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IMPACT OF THE NATIONAL FADAMA III PROJECT ON FARMERS' INCOME IN NASARAWA STATE, NIGERIA

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Abstract

This study was conducted to determine the impact of the Fadama III project on the income of its beneficiaries after three years of implementation using a sample of 232 households. The data was analyzed using the Heckman's difference-in-difference methodology. The result shows that impact of Fadama III on crop productivity was remarkable. The target of 20% increase in productivity was attained by all benecifiaries and across all income terciles. The male beneficiaries exceeded the target by about 17% compared to the female beneficiaries that were 5% below the target. The impact on Livestock productivity was generally weak. An increase of 2.6% in income from Livestock was observed, compared to the 20% target expected. The impact was higher and significant at both 5% and 10%among the female beneficiaries compared to the male beneficiaries. On the average, the agricultural income of beneficiaries increased by 7%. As expected, Fadama III had an impact on non-farm income for all beneficiaries. However, this was not statistically significant. A 21% increase in non-farm income due to participation in Fadama III was recorded. The impact on income from non-farm activities was higher for female than for the male beneficiaries. There was a significant increase of 23% in household income at ($p<0.01$) among the project beneficiaries. However, the level of increase is lower than the project target of 40%. Interestingly, the income of female beneficiaries increased by 24% and is higher compared to their male counterparts whose income increased by 12%. It can thus be concluded that, the Fadama III Project was effective in livelihood enhancement in the project communities. However, future impact studies on the Fadama III project should include environmental and social concerns for the purpose of ensuring the sustainability of the Fadama ecosystems in Nigeria.

Keywords: Fadama III, impact, income, project, Nasarawa

INTRODUCTION

Nigeria has a land area of 98.3 million hectares of which only about 75% is arable (**source**). In addition, 70% of the populations of Nigeria are involved in agricultural activities. However, despite these potentials, poverty and hunger are critical challenges. In 2004, Nigeria's relative poverty measurement stood at 54.4%, increased to 69% (or 112,518,507 Nigerians) in 2010 (Kale, 2012). According to the World Bank (2014), poverty is still

very high and accounts for about 62% live below the poverty line in Nigeria. Hence, Nigeria needs to invigorate a strong reduction in the poverty rate in order to reduce people living below the poverty line the absolute number of people below the poverty line in Nigeria. The government of Nigeria over the years has embarked on programmes and projects aimed at increasing food production as well as alleviating rural poverty and bringing about rural development (Agbarevo and Okwoche, 2014). Some of these programmes include: National Accelerated Food Production Programme (NAFPP); Directorate of Food, Roads and Rural Infrastructure (DFRII); Operation Feed the Nation (OFN); Green Revolution (GR); School to Land Programme (SLP), National Accelerated Food Production Programme (NAFPP); Agricultural Development Programme; which was (sponsored by World Bank) River Basin Development Authority (RBDA); Rural Banking Scheme; Better Life for Rural Women (BLP); Peoples Bank of Nigeria (PBN); Community Banking; National Agricultural Land Development Authority (NALDA); Special Programme for Food Security (SPFS); as well as the Root and Tuber Crops Expansion program (RTEP). In addition, the National Fadama Development Project (NFDP) was also introduced (Ajibefun and Aderinola, 2004), but were implemented in phases as Fadama I (1992-1999), II (2004-2007) and III (2008-2013) respectively across states in the country. All these programmes/projects except the Fadama II and III projects adopted the top-down approach in implementing these programmes. However, the Fadama II and III projects adopted the community driven development approach (CDD) with government officials acting only as facilitators. However, the extent of success or otherwise of the Fadama III project in increasing household income is seemingly not known and this constitutes the problem for this study.

Fadama is a Hausa word which connotes low-lying and flood plain areas underlined by shallow aquifers and found along Nigeria's river system. It is in most cases irrigable land (NFDO 2007). Fadama III project is a tripartite funded intervention by the World Bank, Federal Government of Nigeria and the participating States. The objectives of Fadama III are targeted towards poverty reduction (World Bank, 1996). Fadama III is designed to improve the capacities of beneficiary groups: the Fadama Users Groups (FUGs) which are aggregated into Fadama Community Associations (FCAs) in the states (Ike, 2012).

Fadama III is a follow-up to the Fadama II project, which was implemented in 12 states and showed remarkable success in reducing poverty and helping the rural poor. Based on this success, the Federal Government of Nigeria and the World Bank decided to roll out the Fadama CDD program to all 36 states and the FCT, Abuja. The US$ 450 Million budget for Fadama III to Nigeria is approximately 2.7% of the 2007 US$ 16.145 Billion federal budget, or 36% of the 2007 US$1.26 billion agricultural and water development budget (Bisong, 2009). Thesehuge budgetary allocations are an indication of the importance of Fadama III in the rural development programs pursued by Nigeria.

Fadama III's main objective is to support the growth of non-oil sectors through the development of productive infrastructure that will enhance agricultural productivity and the diversification of livelihoods. It involves building participating communities' social capital and their capacity to provide rural services to the poor. The project - covers up to 20 Local Government Authorities (LGAs) in the states that did not benefit from Fadama II and up to 10 new LGAs in the Fadama II states (Nkonya, Phillip, Mogues, Pender, and Kato, 2010).

METHODOLOGY

The study area

The study was conducted in Nasarawa state which is located in the north central zone of Nigeria. It lies between Latitudes 7^0 and 10^0 North and Longitudes 7^0 and 10^0 East. The State covers an area of 27227 km^2 with an estimated population of 1,863,275 people. The state shares boundaries with Benue state to the south, Kogi State and the Federal Capital Territory FCT) to the west, Kaduna to the north,Plateau and Taraba States to the East respectively (Fig. 1). The state has a climate typical of the tropical zone because of its location.



Fig 1 Map of Nigeria showing Nasarawa State

It has a mean temperature which ranges from 25^0 C in October to about 36^0C in March while rainfall varies from 13.73 mm in some places to 145 mm in others per annum. The state is comprisedof about 30 ethnic groups, each with its distinct cultural heritage.

Sampling technique

The selection of LGAs for participation in the project was determined prior to the baseline survey. From each of the LGAs

participating in Fadama III, the project invited the communities to form Fadama User Groups and Fadama Community Associations, which must satisfy certain criteria, including ensuring a degree of minimum representation of women and vulnerable groups. As these FCAs are formed, Local Development Plans were developed using participatory methodologies. A certain number of LDPs developed by FCAs were funded as part of Fadama III depending on the budgetary allocation for the corresponding LGA.

The 2009 baseline survey of the Fadama III project was used to provide a benchmark for assessing the impact of the project. The specific objectives of the study were to; determine the impact of the Fadama III project on crop and livestock productivity, agricultural income, non- farm income and on household income of the project beneficiaries.

Nasarawa state has a total of 13 LGAs; a figure that is less than the minimum recommended twenty (20) LGAs for Fadama III. As such, all the LGAs participated in the Fadama III project. During the baseline study in 2009, only 6 (Karu, Wamba, Keana, Doma, Lafia, and Nasarawa Eggon) of the 13 LGAs in the state were randomly selected and 232 households from the LGAs were sampled for the study. This comprised of 94 households in Fadama III communities (treatment group) and 138 households who also do not belong to Fadama III communities and did not receive any support from Fadama III (control group). The focus of this mid line analysis was on Fadama III beneficiaries and non-beneficiaries.

The Data

The baseline survey in Nasarawa state was conducted between August and November 2009, while the midline survey was conducted between March and April 2012. The households enumerated in 2009 during the base line were also visited in 2012 in order to create a panel data for the study.

Analytical technique

The propensity score matching method (Smith and Todd, 2001) was used to estimate the intermediate impacts. The matching method compares the beneficiaries and non-beneficiaries who have comparable characteristics, which affect project participation and outcomes. The method nets out the effect of observable time-invariant drivers of project outcomes. The difference of the outcome between the treatment and control group – before and after the intervention – is the impact of the intervention (Smith and Todd, 2001). The Heckman's difference-in-difference (DID) (Heckmann *et al*., 1997) approach was used to determine the intermediate impacts of Fadama III project. The model was specified as:

DID=$\Delta y_t - \Delta y_c$…… (1)

Where:

$\Delta y_t = y_t^2 - y_t^1$ and $\Delta y_c = y_c^2 - y_c^1$

y_t^1 = outcome y in baseline period (1) for the Fadama III beneficiaries group;

y_t^2 = outcome y in the midline period (2) for the Fadama III beneficiaries group

y_c^1 = outcome y in baseline period (1) for the control group

y_c^2 = outcome y in the midline period (2) for the control group.

To capture the social inclusiveness of Fadama III, the analysis was gender

disaggregated as far as possible. Additionally, impact of Fadama III was evaluated across three groups of poverty severity or the poverty terciles which are the $1, $1.5 and $2 poverty lines respectively. It was not possible to include other vulnerable groups due to small samples.

RESULTS AND DISCUSSION

Impact of Fadama III on crop productivity

Crop productivity was measured using profit per hectare. The profit per unit area is a good index of agricultural productivity, since farmers plant many crops in one plot and this makes determination of crop yield harder and sometimes misleading. The impact of Fadama III on crop productivity was remarkable (Table 1). The most significant impact of Fadama III on crop productivity was among the male beneficiaries where there was a 37% increase. The impact on female beneficairies was positive but not significant at (P<0.10). The target of 20% increase in productivity was attained by all benecifiaries and across all income terciles. However, the female beneficiaries were below the target while the male benficiaries exceeded the target by 17%.Agbarevo and Okwuche (2014)also observed that participation in Fadama III project significantly increased crop production among Fadama III beneficiaries in Benue state, Nigeria.Equally so, Girei *et al*., (2013) observed thatduring the implementation of Fadama II project, the income from crop production of the beneficiary farmers increased significantly by about (99%) more than before the project and also more than the non-beneficiaries' income.

Impact of Fadama III on Livestock income

The impact of Fadama III on livestock income was analyzed using the profit farmers obtained from livestock production per household (Table 2). The impact of Fadama III on livestock prodcutivity was generally poor. A significant increase of about 2.6 % in income from livestock was recorded, compared to the 20% target expected. Fadama III impact on livestock income among female beneficiaries was significant (p=0.05) and (p=0.10) for the kernel and nearest neighbor matching methods respectively. In addition, the increase in Livestock income was higher for the female compared to their male counterparts. These results demonstrated the differentiated impact of Fadama III and the implications for targeting vulnerable groups in Nasarawa state.

Impact of Fadama III on Agricultural income

The agricultural income is the total returns less the cost of production of crops and livestock. Agricultural income represents a large share of household income. As expected, there was an overall increase in Agricultural income due to participation in Fadama III. However, only the nearest neighbor matching method indicated a significant impact (p=0.10) but the direction of the impact for both methods is positive. Likewise, the impact was significant among male beneficiaries but not-significant at (p=0.10) among female beneficiaries for the kernel matching method (Table3). On the average, the agricultural income of beneficiaries increased by 7%. This finding disagrees with that of Yunana *et al.*, and (2013) in their study on the impact of

Fadama III project on farm income in the FCT Abuja, Nigeria. It was observed that the project led to a reduction in farm income. The reduction in income was attributed to the payment of the beneficiary contribution of (30%) for productive assets acquisition. It is expected that significant increase in income will occur when beneficiaries start to benefit from their investment in productive assets.

However, Fadama III in Nasarawa state had a significant impact (p=0.10) on income of the poorest beneficiaries – whose income increased by 9.3%, the second largest increase among the income terciles.

Impact of Fadama III on Non-farm Income

Fadama III had an impact on non-farm income for all beneficiaries; however the impact was not significant at (p=0.10) (Table 4). An increase of 21% due to participation in Fadama III was recorded. The impact of Fadama III on income from non-farm activities was very high for female compared to male beneficiaries. This demonstrates that support on non-farm activities was more successful in targeting women compared to men. In addition women are mostly involved in nonfarm activities such as agro processing compared to men.

Impact of Fadama III on Household Income

This section examines the overall impact of Fadama III on household income (i.e income from crops, livestock and nonfarm activities). Table 5 shows that Fadama III significantly increased household income of the beneficiaries by 23% at (p<0.01). However, the level of increase is lower than the project target of 40%. On the other hand, the income of female headed households increased by 24% and is higher compared to their male counterparts (12%). A study on the Fadama II project by Kudi, Usman, Akpoko and Banta (2008) in Kaduna state showed that the project made a positive impact on the income of participants and hence has the potential for alleviating rural poverty.

Despite the encouraging results above, it is pertinent to state that this study and other similar impact evaluation studies on the Fadama project as well as other development projects in Nigeria focused only on the economic dimension of sustainable development. See for example, studies by Okoruwa*et al.* (2015), Agbarevo and Okwoche(2014), Girei *et al.* (2013), Yunana*et al.* (2013), Umar*et al.* (2012) and Kudi*et al.* (2008). The economic dimension of sustainable development is not enough for ensuring sustainable development in the Fadama communities.

CONCLUSION

The Fadama III Project had impacted positively on the beneficiaries in the project communities. Furthermore, this implies that the expenditure by government on the project is justifiable.

Policy Recommendations

To ensure the sustainability of the Fadama ecosystem and usher in sustainable development, future impact evaluation studies of the Fadama III project should consider environmental concerns such as; contamination of ground and surface water with fertilizers and other agro chemicals due to intensification of crop production activities, and the potentials for vegetation

loss as a result of over grazing. The impact of the Fadama project on the Fadama wetlands in terms of its potentials to enhance or destroy the habitat as well as other flora and fauna species that inhabit and depend on the habitat can also be determined. Furthermore, the pattern of water borne diseases of human and livestock due to the project implementation can be determined to ascertain the side effects of the Fadama projects on humans and their livestock. Most importantly, determining the impact of Fadama III on the adaptive capacity, sensitivity and vulnerability of the Fadama production system to climate change is very criticalfor livelihood sustainability in Fadama communities.

On the other hand, a social assessment can also be included to investigate and identify the impact of the project on land tenure practices, extent of access to or control over resources by Fadama resource users, previous and existing conflict situations as well as how the project have impacted on social structures and organizations within the Fadama communities in Nigeria.

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Table 1**:** Impact of Fadama III on crop productivity

Type	Matching method		% increase due to participation in Fadama III
	Kernel	**Nearest Neighbour**	
All	₦61484.85 (97221.74)	₦61484.85 (112251.9)	*21*
Poverty terciles			
Tercile 1	*87964.36 (169953.5)*	*87964.36 (225697)*	*27*
Tercile 2	*92203.4** (47042.93)*	*92203.4* (49630.4)*	*29*
Tercile 3	*49630.4 (254892.7)*	*49630.4 (269004.3)*	*20*
Gender			
Male beneficiaries	*174119.3 (121032.4)*	*174119.3* (92402.35)*	*37*
Female beneficiaries	*13715.11 (139516.3)*	*13715.11 (135166.1)*	*15*

*Source: Field survey 2012 : * significant at 10%, ** 5%, *** 1%*
(Figures in parenthesis are standard errors)

Table 2: Impact of Fadama III on Livestock income

Type	Matching method		% increase due to participation in Fadama III
	Kernel	**Nearest Neighbour**	
All	₦44915.18* (24698.61)	₦44915.18** (20753.73)	2.6
Poverty terciles			
Tercile 1	*31056.46 (32482.54)*	*31056.46 (36473.29)*	4.76
Tercile 2	*28007.9 (43638.82)*	*28007.9 (42106.76)*	*1.0*
Tercile 3	*87738.3*** (28722.25)*	*87738.3** (46083.17)*	*9*
Gender			
Male beneficiaries	*25775.61 (58579.91)*	*25775.61 (59458.49)*	*0.68*
Female beneficiaries	*55515.06** (27237.85)*	*55515.06* (30526.59)*	*12.06*

*Source Field survey 2012: * significant at 10%, ** 5%, *** 1%*
(Figures in parenthesis are standard errors)

Table 3: Impact of Fadama III on Agricultural income

Type	Matching method	% increase due to participation in

	Kernel	**Nearest Neighbour**	Fadama III
All	₦44835.47 (34979.62)	₦44835.47* (26819.04)	*7.0*
Poverty terciles			
Tercile 1	83769.69* (47824.71)	83769.69* (47243.29)	*9.3*
Tercile 2	19479.69 (65870)	19479.69 (62240.37)	*3.8*
Tercile 3	50766.84 (81032.66)	50766.84 (73529.77)	11
Gender			
Male beneficiaries	67777.06* (37604.07)	67777.06 (41970.91)	*7.7*
Female beneficiaries	31415.86 (36407.36)	31415.86 (45290.03)	*6.5*

*Source: Field survey 2012 : * significant at 10%, ** 5%, *** 1%*
(Figures in parenthesis are standard errors)

Table 4: Impact of Fadama III on Non-farm Income

Type	**Matching method**		% increase due to participation in Fadama III
	Kernel	**Nearest Neighbour**	
All	₦363.015 (874.6024)	₦363.015 (747.0815)	*21.79*
Gender			
Male beneficiaries	263.6778 (1222.962)	263.6778 (1135.951)	*8.46*
Female beneficiaries	628.0575 (1355.399)	628.0575 (1322.642)	*62*

*Source Field survey 2012 * significant at 10%, ** 5%, *** 1%*
(Figures in parenthesis are standard errors)

Table 5: Impact of Fadama III on Household Income

Type	**Matching method**	% increase due to participation in

	Kernel	**Nearest Neighbour**	Fadama III
All	₦88074.48*** (21613.91)	₦88074.4*** (21995.69)	23.4
Gender			
Male beneficiaries	*89446.38** (48257.25)*	*89446.38** (44449.14)*	*12*
Female beneficiaries	*87393.21** (87393.21)*	*87393.21** (48622.6)*	*24*

*Source: Field survey 2012 : * significant at 10%, ** 5%, *** 1%*
(Figures in parenthesis are standard errors)