livestock	248	215	86.70
Crop	248	214	86.30
Fishing	248	245	98.80
Processing	248	142	53.30
Trading	248	33	13.30

Source: Field Survey, 2008

Factors determining the fisher’s income

The relationships between the total income obtained by the fishers (y_i) as a function of vector of variable inputs such as seeds, fertilizer, herbicides, labour and man hour (crop); cost of fishing gear/craft, fuelling labour (fishing) and other various enterprises (x_i), dummy variable (D_i) of numbers of activities engaged by the fishers such as fishing, fish processing, trading, livestock and crop production and household characteristics (Z_i), using household size as proxy was assessed. The values of the three coefficients 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 found a strong correlation (R Squared =63.41%), the total income being explained by the three variables. Finally, the p values for two 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 enterprises represented by the dummy variable was not significant at 0.8117 . This

shows that the variable inputs used by the fishers and the household size are strong determinants of their income. This output further motivated the study to compare means of income from the various enterprises to see the combination of enterprises that gives the highest income.

Best activity combination

Five groups of different enterprise 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. Hence

$$\bar{Y}_{i,...,k} = \frac{\sum_{i=1}^k Y_i}{n}$$

The results shows that the fishing households that combine four enterprises have more income, with mean of N 6227.42, followed by five enterprises with mean income of N 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 enterprises rather than two. This essentially will allow them to reduce fishing effort and thereby sustain the resources for future generation.

Table 2: Livelihood Enterprise Combination (Descriptive Statistics)

	N	Minimum	Maximum	Sum	Mean	Std. Deviation
mean income from hh with one enterprise	248	.00	288000.00	535200.00	2158.07	20387.84
mean income from hh with two enterprises	248	.00	37352.38	424257.14	1710.71	6277.43
Mean income from hh with three enterprises	248	.00	20459.18	629537.55	2538.46	3865.13
mean income from hh with four enterprises	248	.00	48400.00	1544400.64	6227.42	8114.95
mean income from hh with five enterprises	248	.00	194818.18	980918.18	3955.32	20244.73
Valid N (listwise)	248					

Source: Field Survey, 2008

hh=household

CONCLUSION

The study assessed the contributions of various livelihood enterprises of fishers to the rural fishing income. It also assessed the best combination of enterprises for more income generation and concludes that multiple engagements of four enterprises 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 enterprises, hence more income and improved well-being.

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REFERENCES

- ABIODUN, J. A. and NIWORU, A. M. (2004).** Fisheries Statistics Bulletin, Kainji Lake Fisheries Management and Conservation Unit, *Technical Report Series 23*:1-22.
- AKOGUN, O. B. (2000).** The Researcher's Manual: A complete guide to research from conception, proposal writing, implementation, reporting and presentation. Paraclete Yola Pp 77-103
- ALAMU, S.O. and MDIHLI, M. (1995).** Evaluation of formal and informal loan schemes existing in Kainji Lake. National Institute for Freshwater Fisheries Research Annual Report pp 188-193.
- ARAOYE, P.A. (2002).** Man-made Lakes, ecological studies and conservation needs in Nigeria. Invited essay Revised *Biology for the Tropics* **50** (314): 2002.pp.857-864.

- AYANDA, J. O. and ALAMU, S. O. (1991).** Preliminary investigation into the development and impact of fishermen's organization in the Kainji Lake Basin. National Institute for Freshwater Fisheries Research Annual Report pp 195-204.
- AYENI, J. S. O. and MDAIHLI, M. (1996).** Identification of non-fishing income opportunities around Kainji. Nigerian-German (GTZ) Kainji Lake Fisheries Promotion Project, 68pp
- BANE, M. J. and ELLWOOD, D. T. (2004).** Slipping into and out of poverty; the dynamics of spells, *The Journal of Human Resources* **18**: 81-103.
- BENE, C. (2006).** "Small Scale Fisheries: Assessing their contribution to rural livelihoods in developing countries." FAO fisheries circular 1008, Food and Agricultural Organization, Rome.
- NEILAND, A. E. and LADU, B. M. B. (1997).** Enhancement of inland fisheries in Nigeria: The institutional context provided by traditional and modern system of fisheries management. FAO Fisheries Technical Paper 374, pp371-392.
- OKOMODA, J. K. (1995).** A Qualitative study to identify alternative sources of income for fisher folks of Kainji Lake Basin. NIFFR Annual Report pp. 194.
- RAJI, A. and OVIE, S.I. (2007).** Biodiversity and Sustainable Livelihoods: The case of the Nigerian Inland Water Fisheries. Paper presented at the national stakeholders workshop on inland capture fisheries development in Nigeria. Kaduna, February 20-22, 2007.
- TAFIDA, A.A., ADEBAYO, A.A., GALTIMA, M. and MANI, J. R. (2010).** Assets accessibility and its relevance to livelihood diversity and poverty alleviation among the artisanal fishers in Kainji Lake Basin Nigeria. *Nigerian Journal of Fisheries Technology* **1(2)**61-66.
- TAFIDA, A.A., ADEBAYO, A.A., AYANDA J. O, WARAA. and ADEDEJI, R. B. (2009).** Rural infrastructure and poverty alleviation in fishing communities around Kainji Lake Basin Nigeria. *Nigerian Journal of Fisheries Technology* **1(1)** 135-142.
- WILLIAMS, S. (2007).** Gender and youth perspective in effective fisheries extension method. Paper presented at the national stakeholders workshop on inland capture fisheries development in Nigeria; Kaduna, February 20-22 2007 12pp.