Impact of IFAD – Community Based Agriculture and Rural Development Programme on the Farm Incomes of the Marginalized and Vulnerable Participants and Non-Participants in Katsina State, Nigeria

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Abstract
The objective of the study was to evaluate the impact of IFAD – Community Based Agriculture and Rural Development Programme on farm incomes of the marginalized and vulnerable participants in Katsina State. Multistage sampling technique was used in selecting 432 respondents for this study. Primary data were collected using a structured questionnaire and data collected was based on 2002 and 2015 cropping seasons, the year for before was 2002 and after was 2015. The structured questionnaire was pre-tested before it was administered to the farmers that were sampled. The tools of analysis employed to analyze the data were double difference model and paired t-test. The results of double difference estimator revealed that IFAD-CBARDP had a positive impact on the participant's farm income based on the positive mean value of ₦ 3696.176 with the farm income of the participants significantly different from that of the non-participants at 5% level of significance. It was concluded that the IFAD-CBARDP has achieved its goal of increasing the farm incomes of the participants in the period of study and has succeeded in targeting the marginalized and vulnerable participants in its farm technical efficiency.
Keywords: Impact, IFAD-CBARDP, farm income, katsina

INTRODUCTION

Successive governments in Nigeria had made a lot of effort to raise and return agriculture to its past enviable position. This is through embarking on several agricultural and rural development programmes towards solving the agriculture/food and poverty problems facing the nation (Ojo *et al.,* 2009). Some of the programmes were: NAFPP (1974), ADP (1974), RBDA (1975), OFN (1976), GR (1979), Integrated Rural Development Projects (1980), DFRRI (1986) and National Agricultural Support Project (1992). However, the programmes failed to realise food sufficiency and poverty reduction in the country (Onuk *et al.,* 2009). According to Egeonu (2009) despite the efforts of the various agencies of rural development, Nigeria is sinking deeper in under-development and poverty especially in the rural areas. There is still high cost of food, increasing food import bills, high prevalence of poverty and the problem of food insecurity in the country (Yusuf and Adenegan, 2008). Nigeria is presently one of the world's largest food importers. In 2014, Nigeria imported 3.8 million tonnes of wheat consumed and it imported 2.9 million tonnes of rice (IFAD, 2015).

Incomes in rural areas are low hence rural population remains poor. Smallholder agriculture, the major occupation of the rural populace in Nigeria, is mainly rain-fed characterized by poor capital formation. The issue of poverty in the country has been described as "widespread and severe" (CBN, World Bank, 1996). It is worth mentioning that incidences of poverty is as high as 80% in some northern states, compared with the 64% national figure (IFAD, 2015). Thus, poverty situation of the rural poor and vulnerable groups in developing countries like Nigeria, and the need for its improvement, has led to the conceptualization of various targeted and non-targeted poverty alleviation programmes worldwide (Babatunde, 2006). An example of such programme is IFAD-CBARDP, which was design to address the problem of poverty by improving the livelihood, and living condition of rural dwellers, using Community Driven Development (CDD) approach, which was seen as efficient and effective approach to poverty reduction in Nigeria and subsequently, in the implementation of IFAD-CBARDP. Despite the existence of the programme, the lives of many rural poor are yet to be improved substantially. Major reason for this is the failure of the programme to cover more states, local government areas, rural communities and households. This necessitates genuine demands from beneficiaries and other key stakeholders to scale-up and replicate the apparent success of the programme in other LGs within the existing programme area and even beyond (IFAD-CBARDP, 2012).

Since the inception of the IFAD-CBARDP in 2003, a lot of studies have been conducted on the impact of the programme either on the income or on the livelihood of the participants. There is however dearth of information on the impact of the programme on farm incomes of the marginalized and vulnerable participants in the study area. Moreover, it was not empirically clear on to what extent IFAD-CBARDP had impacted on the income and living condition of benefiting rural communities in Katsina State. This study was conducted to determine the impact of IFAD-CBARDP on farm incomes of the marginalized and vulnerable participants in Katsina State.

MATERIALS AND METHODOLOGY

Study Area

Description of the Study Area

The study was conducted in Katsina State, Nigeria. The global location of the state is between longitude $6^0 52'$, $9^0 20'$E and latitudes $11^0 8'$, $13^0 22'$N, covering a land area of about twenty four thousand, one hundred and ninety four square kilometres (24,194km^2), with an estimated population of five million, eight hundred thousand, six hundred and seventy two (5,800,672) people comprising of 2,947,639 males and 2,853,033 females (NPC, 2006). There are two seasons in the state which include wet and dry seasons. The wet season starts from the months of June to September and the dry season from October to May. The dry season is usually dominated by the north-east trade winds which are dry and dusty, popularly called the *"harmattan"*. The mean daily temperature ranges between 16^0C to 40^0C while the annual rainfall ranges between 300 – 400mm in the sahel, 600 – 800mm in the Sudan savannah and 900- 1100mm in the northern guinea savannah (KTARDA, 2014). There is an available farmland area of about one million, six hundred and forty thousand hectares (1,640,000 ha) with an identified *"Fadama"* land area of thirty six thousand, one hundred and thirty nine thousand hectares (36,139 ha) out of which twenty five thousand hectares (25,000 ha) are irrigatable "*Fadama*" areas. "*Fadama"* is the Hausa name for describing irrigatable lands that are underlined by shallow aquifer (Bello, 2006).

The main occupation of the people in Katsina State is farming, cattle rearing and crafts. Apart from crop farming, livestock are also reared such as cattle, sheep, goats, camels, poultry, etc. It is worthy of note that there are other income earning activities carried out by the people in the state such as government work, trading, crafts work (blacksmithing, basket and mat weaving, wood carving etc.) trading, hunting and fishing. The state is currently made up of thirty four Local Government areas out of which twelve (12) Local Government Areas participated in the IFAD-CBARDP. The participating LGAs are Danja, Bakori, Musawa, Kusada, Dutsin-ma, Dutsi, Bindawa, Baure, Kurfi, Batsari, Jibia and Kaita. According to IFAD-CBARDP (2012), the marginalized and vulnerable groups identified in the study area are women, widows, elderly, youth, hunters, pastoralists and people living with HIV/AIDS. Population of this study is made up of the crop farmers in the IFAD –CBARDP participating Local Government Areas in Katsina State.

Sampling Technique and Sample

The study was carried out in all the three agro-ecological zones of Katsina State namely: Southern (Northern guinea), Central (Sudan Savannah) and northern (Sahel) zones. Two sample groups were drawn from the marginalized and vulnerable crop farmer population; a sample of participants and non-participants. Multistage sampling technique was used in selecting 432 respondents for this study. The first stage involves the selection of six LGAs out of the 12 participating LGAs in the state. This study took into consideration the difference in the agro-ecological zones in the state. The state has three distinct agro-ecological zones with marked differences in rainfall and crops grown. As such the state was stratified into three according to the agro-ecological zones. Two LGAs with high concentration of Community Development Associations (CDAs) and farmers' associations were then purposively selected in each agro-ecological zone with the help of IFAD desk officers in the state programme, making a total of six LGAs. The LGAs selected for the study were; Jibia and Batsari in the northern zone (sahel), Dutsin-ma and Musawa in the central zone and Bakori and Danja in the Southern zone.

The second stage included the random selection of two villages from each of the sampled LGAs making a total of twelve villages respectively. The twelve (12) villages were: Farfaru, Daga, Ruma, Kasai, Shema, Sanawa, Garu, Sako, Kakumi, Jargaba, Kahuta and Tandama. The third stage involves the random selection of 216 M & V respondents for the participants and non-participants groups. The non-participants were selected to serve as the control group. Thus, a total of 432 farms were sampled for the study which represents 10% of the population of the study. Table 1 shows the distribution of farmers according to Villages.

Method of Data Collection

Primary data was used for this study and were collected for the 2002 and 2015 cropping seasons through the use of structured questionnaire and oral interview schedule administered on both programme participants and non-participants. Specific information that was collected included the socio-economic characteristics of respondents such as sex, gender, age, marital status, household size, educational level, years of experience in farming and years of experience in IFAD-CBARDP programme. Others include: access to basic infrastructure, credit, inputs, crops grown, yield per hectare and income generated. Data on factors that influence respondents' participation in IFAD-CBARDP programme, access to the programmes facilities and problems encountered by the participating farmers were also collected. On the course of conducting this study, secondary data were used. The data were sourced from appraisal reports, mission reports and other vital IFAD-CBARDP documents.

Analytical Techniques

The following analytical and statistical tools were utilized to capture the stated objective of the study:

Double Difference Estimator Method

Double difference method is a tool used in measuring impact (Verner and Verner, 2005). To use this model, it is necessary to get information on both programme participants and non-participants for before and after the

programme or project. This model was used to achieve the objective of the study. A positive double difference in income indicates a programme impact on the income of the participants, while a negative double difference in income value indicates that programme have not increased participants income (Nkonya *et. al,* 2008). The model is specified as follows:

$$DD^S = \left(\frac{1}{p}\sum_{i=1}^{p}\llbracket(Y_{1i}^a - Y_{1i}^b)\rrbracket\right) - \left[\frac{1}{c}\sum_{j=1}^{c}\llbracket(Y_{oj}^a - Y_{oj}^b)\rrbracket\right]$$

Where

Y_{it} = Total revenue or income at time *a* and *b* time *a* and *b* = after and before programme.

p = Number of participants

c = Number of individuals in the control group (non-participants).

The equation above could be improved through a regression model by adding covariates to the model. According to Khandkar *et al.* (2010), the equation could be specified as:

$$Y_{it} = \alpha + \beta T_i + \gamma P_i + \beta(T_i * t) + \varepsilon_{it}$$

Where

Y_{it} = The change in income in period *t* of the programme.

T_i = Binary variable.1 If respondent *i* is programme beneficiary and 0 if otherwise.

P_t = Binary variable. 1 indicating after programme and 0 before the programme.

$(T_i{}^* P_t)$ = An interaction term representing the product of the two binary variables.

The value is 1 if after the programme, the respondent is a beneficiary.

ε_{it} = The error term of the regression with the variance δ^2

$\alpha, \beta, \gamma, \beta$ are the regression parameters to be estimated.

Paired t-test

This is another statistical tool which was used to measure impact and also test the hypothesis of the study. It was used as an alternative to the Double difference model earlier discussed to measure impact of the programme as well as test the hypothesis of the study at ($P < 0.1\%$) level of significance. The t-test was used in this case to determine the impact of the programme on the income of respondents before the programme and after the programme implementation in the study area.

The general formula of the t-test is given as:

$$t = \frac{X_1 - X_2}{\sqrt{\dfrac{S_1^2 - S_2^2}{n_1 - n_2}}}$$

Where

t = t- values

X_1 = the mean sample of respondents income in benefitting communities before the IFAD-CBARDP

X_2 = the mean sample of respondents income in benefitting communities after the IFAD-CBARDP

S_1^2 = Sample standard deviation for respondent income in benefitting communities before the programme.

S_2^2 = Sample standard deviation for respondents income in benefitting communities after the programme.

n_1 = Number of selected members of participants of the IFAD-CBARDP.

n_2 = Number of selected members of non-participants of the IFAD-CBARDP.

RESULTS AND DISCUSSION

Impact of the IFAD-CBARDP on the Farm Incomes of Participants and Non-participants

Double difference estimates of the impact of the IFAD-CBARDP on the farm incomes of participants and non-participants

The double differences estimates of the impact of the IFAD-CBARDP on the farm incomes of participants and non-participants are presented in Table 2. It was found that the farm income difference of the participants was

₦31580.69 and ₦ 64731.50 before and after IFAD-CBARDP. The difference between after and before values is ₦33150.81, which is the first single difference. The farm income difference of the non-participants were ₦ 31027.31 and ₦ 60481.94 before and after IFAD-CBARDP. The difference between after and before values is ₦ 29454.63, which is the second single difference. The double difference, that is, the difference between the two mean farm income differences [33150.81-29454.63] is ₦ 3696.176.It indicates that the double difference estimates of the farm income of participants and non-participants of IFAD-CBARDP had a positive value. A positive mean double difference in farm income value indicates increase in participant's farm income (Nkonya *et al.* 2008). The implication is that IFAD-CBARDP had positive impact on the farm income of participants.

Estimates of double difference from regression analysis for the impact of the IFAD-CBARDP on the farm incomes of participants and non-participants

The estimates of double difference from regression analysis for the impact of the IFAD-CBARDP on the farm incomes of participants and non-participants are presented in Table 3. It was found that the interaction term (T_i*P_t) had a positive coefficient of 3696.176 and statistically significant at 5% level of probability. The coefficient of the interaction term ($Ti*Pt$) between the farm income of the participants and non-participants had positive value and is statistically significant. This implies that IFAD-CBARDP had positive and significant influence on the farm income of the participants. The implication is that the farm income of the participants is significantly different from the farm income of the non-participants in the study area. This indicates that participation in the IFAD-CBARDP enables the participants to generate more income from higher output. This increase in income will reduce poverty level, improve their standard of living and help them to plan their lives in a more organized way. Therefore, further investment in IFAD-CBARDP to establish other sites across the nation will serve as an opportunity for increasing the income of farmers' especially small holder farmers who are responsible for the bulk of agricultural production activities in the nation. This result is consistent with the findings of Ezeh (2004) and Nkonya *et al.* (2008) who reported that "Fadama" project beneficiaries were better off than their non-beneficiary counter-part in terms of income and productivity.

Based on the findings of this study, the hypothesis which states that "there is no significant difference between the farm incomes of the participants and non-participants of the IFAD-CBARD" was tested using the paired t-test.

The result of the t-test as presented in Table 4 shows that the calculated t value (2.782) is greater than the critical t value of 1.65 at one tail and 1.96 at two tail respectively and it is significant at 1% probability level. This implies that there is a significant difference in the farm incomes of the participants and non-participants of the IFAD-CBARD and therefore, the null hypothesis is rejected and the alternative accepted.

CONCLUSION AND RECOMMENDATION

Based on the empirical evidence emanating from the findings of this study, the IFAD-CBARDP has achieved its goal of increasing the farm incomes of the participants in the period of study. Since the IFAD-CBARDP had positive impact on the farm income of the participants. It is recommended that efforts should be made by non-governmental Organisation and local government council in the areas to boost the income diversification practices of farmers through provision of infrastructure especially feeder roads. This could enhance the level of farm and non-farm activities that could generate more income for the household and thereby help to combat poverty among the respondents.

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Table 1: Distribution of farmers according to Villages

Zone	LGAs	Villages	Participants	Non-participants
	Jibia	Farfaru	18	18
		Daga	18	18
Northern Zone	Batsari	Ruma	18	18
		Kasai	18	18
	Dutsima	Shema	18	18
		Sanawa	18	18
Central Zone	Musawa	Garu	18	18
		Sako	18	18
	Bakori	Kakumi	18	18
		Jargaba	18	18
Southern Zone	Danja	Kahuta	18	18
		Tandama	18	18
Total	**6**	**12**	**216**	**216**

Table 2: Estimates of the double difference model for the farmers in the study area

Group	Change in farm income (₦)		
	Before (2002)	After (2015)	Diff. between period
Participants	31580.69	64731.5	33150.81
Non-participants	31027.31	60481.94	29454.63
Diff. between group	553.3796	4249.556	**3696.176**

Table 3: Regression estimates of the impact of IFAD-CBARDP on the farm income of the farmers in the study area

Variable	Coefficients	Standard Error	T-Stat
Constant	31027.31	3524.44	8.803
T_i	553.38	4984.31	0.111
P_t	29454.63***	4984.31	5.909
T_i*P_t	**3696.176****	1648.88	2.242
R-Square	0.547		
Adjusted R-Square	0.519		

***$P<0.01$ and **$P<0.05$ levels of probability

Table 4: Test of hypothesis of the farm income of the participants and non-participants of the IFAD-CBARD

Variable	Participants	Non-participants
Mean annual farm income (₦)	58339.31	45754.63
Variance	6.49E+09	2.35E+09
Observations	432	432
Pooled variance	4.42E+09	
Hypothesized mean difference	0	
Df	862	
T-calculated	2.782***	
P(t≤t) one-tail	0.003	
T critical one-tail	1.647	
P(t<=t) two-tail	0.006	
T -critical two-tail	1.963	

***P<0.01