Socio-economic Factors Influencing the Output of Small-Scale Maize Farmers in Abuja, Nigeria

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ABSTRACT

Nigeria is one of the developing countries facing shortages of cereal crops like maize. Based on this, research on the socio-economic factors influencing small-scale maize farmers' output was conducted in Abuja. A multi-stage sampling technique and semi-structured questionnaire were used for data collection. A total of 160 maize farmers were interviewed in four agricultural zones (40 from each zone). Data were analyzed using multiple regression analysis and descriptive statistics. The results showed that the land area cultivated, land rent, quantity of fertilizer applied, years of farming experience and household size were the major socio-economic factors that significantly ($p < .05$) influenced maize output. The R^2 value of 0.31 (adjusted R^2 = 0.26) indicated that the variables accounted for 31 percent of the variation in maize output. The mean outputs of maize per hectare and per farmer were 316.73 kg and 614.56 kg, respectively. Socio-economic results showed that the mean age of the farmers was 39 years with a substantial percentage (68.12%) of them having, at most, primary school education. Based on the results, it was recommended that farmers in the study area should be informed through extension services of the socio-economic factors that influence maize output so that the farmers can consider these factors in their production decision making process.
Keywords: maize farmers, socio-economic factors, maize output

บทคัดย่อ

ไนจีเรียเป็นหนึ่งในประเทศกำลังพัฒนาที่ประสบปัญหาการขาดแคลนธัญพืชอาหาร เช่น ข้าวโพด งานวิจัยนี้จึงมุ่งค้นหาปัจจัยด้านเศรษฐกิจสังคมที่มีอิทธิพลต่อผลผลิตการปลูกข้าวโพดของเกษตรกรรายย่อย ทำการศึกษาจากกลุ่มตัวอย่างที่เลือกโดยการสุ่มแบบหลายขั้นตอน และเก็บข้อมูลโดยใช้แบบสอบถามกึ่งโครงสร้าง สัมภาษณ์เกษตรกรผู้ปลูกข้าวโพดจำนวน 160 คน จาก 4 เขตการเกษตร (เขตละ 40 คน) วิเคราะห์ข้อมูลโดยใช้สถิติถดถอยเชิงพหุและสถิติพรรณนา

ผลการวิจัยพบว่า ปัจจัยด้านเศรษฐกิจ สังคมที่มีอิทธิพลต่อผลผลิตข้าวโพดของเกษตรกรได้แก่ ขนาดพื้นที่ปลูก ขนาดพื้นที่เช่า ปริมาณปุ๋ยที่ใช้ ประสบการณ์ในการเกษตร และขนาดครัวเรือน โดยร่วมกันอธิบายความแปรปรวนของผลผลิตได้ร้อยละ 31 อย่างมีนัยสำคัญทางสถิติ ทั้งนี้ ผลผลิตข้าวโพดเฉลี่ยต่อเฮ็คแตร์และต่อราย เท่ากับ 316.73 และ 614.56 กิโลกรัม ตามลำดับ สำหรับข้อมูลด้านเศรษฐกิจ-

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สังคมที่สำคัญ พบว่า เกษตรกรมีอายุเฉลี่ย 39 ปี และส่วนมาก (68.12%) จบการศึกษาเพียงระดับประถมศึกษาเท่านั้น จากผลการวิจัยนี้ มีข้อเสนอว่าควรสื่อสารให้เกษตรกรทราบถึงปัจจัยที่มีอิทธิพลต่อผลผลิตข้าวโพด เพื่อจะนำไปเป็นข้อมูลสำหรับการตัดสินใจในการเพาะปลูกต่อไป

คำสำคัญ: เกษตรกรผู้ปลูกข้าวโพด ปัจจัยด้านเศรษฐกิจ-สังคม ผลผลิตข้าวโพด

INTRODUCTION

In Nigeria, agriculture is the dominant activity in terms of employment and linkages with the rest of the economy; it contributes to the gross domestic product (GDP), which is one of the most important parameters for measuring and comparing the economic progress of a nation. Eboh (2008) estimated that 70 percent of Nigeria's active population was engaged in agriculture—an indication that the country has basically an agricultural economy. In spite of this figure, one of the major tasks facing Nigerian agriculture is the provision of an adequate and stable food supply to meet the requirements of a growing population which has been estimated to be increasing at an annual rate of 3.2 percent (National Population Commission [NPC], 2006). This is a serious problem and one of the crops that must be produced to meet this challenge is maize because maize is utilized in many ways unlike other grain crops. According to Chhidda, Prem, and Rajbir (2007), it ranks below wheat and sorghum but considerably above rice in nutrition. Chhidda et al. (2007) called it the "queen of cereals" because according to them, there is no other cereal that has a greater potential than maize and they described it as a miracle crop because it is very high yielding. In fact, the significance of maize according to Onwueme and Sinha (1991) is, first and foremost, clearly reflected in its importance in the diet of humans and animals throughout the world.

Awotide, Fashina, Ologbonjo, and Agbola (2008) stated that to a great extent, climate and soil resources determine the output of maize and other crops, as the seasonality of the climate, that is, the alternating of the rainy season with the dry season, effects the production of maize directly and indirectly. Mani, Usman, and Ado (2009) added that today, global warming which has led to a decrease in the amount and frequency of rainfall in some areas appeared to be endangering the growth and yield of crops, as global warming reduces the moisture available to maize, thereby affecting tasselling and silking, and invariably reducing maize yield twice as much as when a similar amount of stress occurred during the vegetative period or ear development. Similarly, Bello (1986) added that rainfall, among weather parameters, happens to be the most important element that acts as both a resource and a constraint on maize production in the tropics; growth and development of maize have been found to relate highly to the amount of rainfall and its distribution. Although weather and soil conditions affect maize production in Nigeria, other countries in the world experience the same and even more terrible conditions and yet they produce enough maize for both human and industrial consumption. For instance, the United States of America is the largest single producer of maize (Philip, Kehinde, & Ganiyu, 2006), while other producers include Europe, Asia and Latin America.

Compared to wheat and rice, it is more likely to be grown in areas that are regarded as marginal (Ado, Adamu, Hussaini, Maigida, & Zarafi, 2004). Philip et al. (2006) attested to this in their report which indicated that cereals like maize and rice are well distributed in high rainfall and low rainfall regions of the world. They grow in hot, humid, tropical areas through to the cool temperate region and are adapted to a wide range of soils. Similarly, Ofor and Oparaeke (2009) stated that maize is easy to produce because operations such as planting, weeding, chemical application of insecticides and harvesting are easy to mechanize, unlike for crops like yam and cassava. In spite of these qualities, one

of the greatest challenges in Nigeria today is that maize production is in short supply compared to the demand. Although FAO (2006) indicated that maize production in Nigeria increased from 4,107 metric tonnes (t) in 2000 to 5,957 t in 2005, the market price of maize has been on the increase indicating that demand is greater than supply.

In a bid to identify some of the factors that limit maize production, the effects of farmers' socio-economic variables on maize output have been tested by scientists using statistical models. The main objective has been to determine if significant relationships exist between farmers' socio-economic characteristics and maize output. For instance, in the study conducted by Bamire, Adejobi, Akinola, and Olagbaju (2007), it was observed that increased yield in maize production was associated with expanded land area. Furthermore, the study reported that the net return from maize production increased by 2.1 percent for every 10 percent improvement in extension services. According to Bamire et al. (2007), this showed that promoting extension services to enhance easy access by farmers to research information and good agronomical practices is capable of increasing maize production. Similarly, the study also indicated that a 10 percent increase in membership of social organizations (such as farmers' associations and cooperative societies) increased the net earnings by 10.4 percent. Betty (2005) observed that a 1 percent increase in the quantity of fertilizer applied, seed rate and labor, increased maize output by 0.17, 0.63 and 0.46 percent, respectively. A study conducted by Ibrahim, Alhassan, Ibrahim and Ibrahim (2008) indicated that fertilizer use was positive and statistically significant implying that fertilizer has a positive and significant effect on maize output. In another study by Safa (2005), it was noted that education, family size and farm size significantly influenced the profitability of farm products. Furthermore, Awotide et al. (2008) also observed that farm size, labor input and seed input limited maize output. Other studies (Aman, Ademesra, & Irlan, 1987; Fasoranti, 2008; Oyewo & Fabiyi, 2008; Enete & Okon, 2010) have shown that farmers' socio-economic factors such as the level of education, farm size and number of years of experience, technological and institutional factors, and gender affect the net returns from farm production activities, depending on their location.

Since maize is in short supply compared to the demand and the soil, weather and climatic conditions are relatively conducive for its production, research was conducted to identify some of the socio-economic factors that influence maize output in the study area. The questions that demand answers are: What are the socio-economic characteristics of farmers who produce maize in Abuja? What are the major socio-economic factors that influence maize output? What is the average maize output per farmer and per hectare in Abuja? The answers to the questions are important because like any other developing country, the overall objectives of agricultural development in Nigeria are to ensure adequate food supplies, expand export crop production, produce raw materials for domestic industries and create rural employment opportunities. To achieve these objectives, one of the crops that Nigeria must produce is maize because it not only serves as food for humans, but is also an important raw material for a number of agro-based industries which are rapidly increasing in number and scope in the country.

RESEARCH METHODOLOGY

This study was conducted in Abuja, Nigeria located between latitudes 8°25` and 9°25` N and longitudes 6°45` and 7°45` E. The population for the study comprised small-scale maize farmers in Abuja. The sampling technique adopted was multi-stage sampling while a semi-structured questionnaire was used for data collection. Presently, the Abuja Agricultural Development Programme (AADP) has four agricultural zones—namely, central, eastern, northern and western—with 12 agricultural blocks and 93 cells (AADP, 2009). In each of the four agricultural zones, two agricultural extension blocks

were randomly chosen giving a total of eight agricultural extension blocks. From each of the agricultural extension blocks, ten cells were randomly selected resulting in a total of 80 cells. In each of the cells, three maize farmers were randomly selected and interviewed. From those that were returned, two properly completed questionnaires from each cell were used for the analysis. This gave a total of forty respondents per agricultural zone and a total of 160 respondents for the study. Four functional forms were tested—linear, semi-log, exponential and double-log. The lead equation was linear because it had the highest R^2 value compared to other models and most of the signs of the coefficients were in line with the a priori expectations. The SPSS package (version 15.0; SPSS Inc., Chicago, IL, USA) was used for analysis. The model specification is shown in Equation 1:

Y = F (AGE, YFE, MCS, HHS, LOE, LDR, SLC, CMP, COC, FRT, LBO) (1)

Where: Y = Output of maize (kg); AGE = Farmers age (years); YFE = Farming experience (years); MCS = Membership of cooperative society (dummy: Yes = 1, No = 0); HHS = Household size (number of persons per household); LOE =Literacy level of the farmers. This represents the number of years the farmer spent in acquiring formal education and was measured as shown below:

No formal education	= 0
Primary school	= 6
Secondary/commercial/teachers' training college	= 11
Ordinary National Diploma (OND)/ Higher Secondary School (HSC)	= 13
Attended College of Education (NCE)	= 14
University/Polytechnic education (BSc./Higher National Diploma)	= 15
Postgraduate education up to Master Degree level	= 17

LDR = Land rent measured in Nigerian naira (USD 1 = 148 .91 naira); SLC = Area of land cultivated (ha); CMP = Cost of maize seed planted (naira); COC = Cost of chemicals other than fertilizer, that is herbicide, insecticide and pesticide (naira); FRT = Quantity of fertilizer applied (kg); LBO = Labor (worker days).

RESULTS AND DISCUSSION

Table 1 summarizes some of the socio-economic characteristics of the maize farmers. The results showed that the mean age of the farmers was 39 yr indicating that the farmers were still active and dynamic enough to undertake farming. A large percentage (68.12%) of the farmers had, at most, primary school education and the majority were married (86.25%). On average, the farmers had 21 yr of farming experience—an indication that they had enough farming experience to enhance maize production. The mean household size was 8 persons and the ratio of members and non-members of cooperative societies was roughly 1:1 although more maize farmers (58.12%) did not belong to cooperative societies. Table 2 shows the distributions of farmers according to output and farm size; on average, each maize farmer cultivated 1.94 ha of land with mean outputs per farmer and per hectare of 614.36 kg and 316.73 kg, respectively. The average yield per hectare on peasant farms in the Northern Savannah, according to Ofor and Oparaeke (2009), was about 600 kg but the results from the present study are in line with data reported by Mani et al. (2009) which showed that the output of early-maturing and drought-tolerant maize varieties in Zaria, Kaduna State, ranged between 333.3 and 1950 $kg.ha^{-1}$. The output per hectare was low when compared with Aderinto, Adedoyin, and Bolujo. (2009) who conducted a study in Kogi State, Nigeria and reported an output of 1,460 $kg.ha^{-1}$. Similarly, when compared to some other countries, Eboh (2008) stated that Nigeria recorded less than 1.8 $t.ha^{-1}$ of maize compared to 4.2 $t.ha^{-1}$ in Thailand, 3.2 $t.ha^{-1}$ in Malaysia and 3.5 $t.ha^{-1}$ in Indonesia. According to Borokini, Oluwadamilare, and Sedowo (2008), the low output revealed that maize output in Nigeria is still characterized by low yields per hectare.

Table 1 Socio-economic characteristics of maize farmers

Characteristic	ħ	%
Age group (years)		
< 21	2	1.25
21–30	28	17.50
31–40	70	43.75
41–50	41	25.63
> 50	19	11.87
Total	160	100
Years of farming experience		
1–10	32	20.00
11–20	51	31.88
21–30	59	36.87
31–40	16	10.00
> 40	2	1.25
Total	160	100
Literacy level		
No formal education (0 yr)	51	31.87
Primary school (6 yr)	58	36.25
Secondary school (11 yr)	31	19.38
OND/HSC/NCE (13 yr)	18	11.25
BSc./HND and above (15 yr)	2	1.25
Total	160	100
Membership of cooperative society		
No	93	58.12
Yes	67	41.88
Total	160	100
Household size of the maize farmers		
1–3	14	8.75
4–6	52	32.50
7–9	62	38.13
> 9	33	20.62
Total	160	100

OND = Ordinary National Diploma; HSC = Higher School Certificate;
NCE = Nigerian Certificate of Education; BSc. = Bachelor of Science degree and its equivalents; HND = Higher National Diploma.

Table 3 shows the regression results of the socio-economic factors that influence maize output. The results indicated that the number of years of farming experience was a significant ($p < .05$) factor but was negatively related to maize output. By implication, an additional year of experience in farming decreased the output of a maize farmer by approximately 20 kg. The negative sign was contrary to a priori expectations because it was expected that the more experience a farmer acquires over the years, the more competent the farmer will be in farm management activities that will result in increased

Table 2 Distribution of maize farmers according to output and farm size

Variables	n	%
Maize output range (kg)		
0−500	101	63.13
501−1,000	38	23.75
1,001−1,500	9	5.62
1,501−2,000	8	5.00
> 2,000	4	2.50
Total	160	100
Farm size cultivated (ha)		
0.1−1.0	63	39.38
1.1−2.0	57	35.62
2.1−3.0	18	11.25
3.1−4.0	12	7.50
4.1−5.0	4	2.50
> 5.0	6	3.75
Total	160	100

Mean output per farmer = 614.56 kg

Mean output per hectare = 316.73 kg

Mean farm size cultivated = 1.94 ha

Table 3 Regression result of socio-economic factors that influence maize output

Variables	Coefficient	Std error	t	*p*
Constant	11.72	218.05	0.05	0.96
Age of the farmer	9.37	6.84	1.37	0.17
Years of farming experience	-20.10	5.49	-3.66**	0.00
Household size	29.06	11.60	2.50*	0.01
Literacy level	-2.02	8.31	-0.24	0.81
Membership of cooperative society	-108.31	79.77	-1.36	0.18
Land rent	-0.01	0.01	-2.07*	0.04
Cost of maize planted	-0.00	0.01	-0.85	0.40
Cost of chemicals	-0.00	0.00	-0.89	0.38
Land area cultivated	145.45	31.28	4.65**	0.00
Quantity of fertilizer applied	0.65	0.19	3.40**	0.00
Labor	41.17	21.42	1.92	0.06
R^2	0.31			
Adjusted R^2	0.26			
F- ratio	6.11			

** = $p < .01$; * = $p < .05$

output. Since experience is the best teacher, it is correct to say that the more experience a farmer acquires over the years, the more the farmer can allocate scarce resources in order to avert risk and increase maize production. Okoye et al. (2009) considered that more experienced farmers were more efficient in their decision-making processes and were more willing to take risks associated with the adoption of innovation. Similarly, Adah, Olukosi, Ahmed, and Balogun (2007) stated that the greater the years of farming experience, the greater the farmers' ability to manage general and specific factors that affect the business. Hence, the farmer will be in a better position to invest wisely. Similarly, household size was significant ($p < .05$) and positively related to output. The data suggested that an average maize farmer increased maize output for family consumption by approximately 29 kg for every extra person in the household. The positive relationship was in line with the a priori expectation because it implies that an increase in household size leads to an increase in maize output. Land rent (the amount paid to acquire land) was significant ($p < .05$) and negatively related to output. The result showed that an additional increase of land rent by ₦1.00, decreased output by 0.01 kg. The sign of the coefficient was in line with the a priori expectation because if the cost of acquiring land increases, the chances of acquiring land for maize production will decrease and invariably the output of maize will decrease because a farmer will show less interest in maize production. Also, the amount of land cultivated was significant ($p < .05$) and positively related to maize output. The sign of the coefficient suggested that an additional hectare cultivated by a maize farmer would increase output by 145.5 kg. This result is contrary to the one obtained by Nmadu and Ibiejemite (2007) in similar research which showed that area of land cultivated did not significantly increase farm output. The sign of the coefficient was positive and in line with a priori expectation. Furthermore, the quantity of fertilizer applied was significant ($p < .05$) and positively related to maize output, which suggested that the application of an extra kilogram of fertilizer, increased output by 0.65 kg. The sign of the coefficient was in line with the a priori expectation because it indicated that the output of maize increased with an increase in fertilizer application. This result agreed with the study conducted by Onyenweaku and Effion (2005), which indicated that fertilizer shifts the production frontier upwards, leading to higher productivity.

On the contrary, the age of the maize farmers, the literacy level of the maize farmers, membership of a cooperative society, the cost of maize seed planted, the cost of chemicals other than fertilizer and labor input were not significant ($p > .05$). This does not mean that the above variables did not influence maize output because they were significant at lower levels than the 5 percent probability level.

CONCLUSION

Many variables (weather/climatic conditions in an area, pests, diseases, soil conditions, sunlight, and farmers' socio-economic characteristics) act both in isolation and in combination to influence the productivity of crops like maize. However, based on the results of the study, land area cultivated, land rent, quantity of fertilizer applied, years of farming experience and household size were the major socio-economic factors that influenced maize output in the study area. Although there were variations in the magnitude of the parameters and signs of the coefficients tested, the findings were in line with those reported by Betty (2005) and Safa (2005). This supported the assumption that socio-economic variables actually influence maize output. Based on the findings, it was recommended that farmers in the study area should be informed through extension services of the socio-economic factors that influence maize output so that the farmers will take them into account in the production decision-making process. More research into the socio-economic variables that influence maize should be carried out.

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