

## Fish farmers' adoption of improved management practices in Ogun state, Nigeria

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### ABSTRACT

The study examined the adoption of Improved Management Practices (IMPs) among fish farmers in Ogun state, Nigeria. A structured interview schedule was utilized in obtaining information from 108 respondents. Means, frequency and percentage were used in describing the data, while chi-square and Pearson Product Moment Correlation (PPMC) were used in testing the hypotheses. The study reveals that majority (83.3%) were within the age range of 35-45 years, and mostly males (54.6%). Most respondents (58.3%) were married, had primary (36.1%) and secondary (13.9%) education. Majority (55.6%) of the respondents had farming experience of 1-5 years, feed their fishes with both local (38.0%) and improved feeds (30.6%). Most respondents (61.1%) were small scale farmers and earned #51,000 - #100,000 as annual income. Inadequate capital (75.0%), poverty (51.9%) and paper policy of government (49.1%) were identified as severe constraints militating against respondents' adoption of IMPs. Rate of adoption of IMPs among fish farmers in the study area was high for (59.3%) of the respondents. There were significant relationship between farmers' experience ( $\chi^2=10.908$ ,  $p=0.004$ ) constraints ( $r=0.359$ ,  $p=0.000$ ) and adoption of IMPs. It is recommended that fish farmers should be encouraged and mobilized to form cooperative groups in order to gain easy access to credit. Extension agent should organise special training in on-farm feed formulating for fish farmers for attainment of cheaper feeds using locally available feedstuffs.

**Keywords:** Fish Farmers, Improved Management Practices, Fish feed stuff.

### INTRODUCTION

In Nigeria, the role of fish farming in achieving household and national food security and poverty alleviation cannot be over-emphasized. Fish farming, an artificial method of raising fish for human consumption, is an ancient practice that can provide profitable means of livelihood for both rural and urban dwellers (Salu *et al.*, 2014). Fish is an important protein source for teeming Nigerian population, consisting about 60% of the total protein intake in adults especially in rural areas. Adekoya and Miller (2004) cited by Kainga *et al.* (2016), asserted that fish farming generates employment directly or indirectly in terms of people employed in the production of fish and other allied businesses. It also generates income for all categories of people involved in fish farming and thus contributes to the national income (Olagunju, Adesiyani and Ezekiel, 2007). According to Central Bank of Nigeria (CBN, 2005), fisheries occupy an important position in the agricultural sector of the Nigeria's economy. The contribution of the fishery sub-sector to GDP rose from ₦76.76 billion in 2001 to ₦162.61 billion in 2005 (CBN, 2005).

However, the gap between supply and demand for fish in Nigeria is widening. Almost all natural fish stocks in the country have been over-exploited, yet

human population increases and hence demand for fish continues to increase significantly. According to Dauda (2010) cited by Salau *et al.* (2014), national fish demand in Nigeria is 1.85 million metric tonnes while domestic production is about 0.51 million metric tons. Nigeria currently imports 0.7 million metric tons of frozen fish annually (CBN, 2005) making it the highest importer of frozen fish in the world, at annual foreign exchange cost of ₦35 billion (CBN, 2005, Ofuoku *et al.*, 2008 and Salau *et al.* 2014). Access to accurate and adequate information on fish production technologies by farmers is essential for increased fish production. Such information must come from reliable sources, at the right time, and farmers should be able to adopt them correctly.

Aphunu and Agwu (2014) submitted that adoption of improved aquaculture technologies strengthens production and thus increases fish food security and economic growth at individual and national levels as it increases farmers' competence in knowledge, skill and techniques in aquaculture management practices. Ogun state is one of the states in Nigeria that has great fisheries potentials. The state is blessed with so many streams and ponds that can be harnessed for fish farming.

In spite of this great potential, fish farming in Ogun state is still poorly developed (OGADEF, 2016).

According to Amali and Solomon (2001), some of the challenges to increased fish production in Nigeria and Ogun state in particular include inadequate fingerling production, lack of earth-moving equipment, high cost of feeds, low capital investment and non-adoption of improved management practices by the fish farmers.

To this end, many international, government and non-governmental agencies have made frantic efforts to fund research institutions to develop modern fishery technologies and innovations that have been disseminated (Adelodun and Fregene, 2016) to farmers for increased productivity. Some of these improved production technologies or practices include improved technologies in pond construction and maintenance, modern fishing gears, inlet and outlet devices in ponds, fertilization and liming of fish pond, fortification of fish feeds using root and tuber crops, prevention and control of fish diseases, control of water quality and use of aerated containers for transporting fingerlings to reduce stress and mortality.

However, it is not known to what extent these technologies or improved management practices have been adopted by fish farmers in the state, and what constrained them from adopting the improved management practices. It is against this backdrop that this study was carried out to examine the adoption of improved management practices by the fish farmers in Ogun state, Nigeria. The specific objectives were to:

- i. Describe socio-economic characteristics of fish farmers in the study area.
- ii. Identify respondents' sources of information on improved management practices.
- iii. Identify constraints facing fish farmers in adopting improved management practices.
- iv. Determine the adoption of improved management practices by the respondents in the study area.

### Hypotheses

Hypothesis 1: There is no significant relationship between respondents' socioeconomic characteristics and their adoption of improved management practices

Hypothesis 2: There is no significant relationship between constraints to adoption and their adoption of improved management practices

### METHODOLOGY

The study was carried out in Ogun state, Nigeria. Ogun state covers a land area of approximately

16,409,26 square kilometers with a population of about 3,728,098 people (NPC, 2006). The state lies within latitude 6<sup>0</sup>N ad 8<sup>0</sup>N and longitude 2.5<sup>0</sup>E and 50<sup>0</sup>E. The state has a tropical climate with mean annual rainfall of about 1500 millimetres and temperature range of 25<sup>0</sup>C – 35<sup>0</sup>C.

The area is an agrarian community that engaged in crop, fishery and poultry production. The state is blessed with streams and ponds that can favourably support fish farming. The research design was a descriptive survey method and fish farmers that registered with Ogun State Agricultural Development Programmes (OGADEP) were used as respondents. Multi stage sampling procedure was employed for the study. Ogun state is divided into four agricultural extension zones namely: Egba, Yewa, Remo and Ijebu zones. In the first stage two extension blocks were randomly selected from each zone. The second stage was selection of two cells in each of the eight blocks, giving a total of sixteen cells. The third stage involved the simple random selection of 5% fish farmers registered with OGADEP in each cell which gave a total of one hundred and eight fish farmers (108). A structured questionnaire was used to collect data from the respondents. Descriptive statistical tools such as percentage, frequency counts and mean were used to describe socio-economic characteristics of the respondents. Chi-square and Pearson Product Moment Correlation were used to test formulated hypotheses at 0.05 level of significance.

Level of rate of adoption of fish farmers' improved management practices was measured on a 2-point scale and was scored as Adopted (AD=1) and Not Yet Adopted (NYA=0). Adoption score was computed by summing up respondents' score for each IMP. This results to a minimum score of 0 and maximum score of 15. From this, mean score was calculated and used as criterion to categorize respondents' adoption level into high and low. Respondents who scores fell below the mean score were categorized as low and those that fell on the mean score and above were categorized high.

## RESULTS AND DISCUSSION

### Socioeconomic characteristics

Age distribution of the respondents as presented in Table 1 shows that most (83.3%) were within the age range of 35-35 years, (11.1%) were 46-55 years and few respondents (5.6%) fell within the range of 56-65 years of age. This implies that respondents were in their productive age and have vigour to engage in fish farming. Age is an important factor when considering fish farming. It has been argued that age in some instances, could be an entry criterion for some livelihood activities.

This result is in agreement with that of Salau *et al.* (2014) and Ashley-Dejo *et al.* (2013) who carried out similar studies in Nassarawa and Oyo states, Nigeria and reported same age distribution of fish farmers. The result on respondents' sex in Table 1 reveals that majority of the respondents (54.6%) were males while (45.4%) were females. This implies that more males involved in fish farming than females in the study area. This result is concomitant with that of Usman *et al.* (2016) who carried out similar study in Adamawa state, Nigeria and observed that fish farming in the state dominated by males. It also agreed with that of Ewebiyi and Olatunji (2018) who observed that fish farming in Ijebu Ode Local Government Area of Ogun State was male dominated. The marital status of respondents as indicated in Table 1 shows that greater proportion (58.3%) were married while (35.2%) were single. Obviously, the married farmers have more responsibilities to provide for their families hence are more likely to engage in fish farming as a complimentary activity to meet up with their economic needs. This result is in line with that of Aweto and Ademuyiwa (2017) who observed same marital status of the respondents in Lagos State, Nigeria.

Respondents' religion affiliation result reveals that most respondents (63.9%) were Christians while (36.1%) were Muslims. This result agrees with that of Ashley-Dejo *et al.* (2013) in Oyo state. The implication is that more Christians engaged in fish farming than Muslims in the study area. Table 1 also shows distribution of the respondents based on their education attainment. Analysis of results revealed that more than quarter respondents (28.7%) had primary education, (36.1%) had secondary education, while (1.3%) had vocational and adult education. Education is very important and it can likely influence adoption of innovation among fish farmers. It is believed that respondents who had formal education may have been exposed to some theories and practices of fish farming to some extent in the subject of agricultural science which forms part of the primary and secondary

school curriculum in Nigeria (Adebiyi, 2008). Concerning farming experience of the respondents, most (55.6%) had 1-5 years experience, and more than one-third (33.3%) had 6-10 years farming experience. This implies that respondents in the study area are experienced farmers as majority (88.9%) had 1-10 years experience. This result is in agreement with that of Ipadeola *et al.* (2018) who carried out similar study and reported that fish farming in Ogun state was carried out by experienced farmers. This is expected to impact on them positively on adoption of improved management practices. Most respondents (61.1%) had 1-5 ponds, (29.6%) had 6-10 ponds, while (4.6%) and (3.7%) had 11-15 and 16-20 ponds respectively. This result implies fish farmers in the study area are small scale holders. This may be attributed to socio-economic status of the respondents and unfavourable government policy on fish production in the state (Ewebiyi and Olatunji, 2018).

The result of analysis on type of feeds used by the fish farmers to feed their fishes reveals that (38.0%) fed their fishes with local feed, (30.6%) used imported feed, (19.9%) used concentrated feed and (17.6%) fed their fish with pellet. This result implies that fish farmers in the study area had access and could afford to feed their fishes with local and imported feeds. This result is in tandem with the findings of Salau *et al.* (2014) in Nassarawa state, Nigeria and Rozana and Roslina (2015) in Malaysia who reported that fish farmers mostly had access and could afforded to feed their fishes with local and imported feeds.

On fish farmers' income, the result shows that majority of respondents (59.1%) earned income less than ₦50,000 and more than quarter of them earned ₦51,000 and ₦100,000 as income. This may be attributed to small scale farming operating by the respondents. This result is in agreement with that of Ewebiyi and Olatunji (2018) who also reported low income among fish farmers in Ijebu Ode Local Government Area of Ogun State, Nigeria.

**Table 1: Distribution of respondents' by socio-economic characteristics**

Variables	Frequency	Percent
<b>Sex</b>		
Male	59	54.6
Female	49	45.4
<b>Age (Years)</b>		
<35	51	47.2
36-45	39	36.1
46-55	12	11.1
56-65	6	5.6
<b>Marital Status</b>		
Single	38	35.2
Married	63	58.3

Variables	Frequency	Percent
Divorced	3	2.8
Widowed	1	0.9
<b>Religion</b>		
Christianity	69	63.9
Muslim	39	36.1
<b>Educational Status</b>		
Primary education	31	28.7
Secondary education	39	36.1
Vocational education	15	13.9
Adult education	23	21.3
<b>Years of Farming</b>		
1 -5	60	55.6
6 – 10	36	33.3
11 – 15	8	7.4
16 – 20	4	3.7
<b>Number of Ponds</b>		
1 – 5	66	61.1
6 – 10	32	29.6
11 – 15	5	4.6
16 – 20	4	3.7
> 21	1	0.9
<b>Types of Feed</b>		
Local feed	41	38.0
Imported feed	33	30.6
Concentrated feed	15	13.9
Pellet feed	19	17.6
<b>Income (Naira)</b>		
Less or equal #50000	65	59.1
51,000 – 100,000	28	25.5
101,000 – 150,000	12	10.9
151,000 – 200,000	4	3.6
>200,000	1	0.9

Source: Field survey, 2018

#### Respondents' sources of information on IMPs

The result of respondents' information sources in Table 2 reveals that co-farmers (84.3%) friends and family (76.9%) and radio (63.9%) were the main sources of their information on improved management practices, as well as extension agents (53.7%) and cooperative society (48.1%). This implies that respondents are not cut away from latest development on improved management practices and this may favourable predispose fish

farmers in the study area to be fully aware of improved management practices and use them to maximize productivity and income towards enhancement of better standard of living of fish farmers in the study area. This result agrees with the findings of Salau *et al.* (2014) who observed radio and co-farmers as main sources of respondents' information on improved management practices in fish farming in Nasarawa state, Nigeria.

**Table 2: Distribution of respondents' by sources of information**

Items	Frequency	Percent
Radio	69	63.9
Extension agent	58	53.7
Friends and family	83	76.9
Newspaper	50	46.3
Co-farmers	91	84.3
Online resources	55	50.9
T.V. broadcasts	50	46.3
Cooperative society	52	48.1
Schools	46	42.6

Items	Frequency	Percent
Experience over time	81	75.0
Posters	46	42.6
Extension guide	56	51.9

Source: Field survey, 2018

### Respondents' adoption of improved management practices

The result of analysis reveals that most of the improved management practices (IMPs) listed in Table 3a were highly adopted such as feed formulation (92.6%), water quality maintenance (90.7%), fish stocking (89.8%), liming (88.9%), control of pests and diseases (88.0%). Only few, pond construction (50.65), fish breeding (47.2%) and sampling (41.3%) were adopted at average

level. The overall adoption rate of improved management practices as shown in Table 3b revealed that most respondents (71.4%) adopted at high level while (28.6%) fell within low level of adoption. This result concurred with the findings of Ashley-Dejo *et al.* (2013) and Salau *et al.* (2014) who carried out similar studies in Oyo and Nassarawa states, Nigeria and respectively observed high level of adoption of improved fishery technologies among their respondents.

**Table 3a: Respondents' adoption of improved management practices**

IMPs	Adopted (AD)	Not Yet Adopted (NYA)	Mean
Legal permit	66.7	33.3	1.59
Site selection	88.9	11.1	1.98
Pond construction	50.6	49.4	1.54
Water quality control	90.7	9.3	2.12
Liming	88.9	11.1	1.98
Fish stocking	89.8	10.2	2.06
Fertilization	78.7	21.3	1.93
Feed formulation	92.6	7.4	2.22
Control of pests and diseases	88.0	12.0	1.95
Weed control	70.4	29.6	1.81
Sampling	41.3	58.7	1.44
Fish breeding	47.2	52.8	1.50
Marketing	74.1	25.9	1.84
Harvesting	83.3	16.7	1.94
Record keeping	51.0	49.0	1.55

Source: Field survey, 2018

**Table 3b: Level of adoption of improved management practices**

Level	Freq	Percent	Mean	SD	Minimum	Maximum
Low	31	28.6	27.08	6.426	0.00	15.00
High	77	71.4				

Source: Field survey, 2018

### Constraints to adoption of improved management practices

Numerous constraints were identified as restraining fish farmers from adopting IMPs in the study area (Table 4). According to the result of the analysis, a large number of respondents (75.0%, 68.5% and 51.9%) respectively observed inadequate capital, high cost and poverty as severe constraints to adoption of IMPs. Also, nearly half (49.1%, 41.7% and 40.7%) opined that paper policy of

government, inadequate dissemination of information and lack of storage facilities were severe constraints to adoption of IMPs. According to Ewebiyi and Olatunji (2018), Bolorunduro and Adesehenwa (2004), adoption of improved management practices depends on cost, favourable government policy on fish farming, adequate and functional storage facilities. The implication of this result is that respondents may not be able to adopt improved management practices as a result of aforementioned problems.

**Table 4: Distribution of constraints to adoption of improved management practices**

Constraints	Severe	Mild	Not a constraint	Mean
Government policies	49.1	28.7	22.2	1.27
Inadequate capital	75.0	21.3	3.7	1.71
High cost	68.5	17.6	13.9	1.55
Incidence	24.1	62.0	13.9	1.10
Lack of storage facilities	40.7	44.4	14.8	1.26
Water scarcity	26.9	28.7	44.4	0.82
Poor water quality	24.1	42.6	33.3	0.91
Farm microcredit	28.7	46.3	25.0	1.04
Inadequate dissemination of information	41.7	35.2	23.1	1.12
Poverty	51.9	25.9	22.2	1.30
Inadequate records	41.7	38.9	19.4	1.22
Conservatism	26.9	47.2	25.9	1.01
Illiteracy	33.3	27.8	38.9	0.94
Inadequate extension agents	33.3	32.4	34.3	0.99

Source: Field survey, 2018

**Analysis of selected fish farmers characteristics, constraints to adoption and adoption of IMPs**

Table 5 presents the results of the inferential statistical analysis of respondents, socio-economic characteristics, constraints to adoption and adoption of IMPs. Experience ( $\chi^2=10.908$ ,  $p=0.004$ ) was significantly related to their adoption

of IMPs. This implies that fish farmers with wider experience are more favourably disposed to adoption of IMPs for fish farming. The result further reveals that constraints ( $r=0.359$ ,  $p=0.000$ ) also had a significant relationship with their adoption of IMPs. This implies that constraints faced by the respondents posed a threat to their adoption of IMPs.

**Table 5: Analysis of selected respondents’ socio-economic characteristics, constraints to adoption and adoption of IMPs**

Variables	$\chi^2$	df	r-value	p-value	Decision
Experience	10.908	2		0.004	Significant
Constraints			0.359	0.000	Significant

Source: Field Survey, 2018

**CONCLUSION**

This study examined fish farmers’ adoption of Improved Management Practices in Ogun state, Nigeria. Results showed that respondents were predominantly males with low level of education, they were in their productive active years. Co-farmers, friends and family, radio and cooperative societies were respondents’ sources of information on improved management practices. Most of the respondents were small-scale producers. Experience and constraints were significantly related to respondents’ adoption of improved management practices. Inadequate capital and storage facilities, poverty and paper policy of government on fish production in Nigeria were identified by the respondents as severe constraints hindering adoption of improved management practices. Respondents’ level of adoption of improved management practices in the study area was high.

**RECOMMENDATIONS**

In the light of the major findings of this study, the following policy recommendations are advanced

for enhancement of sustainable high adoption of improved management practices, productivity, income and better standard of living among fish farmers in the study area.

- i. Fish farmers in the study area should be encouraged and mobilized to form cooperative groups in order to gain easy access to credit.
- ii. Extension agents should organize special training in on-farm feed formulation for fish farmers to enable them formulate cheaper fish feeds using locally available feedstuffs.
- iii. Other channels of information, notably mass media should be used by the extension agents to disseminate improve management practices to the fish farmers in the study area.

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