EFFECT OF SOCIO-ECONOMIC CHARACTERISTICS OF FARMERS ON MAIZE PRODUCTION IN GOMBE STATE, NIGERIA

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ABSTRACT

With increasing population of Nigerians leading to food shortage, cereals production especially maize should be encouraged to outstripped food insecurity and hunger. This research was carried out to ascertain the effect of socio-economic characteristics of farmers on maize production in Gombe State. The study made use of 222 respondents randomly selected through a multistage sampling procedure. Data were collected via structured questionnaire, analysed with descriptive statistics, regression and correlation.Results show that most maize farmers in the area were still active and energetic with productive age of between 35 and 54years, with about 62% been married, while male dominatemaize production. The respondents mostly had secondary education, with between 6 to 10 persons per household, cultivating on less than 2 hectares of farm holding, with good farming experience. The study shows that respondents are not cooperative society's members, neither are they accessible to adequate extension services. Furthermore, age, educational status, farm size, and access to credit were noticed to significantly influence the production of maize in the study area. The findings imply that a married male farmer within anactive age, with a medium size household, who has gained reasonable experience,cultivating in large farm holding, with access to credit and extension contact will be producing large quantity of maize to offset hunger and food insecurity thereby attaining food security.Therefore, the study recommends thatextension agents should be employed in the State to fill the shortfall in extension service personnel; a financial scheme should be made available to maize farmers by the government and agricultural stakeholders to increase access to credit; andthe traditional land tenure system should be reviewed to increase accessibility to land for those who want to expand their farm sizes.

Keywords: Food security, Gombe, Maize,Socio-economic

1.0   INTRODUCTION

Food is a necessity for human existence. With growing population, the demand for food continue increasing at analarming rate. A majorchallenge confronting Nigerians today is the provision of adequate food both in quantity and quality, thus, leaving over 100 Million Nigerians food insecure, with 18.6 Million facing acute hunger and 43.7 Million Nigerians showing crisis-level or above crisis-level hunger coping strategies as of March 2024 (The Nigerian Economic Summit Group,

2024). To meet up with this challenge, cereals production have increased in land expansion, yield and quantity produced(Abdulaleem *et al*., 2017).One of such salient cereals is maize crop (*Zea mays* L.). Based on global statistics for cereals, maize ranked fifth in land area cultivated, third largest in yield and fourth largest in output (Surinder, 2011).According to PriceWaterhouseCooper, PWC, (2021), maize is one of the most widely cultivated cereals in the world with an average Global production of over 1,000 million metric tonnes (MMT) in the past decades. In Africa, Nigeria is the second largest producers of maize following South Africa with a total production of 10,837,665 MT in 2023; while Gombe State produces 480,829 MT in 2023 (Ndoye *et al*., 2023). This makes Gombe State one of the top five maize producing States in Nigeria (PWC, 2021).

Maize serves as an important staple food for most Nigerians, as it is consumed by both humans and animals, without restriction in any part of the country. Unluckily, based on its diverse domestic uses, the demand often times outstrips supply (Akande, 2004). Furthermore, other factors like inadequate capital, price fluctuation, disease and pest, poor storage facilities have been associated with low maize production in the country (Ojo, 2003). Therefore, the production of the crop must be increased in order to ensure food and income security through the development of improved maize varieties and technology. Maize is a high yielding, easy to process, readily digestible and cheaper cereal crop than others. Every part of the plant has an economic value. The leaves, grains, stalk, tassels and cob can all be used to produce large varieties of food and non-food products (Oyekale, 2006).

According to Abdulaleem *et al*. (2017), more maize is cultivated every year than any other cereal crops with about 50 varieties of maize in existence consisting of different shapes, colours, textures, and sizes. The authors further stated that yellow, white, and red maize are cultivated and consumed by most people. It is consumed as a vegetable, even though it is a grain. The grains of this crop arerich in vitamins A, C, E, carbohydrate, essential minerals, dietary fiber and protein (Mohammad *et al.,*2014). Also, ethanol used as bio-fuel and formedical purposes could be produced from maize grains (Monsanto, 2014).

With all these uses associated with maize, it is still inadequately produced to meet the ever exploding population of the country. This leaves the question of what could be responsible for the low production. In most parts of Nigeria, especially the northern zone, the crop has grown to be cultivated for commercial purposes to generate income and improve the welfare of the farming populace (Oladejo and Adetunji, 2012). Also, studies on maize in different parts of Nigeria show the increasing importance of the crop amidst growing utilization by food processing industries and livestock feed mills (Jimoh *et al.,* 2014). There is a connectivity between socio-economic characteristics of the farmer and crop output. For instance, Ajah and Nmadu (2012) andAbdulaleem *et al*. (2021) noted that increase in farming experience will lead to an increase in production of maize *ceteris paribus* which can be attributed to the farmer's increase in experience, additional knowledge acquired through regular practice and experimentation that increase productivity. Also, off-farm income of the farmer could contribute positively and significantly to maize production. Farming activities demands inputs at different levels, thus, farmers with more off-farm income tend to have more capital to purchase farm inputs, embark more on large scale production which could lead to increased production(Audu and Aye, 2014).

The prospects of achieving increasedand sustained maize production relative food security especially for therural populations lies in improving theproductivity of the land resourcesustainably.Low and declining maize productionis a serious problem in Nigeria particularly in Gombe. Although thearea has a high potential for increasedmaize production, maize yields havebeen fluctuating over the years to apoint where the district is under chronic food shortages (Babuga *et al.,* 2020). The missing link between the researchers and the farmers in a bid to increase maizeproduction has been identified as a major constraint towards achieving this goal.This is especially in relation to information dissemination through farmers'training, farming demonstrations, developing technological innovations, fielddays, research and conducting on-farm experiments and trials.The flow of appropriate and timely information from the researchers to thefarmers in the study area is ineffective. This problem is further compoundedbythe fact that there is inadequate feedback from the farmers to the researchers onwhich the researchers can base further research work on. Consequently, there is a need to evaluate the socio-economic factors of the farmers that can contribute to increased production of maize in Gombe State, being a huge producer of the crop. This is because the poorperformance in the agricultural sector has been

attributed to an interplay ofvarious socio-economic, environmental, technological and institutionalconstraints. Hence this research was conducted to identify the socio-economic characteristics of maize farmers in the study area;examine the effect of the socio-economic characteristics of the maize farmers on their production; and investigate the relationship between the socioeconomic characteristics of maize farmers and their output in the study area.

2.0   METHODOLOGY

The purposively selected area for the study was Gombe State,Nigeria. It lies in the Centre of the Northeastgeopolitical zone between latitudes 9° 30" and 11° 15" N, and longitudes 10° 30" and 11° 15" E. It is bordered by Yobe, Bauchi, Taraba States to the north, west and south respectively; while Borno and Adamawa States are to the South East.It has aland area of 20,265km^2 (Saidu,2013). Gombe State had by 2006, apopulation of 2,365,040 people, thepopulation was projected to be 4,025,034 people in 2023at a growth rate of 3% each year. It has maximum and minimum temperatures of39.8^0 and 32.1^0(NPC, 2006). TheState`s rainfall is unimodal, with an annualaverage of 880mm. From April to October the State experience rain significantly. The State ischaracterized by savanna grassland, withoccasional woody trees varying in heightfrom 2m to 8.5m (Muhammad *et al*., 2021).Multistage sampling technique was used in randomly selecting a total of 225 maize famers from three Local Government Areas of the State,cutting across the Senatorial Districts. Primary data were collected via structured questionnaire.The analyses were based on 222 questionnaires that were correctly filled and returned. The elicited information was analyzed through descriptive statistics, regression and correlation analysis. The explicit form of the regression is shown as:

$Y = \beta_0 + \beta_1X_1 + \beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5+\beta_6X_6+\beta_7X_7+\beta_8X_8+\beta_9X_9+e_1$

Where;

Y = quantity of maize output produced (Kg)
β_0 = constant term
β_1- β_9 =regression coefficients
X_1 = age of farmer (years)
X_2 = household size (number)
X_3 = gender (dummy = 1 male; female 0)
X_4 = educational status (years)
X_5 = farm size (hectares)
X_6 = membership of cooperative society (dummy: yes = 1, otherwise = 0)
X_7=extension contact (dummy: yes = 1, otherwise = 0)

X_8= access to credit (dummy: yes = 1, otherwise = 0)
X_9= farming experience (years)

3.0 RESULTS AND DISCUSSION

3.1 Socio-economic characteristics of maize farmers

The result reported in Table 1 shows the most (65.77%) of the respondents were in the age range of 35 to 54 years old. This implies that maize farmers in the area were in their active and productive age with greater energy to disseminate for farming tasks. Similar to this finding, Onyedicachi (2015) reported a mean age of 41 years among rural farming families in Abia State, Nigeria. About 62% of the respondents were married, meaning they have duties and people to cater for, hence, the need for increased and expanded production of commodities like maize. Male are dominating in agricultural activities as demonstrated in the fact that 66% of the respondents were male. This match to the findings of Onwuaroh *et al*. (2021) where they revealed a male dominating farming activities among maize farmers in Shongom Local Government of Gombe State. The statistics further indicate that 68% of the sampled respondents had secondary and tertiary education, indicating that the farmers were literate. Thus, they could grasp the introduction of new and improved technologies that could boost yield. The findings contradicts the result of Jamilu *et al*. (2014) who discovered low level of education among maize farmers but it is in tandem with Onwuaroh *et al.* (2021)who indicated that most maize farmers in their research area had secondary school education.

The result further show that majority (52%) of the respondents had between 6 to 10 members per household. This suggests that farmers in the area usually had medium household sizes.This support the findings of Motuma *et al*. (2010) who specified that increase in family size favorably influence the decision to adopt better maize varieties and boost productivity. Meanwhile, the report byBabuga *et al*. (2020) contradicts this result. From the result, the farmers were predominantly (78%) small-scale farmers farming on less than 2 hectares of land. This implies that the farmers are not able to cultivate at large scale level. The respondents have good agricultural experience which could assist to better farming activities (84%). Maize farmers that belong to cooperative groups consist of about 75% of the respondents. Access to credit which is an incentive for higher

input purchase, and larger land operation show that roughly 57% of the studied population does not have access to credit facility. This shows that access to loans for maize farming is minimal. This could be related to the fact that most of them are small-scale farmers. The respondents do not adequately have access to extension services, as it revealed that 53% of the respondents do not have access to extension contact. This results controvert the findings of Msheliza and Bello (2018) where it is found that most(85%) of the survey respondents had contacts with extension agents.

Table 1: Socio-economic characteristics of maize farmers

Socio-economic characteristics	Frequency (N=222)	Percentage
Age		
15-24	11	4.95
25-34	36	16.22
35-44	58	26.13
45-54	88	39.64
Above 55	29	13.06
Marital status		
Single	63	28.38
Married	159	71.62
Gender		
Male	147	66.22
Female	75	33.78
Education attainment		
Informal	18	8.11
Primary	41	18.47
Secondary	94	42.34
Tertiary	58	26.13
Adult education	11	4.95
Household size		
1-5	36	16.22
6-10	116	52.25
11-15	43	19.37
Above 16	27	12.16
Farm size		
<1.0	70	31.53
1.0 - 2.0	103	46.40
Above 2.0	49	22.07
Farming Experience		
1-10	35	15.77
11-20	82	36.94
Above 20	105	47.30
Membership of Cooperative society		
None	82	25.44
Cooperative society	140	74.56
Access to Credit		
None	126	56.76
Yes	96	43.24
Access to Extension Contact		
No	118	53.15
Yes	104	46.85
Total	**222**	**100.00**

Source: Field survey, 2023

3.2   Effect of socio-economic characteristics of maize farmers on production

The result examined the effect of socio-economic characteristics of the maize farmers on production, it revealed a positive F – value of 6.46, indicating significance at 1% level. This shows the overall fitness of the model to the data set. The implication is that, there was a good representation of the data and the regression model used is adequate enough for further interpretation. The R-Square value was 0.632, implying that 63.2% of the factors influencing maize production are captured in the model. The result in Table 2revealed that various socio-economic characteristics of maize farmers influences maize production in the study area due to their diverse levels of significance. Age of the respondents was positively significant at 5% level of probability. The coefficient of the variable was 0.721, meaning as respondents' age increases, the output of maize also increases alongside equivalent to the coefficient of the variable. This result is in conformity with the findings of Adegbite *et al*., (2023) where age was observed to be positively related to the income of maize farmers and was significant at 1%, inferring that the higher the age of the maize farmer in the study area, the more profit. The findings from this research also aligns with the work of Otekhile and Verter (2017) on the effect of socio-economic characteristics of maize rural farmers in Ojo and Badagry Local Governments over their peasant income resulting from output. Although, this result is in contrasts with the arguments of Ibekwe *et al*., (2010) that "the older the farmers the weaker they become".

Educational status of the respondents shows a negative coefficient, which indicate that an increase in educational attainment will decrease maize output by 2.052. This shows an inverse relationship which is against the *a priori* expectation of the variable. Although, educational status, statistically significantly affect maize production at 5% confidence interval. The regression result portray that productions of maize in Gombe was significantly influenced by the education level of farmers. Thus, the study suggested that, Gombe agricultural extension workers should help the maize producers on education level to improve their production. However, educational status of the farmers can be improved by giving training on farming and farming related technologies to increase maize production. This result is similar to that of Korgitet (2019) who reported that educational level of the farmer has effect on maize production. In the view of Ninh (2021), education is also found to have a positive effect on output of rice farming households because it helps them better manage farms of larger sizes via combining various inputs in a more desirable

way. Educational level of farmers was reported by several scholars (Kabiru and Arshad, 2019; Ahmed *et al.,* 2017*;* Mabe *et al*. 2017; Justin, 2015; Addai and Nwusu, 2014)to have significant effect on farm production. Therefore, it is very imperative to state that educational level of the farmers is an important factor that affects maize production.

Maize production is carried out on land which means it depends of the size of the available farm size. Hence, from the result presented, farm size had positive sign and significant at 1% level of probability. This suggests that as farm size increases, output from same maize farms tend to increase. Without farm land, maize cannot be produced. Other studies have stated that, the growth in maize output despite dropping yields shows that an increase in the cultivatable area is primarily responsible for the production increase (Abdulhameed and Galadima, 2016). As agriculture becomes more capital-demanding, there is an appeal for larger farm size to farmers' productivity since the relationship between farm size and land productivity is favourable (Helfand, 2003). In the findings of Nkonya*et al.* (1998), farm size is one of the factors that were thought to influence adoption of both improved maize seed and fertilizer; leading to improvement in output of maize. Meanwhile, in the findings of Mabe *et al*. (2017), farm size showed a positive relationship with output with 1% significance level; thus, an increase in area under cultivation by one acre leads to an increase in maize output *ceteris paribus*. This result is also consistent with Awunyo-Vitor *et al*. (2013), who reported in their study that farm size was positively significant in explaining variation in output of maize.

Availability of credit motivates farming activities as high level of capital is required for maize production. Consequently, the coefficient for access to credit was positive and significant at 1% level of significance. This indicate that a value increase in credit would lead to increase in maize output by 7.43. This result is same with that of Kibaara and Kavoi (2011) who found that maize production was directly related to availability of credit facilities. In the same vein Obi and Ayodeji (2020) reported that amongst the variables that significantly influenced technical efficiency, credit was directly related to technical inefficiency. This means, access to credit clearly progresses technical efficiency, a finding supported by Addai and Owusu (2014) who observed that farmers with access to credit generally performed better in agricultural output. The availability of credit, a highly important aspect of agricultural production enterprises, could impact the level of maize

output capacity (Adeola *et al*., 2023). The outcome from this research supports the findings of Nasiru (2010), who stated that access to micro-credit might potentially increase farmers' output and help disadvantaged rural farming communities improve their standard of living.

Table 2: Effect of socio-economic characteristics of maize farmers on production.

Variables	Coefficients	Std. Error	Sig
Age	0.722	0.276	.010**
Household size	-0.166	0.788	.844
Gender	0.811	0.785	.366
Educational status	-2.052	0.786	.010**
Farm size	2.557	0.697	.001***
Membership of Association	-0.157	0.788	.844
Contact with Extension Agent	0.721	0.785	.366
Access to credit	7.428	2.830	.010**
Farming experience	0.565	0.453	.844
(Constant)	18.732	5.585	.001***

F-value = 6.48; Adjusted R Square = 0.632; R Square = 0.625
Source: Computer print-out

3.3   Relationship between the socioeconomic characteristics of maize farmers and output

The relationship between the socio-economic characteristics of maize farmers and output in Gombe, is presented in Table 3. The research found that age of the respondents was positively and significantly related with maize output. This implies that when age of the farmer increase by a unit, maize productivity will increase as well. Higher age, in most cases, is an indication of higher farm experience which contribute to higher skills in farming in rural area where agriculture is the main means of livelihood. The expected sign is positive as obtained. In the studies conducted by Belete (2020) and Acquah (2014), they both acknowledged that higher age leads to a reduction of the inefficiency of maize producing farmers thereby increasing technical efficiency and output,

Household size of maize farmers in Gombe had a low but direct relationship with maize output. This indicate that for every one person added to a household, the output of maize will eventually increase. This could be as a result of the fact that, more of the members could serve as substituted farm labour, thereby reducing the cost of hired labour hence saving cost of production. The positive relationship of household size and maize output was in tandem with *a priori* expectation. In the work of Mabe *et al*. (2017), it was recorded that household size had a positive relationship with

maize output. The finding is consistent with Ajah and Nmadu (2012), who found that an increase in household size leads to an increase in maize output vis-à-vis livelihood enhancement. Conversely, Achem *et al*. (2013) found contradictory results of low overall output from cassava farmers as a result of large family size.

Maize farmers' gender was also positive, although weak. It means that as more males engage in the production of maize in the study area, the output can increase per hectare. Research also suggests that men are more likely than women to be engaged in farm activities, hence, adopt measures for adapting to variability (Deressa *et al*., 2009; Van Aelst and Holvoet, 2016). This is because of the traditional and cultural biasness towards women in acquisition and inheritance of land in Africa. This is why a study in Kenya predicted that uptake of sustainable agricultural practices would significantly increase if women and men farmers had equal access to land and other agricultural practices (Ndiritu e*t al*., 2014). Due to this gender difference and discrimination, sometimes the women are unaware of the agricultural practices that can yield higher output in their production as noticed by Fisher *et al.* (2019) in their survey in Eastern Uganda where women were not aware of improved maize technologies. This discrimination and biasness stemmed from the perception that "women are not farmers" which persists among the people, extension agents inclusive (Ragasa, 2014), because the farmer is typically believed to be male, extension agents target men for extension activities and do not recognize the need to make extension services more accessible for women, despite the fact that women make essential contributions to agriculture in developing countries (Fisher *et al.*, 2019).The expected sign of this variable is in line with the assumption which is conveyed that gender of the household head being male as compared to female household head can have positive impact on farming efficiency and output. According to Belete (2020), agricultural activities in Guji Zone of Ethiopia have been done mostly by male and it was even seen as a males' work and, so, males allocate the majority of their time for outside activities in which agriculture is the paramount one. Therefore, this causes the yield per acre of male-headed household to surpass the female headed household. This comparable finding was reported by Idris and Ayinde (2015).

Educational status of the farmers was inversely but significantly connected with maize output in Gombe. This suggests that when educational status grows, the production from maize will be

declining. This is not in accordance with the *a priori* anticipation, since, the farmers who acquired significantly higher education level are considered to have more exposure to agricultural technology and possibly adoption. This argument maintained that farm productivity per hectare may be boosted, since more educated farmers are more likely to embrace new production technology efficiently (Beyan, 2013, Jianxu, 2017, Belete, 2020). This result could also be attributed to the fact that when more education is acquired it will motivate the individual to abandon farming and embrace white-collar job, hence, reducing farming output. Marital status of the respondents exhibited a weak positive connection with maize yield. This shows that married people are more likely to rise in maize output than the single respondents. It was found that farm size of the respondents showed a medium direct association with output of maize, showing an increase in maize output for each hectare of farm land committed to maize cultivation. Farm size was also found to be significant in its link with maize output. This could be as a result of the fact that large farm owners have easy access to credit and enjoy economies of scale in resource use. This research conflicts with the findings of Mabe *et al.* (2017) where it was shown that farm size has a negative association with farmers' level of knowledge of health effects of pesticide use in maize farms. Meanwhile, Awunyo-Vitor *et al*. (2013) reported identical conclusion of farm size positively associating with maize yield.

The value for farming experience was positively signed, showing a positive and direct association with maize output. This relationship adheres to the *a priori* expectation. When farmers organize themselves into Cooperative and Associations, agricultural productivity tends to improve and increase. Result from this research, demonstrates a negative association between membership of Association and maize output which was not consistent with the *a priori* hypothesis.

Extension visit exposes farmers to enhance production technologies and effective exploitation of farm resources. Extension agents' contact with the farmers was discovered to be favorably connected with maize output consequently bringing about an increment of output when the contacts with extension agent rose by a unit. The positive association with maize output accords to the expectations. This implies that when the number of extension visits increases by one unit, maize output will increase, holding other factors constant. This could be as a result of illiteracy rate among farmers who need to be educated on the use of synthetic inputs and good agronomic

practices to improve yield of maize (Mabe *et al*., 2017). The agricultural extension workers must provide a genuine support and guidance to farmers to encourage them adopts pre- and post-harvesting agricultural technologies. Moreover, the extension service workers must guide farmers on how to use available inputs for sustainability and higher output.

Access to credit was limited but highly connected directly with maize output; this suggests that with increase in credit, the output will be higher than what it was. The results reveal that the association conforms to the predicted sign. Sometimes farmers need financing to finance their farm activities in purchasing various input requirements. In the result obtained by Belete (2020), access to financing minimizes technical inefficiency in maize production. Studies that revealed comparable outcomes were Beyan *et al*. (2013) and Acquah (2014). Lack of financing leads to inadequate operating capital, and therefore, farmers are unable to purchase productivity-enhancing inputs.

Table 3: Relationship of socio-economic characteristics of maize farmers and output

Variables	Maize output	
	Pearson Correlation	**Sig. (2-tailed)**
Age	.410[**]	.006
Household size	.021	.785
Gender	.082	.283
Educational status	-.336[**]	.002
Marital status	-.056	.464
Farm size	.371[**]	.000
Farming experience	.042	.584
Membership of Association	-.048	.528
Contact with Extension Agent	.076	.390
Access to credit	.190[*]	.012

**;* Correlation is significant at the 0.01 and 0.05 levels respectively (2-tailed).
Source: Computer print-out

4.0   CONCLUSION AND RECOMMENDATIONS

4.1   Conclusion

Nigeria population is expanding at roughly 3% growth rate per annum. Food insecurity is high with food crisis level been encountered. The only way out is production of adequate food to limit the supply-demand deficit. This study evaluated the effect of socio-economic features of maize farmers on output in Gombe State, noting that Gombe State is a high maize producing area. Also,

maize could be a panacea to food insecurity in the region because it is consumed both by humans and animals with all the parts been helpful. Maize production in Gombe State is done on small farm holdings, dominated by the male population, carried out by maturely married, youthful, active individuals in their productive age, with secondary school education. The farmers have obtained good experience that can contribute to yield greatly. The study demonstrates that maize farmers do not belong to cooperative societies, neither do they have access to sufficient extension services. This study concludes that with energetic young men involved in cowpea production, having medium household sizes, cultivating on large farm holdings with access to credit and extension contact, and having gained good experience in maize farming, maize production in the area could increase and food security attained.

4.2 Recommendations

The study hereby recommends that:

1. Extension agents seems to be inadequate in the State, hence, employment of more extension agents should be conductedin the State to increase contact of extension agents andmaize farmers.

2. A financial scheme should be made available to maize farmers by the government and agricultural stakeholders to increase access to credit which will in turn increase input purchasing rate and power.

3. The traditional land tenure system should be reviewed to increase accessibility to land for those who wants to expand their farm sizes to increase yield and quantity of production.

4. Maize farmers should be encouraged by the stakeholders to join cooperative societies within the area to benefit from the bulk purchase of input and output price control.

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