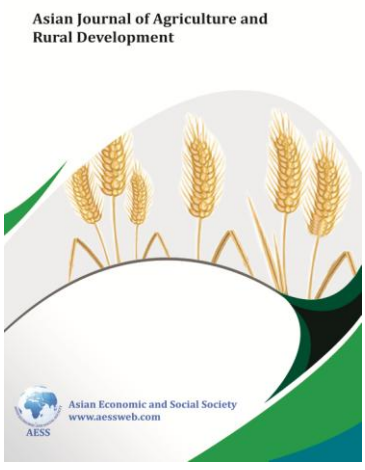
Publisher: Asian Economic and Social Society
ISSN (P): 2304-1455, ISSN (E): 2224-4433
Volume 2 No. 3 September 2012.



Resource Accessibility and Productivity among Women Crop Farmers in Borno State, Nigeria

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Citation: Catherine O. Ojo., Yakubu Bila and Andrew C. Iheanacho (2012) "Resource Accessibility and Productivity among Women Crop Farmers in Borno State, Nigeria", Asian Journal of Agriculture and Rural Development, Vol. 2, No. 3, pp. 480 - 486.

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Abstract

The objective of this study was to determine resource accessibility and productivity among crop farming women in Borno State, Nigeria. Likert scale was used to describe women's accessibility to agricultural production resources. The Maximum Likelihood Estimates (MLE) of the stochastic frontier production function (SFPF) was used to estimate the production and technical inefficiency determinants as a measure of productivity of the respondents. Results indicated that respondents had low access to most of the agricultural productivity resources considered in the study. Furthermore, the gamma of 0.7865 was significant at 1%, revealing that over 78% of the variation in the productivity of respondents was attributable to technical inefficiency factors. This underscores the fact that low access to technical efficiency resources contributes immensely to productivity losses among women farmers It was recommended that access to technical efficiency factors including credit, education, extension contact and membership of cooperatives need to be enhanced among women farmers to empower women to effectively access and utilize resources of agricultural productivity.

Keywords: Access, resource, women, technical inefficiency, production, Productivity

Introduction

The food security and agricultural development of Nigeria lies in the hands of subsistence farmers in an extensive agricultural system. Particularly striking is the fact that rural women more than their male counterparts take the lead in agricultural activities making up to 60 – 80 percent of the agricultural labour force in the country (World Bank, 2003; Mahmood, 2001) depending on the region. They also provide two thirds of the food crop (Ogunlela and Mukhtar, 2009). While men and women generally face the same external constraints, they have an unequal access to human-controlled factors. They have different endowments, such as land rights and education, and different access to technologies, labour, capital, support services and credit. This disparity results in differentials in productivity to the detriment of women.

Often, but not always, findings indicate that women farmers have lower productivity for reasons of poor access to resources. Although women are less productive in farming, the general consensus is that they are no less efficient than men in their use of resources (Udry *et al.* (1995). Rather, a lack of complementary inputs leads to a lower labour productivity for female farmers. This is more so when agricultural policy is formulated with insufficient information on rural women's access to and control over productive resources with respect to solving their immediate problems.

Many instances of the deprivation of women in terms of productive resources abound. For instance, the contribution of women to farm management decision making process is quite minimal going by the findings of Damisa and Yohanna (2007). Lack of access to land remains a major constraint for women in developing countries (Parveen, 2008). In the same vein, as the land holdings, women have less access to credit than men. Women receive as low as 5

percent of agricultural loans in Burkina Faso to as high as 32 percent in Zimbabwe (Screekumar, 2001).Women in Nigeria constitute almost half of the population. However, their literacy rate is 56% compared to 72% for males and in certain states, female literacy, enrolment and achievement is much lower. For instance, in Sokoto State, female literacy rate is 15% compared to 59% for males (Emerging Issues, undated).

Identifying and redressing gender inequalities tend to have high financial, social and economic returns (Bamberger *et al.,* 2001). This is exemplified by the findings of Hazell (2005) which revealed that in Kenya, if women are given the same level of education, experience and farm inputs as their male counterparts, maize and cowpea yield will increase by about 22 percent. For women to overcome these productive constraints, they require actions to reduce women's disadvantage in capabilities, opportunities and security with the action implemented in such a way as to provide women with control over resources and the ability to participate in and make decision regarding their use (Gupta and Malhotra, 2006). The objective of this study was to determine the effect of women's resource accessibility on crop production efficiency in Borno State, Nigeria.

Methodology

The area of the study was Borno State, Nigeria. The data for the study was from primary sources and multistage sampling technique was used to select respondents for the study. Random sampling technique was used to select the respondent Local Government Areas and villages in the first and second stages respectively. In the third stage, purposive sampling was used to select 266 respondents for the study. Purposive sampling was used to select respondents to ensure that only women who were farmers were included in the study Analytical techniques used to analyze the data obtained in the study were descriptive statistics and stochastic frontier production function. Analytical techniques used to analyze the data obtained in the study were descriptive statistics.

Result and discussion

Extent of rural farming women's access to resources

In this study, access to resources was understood to mean the ability of a rural farmer to get sixteen socioeconomic resources and the accrued benefits from them. These resources include production resources such as land, family labour, hired labour, mechanization, fertilizer, insecticide, herbicide and improved seeds. Other resources were socioeconomic factors including education, extension contact, farm management decision making power, farm income, off–farm income, farming time, membership of cooperatives and credit.

Table 1: Respondents' access to productive resources in the study area (n = 266)

Resources	Frequently	Occasionally	Rarely	Not at all	*Mean	CV	SD	Rank by mean values
Farm income	8.7	60.0	24.5	6.8	1.71	42	0.720	1
Decision making power	6.0	48.7	30.6	14.7	1.46	56	0.816	2
Farm Land	4.5	38.5	41.0	15.0	1.32	60	0.791	3
Farming Time	4.5	34.3	30.2	30.9	1.12	81	0.906	4
Off farm income	1.9	34.3	37.0	26.8	1.11	74	0.823	5
Hired Labor	6.0	30.9	23.4	39.6	1.03	95	0.974	6
Family labor	3.8	29.4	20.8	46.1	0.94	114	1.974	7
Education	4.9	12.8	39.2	43.0	0.80	106	0.846	8
Extension.	0.4	18.9	28.7	52.1	0.68	116	0.788	9

Seeds	2.3	15.5	29.4	52.8	0.67	122	0.818	10
Fertilizer	1.9	10.6	37.0	50.6	0.64	117	0.749	11
Mechanization	1.5	12.5	29.8	56.2	0.59	129	0.764	12
Insecticide	2.3	13.2	17.4	67.2	0.51	158	0.808	13
Herbicide	1.1	12.1	15.8	70.9	0.43	173	0.746	14
Cooperatives	1.5	4.5	5.3	88.7	0.19	305	0.579	15
Credit	0.4	0.8	6.8	92.0	0.09	402	0.362	16

* Mean values of items ranging from 0 – 3 where 0, 1, 2 and 3 indicate no access, low access , medium access and high access respectively

Source: Field Survey, 2010.

Data contained in Table 1 showed the extent of women's access to socioeconomic resources in the study area using the Likert scale. The rank order from the Likert scale showed that respondents had better access to the first six resources than all the other resources. They were considered better accessed than the other resources because they all had mean scores that were above 1, though less than 2, indicating low access according to the specified Likert scale. Respondents' access to other resources were limited (less than 1), and in some cases almost zero meaning that they were almost completely inaccessible. The result showed therefore that most farm specific resources were poorly accessed by respondents.

Production determinants

The production function estimates from the stochastic frontier production function of the determinants of productivity showed that all the production variables (land, improved seeds, pesticide, herbicide, hired labour, family labour, fertilizer and mechanization) were all significant at 1% level of significance. These were unlike the findings of Udoh and Falake (2006) where fertilizer and capital inputs were insignificant because of an almost complete non-usage of those inputs in that study.

Table 2: ML estimates of Stochastic Frontier production Function of respondents (n=266)

Variable	Coefficient	Std. error	t - ratio
Production function			
land β_1	-0.0289	0.003	-10.345***
improved seed β_2	0.0136	0.000	22.533***
insecticide β_3	--0.0128	0.000	--13.745***
herbicide β_4	0.0987	0.002	64.279***
hired labour β_5	0.0122	0.000	66.822***
family labour β_6	0.0419	0.000	76.090***
Fertilizer β_7	0.0696	0.000	189.489***
Mechanization β_8	-0.0242	0.000	-95.005***
diagnostic statistics			
$Sigma^2$	0.1218	0.909	13.3890***
gamma	0.7865	0.212	423.4404***
technical inefficiency model			
Education δ	-0.3854	0.190	-2.074**
extension δ_2	-0.0241	0.253	-0.095 ns
Farm income δ_3	0.2654	0.125	.1.178ns
off-farm income δ_4	-0.0254	0.100	-10.584***
Time δ_5	-4.2361	0.406	-10.429***
age δ_6	-0.5427	0.231	-2.132**
credit δ_7	-4.0145	1.420	-2.614**
Land owner δ_8	-0.3762	0.173	-3.356 ***
decision making δ_9	0.0053	0.156	0.0345 ns
cooperatives δ_{10}	-0.2199	0.412	-5.335ns

*** = significant at 1% ** = significant at 5% ns = not significant

Log likelihood function = 239.4681
Source: Field Survey, 2010.

The coefficients all had the expected signs (positive) except for land, insecticide and agricultural mechanization which had negative signs contrary to expectation. The result implied that a reduction in the quantity of land, insecticide and mechanization would result in increased productivity among the respondents. These variables presented unexpected negative signs indicating that decreasing their usage by 1% will result in 0.029, 0.024 and 0.013% increase in productivity. There seemed to be an inability to correctly interpret technology utilization information among respondents with regards to pesticide and mechanization utilization. This is probably arising from inadequate access to education and extension contact among respondents. This agrees with Chi (2008) who observed that increasing farmer education and extension information is likely to increase farmers' interpretation and evaluation of information, thus, adopting technology more efficiently. The over utilization of pesticide tends to reduce output and this probably results from respondents being improperly informed about correct direction in pesticide application and pest control. This agrees with the findings of Kumar and Regmi (2009) which showed that in Nepal, about 74% of farmers used a lot more pesticide than required. Such misinformation probably explains why respondents reported low access to pesticides, assuming that what was assessable to them was insufficient. Mechanization among respondents needed to be reduced probably because there was a relatively high level of family and hired labour available to respondents which reduces the relevance of the more expensive and less accessible mechanization. Access to land was among the highest in the study and may not have been efficiently utilized, such that reduction in the quantity of land allotted by respondents to crop production needed to be reduced in order to enhance agricultural productivity. This emphasizes the importance and need of extension contact among respondents in enhancing input use.

As shown in Table 2, herbicide appeared to be the most important determinant of agricultural productivity among the production variables with elasticity of 0.099 given the existing technology among respondents. This implies that increasing herbicide use by 1% will lead to about 0.099% increase in output. The possibility of the respondents increasing their use of herbicides hence their productivity is however limited by women's low access to herbicides as shown in Table 1. Fertilizer was noted to be the second most important production variable with elasticity of 0.07. A 1% increase in the use of fertilizer would result in 0.07% increase in output. Respondents however, had very low access to fertilizer thus; the possibility of increasing fertilizer usage leading to increased productivity was limited. A 1% increase in the use of the other production inputs (family labour, improved seeds and hired labour) which had elasticity's of 0.042, 0.014, and 0.012 respectively, will increase productivity by 0.042, 0.014 and 0.012% respectively. Accesses of respondents to these variables were low and the possibility of increasing productivity was thus limited among the women in the study area.

Technical Inefficiency determinants

Table 2 presents results of determinants of technical inefficiency of respondents in the study area. The results showed a gamma of 0.7865 implying that 78.65% of the variations in productivity of respondents were determined by technical inefficiency variables. This indicates that reducing technical inefficiency among respondents will result in substantial productivity increases. The Sigma squared (δ^2) of 0.122 was significant at 1% indicating a good fit, thus showing the correctness of the specified distribution assumption of the composite error term.

The statistically significant determinants of technical inefficiency among the specified variables were education, off farm income; time spent on farming, age, credit, and ownership of land. These variables also carried the expected signs. These variables were significant at 1% and 5% levels of significance as shown on Table 2. The variables negatively influenced technical inefficiency (shown by the negative sign on coefficients). This meant that these

variables reduced technical inefficiency among the respondents, thus increasing productivity. The age of respondents positively affected the farm level technical efficiency effects. This implies that as age of farmers increased, inefficiency in resource use decreased while technical efficiency increased. This is in consonance with the findings of Okunade (2007) in a related study on women's accessibility to credit and inputs in Osun state. In that study, it was observed that as women increased in age, they tended to have more access to inputs and credit, resulting in higher efficiency as age of farmer increased.

The result in Table 2 showed that increasing the years of schooling of respondents, off farm income, time on farm, age, access to credit and land ownership may contribute to bridging the gap between efficient and inefficient agricultural productivity. This is because education stimulates farmers' adoption of agricultural technologies. Similarly, as off farm income increased, there were more resources to help farmers' to access and allocate farm inputs more easily. Farmers' input allocation was also enhanced when farmers had access to loans (credit). This is because credit enhanced farmers' enablement to purchase inputs they could not ordinarily afford. Access to farming time significantly affected the technical efficiency of women's farms. This arises because as respondents were enabled to make time to give attention to their farms, farm efficiency was increased. Land ownership was shown to significantly reduce technical inefficiency. This is because when women owned their own farm land, they were enabled to invest on such land without the limitations they contend with when they hold land temporarily. This land use limitation of women was observed by Woldetensaye (2007), who noted that at the household level, women in Ethiopia had less influence on decisions on land and land related matters like what crop to grow on the land. This poses a challenge on women's ability to make investment decisions that will improve their technical efficiency as farmers. This limitation is however overcome when women owned their own land.

Extension contact, farm income, farm management decision making powers and membership of cooperatives were not statistically significant. Extension contact and membership of cooperatives carried the expected negative sign, implying that they reduced technical inefficiency as they were increased. The decrease in inefficiency was however not significant. This was probably because of the generally low number of extension visits to farmers and low membership of cooperatives among respondents in the study. Membership of farmers' cooperatives affords the farmers the opportunity of sharing modern agricultural practices by interacting with other farmers. Cooperatives also provide opportunities for resource access. All of these work to make farmers better equipped and more efficient, thus, leading to greater productivity. Membership of cooperatives was probably not significant because very few women had access to cooperatives (cooperative membership ranked 15^{th} out of 16 with mean access of 0.19). Farm income and women's decision making powers increased inefficiency as indicated by the positive signs their coefficients carried. This implied that these variables increased technical inefficiency of production among respondents. These two variables were also insignificant. Farm decision making powers of respondents probably increased inefficiency because of respondents' low access to extension, education and membership of cooperatives, resulting in limited management decision making powers. This agrees with the finding of Okunade (2007) where it was reported that the low level of women's exposure to education, extension, and cooperatives suggested that women in that study were not likely to make efficient farm management decisions.

Farm income was insignificant and carried a positive sign meaning that the higher the farm income, the lower the technical efficiency. This may result from the fact that farm income is commonly obtained after the production season so is unavailable during the production season,
The specified determinants of agricultural productivity among respondents in the study were considered in this section. The efficiency of the determinants were found to be influenced by level of access to resources. A situation like this has implications for the productivity of farmers. The lower the access respondents have to resources. The respondents' membership of

cooperatives, extension contact, off farm income and farm management decision making powers of women, all other variables were significant in determining agricultural productivity of respondents. There was therefore, a significant relationship between productive resources and agricultural productivity of women in the study area.

Conclusion and Recommendation

This study has found that resources of crop production were not very accessible to women in the study. Some resources were only barely assessable among which were credit, cooperative membership, farm inputs extension contact and education This situation was shown to have a limiting effect on efficiency of crop production especially with regards to resources like credit and education that determined technical efficiency of production. The implication is that crop productivity will be depressed. Such a situation among women farmers who are known to be the major producers of food crop in developing countries has implications for food security.

It is recommended that that access to credit, extension contact, membership of cooperatives and girl child/adult education be given centre stage among policy makers as well as Government and non-governmental organizations. This is because access to these opportunities is expected to empower women to access and efficiently utilize other resources.

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