EFFECTS OF SOCIO-ECONOMIC FACTORS ON THE ADOPTION OF IMPROVED PRODUCTION TECHNOLOGIES BY FISH FARMERS IN KOGI STATE, NIGERIA

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Abstract

This study investigated the effects of socio- economic factors on the adoption of improved technologies by fish farmers in Kogi state, Nigeria. The specific objectives of the study were to examine the socio-economic characteristics of the fish farmers, ascertain the level of awareness of improved fish production technologies, identify the improved fish production technologies adopted and determine the factors affecting the adoption of improved technologies by the fish farmers in the study area. Five Local Government Areas were purposively selected for the study because of the concentration of fish farmers in the areas. They are Lokoja, Idah, Ajaokuta, Kabba/Bunu and Kotonkarfe. A total of 80 fish farmers (using multi stage sampling techniques) were selected and information elicited from them using interview schedule. Data analysis involved descriptive and inferential statistics. Result shows that the mean age of the fish farmers was 47 years. Stocking method (93.8 %), fish feeding technique (91.2 %), harvesting (81.3 %) and pond draining method (68.8 %) were the most adopted technologies. Binomial logit regression indicated that at 0.05 level of significance, there was a positive and significant relationship between education and extension visit. Stakeholders should encourage education and extension visits in orderto enhance the food security status of the study area and consequently Nigeria.

Keywords :Fish farmers, Technology, Adoption

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INTRODUCTION

Out of the three fundamental needs of human beings (i.e. food, clothing and shelter), food is probably the most important. Food contains nutrients that give energy, growth and maintenance of health. Achieving and maintaining food security is a fundamental problem facing the world today. Despite substantial increase in food production in many countries, over 500 million people still suffer from malnutrition (Tacon, 2001).

Aquaculture which has been defined as the husbandry of aquatic organisms such as fish, shellfish and even plants is an integral sub-sector of agriculture and it is still one of the primary occupation of most people in developing nations of the world. It is an essential part of the world's food producing sector, providing about 50 % of the world's food fish supply (FAO 2011).

In the year 2010, capture fisheries and aquaculture provided the world population with about 148 million metric tonnes of fish, of which about 128 million tonnes was utilized as food for people (FAO, 2010). With sustained growth in fish production and improved distribution channels, world fish food supply has grown dramatically in the last five decades, with an average growth rate of 3.2 % per year in the period 1961 – 2009, outpacing the increase of 1.7 % per year in the world population (FAO, 2010).Aquaculture development has not realized its potential in many developing countries as the need for integrating aquaculture development into overall comprehensive rural development programs has not been fully appreciated. While an annual growth of 14 % in aquaculture appears impressive, most of the growth has been recorded in China with only about 4.4 % occurring in other countries. The least developed countries (LDCs), mostly in Sub- Saharan Africa and in Asia; remain minor in terms of their share of world aquaculture production (4.1 % by quantity and 3.6 % by value). However, some developing countries in Asia and Sub- Saharan Africa including Nigeria are making rapid progress to become significant or major aquaculture producers in their regions. Therefore, fish and fishery products represent a very valuable source of protein and essential micronutrients for balanced nutrition and good health. In 2009, fish accounted for 16.6 % of the world population's intake of animal protein and 6.5 % of all protein consumed (FAO, 2010)

In Nigeria, production of fish from aquaculture experiences an annual increase of 10 % which accounts for about 20 % of the domestic need. This rate is translated to about 80, 000 metric

tonnes of fish per annum which is far less than national demand of 1.5 million metric tonnes (www.africanagriculture.com, 2008). The only way the deficit of 1.1 million metric tonnes can be met is through importation which will cost the country about $241 million per annum if local production cannot meet the deficit (www.africanagriculture.com, 2008).

According to the World Fish Centre (2007), one of the promising solutions to the shortage of animal protein intake in developing countries is the proper development of aquaculture.

The total environment can be divided into two elements namely: technology and human. Technology determines the type and physical potential for fish farming, including the physical and biological factors that can be modified through technology development. The human element is characterized by exogenous (community structures, external institutions etc.) and endogenous factors, which can be controlled by the farm household. At the centre of this interaction is the fish farmer. The fish farmer ultimately decides on whether or not to adopt technologies and how to assign resources to support them (Ingold, 2002).

Problem Statement

Fish constitutes a major source of protein in human diet and it has no religious rejections or bias when compared with other animal sources of protein like pigs which is condemned by the Muslims and cattle by the Hindus.

Fish is a relatively cheaper source of protein. It has an important role in world protein supplies particularly in developing countries. Besides protein, fish provides energy, fatty acids, vitamins and minerals (Ladipo, 1994). It is also a well-known fact that animal protein is seriously inadequate in the daily diet of many people in the tropics including Nigeria.

Fish oil is also rich in vitamins A and D, which are needed for the proper functioning of the eyes and healthy bone development. Protein deficiency is responsible for a number of illness and death. It reduces immunity to diseases and can lead to poor growth (Nwuba and Onuoha, 2006).

The continued increase in desert encroachment has resulted in greater dependency on fish as the main source of animal protein. Fish is particularly adapted to the water environment but show great variation in size as well as in shape. The main sources of fish supply in Nigeria are domestic fish production and fish importation.

Nigeria is blessed with about 1.5 million hectares of bond water mass, capable of producing over 1.5 million metric tonnes of fish annually (Ita, 1996). However, the current overall fish production is estimated at 0.6 million metric tonnes of which aquaculture produced some 30, 000 metric tonnes of various freshwater and brackish water fish species in 2000 (Fagbenro, 2005). Due to yearly decline in fish harvest from oceans, rivers and lakes and continued stable demand for fish product, there is rising interest in aquaculture with domestication of more fish species.

The need for the availability of enough food in order to sustain life and good health of the entire world's population at all times across all countries and regions, across all income groups and all members of households requires the supply of an adequate amount of food so as to meet the nutritional requirements/need of all people at all times cannot be overemphasized (Williams, 1996).

Objectives of the study

The broad objective of the study was to evaluate the effects of socio – economic factors on the adoption of improved production technologies by fish farmers in Kogi state, Nigeria.

The specific objectives were to:

I. describe the socio- economic characteristics of the fish farmers in the study area.
II. ascertain the level of awareness of improved fish production technologies by the fish farmers in the study area.
III. identify the improved fish production technologies adopted by the fish farmers in the study area and ;
IV. determine the factors affecting the adoption of improved technologies by the fish farmers in the study area.

Methodology

The study was conducted in Kogistate which was purposely selected due to the prevalence of fishery activities in the states. Kogi state was formed in 1991 from parts of Kwara and Benue states. The state lies on latitude 7.9^0 North and longitude 6.45^0 East. It is bordered to the east by Benue state, Northeast by Nassarawa state, Enugu, Anambra and Delta states borders the state to the south while Ondo, Ekiti and Kwara states borders the state to the weat. Niger state and the Federal Capital Territory, Abuja borders the state to the North.

Kogi state has a total land area of 28, 313.53 square kilometres and a projected population of 3,278,487 people according to the census conducted in 2006 (Encyclopaedia Britannica, 2013).

Population of the Study

The population for the study consist of all registered fish farmers in the study area. The total number of fish farmers registered and scattered throughout Kogi State at the time of the study was 250 (Kogi State Agricultural Development Project).

Sampling Technique and Sample size

5 Local Government Areas (LGAs) each having the highest number of registered fish farmers were selected. The selected LGAs in Kogi state were Lokoja, Idah, Ajaokuta, Kabba/Bunu and Kotonkarfe. 60 % of the registered fish farmers in each of the selected LGAs were sampled. A total of 80 respondents were used. The detail of the sample size is as shown in table 3.1

Method of Data Collection

Data were elicited from the fish farmers by using structured interview schedule designed in line with the objectives of the study, administered by the researcher with the assistance of trained enumerators.

Table 3.1: Selection of the Respondents from Five Local Government Area in Kogi State.

Local Government Area	Number of Fish Farmers	Number of Respondents Sampled
Lokoja	45	27
Idah	32	19
Ajaokuta	25	15
Kabba/Bunu	20	12
Kotonkarfe	12	7
Total	134	80

Source: Kogi State Agricultural Development Project, 2012.

Analytical Techniques

Objectives I, II and III: This was analysed using descriptive statistics such as frequency distribution, tables, percentage, mean and standard deviation to group and summarize the data obtained from the field.

Objective IV: To achieve the research objective, a multinomial logit model was constructed and estimated as used by Bandara and Thiruchelvam (2008). The fish farmers were categorized based on the number of technologies adopted.

The explicit form of the function is specified as follows:

$$Y_i = X_O + X_1AGE + X_2EDU + X_3EXP + X_4POS + X_5SOP + X_6EXC + X_7YLD + X_8HHS$$

Table 3.4: Definition of the Independent Variables used in Adoption Models of the Fish Farmers.

Variables	Definitions
AGE	Chronological age in numbers of completed years by the respondent at the time of interviews.
EDU	Number of years spent in school.
EXP	Number of years to which a respondent has been practicing fish farming.
POS	Extent of water area (in m^2) used for fish farming.
SOP	Extent to which the respondent participated in the activities of formal social organization.
EXC	Frequency of contact of a respondent with any extension personnel.
YLD	Total quality of yield/output in kg/m^2.
HHS	Household or family size.

RESULTS AND DISCUSSION

The results in table 4.1 reveals that majority of the fish farmers (85.0 %) were within the age bracket of 20 – 50 years.

This indicates that young and middle aged people are involved in fish farming. This is because fish farming requires adequate attention and a lot of sense of responsibility. The result agrees with the findings of Ofuoku*et al.,* (2008) who reported that people above the age of 50 years were few in fish farming because they lack adequate stamina required in the management of the fish farms.

The male dominance of this source of livelihood might be due to the laborious nature of fish farming operations right from pond construction to management. The finding obtained is in agreement with that of Basorun and Olakunleyin (2007) that stated that fish farming is male dominated.

87.2 % of the respondents had secondary education and above which implies that majority of the respondents are educated. Farmers' education level has been found to positively influence the adoption of improved production technologies (Obukosia, *et al*. 2004). The fish farmers' level of education encouraged the adoption of improved production technologies.

60 0 % of the respondents had a household size of between 6 – 10 persons implying that the respondents had moderate household size.

Household size is an important factor in agriculture because to a large extent, it determines the extent of labour supply available. The results obtained is in line with that of Olanipekun and Kuponiyi (2009) who said that large family size is an incentive for engaging in livelihood diversification in order to meet family obligations.

Table 4.1: Socio- Economic Characteristics of Sampled Fish Farmers

	Kogi State (n=80)	
Variables	Frequency	Percentage

Age (years)		
Below 21	1	1.3
21 – 30	6	7.5
31 – 40	14	17.5
41 – 50	48	60.0
Above 50	11	13.7
Total	80	100.0
Sex		
Male	72	90.0
Female	8	10.0
Total	80	100.0
Marital Status		
Single	6	7.5
Married	74	92.5
Divorced/Separated	-	-
Total	80	100
Level of Education		
No form of Education	-	-
Quranic/Adult Education	-	-
Primary	9	11.3
Secondary	61	76.2
Tertiary	10	12.5
Total	80	100.0
Household Size	25	31.3
< 6	48	60.0

6 – 10	7	8.7
11 – 15	-	-
16 and above	80	100.0
Total		
Fish Farming(years)		
< 6	36	45.0
6 – 10	38	47.5
11 – 15	6	7.5
16 and above	-	-
Total	80	100.0

Source: Field survey 2012

The reason of high adoption rate for stocking, fish feeding and pond drainage is because it will ultimately determine the yield (output). Stocking implies the number of fish put in water, feeding is the quantity and quality of nutrients needed by fish as well as the timing of giving feed to the fish. Maintenance is also paramount because it will prevent outbreak of diseases as well as reduce retarded growth in fish.

The technologies that had low adoption which include pond fertilization, earthen pond and plastic/fibre pond may be due to economic reasons as plastic/fibre ponds are expensive and may not be affordable by the fish farmers.

Table 4.11: Distribution of Fish Farmers' Awareness, Trial and Adoption of Improved Technologies in Kogi State.

Variables	Aware (100 %)	Trial (100 %)	Adoption (100 %)

Stocking method	80 (100.0)	80 (100.0)	75 (93.8)
Fish feeding technique	80 (100.0)	80 (100.0)	73 (91.2)
Pond fertilization method	80 (100.0)	80 (37.5)	16 (20.0)
Maintenance	76 (95.0)	69 (86.2)	45 (56.2)
Pond draining method	80 (100.0)	74 (82.5)	55 (68.8)
Harvesting	80 (100.0)	80 (100.0)	65 (81.3)
Concrete Pond	80 (100.0)	75 (93.8)	49 (61.3)
Earthen Pond	80 (100.0)	40 (50.0)	20 (25.0)
Plastic/Fibre Pond	80 (100.0)	20 (25.0)	11 (13.8)

Source: Field Survey, 2012

Educational Status of the fish farmers: Educational status has a positive and significant relationship with the adoption of improved technologies at 1 % probability level. This implies that the more educated the fish farmers, the more the chances of their ability to access information and hence they have capacity to analyse such information and make valid decisions that will enhance their fish farming activities when compared to their illiterate colleagues. This agrees with the findings of Tologbonse (2004) who stated that education affects the speed with which new technologies are diffused and accepted by the farmers.

Extension Visit: Extension visit had a positive influence on the adoption of improved technologies at 1 % probability level. Extension contact offer support services to the farmers as well as teaching them on how to improve upon their present practice and this will enhance the process of adoption. This implies that the more contact the fish farmers have with extension agents, the more likely they will adopt improved technologies. This is in agreement with the findings of Tadesse (2008).

Output: The output (yield) of the fish farmers positively and significantly influenced the probability of adoption of improved technologies at 5 % significant level. The output of farmers

also determines the income of the farmers. This implies that as the output increases, the financial status of the fish farmers is enhanced and they are likely to adopt improved technologies.

Table 4.29: Binomial Logit Regression showing the Factors Affecting the Adoption of Improved Technologies by Fish Farmers in Kogi State.

Variables	Marginal Effect	Coefficient and Z-Values
Constant		-3.0278 (-1.61)
Age		-0.0246 (1.06)
Education(years)		0.1138 (2.24) ***
Experience		0.0367 (0.85)
Pond Size		0.0032 (0.75)
Cooperative Membership		0.1675 (0.29)
Extension Visit		0.6544 (4.37) ***
Training		-0.1980 (--0.29)
Output (Yield)		0.0007 (2.19)**
Household Size		-0.0102 (-0.11)
Average Marginal Effect: Extension Visit	0.0951	(7.71)
Education	0.0165	(2.41)
Output	0.0001	(2.39)

Number of Observation = 100 Numbers in Parenthesis are Z values

Log likelihood = - 44.6846

LR Chi-Square = 46.00

Pro > Chi-square = 0.0000

Pseudo R^2 = 0.3341

*** = Significant at 1% level of probability

Source: Field Data Analysis 2012

Conclusion

From the study, majority of the fish farmers were aware of improved fish production technologies but stocking method, fish feeding technique, harvesting and pond draining method. Education, extension visit, and age were significant factors affecting adoption of improved technologies by fish farmers. In order to increase the level of fish production, extension visits should be improved upon both in the quality of information delivery and frequency of visit. Formal and informal education should be encouraged among the fish farmers in the study area.

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