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The Effects of the Ghana School Feeding Programme on Local Rice Production: A Case Study of Selected Districts in Northern Ghana

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Abstract: The Ghana School Feeding Programme (GSFP) is the local version of the Home-Grown School Feeding Programme (HGSP) that has a mandate to give one hot meal a day to school children in public schools from kindergarten through to primary six. Launched in 2005 the programme has the goal of contributing to poverty reduction and increased food security in Ghana. One of the key objectives of the programme is to boost domestic food production by purchasing locally produce foodstuffs and providing a sustainable market for local food producers in the community. To analyse the effect of the programme on rice production in four districts in the Northern Region of Ghana, a formal cross section survey of 80 small holder rice farmers and 40 GSFP caterers, across the four districts was conducted. The translog production function was applied to analyse the programme's effect on rice output while the probit model was used to analyse the factors influencing rice farmers to supply to the programme on one hand and the factors affecting caterer's decision to purchase rice from the rice farmers on the other. The results from the analysis of the production function shows that the coefficients of farm labour, farm size, and fertilizer application were highly significant in increasing farmers' output. While access to the GSFP had a positive influence on output it was statistically insignificant. The results also show that majority of GSFP caterers buy rice from local millers and the market. The factors which had significant influence on the caterers to buy from the rice farmer include availability of storage facility, farmer's willingness to process the paddy rice and sell on credit, price of milled rice, and proximity of rice farmers. The major conclusion of the study is that the effect of the programme on rice farmers output was not significant. This was attributed to poor linkage between the farmers and the programme even though about 100 percent of rice consumed by the GSFP is produced locally.

Keywords: School feeding; Effects; Translog production function; Influence; Significance.

1. Introduction

Ghana is the first of ten countries in Sub-Saharan Africa implementing a school feeding programme modeled to the guidelines of the New Economics partnership on African. Development as described in the Comprehensive African Agriculture Development Programme. The formulization of the Ghana school feeding programme started in 2004 and the programme has been from January 2006 till date. It was preceded by a pilot programme, which carried out from September to December 2005 (NEPAD School Feeding Programme, 2005).

The Food and Agriculture Orgainsation FAO (2007) estimated that about 923 million people in the world were chronically hungry. Many of these are children and a vast majority of them are in developing economies (FAO, 2007). These statistics are greatly worrying and raises a multitude of concerns. Paramount among these is that, the Millennium Development Goals (MDGs) related to hunger and malnutrition may not be met by 2015 in most parts of the developing world. Research has shown that the physical effects of malnutrition as measured by indicators such as Body Mass index (BMI) have significant impact on the individual's productivity and wages (Broca and Stamoulis, 2003). Jomaa *et al.* (2011) state that "childhood under nutrition imposes significant economic costs on individuals and nations and that improving children's diets and nutrition can have positive effects on their academic performance and behaviour at school as well as their long-term productivity as adults". Alderman *et al.* (2006) found that malnutrition led to delayed entry to school, less overall schooling, small stature and 14% lower earnings as adults.

Policy makers over the years in different parts of the world have used a couple of interventions to get various sub-populations within their jurisdiction through social safety nets to address the problem of hunger and

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malnutrition. One of these interventions that governments and non-governmental orgainsations (NGOs) have utilised in targeted areas where a significant proportion of the population faces poverty and chronic hunger is Food for Education (FFE). The United States and the United Kingdom utilised FFE as early as the 1930s to improve children's health (Gokah, 2008). These early programmes took the form of School Feeding Programs (SFP), where participants were fed a meal or snack at school. As a social safety net, FFE programmes have also gained popularity among political leaders and policy makers in developing countries in Asia, Africa and Latin America. The 2011 World Food Prize was shared by John Agyekum Kufour, former president of the Republic of Ghana and Luiz Inacio Liva Silva, former president of Brazil for successful social programmes including school feeding, that each nation has established. Brazil and India have established school feeding programmes by passing legislations. Brazil for instance have added school feeding to its constitution (Brundy *et al.*, 2009). While in 2001, the Supreme Court of India mandated that state governments must provide cooked meals in targeted schools (Afridi, 2010).

The government of Ghana is not an exception with regards to putting in place measures that aim to improve the lives and livelihoods of its citizenry including the welfare of school children. In the context of the New Partnership for Africa Development (NEPAD's) Comprehensive African Development Programme (CADP), the Government of Ghana (GoG) set-up the Ghana School Feeding Programme (GSFP). Its concept of home grown school feeding addresses one of the United Nation's (UN's) three pillars to fight hunger (United Nations, 2005). 'The government of Ghana was of the view that the if the School Feeding Programme was properly funded and implemented, the hunger, education and the food security and poverty landscape in Ghana will change for good (Government of Ghana, 2006).

The GSFP operates under the umbrella of providing children in public primary schools and kindergartens in the poorest areas with one hot, nutritious meal per day using locally-grown foodstuffs. Local is conceptualised as involving the local community, the district and lastly, the national level. In the view of Tomlinson Mark (2007), Home Grown School Feeding (HGSF) aims to reach 50 million children of school age worldwide by 2015.

The GSFP has as its immediate objectives to; reduce hunger and malnutrition, to increase school enrolment, attendance and retention and to boost domestic food production which ultimately will lead to a robust and resilient local economy.

Anecdotally, before the inception of the Ghana School Feeding programme (GSFP), school children in deprived and remote areas in Ghana used to receive food aid from organizations such as the Catholic Relief Services (CRS), the United States Agency for International Development (USAID), the World Food Programme (WFP), and World Vision International (WVI) among others. The interventions put in place by these organizations included feeding children in schools as well as giving female school children take-home rations. It was a strategy of attracting children particularly girls to attend school regularly. One was only qualified for the take home ration based on regularly school attendance throughout the whole term. The take home rations comprised basically wheat, sorghum and cotton seeds oil. Unlike the current School Feeding Programme (SFP), the previous ones implemented by the above organisations relied on imported food.

The Ghana School Feeding Programme (GSFP) has as its immediate objectives to; reduce hunger and malnutrition, to increase school enrolment, attendance and retention and to boost domestic food production. Considerable progress has been made in some regard but there are a couple of concerns that are worth reflecting upon as well. On the bright side, the GSFP has brought about an increase of about 12.8% in primary school attendance and 23.1% in kindergartens (SNV, 2008). In the Northern Region enrolment in basic schools has increased from 4.3% to 5.4% between 2007/08 and 2009/10 academic years (Ghana Statistical Service, 2010).

However the objective of reducing hunger and malnutrition has been partially achieved. Half of school children are served food daily during the 2008 operational year (SNV, 2008). Also, the programme's objective of boasting domestic productivity is becoming a façade as statistics on the procurement of local foodstuffs in beneficiary communities are greatly worrying. There are no established procurement models or procedures that serve as guiding principles for caterers or suppliers of the foods purchased for preparation on the programme. According to inventory of the Ghana School Feeding Programme by SNV, it was only in the Eastern region that more than 20% of food was bought from local farmers, in all other regions, less than 20% of food was purchased locally (SNV, 2008).

Studies by SEND-Ghana, ESCASARD and SNV have independently concluded that there has been limited impact of the Ghana School Feeding Programme on local farmers (ESCARSAD, 2010; SEND, 2010). According to the reports there have been limited supports in terms of credits and inputs to farmers to produce and access the programme's market. Procurement of food from local communities could boost the patronage of locally products including rice. This is however under serious threat from importation. Rice for instance is the first cereal in Ghana accounting for 58% of cereal imports (Coalition for African Rice Development, 2010). Purchase of locally produced rice for instance could be an incentive to local rice producers. The programme has also deviated from its concept of targeting the poorest regions of the country as statistics from SNV (2008) did indicate that regions with the highest level of poverty have the lowest number of GSFP schools. In another regard, the 2007 action plan's target was that 50% of the schools should have a school garden by the end of that year, yet only 16.4% of the schools had a school garden at the end of 2007 (SNV, 2008). As a result of the above problems the research intends to find out whether the GSFP is succeeding in its implementation, and if it is not, identify the implementation gaps.

2. Literature Review

2.1. Historical Analysis of School Feeding Programmes (SFPs) in Ghana

School Feeding Programmes (SFPs) in Ghana have existed since time immemorial. The Catholic Relief Services (CRS) since 1997 through the United States Agency for International Development (USAID) Pl 480 Title II resources have targeted the northern regions of Ghana in a bid to increase enrolment and attendance especially for girls. Before focusing on educational interventions, the earliest Title II programmes addressed emergency feeding, school feeding and dispensing of rations at health centers to encourage mothers to bring their children for vaccinations, weighing, measuring and nutrition information. The maternal and child health programmes was a mainstay of the Catholic Relief Services (CRS) until the late 1980s. Under pressure from the United States Agency for International Development (USAID) to direct its activities to the poorest regions in Ghana, Catholic Relief Services (CRS) in 1989 moved away from maternal and child health and began centering more on school feeding programmes (Edwards *et al.*, 2010). The rationale was based on the fact that; education increases women's opportunities for income generation throughout their lives; educated women provide better health care for their children and educated farmers (women as well as men) produce more crops than do uneducated farmers. CRS-USAID School Feeding Programme (SFP) benefited children in primary schools (average 6-12 years) as well as those at the pre-school level. Each child in a programme school is entitled to a hot lunch a day and the girls who are able to make a monthly attendance of 85% or more are given a take home ration.

The current Ghana School Feeding Programme (GSFP), an initiative of the United Nations Hunger Task Force installed by Kofi Annan (the then UN Secretary General) and the Comprehensive African Agricultural Development Programme (CAADP) pillar 3 of the New Partnership for Africa Development (NEPAD) seeks among others to enhance food security, reduce hunger and improve enrolment and retention among school children. Ghana was one of the ten countries in Sub-Saharan Africa selected to implement the School Feeding Programme (SFP) in public primary schools in the country, starting with a pilot phase in September 2005. The programme is part of Ghana's efforts to attain the United Nations Millennium Development Goals (MDGs) on extreme hunger and poverty, achieving universal primary education, promoting gender equality and reducing child mortality.

The formulation of the Ghana School Feeding Programme started in the year 2004 and the first phase of the programme started to run from January 2006 until December 2010. Before the commencement of the first phase, a pilot programme was carried out in ten schools; one in each of the ten regions of Ghana from September to December 2005 (NEPAD School Feeding Programme, 2005).

2.2. Ghana School Feeding Programme (GSFP)

The Ghana School Feeding Programme (GSFP) was initiated by the Government of Ghana in 2005, in collaboration with the Dutch Government. The programme was inspired by the Comprehensive African Agriculture Development Programme (CAADP) Pillar 3 of NEPAD and the recommendations of the UN Millennium Task Force on Hunger. Its stated long term goal is to contribute to reducing poverty and enhancing food security in Ghana (GSFP, 2010). The GSFP seeks to achieve its objectives of boosting domestic food production; increasing school enrolment, attendance and retention among kindergarten and primary school children; and reducing hunger and malnutrition, thus contributing to the achievement of the Millennium Development Goals. The Government's strategy is to provide meals daily, on school days, to children in public kindergarten and primary schools (Ministry of Food and Agriculture, 2011).

The first operational phase of the Ghana School Feeding Programme (GSFP) took off in two weeks after the launching of the programme, involving 138 schools, one in each District of Ghana and provided one hot meal a day for about 38,000 pre and primary public school children all over Ghana (Adelman *et al.*, 2011).

According to Adelman *et al.* (2011), the first phase of the GSFP which was implemented over a 5-year period (2006-2010) covered about 200,000 pupils in the first year and additional 300,000 pupils each year for the remaining years up to about a cumulative 1,500,000 children by the year 2010.
A study by Adelman *et al.* (2011) indicated that in 2009, the programme was shifted from pilot to mainstream status and that within two years the programme was expected to be extended from primary to Junior High School level. The study further stated that the programme cost 30 cent a day to feed a child totaling to 60 euros per a year of 195 school days therefore the total budget for the pilot programme for the five-year period was estimated at USD 328 million (270 million Euros) comprising of a total Capital Expenditure of USD 15 million and Operating Expenditure of USD 287 million and other expenditure of USD 26 million. This analysis shows that if local farmers in the districts or communities where the GSFP is implemented are the sole producers or suppliers of foods to the caterers, it means that all the monies quoted for the programme will be retained domestically to boost the economy of Ghana.

In another report, the MoE (2014) reiterated that four hundred thousand more pupils benefited from the Ghana School Feeding Programme, beginning the 2013/2014 academic year which brought the total number of pupils benefiting under the initiative to two million. As at the end of 2014, it was estimated that 1.6 million pupils were benefiting from the programme, which was in its eighth year.

The main challenge for the GSFP had been with budgetary constraints because the government of Ghana is now the sole financier of the GSFP (GSFP/AOP, 2010). Initially the programme was financed by the Netherlands government from 2005 to 2010 when they stopped.

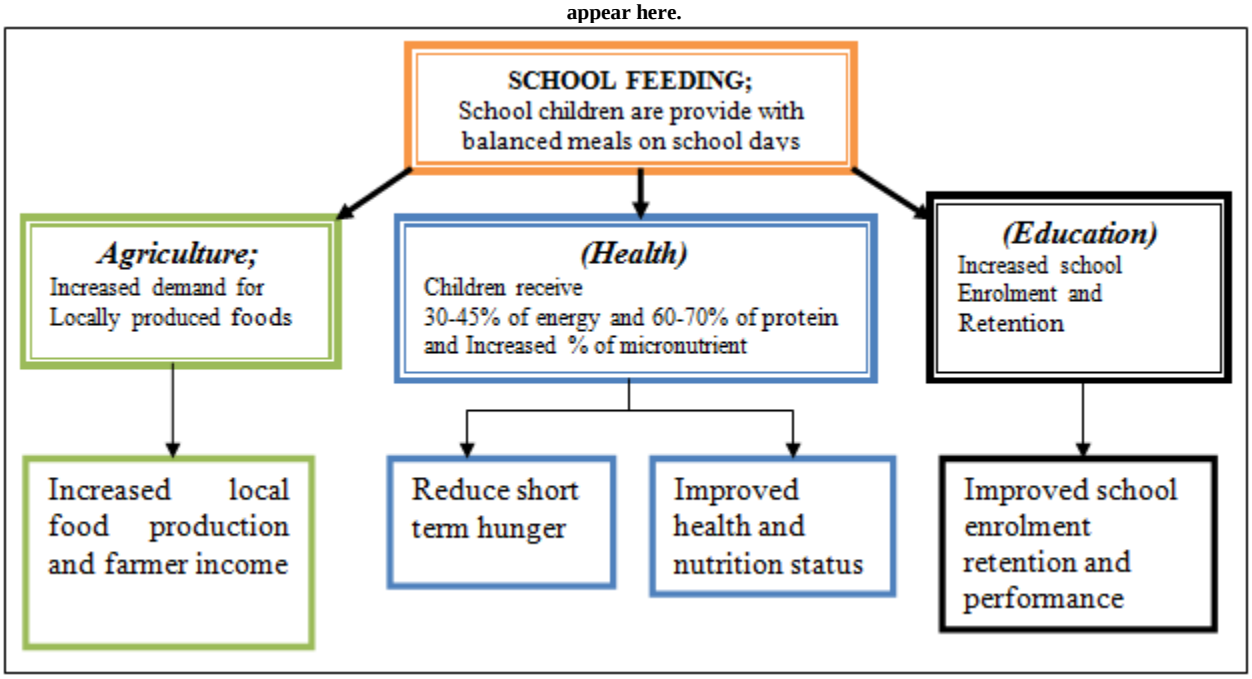
However, the programme receives technical assistance from the Partnership for Child Development, the World Food Programme and SNV, a Dutch NGO.

2.3. Operational Concept of the Ghana School Feeding Programme (GSFP)

The basic concept of the GSFP is to provide children in public primary schools and kindergartens in the poorest areas of the country with one hot, nutritious meal per day, using locally grown foodstuffs. The long term goal of the school feeding programme is to contribute to poverty reduction and food security in Ghana. The immediate objectives are to reduce hunger and malnutrition, attendance and retention; and to boast domestic food production (GSFP Annual operating Plan, Government of Ghana). This obviously will have a positive impact on the local economy.

Figure 1 illustrates the possible impacts of the Ghana School Feeding Programme as an intervention to reduce hunger and malnutrition using locally produced foods. As illustrated in the diagram, there are 3 main outcomes of the GSFP, namely; increased demand for locally produced foods, increased school enrolment and increased nutrient intake of school children. The first box on the top of the diagram represents the basic idea of the Ghana School Feeding programme. Boxes with green lines specifically illustrate the programme's impact on agriculture, the boxes with blue lines represents its impact on the health of school children, while the boxes with black lines illustrate the impact on education.

Figure-1. Conceptual framework of School Feeding Programme **Error! Use the Home tab to apply 0 to the text that you want to appear here.**



Source: Adopted from NEPAD 2005b

2.4. Implementation Strategies and Principles

The GSFP concentrates on schools in the most deprived and poorest areas of the country where the incidence of poverty is high and access to and enrolment in primary education, retention and completion is very low. In the programme document the selection criteria for schools from communities at the district level are enumerated as follows:

- Poverty status based on Ghana Living Standards Survey (GLSS) data and the National Development Planning Commission (NDPC) poverty mapping
- Low school enrolment and attendance rates and Gender Parity Index (GPI)
- High school drop-out rate
- Low literacy levels
- Presence or planned provision/expansion of health and nutrition interventions
- Poor access to portable water
- High communal spirits and /or community management capability
- Willingness of the community to put up basic infrastructure (e.g kitchen, store-room, latrine) and to contribute in cash or kind
- Commitment of the District Assembly towards the programme and the level of readiness and interest towards sustaining the programme
- Communities/schools not already covered by other feeding programmes

3. Research Methodology

3.1. Profile of the Study Area

The study was carried out in four districts of the northern region of Ghana namely Tamale Metropolis, East Gonja District, Savelugu-Nanton Municipality and Karaga District. The Northern Region, which occupies an area of

about 70,383 square kilometres, is the largest region in Ghana in terms of land area. It shares boundaries with the Upper East and the Upper West Regions to the north, the Brong Ahafo and the Volta Regions to the south, and two neighbouring countries, the Republic of Togo to the east, and La Cote d' Ivoire to the west.

The land is mostly low lying except in the north-eastern corner with the Gambaga escarpment and along the western corridor. The region is drained by the Black and white Volta and their tributaries, Rivers Nasia, Daka. The climate of the region is relatively dry, with a single rainy season that begins in May and ends in October.

3.1.1. Profile of the Tamale Metropolis

The Tamale metropolitan Assembly is located at the centre of the northern region. It lies between latitude 9.16^0 and 9.34^0 N and Longitude 00.36^0 and 00.57^0 (Tamale Metropolitan Assembly, 2013). Its altitude is about 180 M above sea level. The Metropolis has Tamale as its administrative capital. It shares borders with the Savelugu/Nanton municipality to the North, Mion District to the East, Tolon District to the West and East Gonja District to the West. It has a population in the range of between 350,000 to 450,000 people even though the 2000 Population and Housing Census (PHC) put the population of the Metropolis at 293,881 (Tamale Metropolitan Assembly, 2013). Apart from Metropolitan Tamale where there is ethnic diversity, almost all people in the surrounding villages are Dagombas. Islam is the predominant religion in the Metropolis. An estimated 60% of the population is engaged in agricultural activities. Major cultivated crops include maize, rice, yam, sorghum, millet, cowpea and groundnuts. Tamale Metropolis has the greatest number of school pupils fed by GSFP and also the highest rice producing district in 2010 (Ministry of Food and Agriculture, 2011).

3.1.2. Profile of the Savelugu-Nanton Municipality

Savelugu/Nanton District is one of the eighteen administrative districts of the Northern Region. It was established by PNDC Law 207 under the Legislative Instrument of 1988. It was carved out of the then Western Dagomba District Council, which included Tolon/Kumbungu and Tamale Metropolitan Assembly. The District is located in the Northern Region of Ghana. It shares boundaries with West Mamprusi in the North, Karaga to the East, Tolon/Kumbungu in the West and Tamale Metropolitan Assembly to the South. The District's total land area is 1790.70 sq. km (Savelugu-Nanton Municipal Assembly, 2013). The 2000 Population and Housing Census (PHC) placed the Municipal's population at 91, 415 (Savelugu-Nanton Municipal Assembly, 2013). With a growth rate of 3%, the Municipal's population was projected in March 2006 to be about 109,442. Savelugu is the capital of the municipality. The Municipal Assembly remains an agro-based economy engaging about 97% of the labour force; majority of who produce crops on subsistence basis. Income levels are extremely low as majority of the produce depend on rain-fed agriculture. Agro-processing is largely done by traditional methods and on very small-scale basis. There are however efforts by external support to upgrade technologies especially for women in the processing of sheanut, groundnuts, rice, cotton ginnery and soap manufacturing.

3.1.3. Profile of the East Gonja District

East Gonja District is located at the South-eastern section of the Northern Region of Ghana. The district lies between Latitude 8.0^0 N & 9.29^0N and, Longitude 0.29^0 E and 1.26^0W (East Gonja District Assembly, 2013). It shares boundaries with Yendi municipal and Tamale metropolitan to the North, Central Gonja District to the West, Kpandai Districts to the East, and the Volta and Brong Ahafo Regions to the South. The administrative capital is Salaga**.** The district is endowed with rich natural resources and tourism. The 2000 Population and Housing Census put the population of the East Gonja District at 174,500 (Special Reports) and it is currently estimated at 197,932 using an annual rate of growth 2.1% per annum (East Gonja District Assembly, 2013). The income levels are generally low and irregular over the year. The greater proportion of the people is either engaged in subsistence agriculture, small-scale industries or petty trade. Incomes of this category of people are usually irregular or seasonal. Islam predominates in the East Gonja District. Traditionally, Salaga was a world renowned centre of excellence in Islamic education and an important slave market. The town has a long tradition of Islamic schools, with learned Islamic scholars mentoring a large number of students from across West Africa and the Sahel.

3.1.4. Profile of the Karaga District

Karaga District is one of the twenty six (26) districts in the Northern Region. The District is located in the North-Eastern corridor of the Northern Region, roughly between latitudes 9°30' and 10°30' North and longitudes 0° and 45'West (Karaga District Assembly, 2013). Karaga is the administrative capital. It shares boundaries with four districts in the Northern Region, West Mamprusi District and East Mamprusi District to the North, Savelugu/Nanton Municipal to the West and Gushiegu (the mother district) to the east. Karaga the district capital is 24km from Gushegu and 94km from Tamale, the northern regional capital. The 2000 Population and Housing Census (PHC) estimate the district's population to be 62,719 (Karaga District Assembly, 2013). Mixed farming is the prevailing farming system. Besides crop cultivation, the average family raises a variety of livestock and local poultry. With regards to crop production, semi-permanent to shifting cultivation is practiced. In Karaga, rice is the second largest crop after soya beans since 2000 to 2010 (Ministry of Food and Agriculture, 2011).

3.2. Data Sources

Data for the study was drawn from both primary and secondary sources. Secondary data comprising statistics on the Ghana School Feeding Programme (GSFP) and rice production was obtained from the School Feeding Programme coordinators and the Food and Agriculture Department at each of the Metropolitan, Municipal and District Assemblies where the study was carried out. Other sources of secondary data include; books, articles, journals and reports amongst others. Primary data was obtained from the field through focus Group Discussion and interviews.

3.3. Sample Size Determination

Data available from the Northern Regional Secretariat of the Ghana School Feeding programme indicates that as at 2015, the numbers of caterers engaged in the study were as follows:

Tamale Metropolis 34
Karaga District 28
East Gonja 34
Savelugu District 38

The sample size for both caterers and rice farmers in the selected districts was calculated using the Snedecor and Cochran (1998) formula for a point estimate sample;

The sample size would therefore be;

$n= z^2pq/d^2$ …… (1)

Where n= sample size, z= Z- score of a 95% confidence level of the study equivalent to 1.96, p= estimated number of rice farmers or GSFP caterers, q= estimated proportion of rice farmers whose products are not bought by the GFSP caterers (1p) d= margin of error of the study thus 100%- 95% = 5% in this study

Therefore the sample size =

$n= (1.96)^2*0.5(1-0-5)/ 0.05^2$

n=120

This implies that 120 respondents will be involved in this study. A total of 80 rice farmers will be interviewed whilst 40 caterers of the GSFP will also be interviewed.

3.4. Sampling Techniques/Procedures

Simple random sampling technique was used initially in the selection of the GSFP beneficiary communities. This was to ensure that each beneficiary community has an equal chance of being selected. Within each beneficiary community, snow-ball sampling was used in reaching out to local rice producers. In each community, the rice producers were selected using snowball sampling. This was to enable the study reach out to other rice farmers through the identified or targeted ones.

Purposive sampling was used in selecting 10 caterers from each of the four research communities giving us a total sample size of 40.

3.5. Data Collection Techniques

Focus group discussions and survey questionnaire were the main techniques of eliciting data from the respondents. Data elicitation started with a focus group discussion convened in one of the research areas. A focus group is 'carefully planned discussion designed to obtain perception on a defined area of interest in a permissive non-threatening environment (Krueger, 1988).

The reason for adopting this technique according Dakurah (2012), is to give room for further revision of the questions through insights that might come from the discussion. The focus group with a membership of 10 involved separate sessions for men and women. The FGDs tried to explore factors that influence the purchase of rice from local rice producers by caterers of the GSFP and the willingness of rice producers to sell their produce to the caterers. The FGD sessions were recorded with a tape recorder and transcribed into themes.

The study also adopted structured questionnaires to collect data from the rice farmers and the caterers. The questionnaire was sectioned into the various study objectives. De Vans (1995) used 'questionnaire' as a general term and distinguished between face-to-face, telephone and mail as different methods of administration. In the case of this study, face-to-face interviews were employed. Both open-ended and closed-coded questions were captured in the survey questionnaire.

3.6. Model Specification

A three-input translog production function can be written in terms of logarithms as originally specified by Christensen *et al.* (1973) as

$\ln Q = \alpha_0 + \beta K \ln K + \beta L \ln L + \beta M \ln M + ½ \beta KK \ln K2 + \beta KL \ln K \ln L + \beta KM \ln K \ln M ½ \beta LL \ln L2 + \beta LM \ln L \ln M + ½ \beta MM \ln M2 + \mu$ …… (1)

Where Q= output variable, α = constant term, β = coefficients of variables to be measured, KLM = input variables, μ = error term.

The empirical tranlog model for the study is given as:

$Ln (Y) = a_{0+} a_1Ln(X_1) +…..+a_6 +Ln(X_6) + 0.5[Ln(X_1)^2+……..+a_6Ln(X_6)^2] + a_{12}$

$Ln (X_1) Ln(X_2) +…..+a_{16}Ln(X_1)Ln(X_6) +a_7 X_7 + Ɛ$ ……(2)

Where Y = Rice output, Variable X_1 = Insecticide Usage, X_2 = Farm Labour, X_3 = Total Farm Size, X_4 = Age of Farmer, X_5= Fertilizer Application, X_6= Extension Visits, X_7 = Access to GSFP and Ɛ = Error term.

Variable Estimation Procedures

Dependent Variable

Quantity of Rice output (Y): The volume of production of rice is measured in kg. Rice farmers output was estimated using total rice harvest in 2011 season. Farmers could not provide standard unit of measurement. Data indicated quantity of rice in bags (cocoa sack) which was converted in kg.

Independent Variables

Farm Labour (X_1): It is a continuous variable, measured in man-days. Farm labour in this study comprises both family and hired labour. The study used the total number of labour man-days used by sampled rice farmers in 2011. This variable could have a positive or negative influence on farmer output.

Total Farm Size (X_2): The total size of rice farm land owned by a farmer is among the variables that could influence both output and supply. It is a continuous variable, measured in hectares and is expected to influence output positively. Farmers were asked to indicate to the total land size of their rice farms during the last harvest.

Extension Visits (X_3): This is a continuous variable measured as the number of extension visits farmers got from extension officers in 2011. This variable is expected to influence output and supply of rice positively. Obviously, as farmers learned more they would produce more and supply or participate more in a market.

Access to a GSFP Market (X_4): This is a dummy variable with a value of 1 for farmers who have access to the GSFP market and 0 for those who do not. Access here has been defined at two levels; farmers who sold their paddy rice directly to GSFP and those who sold through local millers. This variable is therefore estimated using the combined effect of direct and indirect access to the GSFP market. The a priori expectation for this variable is positive. As farmers have access to the market created by the GSFP, their output will increase output. Zeller et al (1997) were of the view that increased productivity by smallholder farmers is influenced by availability of markets.

Age of farmer (X_5): Age is continuous variable and measured in years. The expected influence of age is assumed positive or negative taking the presumption that as farmers get older they could acquire skills and hence produce more. It is also a proxy measure of farming experience. However younger farmers could and could produce and sell more than older farmers as suggested by Tshiunza *et al.* (2001).

Insecticide Usage (X_6): This is a continuous variable measured in litres. Farmers were asked to provide data on litres of insecticides applied to their rice farms in 2012. The a priori expectation of the effect of insecticide on production is mixed.

Fertilizer Application (X_7): This is also a continuous variable measured in kilograms and the apriori expectation is positive. This represents the total quantity of fertilizer applied by farmers to their rice farms during the year under consideration. As the farmer applies more fertiliser to his rice field, it is expected that farm yield will increase.

3.7. Quality Control Measures

The following measures were adopted to ensure that the quality of the data.

Training: A training session was held for the research assistants who assisted in the data collection to ensure that valid and reliable data were collected. The training equipped the enumerators much insight into the questionnaires and what it was targeted to achieve or measure.

Pre-testing of questionnaires: There was a pilot survey to pre-test the questionnaires in order to refine and restructure the questions. The pre-testing was done in the Tamale Metropolis. The pre-testing was to compare the responses with the objectives of the study. It was done to help restructure the questions to conform to the research objectives.

Double entries of data: Double entry of data was done after which the two data sets will be compared at the analysis stage. This helped in identifying some omissions during the data entry.

3.8. Ethical Considerations

Permission was sought from the District Directors of MOFA in the study districts before embarking on the study. The questionnaires were also be approved by the District Directors before they were administered.

Informed consent of the respondents was also sought and in the consent form, the objectives and significance of the study were clearly stated and explained to the prospective respondents. Respondents were given opportunity to partake in the data collection or reject the offer at will.

Anonymity and confidentiality of the actual sources of information obtained from the study was ensured by not indicating the names of enumerators and respondents who took part in the study. Cleary the names of these individuals were not provided on the data collection tools and therefore no clues were provided for someone to trace the source of information.

The recorded tapes of the focus group discussions were not made available to any other person after transcription so the voice recordings of those who took part in it could not be recognized.

4. Results and Discussions

4.1. Characteristics of Respondents

Table 1 indicates that rice farming is dominated by male across the four districts. On the whole majority of the sampled farmers (about 51%) have no formal education, the highest level of education of farmers is the SHS level where only 10 farmers representing 12.5% of the respondents came from Tamale metropolis and Savelugu-Nantong district. This goes to confirm the Ghana Statistical Service report about the educational statistics of the northern region of Ghana in the 2010 Population and Housing Census where the literacy rate in Tamale metropolis was relatively higher than other districts. Of course the number of education facilities in the Tamale Metropolis far outweighs those of the other study districts. Also majority of the farmers grow crops as their main occupation as 73 farmers representing about 91% of the total sample population across the four districts are engaged in crop farming as their main occupation. Interestingly 30 of the farmers representing about 38% earn more than 50% of their crop income from rice production while the remaining 50% earn either less than 50% (19 farmers) or about 50% (26 farmers) of their crop income from rice production. Seventy-three 73% (58 respondents) of the rice farmers belong to Farmer Based Organizations (FBOs) and in fact all the respondents from Tamale Metropolis and Savelugu-Nantong districts have FBOs membership. This is an interesting development as far as linking the farmers to the GSFP is concern. According to World Food Programme (2007), direct procurement from individual small-scale farmers to meet the food requirements of the school feeding programme may be impractical. This is because the surpluses produced by the majority of small-scale farmers can be so small that the logistical resources necessary to collect the quantity of food needed would make the procurement effort time-consuming and expensive (World Food Programme, 2007). Farmer groups provide various services required by farmers, such as distributing agricultural inputs, collecting and marketing members‟ agricultural produce, conducting grading and quality control and, at times, providing transportation. Through farmer groups, smallholders can be more attractive to customers and companies offering credit for agricultural inputs. The district with the least number of farmers belonging to FBOs is East Gonja. Out of the sample, the district has only 5 rice farmers being FBO members with the remaining 15 not belonging to any FBO.

Rice farmer's data also showed that 48% of them did not have any relationship with the Ghana School Feeding Programme. However quite a significant number of 37 out of the 80 respondents supply rice to GSFP caterers with 3 and 2 farmers supplying other foodstuff and providing market information respectively to caterers. In effect 52% of the sample respondents had some relationship with the Ghana School Feeding Programme by way of selling their paddy rice or other foodstuff to caterers or providing them with market information, Rice farmers in the study districts especially in Tamale metropolis are producing mostly on commercial basis. Finally the knowledge about the existence of the Ghana School Feeding Programme is widespread among farmers. About 96% of the farmers are aware of the programme with a basic idea of what the programme does.

Table-1. Characteristics of Rice farmers (categorical) N = 80

Variable	Level	District				Total
		Tamale	Savelugu	East Gonja	Karaga	
Gender	Male	19	20	18	18	75
	Female	1	0	2	2	5
Total		**20**	**20**	**20**	**20**	**80**
Education	Primary	1	1	0	1	3
	JHS	6	4	1	1	12
	SHS	4	4	2	0	10
	Arabic Educ	1	11	0	2	14
	No Educ	8	0	17	16	41
Total		**20**	**20**	**20**	**20**	**80**
Main Occup	Livestock	2	0	1	0	3
	Crops	18	20	18	17	73
	Petty Trading	0	0	0	3	3
	Sal. Worker	0	0	1	0	1
Total		**20**	**20**	**20**	**20**	**80**
Crop Income	less than 50%	5	6	1	18	30
	About 50%	9	12	3	2	26
	More than 50%	6	2	11	0	19
	About 100%	0	0	5	0	5
Total		**20**	**20**	**20**	**20**	**80**
FBO Member	No	0	0	15	7	22
	Yes	20	20	5	13	58
Total		**20**	**20**	**20**	**20**	**80**
Relationship with GSFP	Rice supplier	18	15	2	2	37
	Provide info	0	0	2	0	2
	Other foodstuff	0	0	3	0	3

	Not related	2	5	13	18	37
Total		**20**	**20**	**20**	**20**	**80**
Farming system	Peasant	0	12	3	13	28
	Commercial	20	8	17	7	52
Total		**20**	**20**	**20**	**20**	**80**
Awareness of GSFP	No	0	0	2	1	3
	Yes	20	20	18	19	77
Total		**20**	**20**	**20**	**20**	**80**

Source: Field Survey, 2015

Table 2 shows the demographic characteristics of caterers of Ghana School Feeding Programme. From the survey 55% of the 40 sampled caterers are within the ages of 31 and 40 years which is an indication that the caterers are mostly young women with enough strength to perform their duties. Only 2 of the caterers are aged between 51 to 60 years and one each came from East Gonja and Karaga Districts. In terms of education, majority of the caterers just like the rice farmers have no formal education as 13 of them representing about 33% have no formal education. Ten (10) caterers had attended Junior High School while 6 had Arabic Education with 3 each for Primary, SHS and tertiary education. From the data, Karaga district had the highest number of caterers without any formal education.

Additionally the results from table 2 suggest that majority of the caterers depend on the School Feeding Programme as their main occupation. This is because 75% of the caterers reported that the catering services they render serve as their main source of income. Only about 18% and 7.5% are engaged private businesses and formal sector employment respectively as their main occupations. The conclusion here is that the catering contract is mostly given to individuals who are usually not already in employment This development is very crucial in ensuring that caterers would have enough time to concentrate on their job especially with regards to buying paddy rice and other foodstuffs directly from farmers and to process them before preparing the meals for school children. Finally the results also suggest that a greater number of the caterers (26 out of 40) have been engaged for up to 5 years at the time the data was collected. Eight (8) caterers had the longest service period having being engaged with the Ghana School Feeding Programme for up to 8 years with seven 7 of them coming from Karaga district. None of the caterers had served up to 10 years.

Table-2. Characteristics of GSFP Caterers categorical N= 40

		Tamale Metro	**Savelugu/ Nantong**	**East Gonja**	**Karaga**	**Total**
Age	20-30yrs	3	1	0	2	6
	31- 40yrs	7	9	4	2	22
	41-50yrs	0	1	4	5	10
	51-60yrs	0	0	1	1	2
Total		**10**	**11**	**9**	**10**	**40**
Level of Educ	Primary	1	0	0	0	3
	JHS	3	3	2	2	10
	SHS	0	2	1	0	3
	Tertiary	1	0	2	0	3
	Arabic Educ	2	4	2	0	6
	Non formal	1	1	2	0	2
	No Educ	2	0	1	8	13
Total		**10**	**10**	**10**	**10**	**40**
Main Occupation	GSFP catering	9	10	4	7	30
	Private busines	1	0	3	3	7
	formal sector	0	1	2	0	3
Total		**10**	**11**	**9**	**10**	**40**
Years of Engagement	0-2yrs	0	2	4	0	6
	3-5yrs	10	8	5	3	26
	6-8yrs	0	0	1	7	8
	10yrs and above	0	0	0	0	0
Total		**10**	**10**	**10**	**10**	**40**

Source: Field Survey, 2015

4.3. Effect of the Programme on Output of Rice Farmers in the Selected Districts

Table 3 presents the regression results for the transcendental logarithmic production function. The R-squared value of 0.9235 implies that, about 92.4% of the variations in the dependent variable are explained by the variations in the independent variables. The F-statistic value of 388.5 shows the fitness of the model which explains the explanatory power of all the independent variables put together on the dependent variable. This is significant at 1%.

From the table all the variables are statistically significant with the exception of insecticides, age, extension visits and access to Ghana School Feeding Programme. The variables that met the a priori expectations are farm labour (significant at 10%), farm size and fertilizer application (both significant at 1%). The effect of these two variables on farm output is consistent with the findings of Apostolidis *et al.* (2008). Farmer access to GSFP which is the main variable of interest has positive effect on rice output. Farmers who had access to the Programme had 3 percent more output than those who do not but this margin of a difference is not statistically significant. In contrast, Kamara (2004) and Zeller *et al.* (1997) found that increased agricultural productivity by smallholder farmers is influenced by improvement in market access. Improvement in access to the GSFP perhaps is the major challenge of the programme.

Table-3. Results of the tranlog model on rice output N=80

Variable	Coefficient	STD Error	t-value	P-Value
lnExtension	-0.359	0.517	-1.24	0.218
lnfarmsize	4.281***	0.546	4.80	0.000
lnfarmexeerience	-0.062	1.171	-0.25	0.806
lnfertiliser	2.498***	0.409	3.78	0.000
lninsecticied	0.703***	0.280	3.96	0.000
lnfarmlabour	0.076*	0.172	2.17	0.033
AcceeGSFP	0.163	0.172	1.63	0.108

***sig at 1%
*sig at 10%
R-square 0.75
F-statistics (28,71) = 388,50
Prob F = 0.000
Source: Field Survey, 2015

5. Conclusions and Recommendations

5.1. Conclusions

Rice farmers across the study districts do not have direct access to the Ghana School Feeding Programme as more GSFP caterers buy milled rice from local millers than paddy rice. This is largely due to the fact that farmers are not supported to process the paddy rice they produce. Another factor that hinders farmers‟ accessibility to the GSFP market is delays in the release of feeding bursaries to caterers and farmers unwillingness to sell on credit. Selling to the Ghana School Feeding Programme is not encouraging farmers because prices offered by caterers are below their expectation; quantity of rice they produce is not enough to meet caterers demand.

5.2. Policy Recommendations

The recommendations are measures that can be put in place to strengthen the relation between farmers and caterers, increase local purchase and make the situation for the market relation between caterers and farmers more favorable

Firstly, in order to facilitate easy farmers' access to GSFP market, the GSFP secretariat and government for that matter should contract caterers on permanent basis focusing on those who can spend their time and energy to buy local foodstuffs including paddy rice directly from farmers. This is because one of the reasons why most caterers do not want to buy paddy rice from farmers is there are engaged in other business activities and do not want to add the processing aspect as part of their income generating activities. It is therefore for ideal to recruit individuals who are not in any employment.

Secondly the disbursement of feeding bursaries should also be timely such that it coincides with the harvesting or peak period when prices of foodstuffs including rice are generally low. In this regard, it may also be possible for the government to assist financially through subsidies or grants or by providing some inputs to farmers to increase their output order to meet their demand schedules of caterers

Also government in collaboration with the Ghana Education Service should provide adequate storage facilities in all GSFP schools. With this, caterers will not have much problem stocking paddy rice which they can buy from farmers. The list of all rice farmers in GSFP communities will assist caterers to locate farmers easily. From the literature caterers are assisted by cooks to provide food for the pupils. It is therefore possible for a caterer to allow the cooks to assist them in processing the paddy rice bought from the farmers since the farmers do not have inadequate capacity to process the rice themselves.

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