SOCIO-ECONOMIC DETERMINANTS OF SMALL-SCALE FISH PRODUCTION IN LOKOJA LOCAL GOVERNMENT AREA OF KOGI STATE, NIGERIA.

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ABSTRACT

The objectives of this paper were to identify the socio-economic characteristics of small-scale fish farmers in the study area, determine the inputs accessibility of the fish farmer, determine the output and income generated from fish production and identify the constraints faced by the fish farmers. A total of six villages were randomly selected from the LGA. Purposive sampling technique was used to select 140 small-scale fish farmers from the sampled villages for the study. The data for this study were collected with the aid of Interview Schedule. This was validated and subjected to reliability test using Split-half technique (r = 0.84).Result shows that fish farming is male dominated with only 32 percent of female involvement. Majority (75.7%) of them were members of different associations. Almost 34 percent of the fish farmers had contact with extension agents once in a month, while others had between two to four contacts per month. Majority (71.4%) of the respondents had between 1 and 5 fish ponds which they used for fish production while many (46.4%) of the fish farmers had less than 5,000 fingerlings in stock. Result shows that majority of the fish farmers produced less than 10,000kg of both fresh fish (73.6%) and smoked fish (86.4%). Moreover, over 60 percent and 46.4 percent of the fish farmers generated less than N250, 000 from fresh fish and smoked fish per annum respectively. Regression analysis shows that 53% of the variations in the output of fish measured in kilogram were explained by the variables included in the model. The regression results also showed that membership of association, extension contact, income, fertilizer and number of fingerlings were significant in the in the small-scale fish production in the study area. It is recommended that various existing associations should be strengthened and empowered economically by both governmental and non-governmental organizations. Furthermore, private extension outfits should be revitalized to complement government efforts in the dissemination of improved technologies and capacity building of fish farmers.

INTRODUCTION

Fish farming is the rearing of fish in man-made pools or tanks or the rearing of fish under controlled or semi-controlled conditions. The Nigeria fishing industry has four major sub-sectors. These include the commercial or industrial fishing, artisanal, fish culture (aquaculture) and the distant water. The artisanal fishing comprises of catches from small and medium manual motorized canoe boats in the coastal and brackish water, inland water, rivers and lakes. Nigerians are large consumers of fish with demand estimate at 1.4 million metric tones. However, a demand supply gap of at least 0.7 million metric tons exists nationally with import making up the short fall at a cost of about 0.5 billion US dollars per year. Fish and fish products constitute more than 60% of the total protein intake in adults especially in rural areas, while domestic fish production supplied by artisan fisher – folk is about 500,000 metric tons only, despite extensive fishing activities in many water bodies across the country (Adekoya and Miller, 2004). Out of 35grams of animal protein per day per person recommended by FAO, less than 7 grams is consumed on the average (FAO, 1991). Although Nigeria is currently a leading country in Sub-Saharan Africa in fish production in terms of value and weight, contribution to GDP and protein consumption is relatively insignificant. According to Hecht, (2006), production as at 2003 stood at 30, 677 tons, a percentage increase of about 41 percent when compared with 15,000 tons obtained in 1994. Nigeria has consistently maintained a leading position in the region since 2003.

In Nigeria, small scale fish farming has been reported as the most important sub-sector in the fishing industry, accounting for well over 90% of total domestic production (FMANR, 1997). Fish is a vital source of food for people. It is the most important single source of high quality protein, providing 16% of animal protein consumed by the world's population (FAO, 1991). Fish farming generates employment and income for all categories of people involved in the fish farming and thus contribute to the national economy. About 38 million people worldwide are employed in fisheries, 95% of whom are in developing countries, (Sultana *et. al.*, 2003).With Nigeria's population rate at about 2.83 percent per annum and a declining rate of animal protein, the demand for fish has always outstripped the supply. The major constraints to fish farming include environmental impacts of aquaculture operations such as water pollution, inadequate supply of fingerlings, inadequate information and feeds supply

(Akiah, 1997; Spaulding and Blasco,1997). This paper therefore investigates the socio-economic factors that affect small scale fish production in Lokoja L.G.A., Kogi state. The specific objectives were to: identify the socio-economic characteristics of small-scale fish farmers in the study area, determine the inputs accessibility of the fish farmers in the study area, determine the output and income generated from fish production by the farmers in the study area and identify the constraints faced by the fish farmers.

METHODOLOGY

Kogi State has 21 Local Government Areas, LGA, with a population of 3,314,043. Lokoja LGA was purposively selected because of its preponderance fishing activities. It has a population of 196,643 according to 2006 Census. A total of six villages were randomly selected for the study. Purposive sampling technique was used to select 140 small-scale fish farmers from the sampled villages as respondents for the study. The data for this study were collected with the aid of Interview Schedule. This was validated by experts and subjected to reliability test using Split-half technique (r = 0.84). Time frame for the study is one year

Data collected were analyzed using descriptive (frequency, percentages, means and mode) and regression analysis

Model specification: The ordinary least square (OLS) multiple regressions used is specified in the implicit form as follows:

$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12} X_{13}, U_i)$ *(1)*

The explicit forms of this function take the following forms:

$Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_{8+} b_9 X_9 + b_{10} X_{10} + b_{11} X_{11} + b_{12} X_{12} + b_{13} X_{13} + U_i)$ *(Linear)* (2)

$Y = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + b_8 \ln X_{8+} b_9 \ln X_9 + b_{10} \ln X_{10} + b_{11} \ln X_{11} + b12 \ln X12 + b_{13} \ln X_{13} + U_i)$ (Semi log) (3)

$\ln Y = b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + b_8 \ln X_{8+} b_9 \ln X_9 + b_{10} \ln X_{10} + b_{11} \ln X_{11} + b_{12} \ln X_{12} + b_{13} \ln X_{13} + U_i)$ *(Cobb- Douglas)* (4)

$\ln Y = b_0 + b_1 X_1 + b_2 X_2 + b_3 X_3 + b_4 X_4 + b_5 X_5 + b_6 X_6 + b_7 X_7 + b_8 X_{8+} b_9 X_9 + b_{10} X_{10} + b_{11} X_{11} + b_{12} X_{12} + b_{13} X_{13} + U_i)$ *(Exponential)* (5)

Where

Y = output of fish (Kg)

X_1 = Age of the fish farmer (years)

X_2 = Education (years of schooling)

X_3= Household size (actual number)

X_4 = Fish farming experience (years)

X_5 = Membership of associations (Membership = 1; No Membership = 0)

X_6 = Credit status (access to credit = 1; no access = 0)

X_7 = Extension contact (number of times per month)

X_8 = Income generated (Amount in Naira)

X_9 = Hired labour (Amount in Naira)

X_{10} = Fertilizer use (Used = 1; not used = 0)

X_{11} = Feeds procured (Amount in Naira)

X_{12} = Pond (actual number)

X_{13} = Fingerlings (actual number)

ln = logarithm

b_0 = constant

U_i = error term

b_1 to b_{13} = coefficients of independent variables

RESULTS AND DISCUSSIONS

Socio-economic features of the fish farmers

The fish farmers'socio-economic characteristics considered in this study are shown in Table 1. Fish farming is male dominated with only 32 percent of female involvement. According to Kainga and Adeyemo (2009), the fewer number of females in fish production could be attributed to its time consuming nature. Findings show further that about 32 percent of the respondents were within the active age of 31 – 40 years. The mean age of the respondents is 41years. This implies that majority of fish farmers were young and energetic to be involved in fish production.

Table 1: Socio-economic characteristics of the fish farmers

Variable	Frequency	Percentages
Sex		
Male	95	67.9
Female	45	32.1
Total	140	100.0
Age (Yrs)		
Below 31	33	23.6
31-40	44	31.4
41-50	34	24.3
51-60	22	15.7
Above 60	7	5.0
Total	140	100.0
Highest educational level		
Non-formal Education	34	24.3
Primary Education	10	7.1
Secondary Education	14	10.0
Tertiary Education	25	17.9
None	57	40.7
Total	140	100.00
Household size		
1-5	78	55.7
6-10	40	28.6
11-15	15	10.7
16-20	2	1.4
Above 20	5	3.6
Total	140	100.0
Farming experience		
1-5	47	33.6
6-10	70	50.0
11-15	19	13.6
16-20	3	2.1
Above 20	1	0.7
Total	140	100.0
Membership of associations		
Membership	106	75.7
No membership	34	24.3
Total	140	100.0

Source: Field Survey Data, 2010

Table1 also reveals that only 35 percent had formal education and this may affect technology adoption in fish production. As buttressed by Adaigbo, *et al.*, (2009), the need for education in agriculture cannot be over-emphasized since the level of education of a farmer not only increase productivity but enhances the ability to understand the full potentials of new agricultural technologies. Moreover, over one-half (about 56%) of the respondents had between 1 and 5 household size. This suggests that most of the respondents had fewer mouths to feed and the income realized could be used to expand the fish farm or invested in other income - generating activities. Experience and membership of associations can have positive effects on fishing activities. For instance, experience can enhance knowledge and skills, while membership of associations can improve access to production inputs, especially credit facilities. This might be the reason why majority of them were members of different associations (75.7%).

Access to inputs and extension services

Extension services

Table 2 shows that a little over one-half of the respondents (55.0%) did not have any contact with Extension Agents (EAs) in the last one year. However, 33.6 percent of the fish farmers had contact with EAs once in a month, while others had between two to four contacts per month. EAs are important in the dissemination of improved farm technologies and facilitate its adoption for improved farm production and income.

Table 2: Contact with Extension Agents (EAs)

Extension contact / month	Frequency	Percentage
No contact	77	55.0
Once	47	33.6
Twice	13	9.3
Thrice	1	0.7
Four times	2	1.4
Total	140	100.0

Source: Field Survey Data, 2010

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Number of fish ponds used

It could be observed from Table 3 that majority of the respondents had between 1 and 5 fish ponds which they used for fish production (71.4%). The maximum number of ponds used was between 16 and 20 as indicated by only few of them (2.1%). The average number of ponds used is 8 units.

Table 3: Number of ponds used by the respondents

Number of ponds (unit)	Frequency	Percentage
1-5	100	71.4
6-10	27	19.3
11-15	10	7.1
16-20	3	2.1
Total	140	100.0

Source: *Field Survey Data, 2010*

Fingerlings acquisition

Findings in Table 4 show that most of the fish farmers had less than 5,000 (46.4%) fingerlings in stock. This is followed by between 5,000 and 10,000 fingerlings as indicated by 31.4 percent of the respondents. Only few had above 20,000 fingerlings (7.1%), while the rest had between 10,001 and 20,000 fingerlings (15.1%). It is pertinent to note that over half of respondents practiced measures like avoidance of overstocking and regular change of water to reduce mortality rate among the fingerlings. The mean number of fingerlings acquired is 9,029

Table 4: Distribution of respondents according to their access to fingerlings/year

Variables	Frequency	Percentage
Number of fingerlings		
Less than 5000	65	46.4
5000-10000	44	31.4
10001-15000	16	11.4
15001-20000	5	3.7
Above 20000	10	7.1
Total	140	100.0

Source: Field Survey Data, 2010

Fertilizer usage

Results in Table 5 show that majority of the fish farmers did apply fertilizer (92.1%), while others did not. Also, majority of those that used fertilizer (84.5%), bought them from open markets rather than buying from authorized distributors and ADP. The implication is that farmers may not get high quality fingerlings from open markets due to lack of quality control when compared with the fingerlings supply by authorized dealers and ADPs. Most of the respondents used less than 50kg of fertilizer (65.1%) This is followed by those that used between 50 and 100 kg of fertilizers (30.2%).

Table 5: Distribution of respondents according to fertilizer used

Fertilizer	Frequency	Percentage
Application		
Yes	129	92.1
No	11	7.9
Total	140	100.0
Source		
Open market	109	84.5
Authorized distributors	8	6.2
ADP	12	9.3
Total	129	100.0
Quantity (kg)		
Less than 50	84	65.1
50-100	39	30.2
101-150	2	1.6
151-200	3	2.3
Above 200	1	0.8
Total	129	100.0

Source: Field Survey Data, 2010

Feeds accessibility

The most common source of feed is open market as indicated by almost 51percent of the fish farmers, while 21.4 percent of them purchased from the authorized dealers. The implication is that adulteration of feeds is common among open marketers and this may affect fish production. About 28 percent produced their feeds as this would ensure quality control of feeds (Table6).

Table 6: Distribution of respondents according to feeds accessibility

Feeds	Frequency	Percentage
Source		
Open market	71	50.7
Authorized distributor	30	21.4
Formulated	39	27.9
Total	140	100.0
Cost of feeds / Month (N)		
Less than 2000	25	17.9
2000-2500	34	24.3
2501-3000	38	27.1
Above 3000	43	30.7
Total	140	100.0

Source: *Field Survey Data, 2010*

Access to credit facilities

Table 7 shows that out of the 21.4 percent of the respondents that had access to credit facilities over the last two years, about 47percent of them obtained more than N50,000 credit facilities, while others received lesser amounts. Majority of them (76.7%) received credit facilities from commercial Banks while very few of them received credit facilities from local money lenders (13.3%) and friends (10.0%).

Table 7: Respondent's access to credit facilities

Credit/Loan (N)	Frequency	Percentage
Access	30	21.4
No access	110	78.6
Total	140	100.0
Amount collected		
10000-30000	5	16.6
30001-50000	11	36.7
50001-70000	3	10.0
Above 70000	11	36.7
Total	30	100.0
Sources of credit		
Commercial bank	23	76.7
Local money lender	4	13.3
Friends	3	10.0
Total	30	100.0

Source: Field Survey Data, 2010

Labour

Table 8 shows that 45 percent of the respondents spent over N40,000 on hired labour per annum, while few of them spent less than N10,000. The various amounts spent on labour may be related to the number of ponds owned by individual.

Table 8: Amount paid on hired labor by the respondents/year

Amount spent (N)	Frequency	Percentage
Less than 10000	22	15.7
10000-20000	30	21.4
20001-30000	13	9.3
30001-40000	12	8.6
Above 40000	63	45.0
Total	140	100.0

Source: Field Survey Data, 2010

Output of fish produced and income generated from sales of fish by the farmers per annum.

Fresh and smoked fish

The fish produced were classified into fresh and smoked fish. Table 9 shows that 73.6% and 86.4%, of the fish farmers produced less than 10,000kg of both fresh fish and smoked fish respectively, while few (10 percent) produced above 40,000 kg of fresh fish and 15,000kg of smoked fish (0.7%). Output of fresh fish is more than smoked ones. The difference may be as a result of weight loss during smoking and the demand for fresh fish.

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Table 9: Distribution of the respondents according to their average output

Variables	Frequency	Percentage
Fresh fish (kg)		
Less than 10000	103	73.6
10000-20000	19	13.6
20001-30000	3	2.1
30001-40000	1	0.7
Above 40000	14	10.0
Total	140	100.0
Smoked fish (kg)		
Less than 1000	121	86.4
1000-5000	10	7.1
5001-10000	4	2.9
10001-15000	4	2.9
Above 15000	1	0.7
Total	140	100.0

Source: Field Survey Data, 2010

Income generated from fish production

Table 10 shows that over 60 percent and 46.4 percent of the fish farmers generated less than N250, 000 from fresh fish and smoked fish per annum respectively. The table further shows that more money was generated from sales of fresh fish than smoked fish. However, fresh fish are more prone to deterioration but smoked fish have longer shelf life.

Table 10: Distribution of respondents according to their average income

Income (N)	Frequency	Percentage
Fresh fish (kg)		
Less than 250,000	85	60.7
250,000-500,000	15	10.7
500,001-750,000	12	8.6
750,001-1,000,000	22	15.7
Above 1,000,000	6	4.3
Total	140	100.0
Smoked fish (kg)		
Less than 50,000	65	46.4
50,000-100,000	44	31.4
100,001-150,000	16	11.4
150,001-200,000	5	3.6
Above 200,000	10	7.1
Total	140	100.0

Source: Field Surve Data, 2010

Regression Analysis and Constraints to fish production

A total of 12 constraints to fish farming in the study area were identified. Factors like inadequate marketing facilities (42.9%), inadequate capital (40.7%) and bad weather effect (37.1%) were the first three constraints that respondents considered as highly severe in fish production.

Table 11: Distribution according to constraints

Variables	Highly severe F	%	Severe F	%	Not-severe F	%	Total
1. Inadequate funds	57	40.7	38	27.1	45	32.1	140
2. Lack of access to land	14	10.0	45	32.1	81	57.9	140
3. High cost of input	14	10.0	45	32.1	81	57.9	140
4. Bad weather effect	52	37.1	77	55.0	11	7.9	140
5. Shortage of labor	11	7.9	71	50.7	58	41.4	140
6. Socio-cultural constraints	12	8.6	43	30.7	85	57.1	140
7. Lack of marketing policies	15	10.7	81	57.9	44	31.4	140
8. Pest and disease attack	28	20.8	78	55.7	34	24.3	140
9. Lack of time time	22	15.7	75	53.6	43	30.7	140
10. Inadequate storage facilities	15	10.7	47	33.6	78	55.7	140
11. Inadequate marketing facility	60	42.9	60	42.9	20	14.3	140
12. Tedious nature of fish farming	20	14.3	60	42.9	60	42.9	140

Source: Field Survey Data 2010.

Various functional form of the econometric models were considered. The exponential production function stood out to be the lead equation based on the normal economic econometrics and criteria for selecting the lead equation which includes the explanatory power of the model (R^2), conformity of signs of estimated co-efficient with a priori expectation, magnitude of estimated co-efficient as well as the F-statistics.

Table 12: Regression analysis of relationship between socio-economic factors of the respondents and the fish output

Factors	Regression Coefficient	t-values
Constant	6.629	7.151
Age (X_1)	-0.009	-0.551
Years of schooling (X_2)	-0.044	-1.422
Household size (X_3)	-0.077	-1.565
Farming experience (X_4)	0.069	1.463
Membership of association (X_5)	0.732	2.023*
Credit (X_6)	4.98E-006	1.476
Extension contact (X_7)	-0.098	-0.488*
Income (X_8)	0.011	1.685**
Hired labor (X_9)	0.010	1.509
Fertilizer (X_{10})	0.006	2.881**
Feeds (X_{11})	0.00	-0.719
Ponds (X_{12})	0.000	1.203
No of fingerlings (X_{13})	2.450	2.842**
R^2	0.531	
F-Ratio	4.785	

**significant at 1%, * significant at 5%

Source:Field Survey Data,2011

Exponential regression was chosen based on the number of regression co-efficients that were significant and highest R^2-Value of 0.531. The R^2 value of 0.53 implies that 53% of the variations in the output of fish measured in kilogram were explained by the variables included in the model. The results also showed that income, fertilizer and number of fingerlings were significant at 1% level of probability. Both contact with EAs and membership of associations had positive and significant relationship with fish output at 5% level of probability. It suggests that as contact with EAs and farmers' membership of association increased, farmers' fish outputs also increased. This might arise as a result of improved access to inputs and extension services as members of different associations or groups.

CONCLUSIONS

It can be concluded that fish farming is male dominated with only 32 percent of female involvement. Majority of those that used fertilizer bought them from open markets other than authorized distributors. The same thing was applicable to fingerlings and feeds. Also, more money was generated from sales of fresh fish than smoked fish. In addition, 53 percent of the variations in the output of fish measured in kilogram were explained by use of fertilizer, number of fingerlings membership of associations, contact with EAs and income generated. Furthermore, both contact with EAs and membership of associations had positive and significant relationship with fish output at 5% level of probability. It is recommended that various existing associations should be strengthened and empowered economically by both governmental and non-governmental organizations. Moreover, private extension outfits should be revitalized to complement government efforts in the dissemination of improved technologies and capacity building of fish farmers.

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