

Title: Socioeconomic Determinants of Rice Production among Small-scale Farmers in the Shama-Ahanta East District of Ghana

Abstract

Rice is considered as the second most important staple food in Ghana and it is produced mainly on small-scale basis. Rice production in Ghana meets only 30 to 40 percent of the total demand. The need to increase local rice production is essential, hence this study was designed to identify and analyze the socioeconomic factors that influence rice production among small-scale producers in the Shama-Ahanta East District of Ghana in order to enhance production. A multistage sampling procedure was used to collect data from 320 rice farmers using structured questionnaire. Data were subjected to descriptive and multiple regression analysis. The results show a relatively low level output of 8 sacks of 50kg/sack per acre among rice farmers of whom about 73% are males who have very low access to agricultural credit and agricultural extension services. Significant factors identified include age, gender, educational level, household size, household income, access to agricultural credit, access to land and access to agricultural extension services. The training and empowerment of more agricultural Extension Agents and the development of policies that ensure growth other sectors of the rural economy is essential to provide rural people the opportunity for off-farm employment to earn extra income.

Small-scale, Socioeconomic, Rice production

1. Introduction

Rice is considered as the second most important staple food in Ghana after maize according to the Ministry of Food and Agriculture (Ministry of Food and Agriculture, 2009). It is also the first and most imported cereal in the country and accounts for 58 percent of all cereal imports and also accounts for 5 percent of total agricultural imports in Ghana (Coalition for Agriculture and Research Development, 2010). Rice is considered as the 5th most important source of energy in the diet of Ghanaians, accounting for nine percent of total caloric intake (FAOSTAT, 2012). In 2010, rice was considered the 10th agricultural commodity in Ghana by value of production while it ranked 8th in terms of production quantity (Ministry of Food and Agriculture, 2010). In addition to being a staple food mainly for high income urban populations, rice is also an important cash crop in many rural communities in Ghana where the crop is produced. Current statistics show that rice accounts for about 5 percent of the total annual crop area harvested and about 13 percent of the annual total cereal area harvested (Ministry of Food and Agriculture, 2014). Rice production takes place in all the ten regions of Ghana but the major producing regions are the Northern, Upper East, Western and Volta Regions. These three major regions produced 436,287 tons in the year 2014, representing 77% of the total national production (Ministry of Food and Agriculture-SRID, 2015). Total land under rice cultivation in Ghana has increased since the last five years from 0.09 million

hectares to 0.16 million hectares while yield has been fluctuating within the range of 1.7 and 2.7 tons per hectare (Ministry of Food and Agriculture, 2013). Total production has also been increasing with 2014 production levels being more than double the 2007 production level. This shows an increase in average annual growth of more than 15 percent over the period 2005-2014.

Despite the increase in rice production in the country, the quantities produced satisfy only 30 to 40 percent of the total demand. This is due to the fact that rice production in Ghana is mostly done by smallholder farmers, most of whom have farms of less than one hectare (1ha) in size (Ministry of Food and Agriculture, 2014). These smallholder farmers cultivate rice by using low level of agricultural technology such as low-quality seed with mixed varieties, under application of chemical fertilizers and use of outmoded harvesting and post-harvesting methods which lead to post harvest losses. This situation has created a wider gap between supply and demand for rice in the country. The shortfall in local supply of local rice has led to an increase in the dependence on imported rice to meet the shortfall in production to satisfy demand. The data in Table 1 shows the quantities of rice imported to supplement local production to meet total demand between 2009 and 2014 and shows that more than half of the total demand is imported.

Table 1: Quantities of rice imported to Ghana to supplement local production (2009-2014)

Year	Total Local Production (Mt)	Total Import (Mt)	Total Demand (Mt)	% Imports
2009	235000	383945	618945	62.0
2010	295000	320143	615143	52.0
2011	278000	543446	821446	66.0
2012	332000	400316	732316	55.0
2013	393000	487523	880523	55.4
2014	434481	544080	978561	55.6

Source: FAOSTAT, 2014

The importation of rice increases government expenditure and in the year 2013, the average rice import bill of USD 450 Million was recorded by the government (Ministry of Food And Agriculture, 2014).

It is thus essential to increase local rice production in the country to meet local demand and reduce government's expenditure on the importation of rice. Increasing rice production would help Ghana increase its food availability to improve its food insecurity status due to the dependency on rice by majority of the Ghanaian population. Ghana has great potential of increasing its rice production level to meet the growing demand. The availability of fertile land for rice production, favorable rainfall pattern and the availability of human capital put Ghana in a good position to increase its local rice production (Angeluci et al., 2013). In order to achieve this however, the factors that have significant impact on rice production by smallholder farmers need to be identified and analyzed. Hence, the objective of this study is to identify and analyze the socioeconomic factors that influence rice production in the Shama-Ahanta East District of Ghana. The information will be useful for policymakers and rice stakeholders to understand the factors affecting rice production sector for proper planning, development and implementation of rice production projects and interventions towards achieving food security.

2. Materials and Methods

2.1. The study Area

The study covered five communities in the Shama-Ahanta East District of Ghana. The district is located about 280km west of Accra and 130km East of Cote D'Ivoire. The five communities are Beposo, Dompim, Kobinanokrom, Kwakdwokrom and Ohiamadwen. This District was selected because of its high rice production status. The main crop produced by farmers in the selected communities is rice and is produced on small scale basis. Despite the small-scale characteristic of rice production of rice in the area, the District produced about 45% of the total regional production in 2008 (Ministry of Food and Agriculture, 2008). The district is characterized by favorable and bimodal rainfall pattern of an average of 1800mm which is conducive for rice production.

2.2. Sampling and Data Collection

A multistage sampling procedure was used to select respondents for the study. For the first stage, a purposive sampling procedure was used to select the district. For the second stage, a simple random sampling procedure was used to select the five communities as well as 320 rice farmers as respondents for the study. Structured questionnaire was used to collect cross-sectional data through personal interviews with respondents. The survey was conducted from September, to December, 2007.

2.3 Data Analysis

Data were subjected to descriptive analysis to obtain respondents information based on frequencies, means, minimum and maximum values. Socioeconomic determinants of rice production were analyzed using a multiple regression procedure. Gujarati (1978) suggest the multiple regression method as the appropriate procedure for determining the effect of a set of explanatory variables on a continuous dependent variable. Total output per acre measured as the total number of 50kg jute sacks was used as the dependent variable in the regression analysis.

The multiple regression model was stated as;

$$Y_t = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_n X_n + \epsilon_t \dots \dots \dots (1)$$

Where Y_t – total output per acre by farmer at time t ; X_n is a set of explanatory variable; ϵ is the error term; n is the total number of explanatory variables; α and β are parameter to be estimated.

Based on the general equation (1), the appropriate equation for this study was stated as;

$$\ln Y_t = \alpha + \beta_1 \ln X_1 + \beta_2 \ln X_2 + \beta_3 \ln X_3 + \beta_4 \ln X_4 + \beta_5 \ln X_5 + \beta_6 \ln X_6 + \beta_7 \ln X_7 + \beta_8 \ln X_8 + \beta_9 \ln X_9 + \beta_{10} \ln X_{10} \dots \dots \dots (2)$$

The use of the log-log relationship for the estimation of the model allows the estimates to be interpreted as elasticities.

Define your independent variables

3.0 Results and Discussion

3.1. Characteristics of rice farmers

The data in Table 2 show a relatively low level output of 8 sacks of 50kg/sack per acre among rice farmers in the study area of whom about 73% are males.

Table 2: Summary statistics of respondents

Variable	Frequency	Mean	Std. Deviation	Minimum	Maximum
Output	320	8.21	2.43	5.00	12.00
Age	320	45.41	11.20	14.00	76.00
Educational level	320	2.11	1.68	0	6.00
Household size	320	5.61	1.57	3.00	9.00
Farm size	320	2.40	0.45	1.780	3.01
Household income	320	135.88	67.31	97.00	365.00
Access to credit	320	0.07	0.26	0	1.00
Gender of respond	320	0.73	0.45	0	1.00
Output price	320	48.19	1.83	45.00	50.00
Access to land	320	0.06	0.23	0	1.00
Extension visits	320	0.13	0.34	0	1.00

The difficulty in accessing land by female farmers and the drudgery associated with rice production could account for the low level of female involvement in rice production in the study area. The relatively low rice output level could be attributed to the traditional practices which are widely used by farmers in the study area. It could also be attributed to inadequate investment in improved rice production practices due to low level of household income as shown by the results in Table 1. The results also show an average age of 45 years and a very low level of education (2.1 years) in the study area. The data suggest primary level education is the most common education attainment in the study area. This confirms the report of the 2010 Population and Housing Census which indicates that education level among farmers in Ghana is less than 20 percent among farmers population aged 11 years and older (Ghana Statistical Service, 2010). The results further show relatively high household size of 5.6 people which is higher than the national average household size of 4.5 people (Ghana Statistical Service, 2010). The study found that rice farmers in the study area have very low access to agricultural credit mainly due to lack of collateral and inadequate financial and local credit institutions. The real average output prices in the study area was found to be GH¢48 per 50kg, which is relatively lower as compared to the national average of GH¢53 as at the time of data collection (Statistics, Research and Information Directorate, 2013). The relatively lower average output price could be attributed to the lack of storage facilities in the study area which forces farmers to sell their produce immediately after harvest. Access to agricultural extension service, which is critical for increasing farmers output has been found to be very low. This could be attributed to the very low number of agricultural extension agents in the country. Currently, the extension to farmer ratio in Ghana stands at 1:1500, hence many farmers are not able to access extension services for their agricultural activities. It was revealed during the survey that most of the rice farmers in the study area are migrant farmers from the Volta

region of Ghana who have settled in the area for over 20 years. This explains why the low access to agricultural land in the area among the respondent rice farmers.

3.2. Analysis of socioeconomic factors influencing rice production

The multiple regression results of the socioeconomic determinants of rice production in the study area is shown in Table 3.

Table 3: Socioeconomic determinants of rural households food access

Variable	Parameter Estimate	t - Value	p-values
Intercept	10.0254	2.05	0.041**
Age	0.1112	3.55	0.012**
Male	0.1593	2.57	0.058*
Education	0.5310	0.84	0.040**
Household size	-0.1715	-2.15	0.033**
Farm size	0.2051	0.36	0.314
Household income	0.2645	2.24	0.081*
Credit access	0.3953	2.82	0.041**
Land access	0.2044	4.04	0.299
Extension access	0.4736	6.06	0.001***

*, **, *** - significant at 10%, 5% and 1% respectively

The overall model was significant ($p < 0.001$) with an F-value of 14.33 and a predictability level of 0.74 ($R^2 = 0.74$) and Adjusted $R^2 = 0.72$. This shows that about 74% of the variation in the dependent variable (output) was influenced by the combined effects of the explanatory variables, while the remaining 26% of the variation in output could be explained by other factors which are not included in the model but are found in the error term (ϵ).

The coefficient of age was positively signed and statistically significant ($p = 0.05$). This positive relationship suggests that older farmers are assumed to have more experience and skillful with regards to cultural practices involved in rice production. This results is different from the results of previous studies (Chidi et al., 2015; Boniphace et al., 2015) who found no statistical relationship between rice production and age among rice farmers in Nigeria. Also, the results of Ayoola et al., (2011) showed a negative relationship between age and rice production and argued that older farmers are less vigorous in their farming activities and hence obtain less output.

The coefficient of gender was positively related to rice production among small scale farmers and the relationship was found to be significant ($p = 0.10$). This implies that men in the study area produce more rice than women. This could be attributed to the numerous challenges women farmers face in accessing agricultural resources such as land and improved technology. This results could also be attributed to the fact that women in rural households are usually involved in multiple roles at the household level and hence they have limited time to invest in rice production to achieve higher output levels. Previous studies by Ezumah and Domenico (1995) and Ayoola (1999) found similar results and argued that production and domestic responsibilities of women impinge on their time and mobility.

Educational level of household head was found to be significant ($p = 0.05$) and positively related to increased rice production among small scale rice farmers. This suggests that educated farmers are more likely to increase rice production than

uneducated farmers. According to Omotoyo et al., (2014), improved human capital through education plays a major role in the acquisition and evolution of new ideas. This results is similar to Boniphace et al., (2015) who found that programs and interventions which aim at promoting technological change for increased output favor educated farmers. According to Chid et al (2015), educated farmers are more intelligent in the utilization of available production resources and are also able to adopt innovations in rice production.

Household size was found to be negatively related to rice output among small scale farmers in the study area and the relationship was found to be significant ($p=0.05$). The larger the family size, the higher the household expenditure on household needs such as food, healthcare and clothing. This reduces financial investments that goes into rice production. The reduced investment in rice production could adversely affect output level. This result is however, different from the results obtained by Okorie et al., (2011) who found a positive relationship between household size and rice yield and noted that farmers with increased family size obtained higher yield due to family labor supply which is usually not paid for. The same argument was put forth by Chidi et al (2015) who found different results from the results of this study.

As expected, household income was found to positively relate to rice production and the relationship was found to be significant ($p=0.10$). Increase in household income increases their purchasing power and this allows farmers to hire labor buy inputs to help increase output without jeopardizing expenditure on other household needs. This finding is in consonance with the results of previous studies (Abdulai and Binder, (2006); Moser and Barrett, (2003) which suggests increasing household income allows rice farmers in Nigeria to re-invest in innovations and technology for increased output. Creating enabling environment for the establishment of off-farm employment opportunities could offer rice farmers opportunities to earn off-farm incomes which could contribute to increased rice output.

The results show a significant ($p=0.05$) positive relationship between agricultural credit access and small scale rice production. Commenting on the importance of agricultural credit, Ayoola (1999) stated that access to credit is essential to ensure food security among rural households in Northern Ghana. Access to agricultural credit allows rice farmers to adopt improved practices such as the use of improved seeds, increase investment in land improvement activities which increases rice farmers output. Results however, show a very low access to agricultural credit among respondents. Apart from the study area being characterized by inadequate credit institutions, the long bureaucratic processes and policies adopted by existing institutions could also be responsible for the low access to credit.

Access to Agricultural Extension services was found to be positively related to rice production in the study area and was found to be significant ($p<0.001$). This result was expected because access to extension service contribute to raise the amount of information available to farmers and thus improve their productivity levels. This results is similar to the findings of Haq (2011) who found a positive and significant effects of extension service in improving farm productivity among farmers in Bangladesh and stated that the more the extension contacts between extension agents and farmers, the higher the productivity is. The results is also similar to the findings of Usman and Baker (2013) among rice farmers in Nigeria and argued that

farmer access to extension services reduces production inefficiencies and yield losses.

4. Conclusion and Recommendations

The study sought to identify and analyze the socioeconomic determinants of rice production among small scale farmers in Ghana. The results of the study indicate that rice output level is generally low in the study area. Significant factors identified to influence rice production in the study area include age, gender, educational level, household size, household income, access to agricultural credit, access to land and access to agricultural extension services. In order to increase rice production in the District and the country as whole, these socioeconomic factors need to be influenced by means of policy and program intervention. Failure to this, the gap between supply and the ever growing demand of rice in Ghana will continue to widen and government's expenditure on the importation of rice into the country will continue to soar. Thus, it is imperative for the government and policymakers to put in place programs that support increase in rice production in the study area since the area contributes significantly to national rice output. Modification of social, cultural and traditional barriers that limit small scale rice farmers access to agricultural resources is recommended. This calls for concerted efforts by governments, community leaders, chiefs and opinion leaders in these rural communities by implementing policies to address the problem of poor food access. Developing policies that create the enabling environment for growth in the other sectors of the rural economy such as small-scale industries is essential. This will provide rural people the opportunity for off-farm employment opportunity to earn extra income to supplement their farm incomes. One area that needs critical improvement is provision of adequate and reliable agricultural extension services to farmers. The training and empowerment of more agricultural Extension Agents to augment the efforts of the existing ones is highly recommended.

There are issues which came out from your results that could form your recommendation. Look inwards in include them

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