



Assessment of the effect of national fadama development project II (Fadama II) on fish farming in Lagos state, Nigeria

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ABSTRACT

Fisheries is one of the four important subsectors of the economy recognized and incorporated into the implementation of the second phase of 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 technique was used in sampling 185 fadama II fish farmers and 60 non-fadama II fish farmers from 9 Fadama Community Associations with the aid of structured interview schedule. Data obtained were analyzed by using frequency count, percentages, mean, standard deviation and t-test analytical techniques. Findings from the study indicated that fadama fish farmers had higher number of ponds, were more educated, larger household sizes, and were more experienced in fish farming business than the non-fadama fish farmers while non-fadama fish farmers were older than the fadama fish farmers. The results of t-test analyses revealed that significant differences occurred in the annual income (t-value=32.28, $p<0.01$) and production output (t-value=43.14, $p<0.01$) of fadama and non-fadama fish farmers. The study concluded that the project has a positive effect on the income of fadama fish farmers in Lagos State, Nigeria and recommended that subsequent phases of the NFDPP programme should be extended to all fadama users as this will benefit more people.

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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 (NTWG, 2009). The importance of fish in human nutrition was highlighted by Amienheme (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. IFPRI (2005) also reported that fish contributes 22% of the overall protein intake in many African countries.

Despite the enormous values associated with fisheries, productivity and income of fish farmers had been reported to be low (Igbegwu, 2007). 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. These challenges were responsible for the low productivity of fish farmers which gave rise to malnutrition and increased infant mortality due to low protein intake (World Bank, 2007).

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, fishers, 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 & Beard, 2007; Labonne, *et.al.*, 2007) which are empowerment of local communities and local governments, social inclusion, demand-driven design, collective action and support from external institutions and organizations.

With the expiration of Fadama II project in 2011, it has made some progress. For instance, FDF (2008) reported an

increase in Nigeria's fish production from 1,024,984 metric tonnes in 2000 to 1,355,173 metric tonnes in 2007. It is however unfortunate that the recorded increment was not sufficient to bridge the demand-supply gap. 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 socioeconomic 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 their null forms:

H₀1: there is no significant difference in the production output (in Kg) of participants and non-participant fish farmers in Lagos state; and

H₀2: there is no significant difference in the income (in Naira) of participants and non-participant fish farmers in Lagos state.

Methodology

This study was conducted in Lagos state, which is unarguably the most populated of the six Southwestern 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 and described as follows:

Stage 1 involves 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 involves the random sampling of 60% of the members in each of the selected FUGs and this resulted in 185 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 through the snowballing technique.

Results and Discussion

Socioeconomic characteristics of Fadama II fish farmers

As shown in Table 2, 90.81% and 88.33% 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. 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 and married. This implies that fishing activities 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 married and 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 conforms to Jibowo (1992)'s position who submitted that vast majority of the adult population of any society consist of married people.

More than half (52.97%) of the Fadama II fish farmers had a household size of 6-10 persons while 70% of the non-fadama II fish farmers had a household size between 1 and 5 persons. The mean household sizes in Table 2 also showed that the fadama II fish farmers had as much as twice the household size of the non-fadama II fish farmers. 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.

With regards to the highest educational level attained, about 40.54% and 27.57% of the fadama II fish farmers had secondary and tertiary education respectively while more than half (53.33%) and 26.67% of the non-fadama II fish farmers only had adult and primary education respectively. This implies that Fadama II fish farmers had higher educational attainment than their non-participant counterparts and this supports Henri-Ukoha, *et.al.* (2011) who also reported that fadama users were more educated than their 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. Close to two-thirds (62.70%) of the fadama II fish farmers and 55% of non-fadama II fish farmers had a fish farming experience between 1 and 10 years respectively while about 24.86% of participants and 3.33% of the non-fadama II fish farmers had fish farming experience longer than 20 years. The mean fish farming experience also showed that the fadama II fish farmers had stayed longer in fish farming than the non-fadama II fish farmers. Majority (55.14% and 51.67%) of the fadama II fish farmers and non-fadama II fish farmers respectively had between 5 and 8 fish ponds.

The average fish ponds presented in Table 2 implies that the fadama II fish farmers had more fish ponds than the non-fadama II fish farmers. This is attributed to their involvement in fadama II project which aided their acquisition of more ponds and other equipments. Most (42.70%) of the Fadama II fish farmers acquired lands used for fish farming by purchase while most of the non-fadama II fish farmers inherited lands from their predecessors. This may 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. This contradicts the findings of Oladoja and Adeokun (2009) which reported that up to 80% of their respondents (crop farmers) acquired land through inheritance. The disparity in these two researches may be attributed to the difference in the two enterprises. The combination of the use of family and hired labour was practiced among the two categories of respondents as majorities (41.67% and 36.67%) 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%) 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. This is attributed to the higher production volume by the fadama II fish farmers that required different sources of labour other than self labour.

Table 1: Sampling procedure for Fadama and non-fadama fish farmers

List of FCAs	Lists of FUGs in the FCAs	No of members in the FUGs	Number of selected members from the FUGs	Total sampled fadama fish farmers from each FCA	Non-Fadama fish farmers from each FCA
Agbeyewa FCA	Ore-Ofe FUG Farmate FUG Dolphin FUG	16 17 17	10 10	20	7
Agbede FCA	Ebuwawa zone 1 FUG Agbede Eleja FUG Mowowale Ebuwawa Tikulosoro	14 16 15 12	8 10 9	27	9
Progressive FCA	Oluwatobi FUG Nobel FUG	11 20			
Ikosi marketers FCA	Igbehinadun FUG	21	13	13	4
Irepodun FCA	Agbegbemi Fish FUG Thethewagbe FUG Albarka Ajido FUG Wheviyon fish FUG	17 13 14 12	10 8 7	25	8
Orisunmibare FCA	Kajola fishery FUG Kajola poultry FUG Agbelo Gbon Fishery FUG Anuoluwapo FUG Divine strategic fish Farming FUG Success fish Farmers FUG	13 8 9 12 10 10	8 7 6 6	27	9
Blessed FCA	Blessed Assurance FUG Bless Grace Leads FUG Blessed God's Favour FUG	10 10 10			
Divine FCA	Devine Favour FUG Devine Touch FUG Devine solution FUG Devine Dominion FUG	11 10 10 10	7 6 6	19	6
Igbehin Adun FCA	Amunidara FUG Owomilere FUG Anu Oluwapo FUG	10 10 10			
Itoikin Idena FCA	Assefad FUG Omega FUG Citical FUG Gold Water FUG Irewolede FUG Simisola FUG	10 10 10 10 12 10	6 6 7 6	25	8
Osapa women FCA	Olohuntosin FUG Oredola FUG Irewolede FUG Progressive FUG	12 12 12 12	7 7 8	22	7
Aldamak FCA	Aldamak FUG Owotutu FUG	11 14			
Ayo FCA	Olorunda FUG God's Will FUG	11 10	7	7	2
Ayetoro FCA	Access Divine	13			
		547		185	60

Based on preliminary survey (2011)

Table 2: Distribution of Fadama beneficiaries according to their socioeconomic characteristics

Socioeconomic characteristics	Fadama II fish farmers (n=185)			Non-fadama II fish farmers (n=60)		
	Frequency	(%)	Mean	Frequency	(%)	Mean
Age (years)						
31-40	23	12.43	47.91 years	8	13.33	48.50 years
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	9.43	42	70.00	4.50
6-10	98	52.97		18	30.00	
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	
Fish farming experience (years)						
1-10	116	62.70	11.72 years	33	55.00	10.33 years
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						
Cat fish	105	56.76		43	71.67	
Tilapia + cat fish	69	37.30		17	28.33	
Cat fish + Tilapia + <i>Heterobranchus sp.</i>	11	5.95		0	0.00	

Table 3: Distribution of beneficiaries and non-beneficiaries according to their annual production output

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

Table 4: Distribution of Fadama II fish farmers and non-fadama II fish farmers based on their estimated annual income in Naira

Annual income (Naira)	Beneficiaries (n=185)			Non-beneficiaries (n=60)		
	Frequency	%	Mean±SD	Frequency	%	Mean±SD
≤100,000	0	0.00	2231000±468.25	3	5.00	1098230±597.27
101,000-500,000	15	8.11		15	25.00	
501,000-1,000,000	37	20.00		42	70.00	
>1,000,000	133	71.89		0	0.00	

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			

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			

Table 2 further reveals that all the respondents in both categories cultured catfish while 37.30% and 28.33% of fadama II fish farmers and non-fadama II fish farmers combined catfish with tilapia respectively. Also, about 5.95% of the fadama II fish farmers combined catfish, tilapia and *Heterobranchus spp.* this shows that very few fish farmers still culture *Heterobranchus spp.* This is an indication that catfish 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 *Heteroclaris spp.*

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

As shown in Table 3, majority (41.67%) of the non-fadama II fish farmers had their production output to be less than 5,000Kg per annum while close to 60% cultured between 10,000Kg and above on an annual basis. The mean production output also illustrated that participants of fadama II project had as twice as 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.

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

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 of the Fadama II fish farmers and none of the non-fadama II fish farmers earned more than N1,000,000 per annum from fish farming. Furthermore, Table 4 shows that 70% of the non-fadama II fish farmers and 20% of the Fadama II fish farmers earned between N501,000 and N1,000,000 per annum. The mean values also show that the annual income of the fadama II fish farmers was 103% more than the estimated annual income of the non-fadama II fish farmers. This 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.

Difference between the production output 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 is significant (t-value = 43.14, p<0.01). This implies that Fadama II project has significantly increased the production output of fish farmers who participated in the project in Lagos state. The implication is that fadama II fish farmers were more productive than the non-fadama II fish farmers and 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.

Difference between the estimated annual income of Fadama II fish farmers and non-fadama II fish farmers

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). This implies that the higher income of the Fadama II fish farmers earlier reported is attributed to their participation in Fadama II project. Hence, Fadama II is a very important project to the rural poor as a poverty reduction project since it significantly increased the annual income of the participants. This significant difference in the income of these two groups of fish farmers is attributed to the provision of needed facilities to support fadama fish farmers.

Conclusion and Recommendation

This study revealed that 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 can allow them to expand their production at any time. The result of t-test analyses also showed that significant differences existed in both the income and production output between the Fadama II fish farmers and non-participant fish farmers in Lagos state. The study therefore concluded that the implementation of Fadama II project in Lagos state as far as fish farming is concerned was a success. Based on the findings of this study, it is recommended that Fadama III and 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 does the Fadama II project.

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