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Analysis of Factors Influencing Improved Sorghum Production Technologies among Women Farmers in Southern Yobe, Nigeria

Bawa, D.B.* and Ani, A.O.

Department of Agricultural Extension Services, University of Maiduguri, Borno State, Nigeria

*E-mail of the corresponding author: dauda71bawa@gmail.com,

Abstract

This study was on the challenges for improved sorghum production among women farmers in southern Yobe, Nigeria. The specific objectives were to examine the socio demographic characteristics of the respondents, determine factors influencing the adoption of improved sorghum production by respondents and make recommendations on ways to encourage improved sorghum production. Data for the study were obtained from 120 respondents selected through multistage random sampling procedure. Descriptive statistical techniques such as frequency distribution and percentages were used for the analysis. Similarly, inferential statistical technique namely logit regression analysis was used to establish relationship between socio-economic characteristics of the respondents and challenges for improved sorghum production. The study revealed that majority (91.5%) of the respondents fell within the age bracket of 50 years and below. It is also evident from the study that 65.8% of the respondents were married and 67.4% had one form of education or the other, while 71.6% had less than 1 hectare as farm land. The result further showed that farm size, age of respondents, educational level, cost of technology, extension contact, access to credit and expected benefit from use of improved production technologies are the factors that significantly influenced improved sorghum production among women farmers in the study area. It is recommended that policies should be formulated to take advantage of the factors that positively influence women's improved production of sorghum and to mitigate the negative ones.

Key words: Challenges, Sorghum production, Women farmers, Yobe, Technology

1. Introduction

Agricultural production activities in Nigeria have been majorly carried by women. The significant contribution of women to food production and processing has been empirically reported in various micro-level studies in Nigeria (Afolami and Ajani, 1999; Ajani, 2001; Amaza, Kwaghe and Emos, 1999; Ani, 2003; Rahman, 2008). This in essence indicates that full participation of women is required to increase both crop and livestock production. Women constitute the most powerful prospective means of production and play major role in African Agriculture (Ani, 2004).

Agricultural production activities in which women are involved could include farm site selection, bush clearing, stumping, tillage, mound or ridge making, planting, weeding, harvesting, storage as well as processing. Therefore sustained improvement in the agricultural sector is inconceivable without the active participation of rural women who are responsible for substantial proportion of agricultural production in Nigeria.

FAO (1996) had observed that for any agriculturally based programme to succeed, it must be developed to respond to gender differentiated needs and priorities, aimed to improve for all at household, local and national levels. The report further indicated that the reason for failure of any agricultural development efforts is due mainly to the fact that the technologies and tools introduced to improve productivity are often based on rural men's need and perceptions which substantially differ from those of women farmers. This is due to the fact that agricultural research, technical training and extension programmes have been targeted primarily to men, while those extension messages targeted to women only emphasize their domestic roles such as child-care and family nutrition.

In spite of the invaluable contributions of women in agricultural production, existing agricultural planning and implementation seemed to have failed to direct needed inputs to women producers. It was in this regard that FAO (1990) observed that, despite the huge contributions of women to agriculture, they encountered more difficulties than men in gaining access to land, capital, technical services and information and these in no small measure limit their food production potentials.

Sorghum is one of the major crops which serve as a staple food in Nigeria and Yobe State in particular. This crop is known to be widely grown in Yobe State by women principally because of its tolerance to drought and is used to feed livestock. The production of this crop by women no doubt will be challenged by issues bothering on lack of access to productive resources such as farm inputs (seeds, fertilizers, insecticides etc), credit, extension services and appropriate technology. This study therefore, was conceived on the recognition of the growing need for improved sorghum production in Southern Yobe State of Nigeria and to determine ways of minimizing the challenges women face in producing this crop. Specifically, the objectives include to:

i. determine the socio-demographic characteristics of the respondents;
ii. identify and discuss factors influencing the adoption of improve sorghum production practices; and,
iii. suggest framework for enhancing women's participation in sorghum production.

2. Methodology

2.1 The survey area

The study was conducted in southern part of Yobe state of Nigeria in 2012. Multistage random sampling was employed for the study. The first stage was the selection of southern Yobe because of the fact that it has large proportion women who adopted the improved sorghum production technologies. The second stage was the selection of two (2) out of the six (6) Local Government Areas using simple random sampling. The third stage was to divide each LGA into two strata-North and South. The fourth stage was to select one (1) farming community from each of the stratum which gave a total of two (2) communities per selected LGA. The fifth and the final stage was the selection of thirty (30) women farmers involved in improved sorghum production from each of the communities given a total of 120 respondents for the study.

2.2 Analytical framework

The uses of Logit model for this analysis is consistent with the literature on the adoption of improve agricultural production technologies (Rha, 2006;Ojo, 2011;Akudugu, 2012;) which describe the process of adoption of improved production technologies as taking on a logistic nature. This is indicated as follows:

$Yi = Bx_{i+Ui}$

Where Y_I is equal to one (1) when a choice is made to adopt and zero (o) when otherwise:

Y_i= 1 if X_i is greater than or equal to critical value, X^* and

Y_i = 0 if X_i is less than a critical value, X^*.

log pi/1-pi = The log-odds in favour of women farmers' decision to adopt modern agricultural production technologies.

$X_{1.....}X_i$ are factors that influence or prevent women farmers from adopting improved sorghum production technologies and are defined as follows:

X_1= Farm size in hectares

X_2=Age of respondents in years

X_3= Educational level (Number of years spent in school)

X_4= Cost of technology, dummy (1= Affordable; 0= Otherwise)

X_5= Extension contact, dummy (1= has access to extension; 0= Otherwise)

X_6= Access to credit, dummy (1= has access to credit; 0= Otherwise)

X_7= Level of expected benefits, dummy (1= High expectation; 0= Otherwise)

3. Results and discussion

3.1 Socioeconomic characteristics of the respondents

The study shows that majority (91.5%) of the respondents fell within the age bracket of 50 years and below (Table 1). The implication of this finding is that most women farmers belong to economically active age group and their improved agricultural production behaviours are critical for improvement of sorghum production. Furthermore 65.8% of the respondents were married; marital status more especially for women has implication for adoption of improved agricultural technology, because women activities in the study area are faced by socio-cultural restrictions (Bawa, 2011). Such restrictions limit their ability to accumulate assets, have access to production resources (such as credit, land and technical information) and thus, affect their demand for and supply of improved productive practices. Besides 67.4% of the respondents had one form of education or the other, education influences farmer's adoption of improved agricultural production technology. Educated people are expected to perform certain tasks and functions with higher efficiency and are also more likely to adopt new technologies in shorter period of time than uneducated people (Agbamu, 2006).

Most (71.6%) of the respondents had between one to two hectares of land holding. The effect of farm size could be positive, negative or neutral on farm production. For instance Kasenge (1998) found farm size to be positively related to adoption of new technology. Onu (2006) also, found in his study that farm size significantly influences adoption of improved agricultural production technology. Farmers operating on small holdings may view adoption of new agricultural production technology as a 'risky' venture.

3.2 Factors influencing improved sorghum production technologies among the respondents

Table 2 revealed that farm size was found to have a positive relationship with the probability of adoption of improved sorghum production technology. It was found to be significant at 1% level. Women's land rights are generally derived from their husbands or other men usually family members, sometimes village chiefs and thus conditional and insecure (Ani, 2004). Squire (2003) had earlier indicated that most women do not enjoy equal and independent right and control over the use of land. The report further shows that most women cannot own land, and those who do, generally command smaller land holdings than men. World Bank (2003) stated that evidence from several African countries suggests that female farmers are as efficient as male farmers, but are less productive because they have less access to productive inputs and human capital.

Land is a very crucial farm resource without which there would be no agricultural production. It is very important in directly providing two out of the three necessities of life- food, shelter, and indirectly clothing. The finding is consistent with the finding that large scale farmers are more inclined to adopting new agricultural production technologies than small scale farmers (Fernandez-Cornejo, 1996).

The cost of modern agricultural production technologies was found to be negatively related to the probability of adopting improved sorghum production technology (Table 2). It was however, found to be insignificant. The finding is consistent with Caswell *et al* (2001) who noted in their study that the decision to adopt new technology presents a shift in farmers' investment options. This means that if the technology is costly to the farmer, there is low probability that he or she will adopt it.

The expected benefit to be derived from adopting a given technology was found to be positively related to the probability of adopting sorghum production technology (Table 2). This was found to be significant at 10 percent level. This implies that if farmers expect benefits from adopting a modern agricultural production technology to be higher than their current methods of farming, they are most likely to adopt it and vice versa. This is consistent with Akudugu *et al* (2012) who observed that without significant difference in outcomes between two options, and in the returns from alternative and conventional practices, it is less likely that farmers, especially small-scale farmers will adopt the new farm practice.

The age of farmers assumes a quadratic function which implies that farmers' rate of adoption of improved sorghum production technology is low at both the younger and older ages (Table 2). It was found to be significant at 10 percent level. At the younger age, farmers may not be able to adopt modern agricultural production technologies, especially capital intensive ones because of the fact that they might not have adequate resources to do so. At older age, farmers' volume of economic activities reduced hence they may be unable to pay for technologies. Besides, older farmers have accumulated years of experience in farming through experimentation and observations and may find it very difficult to leave such experiences for new farm technologies.

The maximum level of education within the farm household was found to have a positive relationship with the probability of adopting improved sorghum production technologies and significant at 1percent level (Table 2). Formal and informal education opportunities are of essence and should be made available for female farmers-whether they are girls, middle-aged women or older women. Women farmers should be encouraged to undertake technology-oriented building programmes as they relate to crop production. This will be necessary so as to enhance their performances in farm production activities. Similarly, illiterate women among them should be given the opportunity to gain minimum literacy and numerical skills to enable them access more information that will be useful to their economic or productive efforts. The implication of this finding is that farm households with well educated members are more likely to adopt modern agricultural production technologies than those without as it concerns sorghum production.

Access to credit was found to have a positive relationship with the probability of adopting improved sorghum production technologies. This was found to be significant at the 1 percent level (Table 2). Inequalities in access to and control of assets could have severe consequences for women's ability to provide food, care, health and sanitation services to themselves, their husbands and children. Most of the rural farmers are known to be poor and do not have enough money to hire labour even when domestic and other rural activities pose problems. This situation could greatly affect women participation in agricultural production activities. Agricultural production generally is capital intensive and in rural areas such as the study area, women farmers need to inject capital into agriculture in other to increase production. Even in highly developed countries of the world, agricultural credit has been an important instrument not only for fostering agricultural development but for improving efficiency and expanding production. The availability of credit is essential for improving and enhancing income. This means that credit is an important facilitating factor of agricultural production technology adoption. This finding is in consistent with the view that high poverty levels among farmers and lack of access to credit make it impossible for them to afford technologies (Akudugu *et al,* 2012).

Access to extension services was found to be positively related to the adoption of modern sorghum production technologies and was significant at 10 percent level. This means that farm households are more likely to adopt modern sorghum production technologies if they have access to extension services. Women produce a substantial amount of food consumed in the household and are engaged in its processing and utilization (Ani, 2004). The issue of gender can be said to categorically affect women farmers' participation in agricultural production activities, even with seemingly improved extension services. Female farmers are constrained by time due to their multiple roles as homemakers and income earners. They also could be constrained by restricted mobility due to poor transportation in rural areas. Due to lack of access to improved technologies and extension services, women farmers still could be using crude and traditional implements in food crop production. Access to extension services is critical in promoting adoption of modern agricultural production technologies because it can counter balance the negative effect of lack of years of formal education in the overall decision to adopt some technologies (Yaron *et al,* 1992). Access to extension education services therefore creates the platform for acquisition of the relevant information that promotes technology adoption. Access to information through extension services reduces the uncertainty about a technology's performance hence may change individual's assessment from purely subjective to objective over time thereby facilitating adoption of improved agricultural production technology.

4. Conclusion and recommendations

In Nigeria, women have been known to constitute the bulk of labour force in agricultural production activities. Their role in agriculture has become more prominent in terms of undertaking most of the agricultural activities. This study has attempted to address women farmers encounter in sorghum production in the Southern part of Yobe State, Nigeria. The major findings indicates that farm size, age of respondents, educational level, cost of technology, extension contact, access to credit and expected benefit from use of improved technologies are the factors that could significantly influence improved sorghum production among women farmers in the study area.

It is necessary here to recommend that women's independent access to land, credit and extension service facilities should be enhanced by reducing gender disparities in agricultural education and training. This in essence will promote agricultural growth, provide greater income earning opportunities for women, and provide better food and nutrition for all in the study area and other surrounding communities. It will be apt to also incorporate a gender perspective into agricultural extension policy so that rural women farmers could benefit immensely from extension services so as to meet their basic needs of food, shelter and clothing as well as enough income for other human needs.

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Table 1: Socioeconomic characteristics of respondents

Variables	Frequency	Percentage
Age (years)		
21-30	35	29.1
31-40	62	51.6
41-50	13	10.8
>50	10	8.3
Marital status		
Single	16	13.3
Married	79	65.8
Widowed	12	10
Divorced	13	10.8
Level of Education		
No formal education	39	32.5
Primary school completed	41	34.1
Secondary school completed	25	20.8
Tertiary education	15	12.5
Farm size (Ha)		
< 1	20	16.6
1-2	86	71.6
>3	14	11.6

Source: Field survey, 2012

Table 2: Factors influencing improved sorghum production technologies among the respondents

Variable	Coefficient	Std. Err.	z	P>|z|
Farm size	1.7263	.7006	2.464	0.013***
Age of respondent	-0.2430	.1400	-1.73	0.084*
Educational level	3.3800	.8142	4.15	0.000***
Cost of technology	-0.7862	.6180	-1.27	0.203
Extension contact	1.3758	.8370	1.640	0.100*
Access to credit	1.7923	.6340	2.83	0.005***
Expected benefits	1.1910	.6670	1.78	0.074*
Constant	0.2723	3.7348	0.07	0.942

Log likelihood = -42.8544; Pseudo R^2 = 0.6785; Predicted Prob. (Adoption) = 0.6956

*, **, and *** means significant at 0.10, 0.05 & 0.01 level
Source: Field survey, 2012

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