Assessment of the Effect of National Fadama Development Project (Fadama II) on Fish Farming in Lagos State, Nigeria

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Abstract

The National Fadama Development Project (Fadama II) as a veritable tool aimed at reducing poverty by increasing the productivity and income levels of poor Fadama resource users. The assessment of the effect of Fadama II project on fish farming was carried out in this study by using the with-and-without approach. A multistage sampling procedure was used in sampling 185 Fadama II fish farmers and 60 non-Fadama II fish farmers from 9 Fadama Community Associations. Data was collected with the aid of structured interview guide. Data obtained were analyzed using frequency count, percentages, mean, standard deviation and t-test analytical techniques. Findings from the study indicate that Fadama II fish farmers had higher number of ponds (mean = 8), were more educated (68.1% had at least secondary education), with larger household sizes (mean = 9 persons), and were more experienced in fish farming business (mean = 12 years) than the non-Fadama II fish farmers who had an average of 6 ponds, 18.3% had at least secondary education, with a mean household size of 5 persons and 10 years of fish farming experience. The results of t-test analyses reveal that significant differences exist between Fadama II and non-Fadama II fish farmers in annual income (t-value=32.28, p<0.01) and production output (t-value=43.14, p<0.01). It is concluded that the project has a positive effect on the income of Fadama II fish farmers in Lagos State, Nigeria, therefore, subsequent phases of the NFDP programme should be extended to all Fadama users as this will benefit more people.

Keywords: Fadama II, Fish farmers, Fadama beneficiaries, Income, Production output

Introduction

Fisheries occupy a uniquely important position in the agricultural sector of the Nigerian economy as it contributes 4.5% of the agricultural share to the national Gross Domestic Product (GDP) in 2007 (National Technical Working Group-NTWG, 2009). International Food Policy Research Institute – IFPRI (2005) also reported that fish contributes 22% of the overall protein intake in many African countries. The importance of fish in human nutrition was highlighted by Amiengheme (2005) as an excellent source of high quality animal protein and highly digestible; a suitable supplement for diets of high carbohydrate contents; a good source of sulphur and essential amino acids; very important in lowering blood cholesterol level and high blood pressure; and decreases the risk of bowel cancer and reduces insulin resistance in skeletal muscles.

In Nigeria, the total domestic fish production is far less than the total domestic demand for fish (Bada and Rahji, 2010). Local fish production accounts for only about 30% of the total supply of fish which is produced primarily by artisanal fishermen in the country (FDF, 2008) despite the natural endowment in terms of rivers, lagoons and lakes present in the country. If the potentials of the aquaculture subsector were fully utilized, World Bank (1996) estimated that fish production in the country will rise to 2.5 million metric tonnes per annum. This is higher than the country's estimated annual demand of 1.5 million metric tonnes (Phillip, et al., 2009) and this has the potential to turn the nation into a fish exporting country.

Unfortunately, the country's fisheries subsector has been faced with myriad of challenges which include poor policy formulation and implementation. According to Anetekhai, et al. (2004) the challenges facing increased fish production include lack of access to capital and land, lack of quality feed, insufficient supply of fingerlings, water and electricity. High inflation rates in the economy and high cost of fish feed ingredients were also regarded as problems facing aquaculture development Olaoye, et al. (2011).

Due to the wide gap between the demand for and supply of fish and its products in Nigeria and the need to increase the income of crop and livestock farmers, the Nigerian governments launched the National Fadama Development Programme first in 1993 (Madu, et al; 2012). Fadama II project is a World Bank assisted project aimed at sustainably increasing the income of Fadama users (Henri-Ukoha, et al, 2011). Fadama II project is a follow up to Fadama I project (which was implemented between 1993 and 1999 and focused on crop production) and sought to address the shortcomings of Fadama I by employing the community-driven development (CDD) approach (Madu *et al.,* 2012). Fadama II included other Fadama resource users that were excluded in the first phase of Fadama and supported services like post-harvest processing other than production (NFCO, 2007). Fadama II project, like most other CDD projects concentrating on poverty reduction have 5 main qualities (Dasgupta and Beard, 2007; Labonne, 2007) which are empowerment of local communities and local governments, social inclusion, demand-driven design, collective action and support from external institutions and organizations.

Increase in the volume of fish produced has been reported since the introduction of Fadama II programme. For instance, FDF (2008) reported an increase in Nigeria's fish production from 1,024,984 metric tonnes in put in parenthesis to 1,355,173 metric tonnes in year 2007. In Lagos state, an increase in fish production through aquaculture has been reported from 11,556 tonnes in 2009 to 15,007 tonnes in year 2010 (National Agricultural Extension Liaison Services-NAERLS and National Programme on Agriculture and Food Security – NPAFS, 2010). It is however unfortunate that the recorded increment was not sufficient to bridge the demand-supply gap. This is because a lot of other people were unwilling to participate in Fadama projects due to associated uncertainties like previous government projects. Hence, this study sought to assess the effect of

Fadama II project on fish farming in Lagos State, Nigeria. Lagos State was purposively chosen because it is one of the 12 States where Fadama II was implemented and also because fishing is the predominant occupation of the rural population along the coastline and rivers courses which were many in the state.

To achieve the overall objective, this study specifically described the socio-economic characteristics of fish farmers that participated in Fadama II project in Lagos State; determined the production output of participants and non-participant fish farmers. It also determined the annual income of participant and non-participant fish farmers in Lagos State. This study also investigated the validity of two hypotheses stated in null forms:

$H_0$1: there is no significant difference in the production output (in kg) of participants and non-participant fish farmers in Lagos State; and

$H_0$2: there is no significant difference in the income (in Naira) of participants and non-participant fish farmers in Lagos State.

Materials and methods

This study was conducted in Lagos State, which is unarguably the most populated of the six south-western states of Nigeria. A multistage sampling technique was used in selecting 185 Fadama fish farmers and 60 non-Fadama fish farmers in the ratio 3:1 as presented in Table 1.

Stage 1 involved the random selection of 9 out of 14 Fadama Community Associations of fish farmers from the 7 LGAs participating in fish farming. This constituted two-thirds of the FCAs. This was followed by the random selection of two-thirds of the Fadama Users groups (FUGs) which resulted in the selection of 24 out of the 34 FUGs in the 9 FCAs. The final stage involved the random sampling of 60% of the members in each of the selected FUGs and this resulted in 185 out of 547 fish farmers. One-third of the number of selected Fadama fish farmers in each FCA was selected from each community where the FCAs were located. The 60 non-Fadama fish farmers were sampled using the snowballing technique.

Results

Socioeconomic characteristics of Fadama II fish farmers

From data available in Table 1, 90.8% and 88.3% of the Fadama II fish farmers and non-Fadama II fish farmers respectively were between 31 and 60 years old. This is within the active labour force of the nation's population. The mean ages of the Fadama II and non-Fadama II fish farmers were found to be 47.91 years and 48.50 years respectively. Majorities (71.89% and 73.33%) of the Fadama II and non-Fadama II fish farmers were males and the highest proportions (41.62% and 45.00%) of the Fadama II and non-Fadama II fish farmers were married respectively. More than half (53.0%) of the Fadama II fish farmers had a household size of 6-10 persons while 70.0% of the non-Fadama II fish farmers had a household size between one and five persons. The mean household sizes in Table 2 also show that the Fadama II fish farmers had as much as twice the household size of the non-Fadama II fish farmers. With regards to the highest educational level attained, about 40.5% and 27.6% of the Fadama II fish farmers had secondary and tertiary education

respectively while more than half (53.3%) of Fadama II fish farmers and 26.7% of the non-Fadama II fish farmers only had adult and primary education respectively.

Table 1: Socioeconomic characteristics of Fadama II (n=185) and non-Fadama II (n=60) fish farmers

Socioeconomic characteristics	Fadama II fish farmers			Non-Fadama II fish farmers		
	Frequency	%	Mean	Frequency	%	Mean
Age (years)						
31-40	23	12.43	47.91	8	13.33	48.50
41-50	95	51.35		28	46.67	
51-60	50	27.03		17	28.33	
61-70	15	8.11		6	10.00	
>70	2	1.08		1	1.67	
Sex						
Female	52	28.11		16	26.67	
Male	133	71.89		44	73.33	
Marital status						
Single	59	31.89		11	18.33	
Married	77	41.62		27	45.00	
Divorced	40	21.62		8	13.33	
Widowed	9	4.86		14	23.33	
Household size (persons)						
1-5	70	37.84		42	70.00	
6-10	98	52.97	9.43	18	30.00	4.50
11-15	17	9.19		0	0.00	
Educational level attained						
No formal education	20	10.81		1	1.67	
Adult education	17	9.19		32	53.33	
Primary education	22	11.89		16	26.67	
Secondary education	75	40.54		9	15.00	
Tertiary education	51	27.57		2	3.33	

Source: Field survey (2013) % = percentage

Production characteristics of Fadama II and non-Fadama II fish farmers

Table 2 reveals that close to two-thirds (62.7%) of the Fadama II fish farmers and 55.0% of non-Fadama II fish farmers had a fish farming experience between 1 and 10 years respectively while about 24.9% of participants and 3.3% of the non-Fadama II fish farmers had fish farming experience longer than 20 years. The mean fish farming experience of the Fadama II and non-Fadama II fish farmers were reported to be 11.72 years and 10.33 years respectively. Majority (55.1% and 51.7%) of the Fadama II fish farmers and non-Fadama II fish farmers respectively had between 5 and 8 fish ponds. Table 2 also reports the average number of ponds operated to be approximately 8 and 6 for Fadama II and non-Fadama II fish farmers

respectively. Most (42.70%) of the Fadama II fish farmers acquired lands used for fish farming by purchase while most (45.00%) of the non-Fadama II fish farmers inherited lands from their predecessors.

Table 2: Production characteristics of Fadama II (n = 185) and non-Fadama II (n = 60) fish farmers

Production characteristics	Fadama II fish farmers			Non-Fadama II fish farmers		
	Frequency	%	Mean	Frequency	%	Mean
Fish farming experience (years)						
1-10	116	62.70	11.72	33	55.00	10.33
11-20	23	12.43		25	41.67	
>20	46	24.86		2	3.33	
Number of ponds						
1-4	70	37.84	7.73	18	30.00	6.03
5-8	102	55.14		31	51.67	
>8	13	7.03		11	18.33	
Land acquisition						
Lease	31	16.76		20	33.33	
Purchase	79	42.70		7	11.67	
Gift	32	17.30		6	10.00	
Inheritance	43	23.24		27	45.00	
Labour used						
Self	24	12.97		17	28.33	
Hired labour	51	27.57		12	20.00	
Family labour	33	17.84		9	15.00	
Hired and family labour	77	41.62		22	36.67	
Species cultured						
Clarias sp.	105	56.76		43	71.67	
Tilapia + *Clarias* sp.	69	37.30		17	28.33	
Clarias sp. + Tilapia + *Heterobranchus* sp.	11	5.95		0	0.00	

Source: Field survey (2013); % = Percentage

The combination of the use of family and hired labour was practiced among the two categories of respondents as majorities (41.7% and 36.7%) of Fadama II fish farmers and non-Fadama II fish farmers combined the two sources of labour respectively as reflected in Table 2. The kind of labour used also indicated that more (28.0%) of the non-Fadama II fish farmers made use of self labour than the Fadama II fish farmers who made use of either only family labour or only hired labour. Table 2 further reveals that all the respondents in both categories cultured *Clarias sp* while 37.3% and 28.3% of Fadama II fish farmers and non-Fadama II fish farmers combined *Clarias sp* with tilapia respectively. Also, about 6.0% of

the Fadama II fish farmers combined *Clarias sp*, tilapia and *Heterobranchus spp.* This shows that very few fish farmers still culture *Heterobranchus spp.*

Production output of Fadama II fish farmers and non-Fadama II fish farmers

In Table 3, majority (41.7%) of the non-Fadama II fish farmers had their production output to be less than 5,000 kg per annum while close to 60% cultured between 10,000 kg and above on an annual basis. The mean production outputs were found to be 17072±23.63kg and 7897±9.76kg for Fadama II and non-Fadama II fish farmers respectively.

Table 3: Annual fish production output of Fadama II (n = 185) and non-Fadama II (n = 60) fish farmers

Production output (kg)	Fadama II fish farmers (n=185)			Non-Fadama II fish farmers (n=60)		
	Frequency	%	Mean±SD (kg)	Frequency	%	Mean±SD (kg)
<5,000	31	16.76		25	41.67	
5,000-9,999	44	23.78	17072±23.63	21	35.00	7897±9.76
10,000-19,999	58	31.35		14	23.33	
≥20,000	52	28.11		0	0.00	

Source: Field survey (2013); SD = Standard deviation.

Table 4: Estimated annual income of Fadama II (n=185) and non-Fadama II (n=60) fish farmers

Annual income (Naira)	Fadama II fish farmers			Non- Fadama II fish farmers		
	Fre-quency	%	Mean±SD	Fre-quency	%	Mean±SD
≤100,000	0	0.00		3	5.00	
101,000-500,000	15	8.11	₦2,231,000.0	15	25.00	₦1,098,230.
501,000-1,000,000	37	20.00	0±468.25	42	70.00	00±597.27
>1,000,000	133	71.89		0	0.00	

Source: Field survey (2013); SD = Standard deviation.

Estimated annual income of Fadama II fish farmers and non-Fadama II fish farmer

Table 4 reveals that none of the Fadama II fish farmers and only 5% of the non-Fadama II fish farmers recorded an annual income lesser than or equal to N100,000. Also, the highest proportion (71.9%) of the Fadama II fish farmers and none (0.0%) of the non-Fadama II fish farmers

earned more than ₦1,000,000 per annum from fish farming. Furthermore, Table 3 shows that 70.0% of the non-Fadama II fish farmers and 20.0% of the Fadama II fish farmers earned between N501,000 and N1,000,000 per annum. The mean values reveal that the annual income of the Fadama II fish farmers was ₦2,231,000.00±468.25 while that of the non-Fadama II fish farmers was ₦1,098,230.00±597.27.

Differences between production output and estimated annual income of Fadama II fish farmers and non-Fadama II fish farmers

Table 5 reveals that the difference between the production output of Fadama II fish farmers and non-Fadama II fish farmers earlier reported was significant (t-value = 43.14, $p<0.01$). As revealed in Table 6, significant difference exists between the estimated annual income of Fadama II fish farmers and non-Fadama II fish farmers (t-value = 32.28, $p<0.01$).

Table 5: Test of difference in the production output of Fadama II fish farmers and non-Fadama II fish farmers

Variables	Mean	Standard deviation	df	t-value	p-value
Beneficiaries	17072	23.63	243	43.14	0.000
Non-beneficiaries	7897	9.76			

Source: Field survey (2013).

Table 6: Test of difference in the annual income of beneficiaries and non-beneficiaries of Fadama II project

Variables	Mean	Standard deviation	df	t-value	p-value
Beneficiaries	2231000	468.25	243	32.28	0.000
Non-beneficiaries	1098230	597.27			

Source: Field survey (2013).

Discussion

This study revealed that both Fadama II and non-Fadama II fish farmers were within the active population of Lagos State and according to Henri-Ukoha *et al.* (2011), people within this group are active, vibrant, and dynamic and are more likely to adopt innovations better and faster than their older counterparts and this will positively affect their production activities. Also, the mean ages indicated that non-Fadama II fish farmers were older than the Fadama II fish farmers. The younger age of the Fadama II fish farmers may be responsible for their participation in the project because research has found that the older an individual gets, the less he can adopt innovations or new ideas like Fadama II. In both categories, majorities were men implying that that fishing in

Lagos state primarily remains the occupation of men with few women participating in fishing and is in line with the findings of Henri-Ukoha *et al.* (2011) and Oladoja and Adeokun (2010) who also reported male domination in fish farming. This does not underestimate the significant roles played by women in fish production as the women were observed to be primarily engaged in fish processing and marketing in the study area. Although, there were cases of single fish farmers, the marriage institution is still cherished by majority of the fish farmers (Oladoja and Adeokun, 2009) and confirms with Jibowo (1992) finding that vast majority of the adult population of any society consist of married people.

A larger household size was reported among the Fadama II fish farmers than the non-Fadama II fish farmers. It could therefore be inferred that the larger family sizes may be the reason for the Fadama II fish farmers' involvement in the project in order to either cater for their families through increased income or because the family members can easily be used as cheap labour in their endeavour to expand business. This supports the findings of Olaoye *et al.* (2011) which attributed larger family size of Fadama fish farmers to the fact that Fadama farming embraced the use of extended family members as labour. Fadama II fish farmers were also found to possess higher levels of education than the non-participants and this supports Henri-Ukoha *et al.* (2011) who also reported that Fadama users were more educated than their non-participant counterparts. The educational level of these two groups of fish farmers may be responsible for their participation and otherwise in Fadama II project because the educational level of an individual has also been scientifically proven to influence adoption of technologies or innovations.

Fadama II fish farmers were more experienced than the non-Fadama II fish farmers in terms of number of years spent in fishing. Also, the participants in Fadama II project were found to operate more ponds than the non-participants and this is attributed to their involvement in Fadama II project which aided their acquisition of more ponds and other equipments. Purchase and inheritance were the means of land acquisition by the highest proportions of the Fadama II and non-Fadama II fish farmers respectively. This could be responsible for the fewer number of ponds operated by the non-Fadama II fish farmers because inherited lands must have been fragmented among several family members. Results from this study also indicated that *Clarias sp* and tilapia were the two most common species of fish being cultured by fish farmers in Lagos state. This is in agreement with the findings of Adekoya *et al.* (2004) as cited by Olaoye *et al*. (2007) that found the most popular fish species proved desirable for culture in Nigeria to be *Clarias gariepinus and Heteroclarias spp*. Olaoye *et al*. (2011) also reported majority of fish farmers in Ogun state to have cultured *Clarias sp* more than any other fish species.

The mean fish production output per annum illustrated that the participants in Fadama II project had more than twice the production output of the non-Fadama II fish farmers. This implies that Fadama II project had caused an increase in the production output of those who participated in the project and is in consonance with the findings of Olaoye *et*

al. (2011) which reported an increase in fish farmers' productivity as a result of Fadama II project. Also, the estimated annual income of the Fadama II fish farmers was about 103% more than the estimated annual income of the non-Fadama II fish farmers and implies that participation in Fadama II project had doubled the income of the Fadama II fish farmers when compared with that of those who do not participate in Fadama II project.

Significant differences were also found in the fish production output as well as estimated annual income of the Fadama II and non-Fadama II fish farmers. The implication is that Fadama II fish farmers were more productive than the non-Fadama II fish farmers and it is in consonance with the findings of Henri-Ukoha *et al.* (2011) which also reported that Fadama II fish farmers were more productive than non-Fadama II fish farmers. This further means that Fadama II project was a veritable tool in increasing domestic fish production in Lagos State. Fadama II could also be seen as a very important project to the rural poor as a poverty reduction project since it significantly increased the annual income of the participants. These significant differences in the income and productivity of these two groups of fish farmers could further be attributed to the provision of needed facilities to support Fadama fish farmers.

Conclusion and Recommendation

Fadama II project positively affected both the productivity and income level of the participant fish farmers. This was shown in the production characteristics of the sampled fish farmers from both groups as the participant fish farmers operated higher number of fish ponds and acquired lands by purchase which allows them to expand their production at any time. The result of t-test analyses also showed that Fadama II fish farmers were more productive in terms of the estimated annual income and the output (kg) than the non-fadama fish farmers. The study therefore concluded that the implementtation of Fadama II project in Lagos state as far as fish farming is concerned was a success. Based on this, it is recommended that subsequent phases of Fadama projects should incorporate the components of community-driven development approach in their planning design and implementation so as to record even better success than recorded in the Fadama II project.

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