

INFLUENCE OF AGRICULTURAL TRADE LIBERALIZATION POLICIES ON POVERTY REDUCTION AMONG GHANAIAN RURAL SMALLHOLDER RICE FARMERS

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Abstract

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The objective of the study was to assess the influence of Agricultural trade liberalization policies on production and poverty reduction among rural smallholder rice farmers in Ghana. The study areas were chosen due to the intense cultivation of rice and the presence of a large number of smallholder farmers in those areas. Both cross-sectional and secondary data were used in the study. One hundred (100) respondents were sampled from six (6) districts across the six agro-ecological zones in the country using the simple random sampling technique across the study districts and structured questionnaire was administered to them. Data analyses involved the use of multiple regression and logistic or logit regression. Descriptive statistics was also employed to summarize the data. The study indicated that, government's investment in the agricultural sector and the total land area cultivated of rice significantly influence positively the gross output of rice production while total imports of rice significantly influence negatively the gross output of rice. Again, provision of extension services, input services, market services, and the size of land cultivated and import tariffs showed a higher likelihood of enhancing increase in rice production. Imports of rice were likely to significantly and negatively reduce increase in rice production. The study also found that agricultural trade liberalization policies have generally contributed to the increase in income levels of the farmers. The study concluded that Agricultural trade liberalization policies adopted by Ghana in the early 1980s generally have had both positive and negative effects on the production of rice over the years looking at the production trend of rice but has contributed to the increase in incomes of the farmers hence contributed to poverty reduction.

Key words: Multiple and logistic regressions, Trade liberalization, poverty reduction, rice farmers, Ghana

Introduction

Many countries in Sub-Saharan Africa like Ghana are afflicted by many forms of poverty. Human Development Index (HDI) scores in most countries of Sub-Saharan Africa have stagnated or declined since 1990, leaving this region as the poorest in the world. Indeed, 34 of the 46 low human development countries are in Sub-Saharan Africa (UNDP, 2011).

It has been established that over 70% of people in developing countries such as Ghana live in the rural areas and find their livelihood in agriculture. The World Bank (1995) noted that poverty in Ghana, like any other Sub-Saharan African country is predominantly a rural phenomenon. Out of 35% of Ghanaians classified as poor, 75% live in the rural areas. Poverty in rural Ghana is estimated to contribute approximately

90% of national poverty. In 2005/06 in particular, poverty was highest by far among food crop farmers. Moreover, their contribution to the national incidence of poverty is much in excess of their population share (GSS, 2007).

In most developing countries such as Ghana, small-scale farmers generally constitute the largest group in the largest economic sector agriculture (Chamberlin, 2007). They produce about 80 percent of the total agricultural production using rather rudimentary technology on family-operated farms. These small scale farmers tend to be among the low income and the poorest sector of the population and yet not many public expenditure and development programs are designed to improve their lot.

In recent times, globalization with particular reference to agricultural trade liberalization has been identified as one of the ways to reduce poverty among smallholder's farmers in devel-

oping countries including Ghana since agriculture is a major employment sector in these countries and most of the farmers are smallholders. Trade liberalization is increasingly advocated as a critical policy for poor countries to promote economic growth and to reduce poverty. This view underpins the work of leading multilateral institutions, including the World Bank, IMF and WTO, as well as many Northern governments including DFID. The case for trade liberalization in developing countries is based on economic arguments that trade liberalization promotes growth, which leads to poverty reduction. This view is largely based on aggregate income and consumption measures of poverty.

In recent years (late 1980s) the government of Ghana adopted policies with the intention to open the economy by promoting trade with the rest of the world. The effects of import liberalization on the viability of agriculture, particularly that practiced by small farmers of food crops, have become an important field of study in recent years. This is due to the increasing concerns of farmers and their organizations, civil society organizations involved in development, and policy makers in governments of the developing world (Khor and Tetteh, 2006).

Such concerns emerged because of the experience of many developing countries which undertook structural adjustment programmes, in which trade liberalization as well as the withdrawal of the state from an active role in support of farmers, were prominent components of the loan conditionality of international financial institutions. The concerns increased due to the commitments that developing countries undertook to eliminate quantitative restrictions in agricultural products and to reduce their agricultural tariffs under the Uruguay Round. Among the trade policies implemented were the reduction of the trade barriers, such as, tariffs and quotas that affected the importation of several products and the exportation of non-traditional agricultural exports (Khor and Tetteh, 2006).

In many developing countries like Ghana, the liberalization of imports has resulted in intense competition from imports that have threatened to displace some of the products of small farmers from their own domestic market. The competition emanating from imports has not been fair, in many cases. This is because imports coming from developed countries are usually heavily subsidized, and thus their prices are artificially cheapened. On the other hand, the farmers of developing countries are usually not subsidized. Moreover, the assistance that their governments provided have, in many countries, been withdrawn or substantially reduced, due to the structural adjustment policies. One of such food crops in Ghana that have faced intense competition from cheap import is rice and threatened to displace some of the products of these small farmers from their own domestic market (Khor and Tetteh, 2006). Rice cultivation was a thriving activity in

Ghana in the mid-1970s. Rice farmers were able to supply all of the country's consumer needs. In particular, the Northern Ghana region had many districts in which rice was an economically successful activity.

However, rice production has not kept pace with the demand, and has in fact declined. In 2002, rice production in Ghana was 187,000 tonnes (milled rice equivalent) while net imports were 330,000 tonnes (milled rice equivalent); thus imports were 64% of domestic supply (Oxfam 2005).

A major cause of this was the liberalization of rice imports as part of the government's agricultural liberalization policy that started in 1983, under the influence of loan conditionality of the World Bank and the IMF. Under the 1983 deal between the Ghana government and the World Bank and IMF, Ghana agreed to make major economic reforms including cutting farm subsidies, privatizing food distribution, and opening up the country's markets to imports. The government stopped subsidies for fertilizer used in rice production and privatized state-owned farm machinery, such as combine harvesters and tractors. Other support for the rice industry suffered too, as the government reduced its budget for agricultural extension work. The import tariff for rice was reduced (Armin et al., 2007).

The displacement of developing countries' farmers and their products due to trade liberalization has thus become the subject of global concerns (Khor and Tetteh, 2006). Not surprisingly, the impact of trade reforms on the welfare of the poor has become an important subject of interest to researchers and policy makers alike. However, there has been limited empirical research on how these reforms affect poverty at the household level (Winters, 2002; Winters et al., 2004). This situation is not different in Ghana and in the six districts selected for the study in particular. The six districts selected namely; Nzema East Municipal, Offinso South Municipal, Wenchi Municipal, Kwahu West district, Central Tongu District and Builsa district cut across all the six main agro-ecological zones which span the whole of the country. Rice is one of the crops cultivated in these districts among the production of other crops with majority of the farmers being relatively poor.

The main objective of this research is to make a contribution to literature through an empirical investigation of the poverty effect of trade liberalization based on survey of Ghanaian household data. This objective is motivated by the paucity of research in this area for Ghana.

Materials and Method

The study was carried out in six districts namely; Nzema East Municipal, Offinso South Municipal, Wenchi Municipal, Kwahu West district, Central Tongu District and Builsa district which cut across all the six main agro-ecological zones of the

republic of Ghana. Ghana is located in West Africa, on West Africa's Gulf of Guinea only a few degrees north of the Equator. With a total area of 238 538 sq km, the country is bounded by Côte d'Ivoire to the west, Burkina Faso to the north, Togo to the east, and the Atlantic Ocean to the south. Ghana's population according to the 2010 population and housing census stands at 24 658 823, an increase by 30.4 percent from 18 912 079 in 2000 to 24 658 823 in 2010 (GSS, 2010).

The Nzema East Municipal covers an area of about 2194 square kilometres. It is bounded on the west by Jomoro, north by Wassa Amenfi East, and the east by Wassa Amenfi West and Ahanta West District. On the south, it is bounded by the Gulf of Guinea. The current population of the Municipality (according to the 2010 population census) is 60 828 (males 29 947 and females 30 881) constituting 2.6% of the Western Regional population (GSS, 2010). Agriculture or farming is the main economic activity in this district with crops like cassava, maize, rice, cocoyam and plantain grown extensively both for subsistence and for cash. (http://www.ghanadistricts.com/districts/?news&r=7&_id=128, accessed 25/5/13).

Offinso South Municipal located in the extreme north-western part of the Ashanti Region of the republic of Ghana. It lies between longitude 1° 65W and 1° 45E and latitudes 6° 45N and 7° 25 S. The District covers an area of 1255 km². The 2010 Population and Housing Census yielded the District a population head count of 76 895. Agriculture is the main economic activity in the Municipality. The major crops that are cultivated in the municipality are cassava, maize, plantain, vegetables, oil palm, cocoa, cashew and rice.

The Wenchi Municipality is located in the Western part of Brong Ahafo Region. It is situated at the northeast of Sunyani (regional capital). It lies within latitudes 7.30° and 8.05° North and longitudes 2.15° West and 1.55°. The 2010 population figure of Wenchi Municipal was 89 739 (GSS, 2010). Some of the crops grown in the districts include cocoa, maize, groundnut, cowpea, soya bean, bambara, sorghum, yam, cassava and cocoyam.

The Kwahu West Municipal is one of the newly created districts in the Eastern Region of Ghana and lies between latitudes 6°30' North, and 7° North and longitudes 0°30' West and 1° West of the equator, covering an area of about 414 square kilometers. The 2010 National Population and Housing Census put the District's population at 93 584 with an intercensal growth rate of about 4%. Agriculture is the major economic activity in the Kwahu West District and employs 60% of the labour force.

The Central Tongu District, which was carved out of the former Tongu District Council in 1989 by Legislative Instrument (LI.15) lies within latitudes 5°47'N to 6°0'N and longitude 0°05' E to 0°45'. The population of the district as recorded in the 2010 Ghana Population and Housing Census is 149,188 compared with 90,000 in 1984. Agriculture is the leading sector in

the District's economy. Some of the major crops grown in the district include rice, maize, cassava and plantains.

The Builsa district lies between longitudes 1° 05' West and 1° 35' West and latitudes 10° 20' and 10° 50' North. It is bounded on the North and East by the Kassena-Nankana District; on the west by the Sissala District and on the South by the West Mamprusi District and part of Kassena-Nankana District. The 2010 total population consists of 50.64% (or 47 099 females) and 49.4% (45 892 males). The people are predominantly small holders growing a range of rain-fed food crops. The main food crops are cereals (maize, rice, sorghum, millet) and pulses (cowpea and groundnuts).

A structured questionnaire was developed for the collection of data. Purposively sampling was used to select one (1) district from each of the six agro-ecological zones due to their intensive involvement in the cultivation of rice. Each district was considered as a cluster. In addition, simple random sampling technique was used to select 100 respondents for the survey to ensure an even selection of the respondents giving each respondent an equal chance of being selected. This was done according to the proportions of the populations in these zones. Secondary data was source from registered data sources such as economic surveys and research databases such as Food and Agriculture Organisation (FAO) statistic database, World Bank Country status report, World Food Program (WFP) database and World Trade Organisation (WTO) database, United Nations Conference on Trade and Development statistic database (UNCTAD) and official documents of the Ministry of Food and Agriculture (MOFA) of Ghana. The period for which data was collected was between 1980 and 2010.

The Statistical Package for the Social Sciences (SPSS) was used to analyze the data.

The data collected were analyzed using the multiple regression and the logistic or logit models. Descriptive statistics such as, tabular description and summary statistics like percentages and frequencies were also used to summarize the data.

Econometric Models

The schematic representation of the multiple regression models is as stated below without regard to the signs of the coefficients:

$$Y_t = \beta_0 + \beta_1 IMP_t + \beta_2 GIA_t + \beta_3 IT_t + \beta_4 TLAC_t + \beta_5 TEX_t + \beta_6 EXT_t + \varepsilon_t \quad (1)$$

where:

Y_t is the production of rice

t refers to the time period from which the data was obtained (1980 to 2010),

β_0 is a constant known as the intercept,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6$ are the coefficients of regression param-

eters that were estimated and described the direction and strengths of the relationship between Ghana’s gross output of rice and the explanatory variables and ϵ_i represents the stochastic disturbance term that capture the effect of all the other factors that were not included in the model, but have an effect on the production factors.

In this model, the dependent variable is that of the total production or output of rice in metric tons. *IMP*, *GIA*, *IT*, *TLAC*, *TEX* and *EXT* repress the total quantity of imports of rice in tons in year, Governments’ investment in the agriculture sector in millions of US Dollars in year, import tariffs on agricultural commodities in percentage (%) in year, total land under cultivation of rice in hectares (Ha) in year, total export quantity of rice in tons in year and export tariffs on agricultural produce in percentage (%) of total government revenue in year respectively.

For the logistic regression, the regress and in this objective was a binary variable that take only two values (1, 0), say, 1 if production increased and 0 if production decrease.

We assume that we have a regression model

$$Y_i^* = \beta_0 + \sum_{j=1}^k \beta_j X_{ij} + \mu_i, \tag{2}$$

where Y_i^* is not observed. It is commonly called a latent variable. What we observe is a dummy variable y_i defined by:

$$y_i = \begin{cases} 1 & \forall Y_i^* > 0 \\ 0 & \text{otherwise} \end{cases} \tag{3}$$

It is common practice to assume that the outcome variable, denoted as Y, is a dichotomous variable having either a success or failure as the outcome.

$$\log_1 e^{[(P(Y = 1|X_1, \dots, X_1p)) / (1 - P(Y = 1|X_1, \dots, X_1p))] = \log_1 e^{[\pi / (1 - \pi)]} = \tag{4}$$

$$\alpha + \beta_1 X_1 + \dots + \beta_p X_p = \alpha + \sum_{j=1}^p \beta_j X_j$$

For logistic regression analysis, the model parameter estimates ($\alpha, \beta_1, \beta_2, \dots, \beta_p$) should be obtained and it should be determined how well the model fits the data (Agresti, 2007). The complete model contained all the explanatory variables and interactions believed to influence increase in production.

Since we fit a logistic regression model, we assume that the relationships between the independent variables and the logits are equal for all logits. The regression coefficients are the coefficients $\alpha, \beta_1, \beta_2, \dots, \beta_p$ of the equation:

$$\text{Logit}[\pi(x)] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_p X_p \tag{5}$$

Fitting equation (5) above, we have the following model for rice:

$$\text{Logit}[\pi(x)] = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8, \tag{6}$$

where:

α is a constant known as the intercept,

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7$ and β_8 are the coefficients of regression parameters that were estimated; and $X_1, X_2, X_3, X_4, X_5, X_6, X_7$ and X_8 represent the explanatory variables; provision of extension services, provision of input services, provision of storage facilities, provision of market services, export quantity, size of land cultivated, current import tariff agricultural commodities and imports of rice respectively.

Results and Discussion

Empirical results of the influence of trade liberalization policies on rice production

The relationship between the production or output value of rice and the predictor policy variables influencing output was accessed using the six (6) predictor explanatory policy variables of interest in the regression model and regressed. The explanatory variables include, Ghana’s total imports of rice (IMP), Ghana government’s investment in the agricultural sector (GIA), import tariffs on agricultural commodities (IT), total land area cultivated of rice (TLAC), total export quantity of rice (TEX) and export tariffs on agricultural commodities (EXT). The results from the regression analysis are presented in Table 1.

The fitted regression for the above relationship is:

$$\begin{aligned} \text{Rice Output} = & -454.329 - 0.095IMP + 2.623GIA - 0.412IT \\ & + 1.618TLAC + 2.732TEX + 0.713EXT \\ & (149.807) (0.053) (0.499) (4.389) (0.366) (4.510) (1.204) \\ R^2 = & 0.0913 \quad F = 42.023 \quad DW = 1.350 \end{aligned}$$

From the regression results above, Ghana’s total imports of rice has a negative sign with a value of $\beta_1 = -0.095$ as expected. The negative sign of this coefficient indicates that the total imports of rice to Ghana and gross output production of rice have an inverse relationship. This means that as Ghana’s total rice import quantity increases by 1000 tons, the output value of rice production decreases by 95Mt. This was statistically significant at the 10 percent level of confidence. This can be explained by the fact that, as more rice is imported into the country, domestic rice production is under threat of collapsing and this is in accordance with fact. The results also conform to (Khor and Tetteh, 2006) who explained that huge imports of rice from countries such as the United States and other countries where a significant number of the farmers were subsidize and therefore production cost was relatively low ‘dump’ their products on the Ghanaian market hence displacing local rice producers.

$\beta_2 = 2.623$ carry an expected positive sign. This policy variable is also significant at the 5 percent level. As total investment into the agricultural sector increases by 1million USD, Ghana’s output of rice will also increase by 2620 Mt and this is in line with theory. The results confirm the find-

Table 1
Results of Regression analysis of the influence of agricultural trade policies variables on rice production

Variable	Coefficient	t-statistic	Prob.
Constant	-454.329	-3.033	0.006***
IMP, 000t	-0.095	-1.804	0.084*
GIA, USD Million	2.623	5.257	0.000***
IT, %	-0.412	-0.094	0.926
TLAC, 000Ha	1.618	4.426	0.000***
TEX, 000t	2.732	0.606	0.550
EXT, % total revenue	0.713	0.592	0.560
R ²	0.913		
Adjusted R ²	0.891		
Total Panel Observation	30		
F-Statistic	42.023		
Durbin Watson	1.350		

Source: Multiple Regression Analysis. ***, **, and * = 1%, 5% and 10% significance level respectively

ings of (Wiredu et al., 2010) in a study of the impact of improved varieties on yield of rice producing households in Ghana, observed that government investment in programs that promote high-yielding rice varieties and other complementary technologies enhanced the gross output of rice production. $\beta_3 = -0.412$ which means import tariffs on agricultural products is inversely proportional to the gross output of rice. This however was not statistically significant at the 5 percent confidence level. This means that as Ghana's import tariffs on agricultural products rises by 1%, rice production will decrease by 410 Mt but this is not in accordance with fact. The possible explanation to this may be that since Ghana is not self-sufficient in rice production, a further increase in the import tariff will adversely affect the quantity of rice imported into the country and this will erode the purchasing power of the poor farmer who needs to consume this product to get the required calories to farm. If these calories are not sufficient, production will be affected due to lack or limited energy to farm. Arulpragasam et al. (1997) said that, additional tariff on imported food would particularly increase the price of local and imported rice and decrease real incomes for both rural and urban households. $\beta_4 = 1.618$ depicting a positive relationship between Ghana's total land areas cultivated of rice and gross output value of rice. This suggests that as Ghana's total land area cultivated of rice increases by 1000Ha, rice output will also increase by 4430 Mt. This result was also consistent with the findings of (NRDS, 2009) who indicated that the annual production fluctuations of rice are largely due to the area (ha) put under rice cultivation, rather than yield variations (t/ha). The elasticity for Ghana's total export of rice is $\beta_5 = 2.732$ which mean that Ghana's total export of rice is directly proportional to the gross output of rice. This was however not statistically significant at the 5 percent

confidence level. This means that as Ghana's total export of rice rises by 1000 tons, gross output production of rice also increases by 2730 Mt. This is backed by theory. Finally, $\beta_6 = 0.713$ which also suggests a positive relationship between Ghana's export tariffs on agricultural commodities and total output of rice. This means that as Ghana's export tariffs on agricultural products increased by 1% of total revenue, total rice production also increases by 710 Mt. This was however not significant at the 5 percent level and contrary to fact.

The Durbin-Watson value of 1.350 shows inconclusive evidence of autocorrelation. The coefficient of determination, $R^2 = 0.913$, which is the proportion of the sample variation in the dependent variable explained by the independent variables, serves as goodness-of-fit measure. In other words, the linear combination of independent variables included in the equation explained 91.3% of the variability of the effects of these policy variables on rice production in Ghana. The fit of the regression is good as well.

From Table 2, it can be observed that the probability of increased production of rice is likely to be enhanced by 0.551 times with a unit increment in the provision of extension services. This was statistically significant ($p < 0.05$). Extension services provision should be pursued by the government and other stakeholders in order to enhance or sustain increase in production of rice in the country. With the introduction of new rice for Africa (NERICA) program, farmers should be educated about the program to be able to adopt and use the new rice variety to able to increase production.

The likelihood of increased in production is higher for each unit increment in input provision. Production is likely to be increased by a factor of 0.423 times with each unit increment in provision of input service. This was statistically significant ($p < 0.05$).

Table 2
Results of Logistic Regression analysis of agricultural trade policy variables influencing or enhancing increased in production of rice

Variable	Coefficient	Standard error	EXP(B)	t-statistic	Prob.
Constant	12.410	1.565	1.506	0.068	0.794
Provision of extension	0.596	0.714	0.551	0.697	0.041**
Provision of input service	0.861	0.834	0.423	1.067	0.032**
Provision of storage facilities	0.542	0.670	0.582	0.654	0.419
Provision of market services	0.539	0.996	0.672	0.293	0.071*
Export quantity	1.274	1.123	3.575	1.274	0.257
Size of land cultivated	3.575	1.191	0.287	5.013	0.003***
Current import tariff	2.892	1.247	0.553	0.899	0.023**
Imports of similar produce	-7.654	1.034	0.564	1.212	0.038**
Number of Observations	100				
% of correct Predictions	85%				
Nagelkerke R ²	0.581				
Model Chi-square	55.945				
d.f	8				
Number of increased production	30				
Number of non- increase production	70				

Source: Logistic Regression Analysis. ***, **, and * = 1%, 5% and 10% significance level respectively

The odds of increase in rice production are higher for provision of storage facilities. This means that increase in rice production is likely to be achieved with increase in provision of storage facilities. This was not statistically significant ($p > 0.05$). The probability of increase in rice production is likely to be enhanced by 0.582 times with each unit increment in storage facilities provision.

The probability of increase in rice production is enhanced by a factor 0.672 times with a unit increment in the provision of market of services. This was statistically significant ($p < 0.1$). Market provision is absolutely necessary to enhance and sustain increase in rice production. This is because the local farmers find it difficult to get market for their produce which has been taken over by rice imports from other countries. Market structures and channels should therefore be created in order to provide the farmers an avenue to sell their produce both locally and internationally.

The odds of increased production are higher for total export quantity of rice. This gives an indication that increase in production is likely with higher export quantity. Production is likely to increase 3.575 times with additional unit increase in total volume of rice exports. This was not statistically significant ($p > 0.05$). Efforts should therefore be made to increase export volumes to enhance increase in production. (Khor and Tetteh, 2006) observed that, the total export quantities of rice determined the amount of incomes farmers received therefore farmers were motivated to increase production to earn more income.

The probability of increase in production of rice is enhanced by 0.287 times with a unit increase in the size of the land cultivated of rice. Farmers must therefore be encouraged to adopt new technologies in order to enhance production.

The probability of increase in rice production is likely to be enhanced with higher current import tariffs. Production is likely to increase by a factor of 0.553 times with a further unit increment in import tariffs. This was significant at the 5 percent level of confidence ($p < 0.05$).

The odds of increase in rice production are lowered for imports of rice into the country. This means that the probability of increase in production of rice is likely to decrease by a factor of 0.564 times for each unit import of rice into country. This was however statistically significant ($p < 0.05$). This result was in accordance with (Khor and Tetteh, 2006) who explained that because Ghana's bound tariff for agricultural products is 99%, the country can increase its 20% tariff on rice to 25% or even much higher levels, and still be in compliance with its WTO obligations. The use of this flexibility is especially useful when a country faces import surges that adversely affect the domestic producers and this can result in increase in production of rice.

Agricultural trade liberalization policies and poverty reduction

Income is widely used as a welfare measure because it is strongly correlated with the capacity to acquire many things that are associated with an improved standard of living, such as food, clothing, shelter, health care, education, and recreation (Morris et al., 1999).

The income of farmers is the total income received by farmers at the end of a farming season. It didn't include income received from other sources since farmers found it difficult computing such incomes because such incomes come to the farmers in bits and pieces and occasionally. The income refers to the net income received by the various farmers of rice sold at farm gate prices after the cost of production has been deducted. The average income earned by the rice farmers is about GHC1809 which is higher than the national average income of about GHC1217 but comparing to other farmers, the farmers with the least annual average income are rice farmers. Rice farmers earned the least average income not because they cultivated less size of land but due to inadequate government support. These farmers relatively do not get support from the government in terms of inputs, credit and marketing structures. Another challenge is the surge in imports of rice which doesn't motivate the farmers to expand their farm sizes to increase output and income.

Expenditure refers to the total amount spent on consumer goods and services in the last 12 months. It doesn't include cost of production items like seeds, fertilizers and so on.

From Table 3 it can be observed that rice farmers with the relatively low annual average income have high average annual expenditure of about GHC5762.

Farmer's ability to afford basic social amenities

Poverty has several dimensions and some of these are powerlessness, isolation, vulnerability and weakness. The weakness here refers to the inability of the farmer to afford some basic social amenities. The study classified the basic needs of respondents as, providing three square meals a day, fish and meat prod-

ucts, ability to pay school fees for dependents, health bills, ability to afford new clothes for members of the household, fuel for cooking, ability to access information and access to entertainment facilities in line with the United Nations (UN) Millennium Development Goals (MDGs).

Inferring from Table 4, a slightly lower percentage (28%) of the respondents could easily have access to food compared to those who could only afford when food is in the community and even not always. This category of farmers formed a majority (61%) of the respondents while just about 11 percent of the farmers find it difficult with access to three square meals a day. This gives an indication that accessibility to food is still a problem in most rural areas of Ghana. Again farmers' accessibility to fish and meat products are not quite encouraging as just about (12%) of the respondents could readily access such items as against (47%) of the respondents who could not access such items.

In terms of school fees, majority (60%) of the farmers could not pay fees for their children compared to just about (14%) who had the ability to pay. The situation was slightly different when it came to the payment of health bills. Majority (44%) said they could somewhat afford to pay the health bills of their households while about (26%) confirmed they could afford the health bills of members of their households with just about (30%) who said they could not pay for the health care of dependents. A lower percentage of the farmers (13%) could easily afford to buy new clothes for household members as against about (51%) of the farmers who could not afford to buy new clothes for members of their households. Fuel wood is the common source of fuel for most rural households in Ghana. It is readily available to most farmers

Table 3
Annual average income and expenditure of rice farmers

Crop	Mean (\pm SD)	Minimum (GHC)	Maximum (GHC)
Rice			
Income	1808.80 (\pm 1335.93)	450.00	6900.00
Expenditure	5761.45 (\pm 441.45)	4838.00	7342.00

Source: Field Survey (2012); Estimated by author. USD 1.00 = GHC 2.00 as at May 2013

Table 4
Farmers' ability to afford certain basic social amenities

Basic social amenity	Not able	Somewhat able	Very able	Total
Food	11% (11)	61% (61)	28% (28)	100% (100)
Fish and meat products	47% (47)	41% (41)	12% (12)	100% (100)
School fees	60% (60)	26% (26)	14% (14)	100% (100)
Health bills	30% (30)	44% (44)	26% (26)	100% (100)
Clothing (New)	51% (51)	36% (36)	13% (13)	100% (100)
Fuel for cooking	1% (1)	37% (37)	62% (62)	100% (100)
Information service	13% (13)	52% (52)	35% (35)	100% (100)
Entertainment	14% (14)	51% (51)	35% (35)	100% (100)

Source: Field Survey (2012); Percentage (Frequency); Estimated by author

since they only need to get them from their farms. It's not surprising to see majority (62%) of the farmers having access to fuel as against just (1%) of them not having access to fuel.

Information here refers to access to productive information through extension agents or through television, radio and mobile phone. This was to assess if respondents had the ability to afford private extension services or bought a television or mobile phone to access productive information. A greater percentage (52%) of the farmers could somewhat access this basic amenity and another (35%) confirmed they could access information service easily compared to just about (13%) who could not afford such services. Finally, slightly above a third (35%) of the respondents indicated easy affordability of entertainment facilities compared to just about (14%) of the respondents who said they could not afford entertainment facilities.

Conclusions and Recommendations

The findings of the study suggest that, Government's investment in the agricultural sector and the total land area cultivated of rice were found to significantly influence positively the gross output of rice production while total imports of rice significantly influence negatively the gross output of rice. Specific areas of investment by government, among others, which have resulted in this level of production, were increased mechanization, increased cultivation of inland valleys and efficient utilization of existing irrigation systems. Area expansion was positively related to gross rice production and this could be due to the relatively low level government investment in technological infrastructure, research development and information dissemination and production inputs in the rice sector, hence the only way to keep up production was through area expansion.

Huge imports of rice from countries such as the United States and other Asian countries like Thailand, China and Vietnam where a significant number of the farmers were subsidized and therefore production cost was relatively low end up 'dumping' their products on the Ghanaian market hence displacing local rice producers as indicated by several studies.

Imports of rice, import tariffs, export quantity of rice, size of land cultivated of rice and government investment in the agricultural sector which was proxy by provision of extension services, provision of input services, provision of market services, provision of input subsidies and provision of storage facilities were the policy variables that were hypothesized to enhance or increase rice production. The provision of extension services, input services, market services, the size of land cultivated and import tariffs were significant and likely to enhance the increase in rice production. Imports of rice were likely to significantly and negatively reduce increase in rice production.

Finally, the findings of the present study suggest that trade liberalization policies generally have contributed positively to

the income levels of the rice farmers since the average income earned by the farmers is higher than the national average income but due to the relative large household sizes kept by some of the farmers, this income levels could not sustain their basic needs and therefore plunging them into poverty.

Governments should therefore increase its investment in the agricultural sector through mechanization and machinery provision, provision of agricultural input services, provision of financial services to the farmers to further boost production. Another critical area which should be addressed is the land tenure issues in Ghana since the total land cultivated of the crops positively impacted on gross output. Also the applied import tariff rate should be increased marginally without violating WTO rules and regulations to limit the imported quantities of rice to enhance local production.

It is recommended that trade liberalization should be carried out gradually in the rice sector to protect local producers for now. Government must put in place strategies and special programs to address the short fall in rice production. It is also recommended that farmers must be educated through public programs to keep relatively small household sizes which they can maintain without difficulty so that they do not end up in abject poverty.

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