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Determinants of Crop Output among Women Farmers of Development Exchange Centre Microcredit in Plateau State, Nigeria

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Abstract
This study was conducted to determine crop output among women farmers of the Development Exchange Centre microcredit program in Plateau State, Nigeria. A multi-stage sampling method was employed to select 256 respondents. Primary data were collected through the use of questionnaires and interview schedules and were subjected to both descriptive and inferential statistics. Determinant of crops output of program participants shows that, farm size (0.046, P<0.01), farm inputs (0.527, P<0.05), labour(-0.485, P< 0.10, credit(0.821, P< 0.01), extension contact (0.0542, P< 0.05) and age (-0.787, P<0.10)had a direct relationship with crops output of program participants, implies that a unit increase in these variables will result to an increase in the crops output of program participants in the study area. F-chow calculated value was 15.658, at a 1% level of probability, implying that DEC microcredit had a positive impact on the crop output of program participants calculated (15.167) was significant at a 1% level of probability. Major constraints perceived to be serious constraints in accessing credit, were the low volume of loans disbursed (X = 2.36), the short repayment period (X = 2.23) and the high interest rate charged (X = 2.15. It was recommended that the DEC microcredit organization should increase the amount of loan disbursement from the current N 20,000 - N150, 000, to increase participation or patronage; extend the repayment period, lower interest rates and extend the program to other farming communities in Plateau State, to accelerate the poverty alleviation among women farmers in the State.
Keywords: Determinant, DEC, Crops output, Women farmers and Plateau State

Introduction

The government has taken several measures over the years to use agriculture as a vehicle to alleviate poverty and attain food security. Yet, there is low and declining productivity in Nigeria's agricultural sector due to poorly developed irrigation facilities, on-access to funds, inadequate infrastructure, ineffective agricultural research and extension systems, non-availability and poor distribution of key inputs(Fertilizers, chemicals, machinery and improved seeds) (Ajala and Gana, 2015; Nwaobiala, 2019). According to Auta (2004), women in Nigeria produce, process and market about 80% of food, manage 70% of all small-scale enterprises and about 33% of all small households which is sustained by women. Their role in agriculture has important implications for development and poverty alleviation because women constitute a very important segment of the labour needed in production. Yet, despite their contribution to global food security, women farmers are frequently underestimated and overlooked in development strategies.

Micro-credit is a small amount of loan usually given to the working poor, most often for income generating, employment, agricultural production and poverty alleviation (United Nations 2017; Ilavbarhe, 2015; Adamu *et al.*, 2020). Development Exchange Centre (DEC) is an NGO, established in 1987 by the Canadian University Services Overseas (CUSO) and the Adult Non-Formal Educational Agency, (ANFEA) in Bauchi State. DEC currently covers the North-East, North-West and North-Central regions of Nigeria. The aim and objective was to empower women groups to enhance their capacity for sustainable development through the provision of microfinance services (DEC, 2014). DEC Micro-credit programs have provided microcredit services to women in Kaduna State to engage in agricultural production and income-generating

activities, such as capital which is not easily accessible in the formal banking sector due to the inability of these poor women to provide collateral. The common ventures in which the women invest their loans include crop production, livestock rearing/fattening, grain and petty trading (DEC, 2014)

It is widely assumed that microcredit will have a positive impact on the income, agricultural production, and nutritional and educational status of household members. Microcredit is also believed to play an important role in increasing women's employment in micro-enterprises and improving the productivity of women's income generation. Plateau State being among the poorest states in the north-central of the country (WB/DFID, 2014, Folorunso,2016), has seen many financial institutions, Non-Governmental Organizations (NGOs), programs and policies initiated to improve agricultural productivity and alleviate poverty between 1986 and 2010. However, empirical evidence has shown that these interventions have not provided the desired impact on improving agricultural productivity and the standard of living among rural women in the state (WB/DFID, 2014, Folorunso, 2016). This unfortunate situation appeared to threaten the ability of women to secure sustainable livelihoods to guarantee a continuous flow of food security, income and standard of living, despite benefiting from microcredit schemes. Studies have been conducted on poverty and the impact of poverty alleviation interventions on the Nigerian population. These include Nkonya *et al.* (2008), Kudi *et al.* (2009), Simonyan *et al.* (2015), and Yunana *et al.* (2016). However, there is scanty empirical information on the impact of DEC microcredit on women with particular reference to crop output and poverty status in Kaduna State. The main objective of the study was to determine the impact of DEC microcredit on crop output and poverty status among women farmers in Kaduna State, Nigeria. The specific objectives were to: determinants of crop output among program participants and non-participants and identify the constraints encountered among women participants in accessing DEC microcredit program in the study area.

The hypotheses of the study are stated as follows.

Ho_2: DEC microcredit programs have no significant impact on the crop output of participants in the study area.

Methodology

This study was conducted in Plateau State, Nigeria. The State was created in 1976 from the defunct Benue-Plateau State. It has high lands rising from 1,200 meters above sea level at the low lands to a peak of 1,829 meters above sea level. It is located in Nigeria's middle belt and lies between the latitude and longitudes of the Greenwich Meridian. (Plateau Agricultural Development Programme, 2000). The State has a landmass covering nearly 53,585 square kilometres with a population of 3,577, 669 people as per the 2006 census (NPC, 2006). A multi-stage sampling procedure was used to select participating farmers for the study. There are nine (9) DEC participants LGAs in Plateau State and they are given priority consideration for the programme. In the first stage, all nine Local Government Areas were used for the study. This was because of their high level of participation in the DEC programme. In the second stage, two villages were randomly selected in each Local Government Area and this was based on the level of participation in the programme. This gave a total of eighteen (18) villages. During a reconnaissance survey of the study area in 2018, the list of DEC women farmers in the chosen villages was compiled with the help of the programme coordinating officers in each LGA and the total number obtained was seven hundred and eleven (711) farmers. Therefore, a total number of two hundred and fifty-six (256) DEC women farmers were selected randomly using the random number table method. Primary data were obtained by the use of a well-structured questionnaire and administered to the participating farmers and non-participating farmers by the researcher and to be assisted by well-trained enumerators from the Plateau State Agricultural Development Project (PADPs). The secondary information was obtained as baseline information from the DEC head office and the coordinating liaison offices. Also, information from other related studies was used to support the discussion of the results of the findings. Data collected were subjected to both descriptive and inferential statistics. Descriptive statistics, such as percentages, tables, frequency counts and means were used to achieve objective i. Logit regression model and Ordinary least square (OLS) regression were used to achieve objectives ii and iii. Chow–test was used to test the hypothesis.

Analytical Techniques

A logit regression model was used to achieve objective ii determinants of crop output among program participants and non-participants and OLS regression analysis gives the technical relationship between the various inputs specified (independent variables) and the production output (dependent). The OLS regression was used to determine crop output among women farmers of Development Exchange Centre (DEC) micro-credit programs (Kg). The model was specified in implicit form as:

$$Y = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9, X_{10}, X_{11}, X_{12}, X_{13}) + e \quad \ldots\ldots (6)$$

Where ;

Y = Crop output (Kg); X_1 = Farm size (hectare); X_2 = Labour input (man day); X_3 = Age (years), X_4 = Farming experience (years); X_5 = Cost of inputs (Naira); X_6 = Access to DEC micro-credit (amount received in naira); X_7 = Education (number of years of formal schooling); X_8 = Extension contact (number of contact in a year); X_9= Distance to market (Km); X_{10}= Remittance (Naira); X_{11}=Household size (number); X_{12}=Household expenditure (naira); X_{13}=Training (number of training), e = error term.

Results and Discussion

Determinants of crop output among program participants and non-participants

The determinants of crop output among program participants and non-participants were estimated by using the best-fit regression model in Table 1. The result of the semi-log functional form, which was found to be the lead equation in this study, shows the adjusted R square of 0.66. This implies that 66% of the variability of crop outputs among program participants was explained by the explanatory variables (age, farm size, labour, farm input, credit, education and extension contact). The coefficients of age, farm size, labour, credit, farm inputs, education and extension contacts obtained were positive. This indicates that the variable has a direct relationship with the crop output of the respondents. The coefficient of age was found to be negative and significantly related to crop outputs at P<0.10) level of probability. The estimated coefficient of -787 implies that the crop outputs of program participants will decrease by a magnitude of -787 as age increases by a unit. This could be because as program participants increase in age, strength, agility and vigour decreases. The coefficient of farm size was found to be positive and significantly related to the crop output of program participants. Foluronso (2016), stated that the coefficient (0.31010) for farm size is statically significant at a 1% level of probability which shows that land as an input has a major influence on output. Since the farming activity is traditional, the availability of land determines the crop output that can be obtained from the farm. The estimated coefficient of 0.970 implies that the crop outputs of program participants will increase by a magnitude of 0.970 percent as farm size increases by one unit. This is obvious because *ceteris paribus*, the expectation is that an increase in farm size should result in a concomitant increase in output. This result is in line with the findings of Agwu *et al*. (2014), who stated that the coefficient of crop output was significant at a one percent probability level with a positive sign. This implies that the larger the crop output from their farms, the greater the probability women in the study area move out of poverty, increase their food crop marketing and improve their standard of living The regression coefficient of labour was found to be negative and significantly related with crop outputs at 10% level of probability. The estimated coefficient of -485 implies that the crop outputs of program participants will decrease by a magnitude of -485 as labour increases. This may be due to the shift in interest from farm drudgery to white-collar jobs usually associated with people with higher educational qualifications. The coefficient of farming experience was found to be positive and not significant. The coefficient of farm inputs (0.527) and credit (0.821) had the expected positive relationship with the crop output of program participants and were significantly at P<0.05) and P<0.01) levels of probability. The estimated coefficient of farm inputs and credits implies that the crop output of a program participant will increase by a magnitude of 0.527 and 0.821 respectively as his crop outputs increase by one unit. This is considered a strong relationship. Ojiako and Ogbukwa (2012) stated that agricultural or farm credit was a crucial input required by the smallholder farmers(women) to establish and expand their farms to increase agricultural production, enhance food sufficiency, promote household and national income, and augment individual borrower's ability to repay. Generally, the use of credit facilities to support farmers has been advocated because credit plays an enviable role in agricultural production, economic transformation and rural development (Ojiako *et al.*, 2015; Ojiako and Ogbukwa, 2012). This finding is corroborated by Ojiako *et al*. (2017) whose investigation of the determinants of productivity of smallholder farmers supplying cassava to starch processors in Nigeria, found that there was a significant positive influence on the use of improved cassava varieties to boost yield outcome. The coefficient of distance to market was found to be positive and not significant. The coefficient of education was found to have a direct relationship with the crop outputs of program participants in the study area and is statistically significant at P<0.01) level of probability. The estimated coefficient of 0.063 implies that the crop output of a program participant will increase by a magnitude of 0.063 as the number of years spent in school increases by one unit. Extension contact was positive and significant at P<0.01) level of probability. It was not surprising that extension contact was a good predictor of crop outputs, given the important role being played by contact farmers in the study area. Ogunbameru *et al*. (2006) identified extension contact, access to market, level of education, access to credit, access to land and taking part in decision-making as the determinants of crop output among women farmers of urban agriculture in Borno State, North-east, Nigeria.

The result shown in Table 2, indicated that the F-chow calculated value is 15.6583 while the F-tabulated value is 1.93 at a 5 percent level of probability for eight degrees of freedom and the population (N) was 420. The analysis shows that F* chow calculated is greater than F-tabulated. This implies that DEC microcredit had an impact on the crop outputs of participants. This study agrees with the findings of Simonyan (2010) on the impact analysis of the Fadama II project on the income and productivity of beneficiaries in Kaduna State.

Constraints Encountered by Participants in Accessing WAYE) programme

The results in Table 3 show three major constraints were perceived to be a serious constraint in accessing credit. These were the low volume of loans disbursed (X = 2.36) followed by a short repayment period (X = 2.23) and the high-interest rate charged (X = 2.15). This is in line with the finding of Olujide (2014), Adamu and Michael, (2021), Adamu, B.D and Michael H. (2023) who identified limited funds, short periods of repayment and high rate of loan default as the major constraints facing COWAN in Ondo State, Nigeria.

Conclusion

Based on the findings, this study concludes, that age,

education, farm size, farm experience, farm income, crop output and standard of living had a significant and direct relationship with the crop output of the participants. Furthermore, the F-chow calculation shows that DEC microcredit impacted the crop output of program participants. The major constraints encountered in accessing DEC microcredit by program participants were the low volume of loans disbursed, short repayment period and high interest rates charged. It was recommended that the DEC microcredit organization should increase the amount of loan disbursement from the current N 20,000 - to N100, 000, to increase participation or patronage; extend the repayment period (but without jeopardizing the interest of the organization), interest rates should be lowered to allow for greater participation and DEC microcredit should be extended to others states and regions of Nigeria.

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Table 1: Regression estimates of crop outputs and socio-economic factors of programme participants and non-participants

	Participants			Non –participants		
Variables	**Coefficient**	**S E**	**t-value**	**Coefficient**	**S E**	**t-value**
(Constant)	-10.054**	4.181	-2.404	-1.548*	0.925	-1.673
Farm size	0.970***	0.186	5.21	0.332***	0.028	11.857
Labour	-0.485*	0.280	-1.734	0.261***	0.100	2.61
Age	-0.787*	0.455	-1.729	-0.139	0.093	1.494
Farm experience	0.239	0.256	0.933	0.023	0.040	0.575
Farm input	0.527**	0.268	1.965	-0.037	0.059	-0.633
Credit	0.821***	0.295	2.783	0.001	0.067	0.014
Access to market	0.001	0.116	0.008	-0.003	0.035	-0.085
Education	0.063**	0.028	2.25	-0.021	.018	-1.166
Extension Contact	0.0542**	0.221	2.45	-0.012	0.062	-0.193

Source: Field Survey, 2021. **** P< 0.01, ** P<0.05 and * P<0.10.*

of Test of Hypothesis of Impact of DEC Microcredit Programs on Participants' Crop Output

Table 2: Chow test analysis of the impact of DEC microcredit programs **on the participants' crop output**

Group sample	**r^2**	**RSS**	**N**	**K**	**F-cal**	**F-tab**
Pooled	0.542	295.399	420	9	15.6583	1.93
Participants	0.460	299.449	210			
Non-participants	0.474	6.463	210			

r^2 = regression coefficient, N = numbers of observation and K = numbers of parameters

Table 3: Mean distribution of respondents according to perceived constraints encountered in accessing WAYE) programme

S/N	**Constraints**	**Mean score**	**Percent**	**Ranking**	**Decision**
1	Low volume of loans disbursed	2.36	79	1st	S
2	The short duration of the loan	2.23	74	2nd	S
3	The high-interest rate on the loan	2.15	72	3rd	S
4	Inadequate finance	1.98	66	4th	Ns
5	Lack of government support	1.80	60	5th	Ns
6	Transport problem	1.86	62	6th	Ns
7	Non-involvement in project supervision	1.80	60	7th	Ns
8	Non-involvement in decision making	1.60	53	8th	Ns
9	Communication gap	1.45	48	9th	Ns
10	Religious discrimination	1.32	44	10th	Ns

Source: Field survey, 2021 *S= Serious constraints. Ns = Not serious constraints*