Global Academic Journal of Agriculture and Bio sciences

Available online at https://www.gajrc.com
DOI: https://doi.org/10.36348/gajab.2024.v06i06.001

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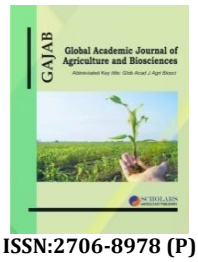

ISSN:2706-8978 (P)
ISSN: 2707-2568 (O)

Original Research Article

Assessment of Socio-Economic Determinants of Maize Production among Smallholder Farmers in Nassarawa State, Nigeria

Ezike, D. N[1*], Fadiji, T. O[2], Onjewu, S. S[2], Abubakar, T. T[2], Mohammed, A. U[2]

[1]National Biotechnology Development Agency (NABDA) P.M.B 5118, Umar Musa Yar'adua Express way, Lugbe, Abuja FCT, Wuse, Abuja, Nigeria

[2]Department of Agricultural extension and Rural Sociology, Faculty of Agriculture, University of Abuja, F.C.T, P.M.B. 117. Abuja, Nigeria

***Corresponding Author**
Ezike, D. N
National Biotechnology Development Agency (NABDA) P.M.B 5118, Umar Musa Yar'adua Express way, Lugbe, Abuja FCT, Wuse, Abuja, Nigeria

Article History
Received: 27.09.2024
Accepted: 02.11.2024
Published: 05.11.2024

Abstract: The study focused on assessment of socioeconomic determinants of maize production among smallholder farmers in Nasarawa State. A multistage sampling technique was used for the selection of 171 small holder farmers for the study. A well-structured questionnaire containing both open and closed ended questions was used to collect the data for the study descriptive statistics such as percentage and frequencies and multiple regression analysis were used to achieve the objectives of the study. The socioeconomic result of the smallholder maize farmers in showed that the majority (36.3%) of the farmers were within the age range of 31-40 years of age and were mostly 76.6%) male farmers with the majority married and literate. Also, a greater number (66.1%) were members of association, 71.3% had farming experience between the range of 16-20 years with household size of 4-6, cultivating average farm size of 2-3 acres, had good contact with extension agents though only 4.1% had access to credit facility. The result of the multiple regression analysis showed that farm size, educational status and household size have positive significant effect on the output of maize at 1% and 10% level of significance respectively. The maize production technologies adopted by the majority (88.4%) of the farmers were herbicides and improved variety while the major constraints were high cost of labour, high cost of inputs and poor credit facility. The federal Government should create an enabling environment that guarantees available farmland to farmers since farm size is a critical determinant to maize production.

Keywords: Production, Farmers, Maize, Extension, Smallholders.

INTRODUCTION

Smallholder farmers in Nigeria produce the majority of the country's food. The smallholder farmers are those who possess and cultivate land that is less than 3hectares. About 80% of Nigeria's people who work in agriculture are dominated by this group of farmers (Awoke and Okorji, 2014, Mgbenka and Mba, 2016). Even though the small holder farmers produce the food which the entire nation depends on, they are the poorest group in Nigeria (Mgbenka and Mba, 2016). Because they are the mainstay of the Nigerian agricultural sector, they deserve all the support of the government to increase their capacity to produce food, grow more raw materials for the agro industrial sector and equally contribute to

bringing food insecurity to a stop (Olaitan, *et al.,* 2024).

However, these smallholder farmers in most cases have limited access to improved agricultural technologies and their general conditions deny them palpable investment in capital, input as well as labour. Many factors contribute to low efficiencies of smallholder farmers (Lai-Solarin *et al.,* 2024a). They have little or low extension services which make them continue in the conventional method of farming. Their access to credit facilities is equally limited; currently the environment where these smallholder farmers carry out their farming activity are not safe as Fulani herdsmen have become a threat to their lives and crops. All these reduce their productivity to a large extent. Over 12 million smallholder farmers in Nigeria, dispersed over various ecological zones, are engaged while growing a particular type of arable crops, maize (*Zea mays L.*) is the most significant of these according to Oluwatayo, Sekumade and Adesoji (2018).

Food Agricultural Organization (2018) recorded that Nigeria is the top producer of maize in the whole of West Africa and the whole world. Additionally, maize production in Nigeria is higher than that of other grains due to the crop's capacity to flourish in a variety of ecological settings (Sennuga *et al.,* 2024). Maize (*Zea mays* L.) is a vital staple food for millions of people in the Federal Capital Territory (FCT) Abuja, Nigeria and West Africa. It is one of the major foods in the world today, more than 50% of the global caloric intake is supplied from the combination of Maize, Rice and Wheat (World Atlas, 2017). Therefore, maize production is important for Nigeria's food security and economic stability. According to De Janury and Sadoulet (2017), rising productivity of maize in developing nations is a significant factor in reducing hunger and poverty. Increase in production of Maize will help to lower the prices and benefit the consumers. The world food summit in 1996 opined that it is only when all people at every given time have both physical and economic access to sufficient ,safe as well as nutritious food in order that their dietary needs are met in a way that they will be active and healthy (Hazell, 2016). It was also stated in the study that food security at macro level means adequate supply of food through domestic production or through import to meet the needs of all citizens. However, at the micro level household food security depends on income and food producing assets. According to a study conducted by Kibwage,Momanyi and Odondo (2017) it was established that like Kenya all African countries are faced with hunger problems and it is getting worse.

It has also been established by Ogunsumi (2015) that Maize Production by smallholder farmers has the capacity to overcome hunger in the households and this could help to double food production in Africa. Households across Nigeria delight in Maize consumption. Mundi Index has it that consumption of Maize across Nigeria in 2017 was about 10.9Million tons. Olaniyan (2015) stated that those who use Maize either alone or in combination with other food or snacks in Nigeria use it as Akamu, Tuwo, Maasa, Couscous, Koko etc. Maize can also be used as medicines and raw materials for industries as well as poultry feed (Oyediji, *et al.,* 2024).

Since every component of the maize plant has a marketable use, it may be argued that it serves multiple purposes. A variety of edible and non-food products can be made using the grain, leaves, stalk, tassels, and cob, among other plant parts (IITA, 2011). In developed nations, maize is mostly utilized as livestock and poultry feed, according to IITA (2001). However, it is a significant staple meal in low-income countries. There is a critical need to expand output of maize because both animals and humans are consuming more of it (Lai-Solarin *et al.,* 2024b).

Due to this rapid increase in population there is therefore an increase in demand for food products. Given the important position of maize to the population in Nasarawa State and the economy of Nigeria and considering the fact that the supply of maize has not met up with the increasing demand, there is, therefore, the need to assess the socio-economic determinants affecting the production of maize in Nassarwa state of Nigeria. Therefore, the broad objective of the study is to assess the socio-economic determinants of maize production among small holder farmers in Nassarawa State. The specific objectives are to:

i. Describe the socio-economic characteristics of Maize farmers in the study areas.
ii. Examine the effect of the socio-economic characteristics of the Maize farmers on their production in the study areas.
iii. Identify the technologies adopted by the Maize farmers in the study areas.
iv. Ascertain the extension services obtained by the Maize farmers in the study areas.
v. Identify the constraints faced by the Maize farmers in the study areas.

Hypothesis

Socio-economic characteristics of the smallholder maize farmers have no significant effect on the maize output in the study areas.

METHODOLOGY

This study was carried out in Nasarawa State of Nigeria. Nasarawa is a State in the North central of Nigeria surrounded by the states of Taraba and Plateau to the east, Kaduna State to the north, Kogi

and Benue to the south, and the Federal Capital Territory to the west. On October 1, 1996, the western portion of old Plateau State was divided into a new state that bore the name of the former Nasarawa Emirate. The state is divided into thirteen local government areas) namely Akwanga, Awe, Doma, Karu, Keana, Keffi, Kokona, Lafia, Nasarawa, Nasarawa Eggon, Obi, Toto and Wamba with its capital seat at Lafia. The main ethnic groups in Nasarawa State are Aguta, Alago, Basa, Ebira, Eggon, Gbagyi, Gwandara, Kanuri and Tiv. There are 29 languages spoken in the state, the major ones being: Agatu, Basa, Eggon, Gbagyi, Gade, Goemai, Gwandara, Ham, Kofyar, and Lijili. Along the state's western border with the FCT, the Karu Urban Area, an Abuja suburb, serves as the state's major economic hub. It's projected population size as of 2022 is 2,886,000 (Nasarawa State, Nigeria Population Statistics), Nasarawa is the second-least populated and fifteenth-largest in terms of area of Nigeria's 36 states. The state is primarily located within the tropical Guinean forest-savanna mosaic Eco region. The River Benue, which forms a large portion of Nasarawa State's southern borders, and the state's remote northeast, which contains a small portion of the Jos Plateau, are both significant geographic features. Agriculture dominates Nasarawa State's economy, with the primary crops being sesame, soybeans, groundnuts, millet, maize, and yams.

Population of the Study

Sampling is consisted of respondents that were engaged in maize production in selected communities of Nasarawa State. Maize farmers were purposely selected to assess the socioeconomic determinant of maize production.

Research Design

The study adopted survey design as data was collected at one point in time. Usually, it is the simplest. According to Babbie (1990), survey design is suitable for description purposes as well as for the determining of relationship between variables and it is cost effective and saves time.

Instrument for Data Collection

The study gathered a variety of data on the socioeconomic status that influenced maize output. The main information generated was on the socioeconomic factors that affect maize farmers, which include their age, gender, and marital status, level of education, household income, farm size, and access to credit. The type of technology used by the maize farmers, the extension services they received, and the challenges posed by maize production.

Method of Data Collection

For this study, both primary and secondary data were used. The primary data were gathered using well-structured questionnaire. The secondary data were from books, libraries, and academics who studied relevant subjects. The questionnaire was administered in the study area through the help of trained enumerators who understood the languages of the people. The use of enumerators gave room for the respondents to express themselves in their own languages. The questionnaire was divided into (5) five sections according to the objectives of the study. The questionnaire was administered to a total of 171 maize farmers in the study area.

Method of Data Analysis

The data collected for the study was analysed using descriptive statistics such as percentage and frequencies. And multiple regression analysis with the aid of statistical package for social science version 23.

Sample Size:

The sample size for the study was 171 smallholder maize farmers. It consists of 18 farmers from each of the selected seven local government areas which include Nasarawa, Doma, Lafia, Obi, Karu, kefi, Akwanga and 45 farmers from kokona local governmnent area which were randomly selected.

Model Specification

Multiple regression analysis was performed to determine the effect of socioeconomic variables on maize output. Regression coefficient was obtained using the regression analysis to ascertain the effect of each independent variable on the amount of maize yield (kg/ha) generated by farming households. Regression analysis was performed on the dependent variable, maize yield, and the independent variables.

The regression model is specified as follows:

$$Y=a+b_1X_1+b_2X_2+b_3X_3+b_4X_4+b5X_5+b6X6+b_7X_7+b_8X_8+b_9X_9+b_{10}X_{10}+b_{11}X_{11}+\mu\text{----------Eqt (2)}$$

Where Y =output of maize in the study area while X_1 to X_{11} are the independent variables.
a = constant term
b_1 –b_{11} = regression coefficients
X_1=Age (measured in years)
X_2= Sex
X_3= Educational status
X_4= Marital status
X_5= Household status (measured by number of people living under one roof)
X_6= Membership of group
X_7 =Access to credit
X_8= Size of land (measured in hectares)
X_9= Farming experience (measured in number of years)
X_{11}= Extension contact
μ =error term.

T-statistics: The t-statistics embedded in the regression was used to test the hypothesis.

RESULT AND DISCUSSION

Socioeconomic Characteristics of Smallholder Maize Farmers in Nasarawa State

Age:

The result in table 4.4 shows that the majority (36.3%) of the respondents were within the age range of 31- 40 while 5.8% of them were within the range of 15- 30 years. With the majority being within 31- 40, it indicates that the maize farmers in Nasarawa State were within their productive age. This implies that most of the farmers in the study area were very energetic and could carry out agricultural activities that enabled increased maize output. This is similar to the findings of Issa *et al.,* (2016) who reported that the mean age of maize farmers in Ikara Local Government Area of Kaduna State, Nigeria was 40 years. This shows that the farmers were young and are expected to have more energy with high vigour to practice maize farming.

Household Size:

Table 4.4 shows that the majority of the respondents (46.2%) had household size of 4-6 while 5.8% had a house hold size of 1-3 persons. This shows that greater number of the respondents had access to family labour since labour is a very important factor in crop production. This agrees with the findings of Sadiq *et al*., (2020) who noted that majority (70%) of farmers that engaged in maize production had household size ranging from 1-10 persons. According to Ozor and Cynthia (2019), a fairly large family size implies more family labour available for the household farm activities.

Gender:

The result in Table 4.4 showed tha**t** majority of the respondents in the study area were males (76.6%). This shows that the majority of the maize farmers sampled in the study area were male. This may be attributed to the fact that males in the study area had more right to land as a productive resource than females. This aligns with a study by (Akerele and Akinleye, 2019) which indicated that 88% of farmers involved in maize production were males due to the fact that male farmers had more access to land than their female counterparts.

Educational Status:

The result in Table 4.4 shows that 72.5 % of the respondents had one form of education or the other with the highest being primary education. This accounted for 29.8% of the maize farmers while 27.5 % had no formal education. This shows that their current level of education is sufficient to give them the skills necessary to manage and comprehend farm-related communications included in instruction manuals on input and machinery applications as well as to recognize the value of extension services. Education is one of the main factors influencing a country's economy. This result agrees with Sullumbe (2018) who opined that a person's personality, outlook on life, and acceptance of new and better innovations are significantly shaped by the level of formal education he/she received.

Marital Status:

The table 4.4 equally showed that 82.5% of the respondents were married. The percentage of married people who engaged in activities was high; it is consistent with a survey conducted by Uddin (2014) which found that 85.8% of farmers in Edo state were married. Given that marriage is frequently linked to job security and responsibility, the majority of married people who participated in farming activities suggests that they are prepared to enhance their standard of living as well as that of their families (Uddin, 2014).

Farm Size:

The Table 4.4 also revealed that the majority of the respondents (56.1%) had farm size of between 2-3 acres while only 3.5% had farm size of 10 acres and above. This really reveals that a greater number of maize farmers in the study area were into small scale maize production which negatively affected their production. Deliberate polices should be put in place to protect agricultural land from the rapid effect of industrialization and urbanization. Farm size and the ability to diversify farm businesses are correlated (Hassan & Ahmad, 2015). According to the research done by Bamire, *et al.,* (2007), greater yield in maize production was linked to increasing land area.

Farming Experience:

The result in Table 4.4 shows that 71.3 % of the respondents had farmed for 16-20 years and only 6% of the respondents had less than one year farming experience. This implies that quite a number of the respondents had farmed for a long time and had acquired necessary knowledge to improve maize production. Years of farming experience is important because the higher the farmers' experience in farming, the better will likely be the production capacity of the farmers. According to Obinne (2019) farming experience enhances productivity and has shown to encourage rapid adoption of farming innovation.

Membership of Association:

According to the result in Table 4.4, 66% of the respondents belonged to one association or the other while 33.9% did not belong to any association**.** The result revealed that maize farmers in the study area could have benefit in one form or the other such as information on new technology or credit from

their respective group or associations. Naturally, being members of associations afford farmers to benefit from financial institutions and /or lending agencies since such requirement is the determinant factor. This agrees with Onoja *et al.,* (2013) who asserted that being a member of association affords maize farmers better access to information that could improve their maize production than farmers who did not belong to any.

Contact with Extension Agents:

The result of the research in Table 4.4 also shows that 84.2% of the respondents had contact with extension agenst whereas 15.8% did not. Since extension agents help farmers make good decisions by use of information, it implies that the maize farmers in the study area had access to proper information that could boost maize production. Those who have contact with extension agent have more tendency of adopting new production practices, Ray, *et al.,* (2013) confirmed that contact with extension agents increase the chances of adopting improved maize technology by farmers.

Access to Credit:

The result in Table 4.4 shows that only 4.1% of the respondents in the study area had access to credit facility. This indicates that the smallholder maize farmers totally struggle on their own to finance their maize production activity which had perpetually kept them at small scale level. This is in agreement with a study carried out by Osabohien*, et al.,* (2020), who acknowledged that the agriculture finance gap brought by credit limitation has a detrimental effect on agricultural performance. According to Ojo *et al.,* (2019) farmers' inability to access agricultural loans typically has a negative impact on their capacity to acquire the necessary raw materials for their output. Therefore, providing finance to smallholder farmers who are poor increases their capacity for production.

Table 1.1: The socioeconomic status of the smallholder maize farmers in Nasarawa State

Socio Economic Variables	Frequency(n=171)	Percent (%)
Age(yrs)		
15-30	10	5.8
31 – 40	62	36.3
41-50	61	35.7
51 and Above	38	22.2
Household Size		
1-3	10	5.8
4-6	79	46.2
7-10	60	35.1
11-14	22	12.9
Gender		
Male	131	76.6
Female	40	23.4
Educational Status		
None	47	27.5
Primary	51	29.8
Secondary	47	27.5
Tertiary	26	15.2
Marital Status		
Single	7	4.1
Married	141	82.5
Divorced	4	2.3
Widowed	19	11.1
Farm Size(ha)		
Less than 1	17	9.9
2-3	96	56.1
4-5	42	24.6
6-10	10	5.8
10 and above	6	3.5
Farming Experience(yrs)		
Less than 1 -2 Yrs	1	.6
7-10 Yrs	12	7.0
11-15 Yrs	36	21.1

Socio Economic Variables	Frequency(n=171)	Percent (%)
16-20 Years	122	71.3
Membership of Association		
No	58	33.9
Yes	113	66.1
Contact With Extension Agent		
No	27	15.8
Yes	144	84.2
Access To Credit Facility		
No	164	95.9
Yes	7	4.1

Source: Field Survey, 2023

The Effect of Socioeconomic Characteristics of the Farmers on Output of Maize Output in Nasarawa State

The result on the effect of socio-economic characteristics of the maize farmers in Nasarawa state is presented in Table 4.5. The F-value (8.548) was statistically significant at 1% which shows overall fitness of the model to the data used. This means that the set of data used for the analysis was adequate and complies with the requirement of the regression model. The coefficient of determination, R-square was 0.348, indicating that 34.8% of the effects of socio-economic characteristics on maize output in Nasarawa are captured in the model, implying that, majority (65.2%) are outside the model.

Farm Size:

The coefficient of farm size was positively signed (13.4), indicating a corresponding positive increase in maize output if the farm size of the farmer increased by a unit. Farm size was found to be statistically significant at 1% level of probability. This research outcome is similar to that of Ninh (2021) who reported that farm size have significant impacts on output of rice farming households. Similarly, the size of the cultivated land areas as reported by Mohammed (2021) had a positive influence on the quantity of maize production. Consequently, Obi and Ayodeji (2020) stated that farm size is a key determinant of economic and technical efficiencies in maize production. Thus, farm size is a vital tool in maize production. According to Gollin (2018), the narrative that expansion of farm size is consistent with agricultural development and economic growth is a commonly held one, which is very true.

Educational Status:

Educational status of the maize farmers in Nasarawa State showed a positive and significant effect on maize output in the study area at 10% level of significance. A number of mechanisms through which education influences agricultural output have been explored by researchers. Education boosts farmers' ability to obtain, decode and understand information, thus enabling them to make better use of available information to come up with pertinent solutions to production, market and financing challenges. In other words, farmers with good education possess improved decision-making skills and hence better manage resources to exploit farms of various sizes (Asadullah and Rahman, 2009). The coefficient for educational status showed a positive relationship, implying that, as educational attainment increases by a step, maize output will increase by 2.488 per hectare when all other predictors are kept constant. It has been reported that well-educated farmers are not only capable of utilizing available information but also better access to needed information (Ninh, 2021). Consequently, highly educated farmers use a combination of inputs superior to what is applied by low-skilled ones, meaning that the former allocates scarce resources more efficiently (Reimers and Klasen, 2013).

Household Size:

The household size of the respondents was positively significant at 5% level of probability. The coefficient of the variable was 0.817, implying that as respondents' household increases by a unit, the output of maize also increases by a corresponding value of 0.817. The finding is similar with the result obtained by Ajah and Mmadu (2012) in a similar research which showed that increase in household size leads to increase in maize output. But the findings is contrary to the findings of Makama *et al* (2022) who found that household size negatively influence maize production contrary to expectation. This is because as household size increases, farmers faced more financial constraints thus divert resources off the farm.

Table 1.2: **The effect of socio-economic status on the output of maize in Nasarawa State**

Variables	coefficients	Std Error	t valu	Sig level
(Constant)	-42.624	13.830	-3.054	003***
Access to credit	1.502	7.533	.770	.442
Contact with ext Agent	1.474	4.052	.634	.717
Membership of Association	1.692	3.210	.527	.599
Farming experience	3.244	2.267	1.431	.154
Farm size	13.400	1.745	7.679	.000***
Marital status	-.737	2.405	-.306	.760
Educational status	2.488	1.414	1.759	.080*
Gender	-.796	3.652	-2.218	.828
Household size	.817	.409	1.997	.048**
Age	.073	.195	.377	.707
F Value=8.548; R Square=0.348; Adjusted Square =.307 *** P ≤ 0.01,**=P≤ 0.05,*= P≤ 0.010				

Source: Field survey, 2023

Maize Production Technologies Adopted by the Maize Farmers in Nasarawa State

Figure 1.1 shows the distribution of respondents according to maize technologies adopted in Nasarawa State. The result showed that 88.9% of the respondents adopted herbicides application, 77.2% adopted improved variety, and 75.4% adopted fertilizer application followed by others. The most commonly and highly adopted technologies were improved variety, herbicide and fertilizer application. The rise in farm productivity in smallholder agriculture is supported by the use of technologies, which is also anticipated to bring about the much-needed reform of the agricultural industry (Adesugba & Mavrotas, 2016). Furthermore, this result is in agreement with Kaine (2008) who found out that smallholder farmers easily adopt improved varieties and fertilizer application which have numerous direct advantages on maize farmers.

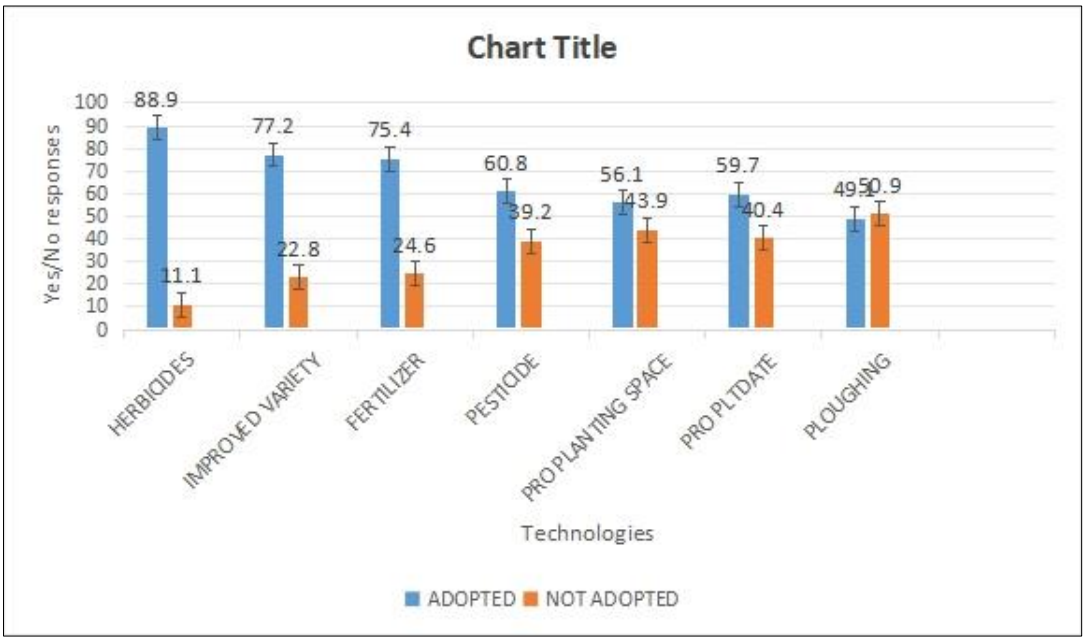

Figure 1.1: Adoption of maize technologies in Nasarawa State
Source: Field survey, 2023

Extension Service Received by the Smallholder Farmers in Nasarawa State

Figure 1.2 shows that that all the respondents received one extension service or the other. The majority of the respondents (84.8%) had access to extension agents and therefore received information needed to make informed decisions on adoption of improved maize production technologies which will enable them increase their maize output. The role of agricultural extension agents involve dissemination of information and building capacity of farmers through the use of different communication methods and helping farmers to make informed decisions.

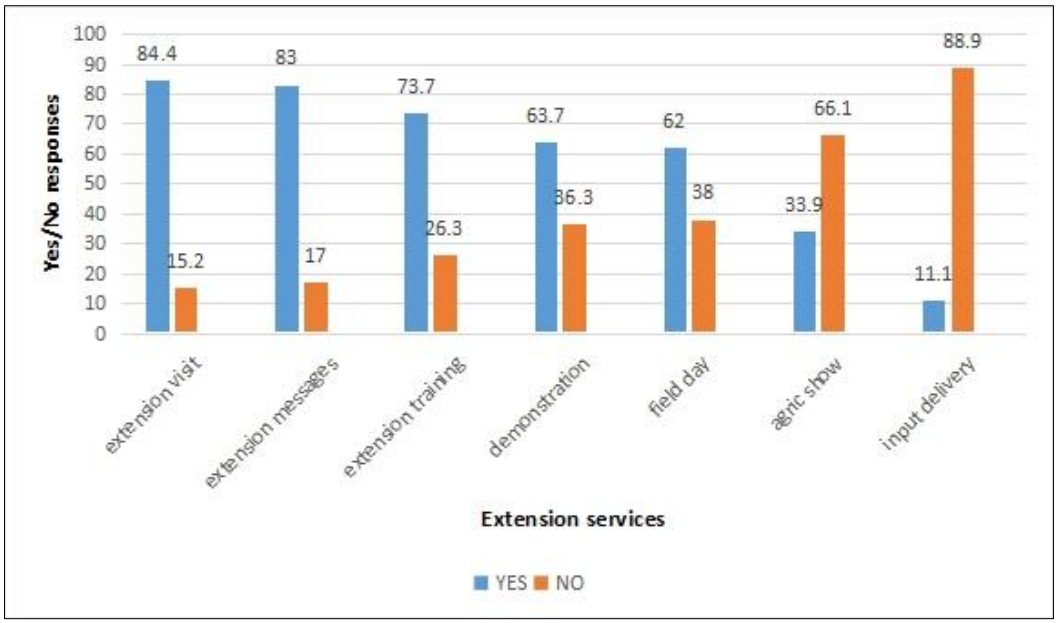

Figure 1.2: Extension services received by maize farmers in Nasarawa State
Source: Field survey 2023

Constraints of Maize Production among Smallholder Maize Farmers in Nasarawa State

Figure 1.3 shows that 95.3% of the respondents identified high cost of labour as a constraint of maize production, 94% pointed out high cost of inputs as a constraint and 88.9% of the respondents opined that poor access to credit poses a problem to maize production. The high cost of labour may be due to the migration of a good number of youths to the urban areas and due to the high cost of other basic needs, so the labourers charge high to enable them meet up with their basic needs. Small holder farmers having poor access to credit find it difficult to use hired labour and also to purchase inputs. This is one of the major reasons they remain at subsistence level. This findings agrees with Odemenam and Obinne (2010) who pointed out that smallholder productivity and growth are hindered by limited access to credit facilities and high cost of inputs. The findings are also in line with Wittlinger and Tuesta (2016) who opined that small scale farmers are facing many difficulties in securing credit and cheap labour.

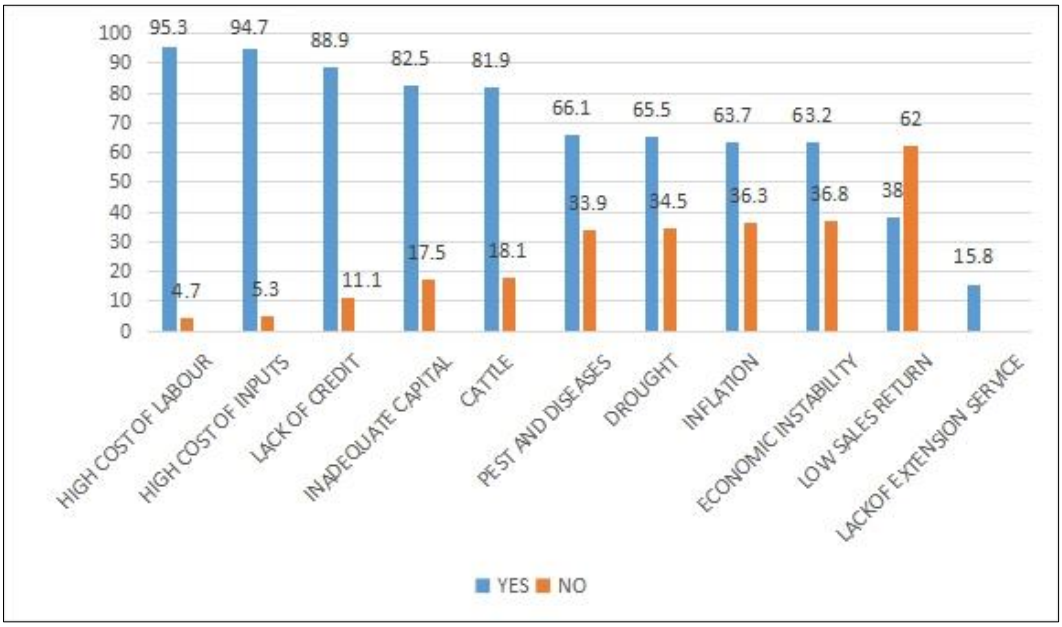

Fig.1.3: Constraints of maize production in Nasarawa State
Source: Field survey, 2023

CONCLUSION

Maize farming was basically a male dominated enterprise due to landholding issues which gives men more access to land than women in the study areas. Educational status, farm size, and household size significantly affect maize production and by implication, these variables were critical determinants of maize production in the study areas. Thus, smallholder farmers' productivity in growing maize is essential to ensuring food security for their households and reducing poverty, both of which can improve farmer households' well-being.

RECOMMENDATIONS

Based on the above findings, the following recommendations were made:

1. Since education is a critical determinant of maize production, federal government should give incentives for education and training of farmers.
2. The federal Government should create an enabling environment that guarantees available farmland to farmers since farm size is a critical determinant to maize production.
3. Since the majority of the maize farmers adopted herbicides, fertilizers, and improved varieties, policy makers should encourage maize production by supplying improved seeds, herbicides and fertilizers at a subsidized rate which majority had earlier adopted.

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