Impact of Fadama III Project on the Food Security Status of Beneficiary and Non Beneficiary Farmers in Kabba/Bunu LGA, Kogi

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Abstract
The study examined the impact of Fadama III project on the food security status of beneficiary and non beneficiary farmers in Kabba/Bunu LGA of Kogi state, Nigeria. A two stage sampling technique was used to select 5 villages out of the 15 villages in the area and 18 beneficiary and non beneficiary farmers from each village giving a total o 180 respondents. Generated data were subjected to descriptive statistical analysis, logistic regressions, food security index (FSI), food insecurity gap (FIG), headcount ratio (HCR) and surplus index (SI). Analysis of the socioeconomic variables revealed that most of the beneficiary farmers are within the age of 40 – 49 years while most of the non beneficiary farmers are within the age of 30 – 39 years. About 15% of the beneficiary farmers had no formal education while 46% of the non beneficiary farmers had no formal education. The crop output level of the farmers showed that beneficiary farmers had more output than the non beneficiary farmers with an output difference of 1% before fadama programme and a crop output difference was 9.5% after the project. Similarly, the farmers had 0.16% difference in their level of consumption before the fadama project and 13.9% difference in their consumption level after the project in favour of beneficiary farmers. The result further show that 75(83%) of the beneficiary farmers are food secure as against about 39(34%) of the non beneficiary farmers. The mean FSI of food secure beneficiary farmers was 3.88 while that of food secure non beneficiary farmers had 1.98. The FIG/SI of food insecure household of non beneficiary farmers and beneficiary farmers were 29% and 49% respectively. The logistic regressions analysis shows that the socioeconomic characteristics considered had significant relation with access to fadama project except age, household size and marital status that had no significant relationship. The study established that shortage of water, late supply of inputs and high fadama user group contribution were the problems associated with the project in the area. The major food insecurity coping strategies were purchasing food on credit (99%), reducing size of food per meal (89%), consuming seed stock for next season (86%), borrowing food (81%) and rationing money to buy prepared food (73%). It was therefore concluded that the level of farmer – extension contact was low, the farmers operate on a small scale level and Fadama III programme increased the crop output and consumption levels of both the beneficiary farmers and non beneficiary farmers. Based on the conclusions, it was recommended that the Agricultural Development Project (ADP) should ensure regular contacts with farmers to expose them to the benefits of Fadama farming, the ADP and the Local Agricultural Authority should help the farmers and liaise with the State Fadama office to ensure early supply of material inputs and government at the state level should ensure an alternative source of water.
Keywords: Fadama, Food Security, Beneficiary, Kabba/Bunu, Kogi

1. Background of the Study

Fadama is a Hausa word meaning the seasonally flooded or floodable plains along major savannah rivers and or depressions or adjacent to seasonally or perennially flowing streams and rivers. Such lands are especially suitable for irrigated production and fishing, and traditionally provide feed and water for livestock (World Bank, 2008). Fadama III was equipped with measures to correct the shortcomings of Fadama II. New components such as fadama user equity fund, adaptive research support and mainstreaming of sustainable land management were incorporated into the project. One of the key features of the project is to empower the communities to collectively decide on how resources are allocated and managed for their livelihood activities and to participate in the design and execution of their sub-projects.

In the context of food insecurity, the increasing food short as against the increasing population in Nigeria calls for less dependence on rain fed production to irrigation practices. This will ensure all year round food production. Concisely, FAO (1996) explains food security to be a situation where all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. This definition has three dimensions: food availability, access and stability. Availability is related to domestic production, access is influenced by level of income and utilization – consumption level and stability of food security refers to factors affecting variability in supply and access (Flores, 2004). Stemming from the foregoing, the aim of this study is to assess the impact of *Fadama* III project on food security levels of beneficiaries and non -beneficiaries' farmers in Kabba/Bunu local government area of Kogi State with the following specific objectives; describe the socioeconomic characteristics of beneficiary and non

beneficiary farmers in the study area; determine and compare the food security statuses of beneficiary and non beneficiary farmers based on food availability and consumption level in the study area; determine the relationship between farmers' socioeconomic characteristics and access to *fadama* III project in the study area; identify the food insecurity coping strategies used by food insecure households in the study area; and identify the problems associated with *fadama* III project in the study area.

2. Materials and Method

2.1 Study Area

The study was conducted in Kabba/Bunu Local Government Area of Kogi State. The study area is within the Northern Guinea Savannah Ecological zone of Nigeria. It lies between Latitude 7° 49'4"N and Longitude 6° 04'23"E of the equator with an area of 2.70km² and a population of 145,446 (NPC, 2006). The area has two distinct seasons in a year, the wet and dry seasons. The wet season spans between middle of March and October, while the dry season is between the months of October and March. The area has an average maximum temperature of 32°C and an average minimum temperature of 21°C with annual rainfall between 1,100 mm and 1,300 mm. The main crops grown in the area are cassava, oil palm, maize, yam, melon, plantain, and vegetable. Animal husbandry is also practiced in the area.

Two stage sampling procedure was employed. The first stage was the purposive selection of five (5) villages out of the fifteen (15) villages that have benefitted from *fadama* III in the study area. This is based on the number of beneficiary farmers in the 5 villages. In the second stage, eighteen (18) beneficiary and non-beneficiary farmers each making 36 farmers was randomly selected from each village. A total of 180 respondents were selected. Primary data for analysis was generated through the administration of structured questionnaire while secondary information was obtained via journals, newspapers, internet, literature, and state official website. Generated data were analysed with descriptive statistics, Logistic Regressions and Food Security Line Analyses. Nlogit software statistical package was used for analysis.

2.2 Logistic Regressions Analysis Model

$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + e$

Where

Y= Access to *fadama* III project (beneficiary = 1 and non beneficiary = 0)

X_1=Age of household head (yrs)

X_2= Sex of household head (male=1, female=0)

X_3=Household size (Number)

X_4=Level of education of household size (yrs)

X_5=Farming experience of household size (yrs)

X_6=Farm size of household size (ha)

X_7=Marital status (married 1, single = 0)

X_8=Level of income of household size (₦)

X_9 = Extension contact (frequency of visits in a month)

e =Error term

2.3 Food Security Index Analysis

To determine the food security status of each household of beneficiary and non beneficiary farmers of *Fadama* III in the study area, the study adopted the Food Security Index (Z_i) as used by Babatunde *et al*., (2007) and Kuwornu *et al.,* (2013). Household with Calorie intake above or equal the recommended Daily Calorie required were considered food secure while households that have Daily Calorie intake below the recommended Daily Calorie required were considered food insecure. The formula of Food Security Index (FSI) is given below;

$$Z_i = \frac{Y_i}{R} \quad \text{... } i$$

Where

Z_i = food security status of ith farm household, Y_i = per capita daily calorie intake of ith farm household and R = recommended per capita daily calorie intake (2260 Kcal) Babatunde *et al*., (2007). For further analysis, the study also estimated other food security indices including Food Insecurity Gap (FIG), Headcount Ratio (HCR) and Surplus Index (SI).

The explicit forms of the indices are given below;

$$FIG = \frac{1}{M}\sum_{i=0}^{n} G_i \quad \text{...} i$$

Where M represents the number of food insecure households and G_i the calorie intake deficiency for the ith

households; a further derivative of G_i is given as;

$$G_i = \left(\frac{Y_i - R}{R}\right) \text{...} iii$$

Where Y and R have been defined previously and Z_i

Headcount Ratio is given as:

$$HCR = \frac{M}{N} \times 100\% \text{……………………………………..} iv$$

Where N represents the number of households in the sample and M represents number of food insecure households.
The Surplus index (SI) is expressed as;

$$SI = \frac{1}{M} \sum_{i=0}^{n} \left(\frac{Y_i - R}{R}\right) \text{……………………………………..} v$$

For ease of analysis, the daily energy calorie intakes for the different age grouping in the households were converted to adult equivalent. By this conversion, the total household calorie requirement was obtained by multiplying the household size by the recommended calorie requirement of 2260 kcal.

3. Results and Discussion

3.1 Socioeconomic Characteristics of *Fadama* III Project Beneficiary and Non Beneficiary Farmers in the Study Area

Table 1 show that more males (74%) participated in *Fadama* III farming in the area than the females (26%). Farmers between the age brackets of 30 – 59 years participated in *Fadama* III project in the area. On the other hand, more of the farmers (49%) who did not participate in *Fadama* III are from the age bracket of 30 – 39 years. This shows that though the farmers are in their productive age, younger youths between the ages of 20 – 29 are not actively involved in farming in the study area. This confirms the findings of Onoh *et al*., (2012) and Ekong (2010) that Nigeria farmers are within the age of 40 – 60 years.

Level of Education revealed that 15% of the beneficiary farmers did not have formal education while 85% attended one form of formal education. This would enhance their awareness of the project, its mode of operation and requirements. On the other hand, majority of the non beneficiary farmers (46%) did not have formal education which is expected to have affected their level of participation in *Fadama* III project in the area. This result agrees with the finds of Anaglo *et.al*, 2014; Mahmudul *et.al*., 2004; Asadullah, 2005 and Langyintuo & Mekuria, 2005 who pointed out the significant roles of education the adoption process.

3.2 Selected Crop Output Levels of Fadama III Beneficiary and Non Beneficiary Famers in the Area

The table 2 shows that for all the crops cultivated before *Fadama* III project, beneficiary farmers had a total of 11, 995.96 kg while non beneficiary farmers had 11, 757.31kg with percentage crop output difference of 1.0. This shows that before *Fadama* III project, the difference in crop output level between beneficiary and non beneficiary farmers was negligible. After the first season of *Fadama* III in the area, the crop output level of beneficiary and non beneficiary farmers were 14, 014.11 and 12, 413.75 respectively with percentage crop output difference of 6.0. This indicated that *Fadama* project increased the output levels of both beneficiary and non beneficiary farmers.

3.3 Food Security Status of Beneficiary and Non Beneficiary Farmers According to Selected Corp Consumption Levels

Table 3 shows that beneficiary and non beneficiary farmers consumed 8205.80 Kcal and 8187.54 Kcal respectively of all the crops cultivated giving a percentage consumption difference of 0.16 before *Fadama* III project. This difference is insignificant on their food consumption status. After the first season of the *Fadama* III project, their total consumption level for the grown crops were 11833.08 Kcal and 8946.08 Kcal for beneficiary and non beneficiary farmers respectively. This amounted to 13.89% difference in their levels of consumption. This implies that the food consumption level of *Fadama* III beneficiary farmers increased after the first *Fadama* III season. This suggests that *Fadama* project is capable of increasing crop production output and improve the food security level of farmers.

3.4 FSI, FIG and SI Analyses of Fadama III Beneficiary and Non Beneficiary Farmers in the Study Area

Table 4 shows that about 75(83%) of the beneficiary farmers are food secure as against about 39(34%) of the non beneficiary farmers. The mean FSI of food secure beneficiary farmers was 3.88 while that of food secure non beneficiary farmers had 1.98. Further, FIG/SI show that on the average, food insecure household of non beneficiary farmers consumed 29% less than the recommended daily calorie intake while food secure beneficiary farmers consume 49% in excess of the recommended daily calorie intake. The estimated per capital daily calorie of 2340 Kcal is higher than the 2260 Kcal recommended level.

3.5 Logit Regressions Results of the Relationship between Socioeconomic Characteristics and Access to Fadama III in the Study Area

The regressions analysis in table 4 shows sex, level of education, farming experience, farm size, level of income and extension contact had positive significant relationship with access to *Fadama* III. This mean a unit increase of any of the variables will increase access to *Fadama* III project. On the other hand age, household size and marital status had no significant relationship with access to *Fadama* III project. The negative relationship with age shows that a unit increase in age will result to a unit decrease in the access to *Fadama* III project. The adjusted R explains that 95% of the variables accounted for the variations in the access to *Fadama* III project in the study area.

3.6 Multiple Responses on Food Insecurity Coping Strategies by Sample Beneficiary and Non Beneficiary Food Insecure Farmers in the Study Area

Table 6 shows that most common coping strategies among respondents is purchasing food on credit (99%), reducing size of food per meal (89%), consuming seed stock for next season (86%), borrowing food (81%) and rationing money to buy prepared food (73%).

3.7 Multiple Responses on Problems Associated with Fadama III Project in the Study Area

The table 7 shows that the major problems associated with the project in the study area are shortage of water, late supply of inputs and high user group contribution.

4. Conclusions

Based on findings, it was concluded that younger farmers are not actively involved in *Fadama* farming in the study area; the level of farmer – extension contact was low; the farmers operate at a small scale level; *fadama* III *p*rogramme increased the crop output levels of both the beneficiary farmers and non beneficiary farmers; the consumption levels of beneficiary farmers improved more than that of non beneficiary farmers and as such were more food secure with regards to food availability and consumption; socioeconomic characteristics of farmers have significant relationships with access to *Fadama* programme and shortage of water is the major problem associated with *fadama* programme in the area.

5. Recommendations

Based on the conclusion, it was recommended that the Agricultural Development Project (ADP) should ensure regular contacts with farmers to expose them to the benefits of *Fadama* farming; the ADP and the Local Agricultural Authority should help the farmers and liaise with the State *Fadama* office to ensure early supply of material inputs; and government at the state level should ensure an alternative source of water (bore holes, tape water and dams) for the farmers to ensure efficient and smooth operation of the programme in the area.

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Table 1: Socioeconomic Characteristics of *Fadama* III Project Beneficiary and Non Beneficiary Farmers in the Study Area

Characteristics	Beneficiaries		Non Beneficiaries	
	Frequency (N = 90)	Percent	Frequency (N=90)	Percent
Sex				
Male	67	74	43	48
Female	23	26	47	52
Age (Years)				
30 – 39	15	17	44	49
40 – 49	47	52	28	31
50 – 59	20	22	12	13
> 59	8	9	06	7
Marital Status				
Married	62	69	52	58
Single	28	31	38	42
Level of Education (Years)				
Non Formal Education	13	15	41	46
Primary Education	30	33	20	22
Secondary Education	35	39	23	26
Tertiary Education	12	13	06	6
Household Size (No)				
1 – 5	26	29	49	54
6 – 10	55	61	35	39
11 – 15	09	10	6	7
> 15	0	0	0	0
Farm Size (Hectare)				
0 – 1.0	13	15	33	37
1.1 – 2.0	70	78	52	58
2.1 – 3.0	07	7	5	5
3.1 – 4.0	0	0	0	0
> 4.0	0	0	0	
Farming Experience (Years)	26	29	36	40
1 - 10	52	58	50	56
11 - 20	12	13	04	4
21 - 30	0	0	0	0
> 30				
Level of Income (₦)				
50, 000 – 99, 000	39	43	29	32
100, 000 – 149, 000	51	57	54	60
150, 000 – 199, 000	0	0	7	8
> 199, 000	0	0	0	0
Extension Contact (Freq)	28	31	63	70
Once a month	62	69	27	30
Twice a month	0	0	0	0
Thrice a month	0	0	0	0
> Thrice a month				

Source: Field Survey Data, 2014

Table 2: Selected Crop Output Levels of Fadama III Beneficiary and Non Beneficiary Famers in the Area

Crops (Kg/ha)	Before *Fadama*			After *Fadama*		
	Beneficiaries	Non Beneficiaries	% Diff	Beneficiaries	Non Beneficiaries	% Diff
Yam	2,678.18	2,429.28		3, 417.88	2, 691.68	
Cassava	3, 772.48	3, 017.22		4, 596.44	3, 316.79	9.5
Maize	4, 618.10	4, 908.19	1.0	5, 819.68	5, 062.72	
Tomato	927.20	1, 402.62		1, 180.11	1, 342.56	
Total	**11, 995.96**	**11, 757.31**		**15, 014.11**	**12, 413.75**	

Source: Field Survey Data, 2014

Table 3: Food Security Status of Beneficiary and Non Beneficiary Farmers According to Selected Corp Consumption Levels

Consumed Crops	Consumption Level Before Fadama III (2260Kcal)			Consumption Level After Fadama III (2260Kcal)		
	Beneficiaries	Non Beneficiaries	% Diff	Beneficiaries	Non Beneficiaries	% Diff
Yam	1740.86	1654.45		2419.18*	1944.76	
Cassava	2292.51*	2006.91		2822.62*	2341.33*	
Maize	2017.12	2451.20*	0.16	2781.07*	2470.97*	13.89
Tomato	2155.31	2074.98		3810.21*	2189.02	
Total	**8205.80**	**8187.54**		**11833.08**	**8946.08**	

Source: Field Survey Data, 2014; * = Food Secure based on consumption Level

Table 4: FSI, FIG and SI Analyses of Fadama III Beneficiary and Non Beneficiary Farmers in the Study Area

Description of Items	Beneficiary Farmers		Non Beneficiary Farmers	
	Food Secure	*Food Insecure*	*Food Secure*	*Food Insecure*
Household (No.)	75	15	39	51
Household (%)	83.33	16.67	34.44	56.66
Mean (FSI)	3.88	1.30	1.98	2.44
Standard Deviation	0.74	0.42	0.51	0.22
FIG/SI	0.49	0.15	0.18	0.29
Per capital Daily Calorie available	2340 Kcal			

Source: Field Data. 2014. FSI = Food Security Index; FIG = Food Insecurity Gap; SI = Surplus Index

Table 5: Logit Regressions Results of the Relationship between Socioeconomic Characteristics and Access to Fadama III in the Study Area

Characteristics	Regression Coefficients	SE	t-value	Result
Age	-0.817	0.827	-0.987	NS
Sex	0.045	0.014	3.214	S
Household Size	0.732	0.596	1.227	NS
Level of Education	0.006	0.001	7.367	S
Farming Experience	0.871	0.178	4.893	S
Farm Size	0.698	0.113	6.176	S
Marital Status	0.824	0.926	0.889	NS
Level of income	0.021	0.004	5.250	S
Extension Contact	0.039	0.007	5.571	S
R-squared = 0.97516				
Adjusted R-squared 0.95742				

Source: Field Survey Data, 2014

Table 6: Multiple Responses on Food Insecurity Coping Strategies by Sample Beneficiary and Non Beneficiary Food Insecure Farmers in the Study Area

Food Insecurity Coping Strategies	F (N = 180)	%	Rank
Purchase food on credit	178	99	1st
Reduce the size of food per meal	161	89	2nd
Consume seed stock held for next season	156	86	3rd
Borrow food	145	81	4th
Ration the money to buy prepared food	132	73	5th
Borrow money to purchase food items	123	68	6th
Rely on help from a friends and relatives	115	64	7th
Buy less preferred and less expensive foods	102	57	8th
Skipping one meal per day	71	39	9th
Skip meal within a day	52	29	10th
Sale assets to buy food	31	17	11th
Restrict consumption of adults in order for small children to eat	29	16	12th
Harvest immature crops	21	12	13th

Source: Field Data, 2014.

Table 7: Multiple Responses on Problems Associated with Fadama III Project in the Study Area

Problems	Frequency (N=40)	Percent	Rank
Shortage of water	36	90	1st
Late supply of inputs	33	82.5	2nd
High user group contribution	29	72.5	3rd
Inadequate capital	25	62.5	4th
High cost of inputs	22	55	5th
No ready market	18	45	6th

Source: Field Survey Data, 2014