

SUMMARIES OF MASTER OF PHILOSOPHY STUDENTS' RESEARCH

**Ghana Strategy Support Program
International Food Policy Research Institute**

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Preface

Established in 2005, the Ghana Strategy Support Program (GSSP) is a research, communication, and capacity-strengthening program to build the capabilities of researchers, administrators, policymakers, and members of civil society in Ghana to develop and implement agricultural and rural development strategies. With core funding from the U.S. Agency for International Development (USAID), the International Food Policy Research Institute (IFPRI) launched GSSP as a partnership between Ghana and its development partners.

To contribute to graduate education in Ghana and strengthen capacities as well as to make research done in the country more relevant for policy making, GSSP initiated a scholarship program in the 2012/2013 academic year for MPhil students in the social sciences on topics related to agriculture and rural development. Specifically, students in Economics, Agricultural Economics, Agribusiness, and Agricultural Administration in the public universities of Ghana were considered for an award. The scholarship program was aimed at enhancing the relevance of research to improving the effectiveness of agricultural and rural development policies and strategies in Ghana. A total of 35 students were awarded scholarships as follows: University of Cape Coast (3), University for Development Studies (6), University of Ghana (17) and Kwame Nkrumah University of Science and Technology (9).

The program provided a modest stipend to selected students and funded field research of the students. The financial support assisted in the satisfaction of the thesis requirement for the MPhil degree of the students. In addition to the theses, the students prepared research briefs which have been edited, reorganized and compiled into this publication as research summaries. The content of the summaries reflect the materials provided by the students in their research briefs.

Shashidhara Kolavalli
Program Leader, GSSP

A. ADOPTION STUDIES

1. Smallholder adoption of soil and water conservation techniques in Ghana¹

Abdul-Hanan, Abdallah

Intensifying crop production to boost food security and help eradicate hunger and poverty while at the same time maintaining agricultural resource sustainability is an important policy issue. This has been recognized in Ghana's medium and long-term agricultural development programs. Indeed, sustainable land management is the first pillar of the Comprehensive Africa Agriculture Development Program (CAADP), yet adoption of improved land management practices remains low. For example, average application of fertilizer in Africa south of the Sahara is only about 10 kg of nutrients per hectare, which is the lowest in the world according to FAO data.

In Ghana, both governmental and non-governmental organizations have introduced a number of soil and water conservation (SWC) techniques, but adoption rates are lower than what prevails elsewhere on the continent. The present study aims at providing national level empirical evidence on the rate of adoption of SWC techniques by farmers and how such adoption affects yields and factor productivity. Given that maize is the single most important staple crop in Ghana SWC on maize farms is used as a case study. The specific objectives of the study were to: (i) identify the determinants of adoption of SWC technologies; (ii) examine the effect of adoption of SWC techniques on maize output, (iii) identify the level of technical efficiency of and its determinants among maize farmers.

The results revealed a positive relationship between the number of SWC technologies adopted and farm size, household size, membership of cooperatives, and access to credit, but an inverse relationship with years of education, number of extension visits and distance to market. The number of SWC technologies adopted was also greater among male than female headed households. It is observed that adoption of SWC techniques has significant positive effect on maize yield. It is also observed that maize farmers in Ghana are only half as efficient as they could be using the same levels of input. This indicates that there is room to increase output by an average of 50% from current levels without increasing input amounts at the

¹ This summary is from a dissertation submitted to the University of Development Studies for the award of the degree of Master of Philosophy in Agricultural Economics.

present level of technology. Factors found to have influenced farmers' technical efficiency levels were education, household size, extension visits, credit and distance to the market. Female farmers were more technically efficient than their male counterparts.

2. Factors influencing adoption of plantain technologies in the Atiwa district of Ghana²

Anumu, Dominica Janet Efua

The level of plantain productivity in Ghana is low compared with other African countries such as Cameroon and Kenya. There is currently a gap between average yield (approximately 11 Mt/Ha) and achievable yield (20 Mt/Ha). Among other factors, low adoption of improved farm practices has been seen as a major reason for the observed productivity gaps. Over the past two decades, about US\$1.3 million has been spent by both the government and donor agencies on plantain technology development. These investments notwithstanding, yields remain low. There is paucity of information on plantain-specific production technologies as well as the level of smallholder farmers' knowledge on the same.

In the light of these, the current study set out to identify factors influencing adoption of plantain technologies in a leading plantain growing district—the Atiwa district of Ghana. The specific objectives of the study were to: (i) identify plantain technologies that have been developed in Ghana; (ii) assess the level of awareness of available plantain production technologies by farmers, and identify factors influencing awareness; (iii) assess plantain farmers' perceptions of developed plantain technologies; and (iv) identify the determinants of adoption of these technologies.

The study's participants included research scientists from the University of Ghana, the Crop Research Institute, Kumasi, and a sample of famers from the Atiwa District. A structured questionnaire was administered to a sample of 400 plantain farmers. The sampling procedure involved a two-stage sampling approach where in the first stage 10 plantain growing communities were purposively sampled and then 40 farmers were randomly selected from each community.

The study identified nine plantain technologies which have been developed to increase productivity through pest control, rapid multiplication of planting material and high yielding varieties. Out of these technologies, 54% of the farmers were aware of seven of them. Number of agricultural extension visits, years of formal education and membership of

² This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Administration.

farmers' group positively affect awareness of plantain technologies. Among the technologies identified, farmers had positive views about paring (direct planting), split corm (nursery production with sawdust) and the high yielding variety (FHIA 21). Adoption rate was highest for paring with 39% of farmers applying the technique. Less than 2% of farmers had adopted the other technologies. Perceived relative advantage of new technology over an existing one, opportunity to observe and try the new technology, mode of communication (such as radio, television or through extension agents), access to credit, number of visits by agriculture extension agents, and farmers' group membership were the factors that influenced adoption of new plantain technologies.

3. Improved rice variety adoption and its effects on farmers' output in Ghana³

Bruce, Abel Kwaku K.

The Savanna Agricultural Research Institute (SARI) and the Crop Research Institute (CRI) have conducted extensive research generating improved rice varieties based on on-farm trials in various part of Ghana. However, there still exists a large gap between yields from on-farm demonstration plots (6.5 Mt/ha) and actual average yields from farmers' fields (2.4 Mt/ha).

This study therefore sought to investigate what factors may be responsible for the yield gap. It is hypothesized that low adoption of improved technologies resulting from socio-economic and institutional constraints impacts negatively on yields and rice farmer incomes. Specifically, the study had the following objectives: (i) to analyze the determinants of adoption of newly improved rice varieties in nine selected communities in Ghana; and (ii) to estimate the effect of adoption of newly improved rice varieties on farmers' income.

The findings of the study show that the probability of adoption was greater for the following: farmers with formal education; farmers who received extension advice; farmers who applied fertilizer, and famers who had large farms. The adoption of improved rice varieties also led to increased output. These results are consistent with other empirical research including those that evaluated the effects of the Asian Green Revolution.

While rice output is driven by the adoption of improved seeds, it is also enhanced by inputs such as agricultural credit, extension services and formal education. The results also suggest that although smallholder farmers appreciate the possible effect of adopting the improved rice varieties on their output and income, access to complementary inputs constrain adoption.

³ This summary is from a dissertation submitted to the University of Development Studies for the award of the degree of Master of Philosophy in Agricultural Economics.

4. Impact of Radio Peace on disseminating agricultural information to farmers in the Central region of Ghana⁴

Folitse, Benjamin Yao

Farmers' access to accurate agricultural-related information in a timely manner can contribute to improved agricultural production. The radio can be an effective medium for the provision of information on improved farm practices to farmers. Radio Peace, a Central Region-based radio station, is known for the dissemination of agricultural information. This study therefore seeks to examine the impact, if any, of Radio Peace's information dissemination programs on farm activities in the region.

Specifically, the study seeks to *(i)* examine the extent to which farmers use agricultural information disseminated through the radio station; *(ii)* determine the level of impact the radio station has had on farmers' livelihoods; and *(iii)* identify challenges associated with the dissemination of agricultural information through radio.

Simple random, stratified and purposive sampling techniques were employed for sampling the study's participants. First, five districts and municipalities within the catchment area of the radio station in the region were selected. Next, from these communities, 198 farmers each from those who listen to the radio station and those who do not listen to the radio station were interviewed making up a total sample size of 396. A structured questionnaire was then administered after being subjected to face and content validity tests.

Among the respondents who listened in to agricultural related programs, 37% were female, and for the group that did not listen to such programs 42% were female. From the results of the study, a higher average agricultural information utilization score was observed among the group that listened to the radio programs than among the group that did not listen. A statistically significant difference in information utilization was observed between the two groups. Although there were different levels of impact of radio information utilization on farmer livelihoods by district location, in general, positive impact was observed across all districts in terms of adoption of technology and use of good agricultural practices.

⁴ This summary is from a dissertation submitted to the University of Cape Coast, Ghana, for the award of the degree of Master of Philosophy in Agricultural Extension.

The major limitation of using radio as an agricultural information dissemination tool from the farmers' perspective was their inability to ask adequate number of questions, if at all, on the various subject matter due to short duration of the programs. The timing of the programmes which could conflict with farm or domestic activities was also cited as a major limitation by farmers.

5. Adoption of improved technology and farm level technical efficiency of small-scale oil palm producers in the Western region of Ghana⁵

Johnson, Emmanuel Nimbuen

Oil palm is one of the strategic crops under Ghana's Food and Agricultural Sector Development Plan (FASDEP II). Recent production figures indicate a substantial increase in production particularly when compared with leading African producers such as Cameroon and Côte d'Ivoire. However, there is still a wide production gap between Ghana and Africa's leading producers although this gap has been reducing over time.

One of the factors contributing to the production gap is low productivity even by West African standards. Among other factors, this situation has been attributed mainly to low adoption of improved oil palm production technologies. It is hypothesized that the adoption of improved technologies leads to improved technical efficiency and increased productivity.

The primary objective of this study was therefore to assess the role of improved technology adoption on technical efficiency of small-scale oil palm producers in the Western Region of Ghana. The specific objectives were to: (i) examine the intensity of adoption of improved technologies in oil palm production; (ii) assess the factors that influence the adoption of improved technologies by small-scale oil palm producers; (iii) determine the factors that influence technical efficiency of small-scale oil palm producers.

Seven categories of improved oil palm technologies were identified in the study region. It was observed that smallholder producers who belong to an outgrower scheme (produce to supply oil palm factory) adopted all the seven improved technologies identified compared with six for those who did not belong to any such scheme. The difference between the two groups of farmers is that outgrowers have a ready market for their produce and the others have to search for buyers from time to time. It was also observed that average productivity among smallholder outgrowers was significantly higher (17 tons/ha) than that of independent producers (7 tons/ha).

It was observed that smallholder outgrowers achieved higher technical efficiency than independent producers. Among the independent producers, adoption of improved technologies and number of years of farming were important determinants of technical

⁵ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

efficiency. For smallholder outgrowers, frequent contact with extension and number of years of production experience were the most important factors that contributed to deriving higher output from using the same levels of resources.

6. Factors influencing the adoption of organic fertilizers in vegetable production in Accra⁶

Lavison; Robert Kofi

Sustainable agriculture connotes perpetuity and continuance in profitable production. It involves agricultural practices that do not deplete available resources that support agriculture. The level of inorganic fertilizer use is very low in Ghana, about 8 kg/ha according to the Ministry of Food and Agriculture. Among other factors, fertilizer utilization is constrained by high cost and uncertain returns under rainfed agriculture. In addition, inorganic fertilizers do not improve soil physical properties such as moisture retention capacity and bulk density, among others. The use of organic fertilizers on the other hand has the capacity to improve soil physical properties while avoiding negative consequences such as contamination of ground water. Thus, sustainable agriculture can be better achieved through the utilization of organic fertilizers.

In Ghana, fertilizer used on vegetables, particularly in urban agriculture production is common but there is paucity of information on the benefit-cost analysis of organic versus inorganic fertilizer use on vegetables. This study sought to contribute to the literature by addressing the following research questions: What is the rate of organic fertilizer use in vegetable production? What factors influence the adoption of organic fertilizers in vegetable production? What are the transactions cost associated with organic fertilizers usage among vegetable producers? What is the net benefit of using organic fertilizers rather than inorganic fertilizers in vegetable production? And what are the constraints associated with organic fertilizers used by vegetable farmers? These questions were addressed using a sample of vegetable farmers from Accra.

The study found a fairly high rate of organic fertilizer use by vegetable farmers in Accra—about 45% of vegetable farmers sampled were using organic fertilizers. Poultry manure was the most common type of organic fertilizer used and was obtained from poultry farms in and around Accra.

The determinants of organic fertilizer use included income of farmer and type of market channels such as supermarkets, selling to local market retailers, and direct selling to the consumer. It was observed that the use of organic fertilizers was associated with higher

⁶ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agribusiness.

search and transportation costs than the use of inorganic fertilizers. According to the vegetable farmers, the bulky nature of organic fertilizers is the most pressing constraint to its use. However, net benefit in terms of profit from using organic fertilizers rather than inorganic fertilizers was higher.

7. Farmer field forums and adoption of yam integrated pest and disease management technologies⁷

Opore-Atakora, Daniel Yaw

Agricultural technology information packaging and delivery has important implications for both the decision to adopt and level of adoption of improved technologies. Farmer Field Forums (FFF) is one of the methods through which agricultural technology and innovation information can be delivered to farmers. This study examined the role of FFF in the adoption of yam Integrated Pest and Disease Management (IPDM) technologies. Specifically, the objectives were to: (i) compare the level of knowledge of participants and non-participants of yam IPDM technologies before and after FFF training; (ii) examine the effect of participation in FFF on the level of adoption of yam IPDM technologies; (iii) determine the effect, if any, of participation in FFF on farmers' income.

The study locations were the Nanumba North and Kpandai Districts of Northern region. These districts were purposively chosen because of their dominance in yam production and the availability of training in yam IPDM using FFF. Four communities were selected from each district—two participating communities and two non-participating communities each. At the final stage, 20 participating farmers in the project community and 20 untrained farmers outside the project community were randomly sampled, yielding a sample size of 240 individual farmers. Data collection methods included focus group discussions using a checklist and farmer interviews using a semi-structured questionnaire.

The results show that FFF was effective as an educational tool and resulted in increased knowledge of IPDM technologies among participants. In addition, FFF resulted in behavioral change as all participants adopted IPDM technologies. Although some of the non-participants adopted the technologies adoption rate was higher among participants.

On the determinants of adoption of IPDM technologies, the result showed that the probability of adoption is greater among young farmers, large farm owners, farmers with access to credit and farmers participating in FFF. Finally, FFF participants had higher income compared with their non-participant counterparts.

⁷ This summary is from a dissertation submitted to the University of Development Studies for the award of the degree of Master of Philosophy in Innovation Communication.

B. AGRICULTURAL PRODUCTIVITY AND EFFICIENCY ANALYSES

8. Technical efficiency of maize production in northern Ghana⁸

Abdulai, Shamsudeen

Maize is probably the single most important staple food crop in Ghana and accounts for more than 50% of total cereal production and is produced in all agro-ecological zones. Nonetheless, the yield of 1.7 Mt/Ha is less than a third of the achievable yield of 6.0 Mt/Ha. Increasing maize productivity in a sustainable manner depends, among other things, on the efficiency of current production practices and by extension the technical efficiency of maize farmers.

The literature suggest that technical efficiency is influenced by socio-economic, technological and location factors. This study therefore sought to empirically analyze the extent to which these factors limit maize productivity and technical efficiency. The specific research objectives were to: (i) determine the level of technical efficiency of maize production across the three regions of northern Ghana; and (ii) identify the socio-economic and location specific characteristics that influence technical efficiency in maize production.

The results indicated significant variation in mean technical efficiency across the regions. Mean efficiency estimates were 85%, 74% and 71% for the Upper West, Upper East and Northern regions respectively, yielding mean technical efficiency of 74% for the entire sample of maize farmers in northern Ghana. Clearly, there exists some level of technical inefficiency in all the regions. For instance, a mean efficiency of 74% for northern Ghana implies that the average farmer attains only 74% of 'achievable' output. The determinants of technical efficiency in maize production in northern Ghana are farm mechanization, farming experience and gender.

⁸ This summary is from a dissertation submitted to the University of Development Studies for the award of the degree of Master of Philosophy in Agricultural Economics.

9. Production risk and technical efficiency of irrigated rice farms in the Greater Accra and Volta regions of Ghana⁹

Adinku, Edith Ogboo

Beside maize, rice is the most important food staple in Ghana and its consumption is on the increase. The demand for rice, however, outweighs domestic supply, meaning that the difference has to be met through imports. The annual rice import bill is estimated at about US\$ 500 million which clearly is a drain on the country's foreign exchange.

Increasing domestic production is critical for addressing the huge supply gap. But first, it is important to assess the utilization of available technologies. Given that risk considerations are important when choosing between production plans, it is necessary to account for such in assessing the performance of rice production. This study is concerned with three fundamental questions: (i) What are the contributions of available inputs to output? (ii) What production risks exist with respect to input use? and (iii) What is the level of technical efficiency of rice farmers and what factors influence this?

These questions were addressed using data from the Greater Accra and the Volta regions of Ghana.

The results show that variations in observed output from the highest possible level is due to technical inefficiency; that farmers in the Greater Accra region are more efficient than their counterparts in the Volta region; that rice output is directly related to seed, fertilizer, and mechanization; that the factors that affect production risk are seed, labour, fertilizer and mechanization; that whereas risk is inversely related to the use of fertilizer and mechanization, it is directly related to the use of labour and planting material; that deviation in output is due to technical inefficiency and random noise effects beyond the control of the farmer; that the deviations resulting from technical inefficiencies are more pronounced than that due to pure noise. Improving farmers' access to credit, encouraging membership of farmer organizations, improving land preparation and planting methods all contribute to farmers getting the most possible output from using current levels of input.

⁹ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agribusiness.

10. Effect of MiDA intervention on productivity of maize farmers in the Afram Basin of Ghana¹⁰

Agyekum, Afia Fosua

Low land productivity is one of the major agricultural sector challenges in Ghana. A US government sponsored intervention through the Millennium Development Authority (MiDA) was therefore aimed at, among others, increasing land productivity for specific crops including maize. This program was implemented between March 2008 and February 2012 in three agricultural zones including the Afram Basin. The program's effect on the productivity of maize is the focus of this study.

The study has two specific objectives: (i) to solicit the views of maize farmers on the MiDA intervention; and (ii) to estimate the effect of the intervention on maize productivity.

The analysis is based on a cross-sectional survey of 100 maize farmers who participated in the MiDA program and 200 maize farmers who did not participate in it. The sampling procedure was as follows. First, a list of program participating FBOs was obtained from the relevant MoFA district offices. Second, 25 participant farmers were randomly selected to ensure representation of each FBO group. In respect of non-participant farmers, a list was obtained from MoFA district offices after which the farmers were serially numbered and the first fifty farmers in each serially generated list was selected.

The results show that the majority (81%) of farmers in the sample held favorable views of the MiDA interventions including its contribution to increased maize yields by participating farmers. The main limitation of the intervention, according to the farmers, was the late purchase of maize output by MiDA. Average maize yield was indeed higher among sampled participant farmers than among sampled non-participants—1.51 Mt/Ha among the former and 0.86 Mt/Ha among the latter. Also, the study revealed that while there was no significant difference in mean yield between participant males and females a statistically significant difference was observed by gender among the sample of non-participants, with females having significantly lower mean yields.

Results from an average treatment effects model based on propensity scores suggest that participation in the MiDA program has a positive and significant effect on maize productivity with participation increasing yields by 0.67 Mt/Ha.

¹⁰ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

11. The effect of mechanization on the productivity of rice farms in southern Ghana¹¹

Apiorsornu, Emmanuel K.

Providing irrigation infrastructure and enhancing farmer access to farm machinery were major interventions proposed in Ghana's medium term development plan. In line with this, the government has been investing in irrigation infrastructure as well as importing farm machinery under various programs in recent years. Rice is one of the primary target crops of such mechanization initiatives. This study therefore was aimed at analyzing rice productivity effects of farm mechanization in southern Ghana. The study investigates the relationship between activity specific mechanization intensity and productivity of rice farms.

The specific research objectives are to: (i) measure the level of mechanization access achieved by rice farmers; (ii) examine the determinants of intensity of mechanization on rice farms; and (iii) estimate the effect of mechanization intensity on rice productivity.

The analysis was based on data from 360 randomly selected farmers from rice growing communities in the Shai-Osudoku and Ketu-North districts. The sample consists of 92 females and 268 males who were interviewed using a structured questionnaire.

The study found that out of a total of eleven activities on the rice farms, motorized equipment is used to undertake an average of six of them. Farmers mechanized at least one of the following activities: tillage, irrigation, harvesting, threshing, transportation and winnowing. Activities such as planting, weed control spraying, insect control spraying, fertilizer application, and drying have not been mechanized due to the unavailability of machinery.

Only about 26% of farmers have mechanized half or more of rice farm activities. About 74% of rice farmers were operating at 45% or less mechanization levels. It was observed that increased intensity of any type of mechanization is associated with higher average productivity. This is particularly true for tillage, threshing, and transportation. The study also found that mechanizing harvesting on small, wet, weedy and muddy fields was associated with lower average productivity.

¹¹ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

12. Fertilizer use intensity and productivity of smallholder rice farmers in the Ahafo-Ano South district¹²

Asare, Sarah

Ghana's agriculture is dominated by small-scale farmers operating farms of less than two hectares and characterized by low technology use. Consequently, productivity of factor inputs is low. Rice has increasingly become an important staple crop across the whole of Ghana and demand continues to increase, putting a large foreign exchange burden on the economy.

In order to meet the growing demand for rice from local sources the productivity of current production systems must be increased several folds. This would undoubtedly require more intensive production system and increased use of fertilizers in particular. Yet, fertilizer use intensity in Ghana is one of the lowest in the world, estimated at 8 kg/ha compared with 20 kg/ha for Africa south of the Sahara.

These figures are based on national averages but fertilizer use intensities are expected to differ by crop and production location. This study was to empirically analyze fertilizer use intensity among rice farmers and the effect on rice productivity. The specific objectives of the study were to: (i) evaluate the intensity of fertilizer use by smallholder rice farmers; (ii) identify factors that influence the intensity of fertilizer use by smallholder rice farmers; and (iii) estimate the effect of fertilizer use intensity on productivity of rice.

The study was based on a case study sample of smallholder rice farmers in the Ahafo-Ano South district of the Ashanti region because of its potential in rice production. A sample of 120 farmers was drawn using a list of smallholder rice farmers from five major extension operating areas of the Ministry of Food and Agriculture in the district.

It was observed from the results of the analysis that, on average, total fertilizer use intensity of smallholder rice farmers' in the study area was 1.896 kg/ha. Fertilizer use intensity was found to be increasing with farmer's age and frequency of agricultural extension contacts but decreasing with off-farm earnings. As one would expect, rice productivity was found to be increasing in fertilizer use intensity. Other determinants of rice productivity in the study areas include farm size, labour input and agrochemical use.

¹² This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

13. Economic efficiency of chili pepper producers in the Volta region of Ghana¹³

Asravor, Jacob

Ghana has been identified to have a competitive advantage over other African countries in chili pepper production. Notwithstanding, the country is currently ranked fourth in chili pepper production in Africa after Egypt, Nigeria and Algeria, although Ghana commits the largest land area (70,000 Ha) to the crop. Low productivity of chili pepper has been attributed to constraints such as pests and disease, low adoption of improved chili pepper production technologies, and inefficiencies arising from the use and allocation of production resources. Owing to inadequate resources to introduce innovative technologies, improving available resource use efficiency is necessary for increased productivity. The study therefore seeks to determine the key drivers of current levels of productivity of chili farmers and also to identify some of the key constraints militating against the attainment of highest possible output under current constraints.

Using a sample of 200 chili pepper farmers from the Volta region of Ghana the study seeks to primarily analyze the determinants of farm level economic efficiency of chili pepper producers. The study had four specific objectives: (i) to determine the level of productivity of chili pepper producers with respect to various production inputs; (ii) to estimate the technical, allocative and economic efficiency of the chili pepper farmers; (iii) to identify the determinants of economic efficiency of chili farmers; and (iv) to identify and rank the major constraints of chili pepper farming.

The study found that chili pepper output is influenced by farm size, labour use, and quantity of seed used. Chili farms in the study area have decreasing returns to scale, implying that a proportionate increase in all inputs result in a less than proportionate increase in chili output. The average farm is also operating below the economically efficient frontier and this is largely due to the presence of both technical and allocative inefficiencies. Technical inefficiency effects constitute a more serious problem to economic efficiency than allocative

¹³ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

inefficiency effects. Improvement in technical efficiency offers a higher potential for enhancing economic efficiency than allocative efficiency.

Current economic efficiency level of the farms implies that the ability to produce a predetermined level of output at lower cost is still low on average and needs to be improved. Difficulty in accessing credit, lack of market and lack of irrigation facilities are among the key factors militating against the attainment of highest possible chili pepper output.

14. Effects of sustainable agricultural practices on maize productivity among women farmers in the Savelugu-Nanton district of Ghana¹⁴

Crentsil, Emelia Mansah

Sustainable agriculture in the light of climate change has been of great concern globally, especially for vulnerable groups like women. The adoption of Sustainable Agricultural Practices (SAP) aimed at addressing the negative impacts of climate change on agricultural productivity, especially in semi-arid regions has become more crucial than ever. In Ghana, there are indications that the level of adoption of SAP is low and that extension agents do not have the adequate capacity to assist farmers to adopt the practices.

In the Northern Region of Ghana, the effects of climate change are manifest through shifting rainfall patterns and more frequent droughts and floods. This places a further strain on food security and livelihoods of already vulnerable groups particularly women farmers.

This study therefore was to examine the effects of SAP on the productivity of maize, one of the most widely cultivated staple crops, among women farmers. Specifically, the study was to: (i) identify types of SAP adopted by women maize farmers; (ii) empirically estimate the effects of SAP adoption on women's maize productivity; and (iii) examine the constraints to the adoption of SAP by women farmers.

The analysis was based on a sample of women farmers drawn from the Savelugu-Nanton district in the Northern region of Ghana. The study identified seven SAP adopted by women maize farmers to reduce the impacts of climate variability on maize productivity. The most common SAP adopted was mounding while the least adopted was fallowing. The latter was due to the scarcity of land in the district. On the effect of SAP adoption on maize productivity, it was observed, as expected, that maize productivity increased as the number of practices (SAP) adopted increased.

An analysis of SAP adoption constraints showed that lack of access to credit, limited labour input, limited access to land and output markets were the major bottlenecks.

¹⁴ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agribusiness.

15. An assessment of the distributional impact of fertilizer subsidies in Ghana¹⁵

Dauda, Hambali

Fertilizer use is low in Ghana even by African standards, particularly among small-scale farmers. In 2008, the government of Ghana introduced a national voucher-based fertilizer subsidy, the first of such large scale subsidy system since market liberalization in 1991. This study was aimed at assessing the implementation of the program in terms of nature of distribution, and on private fertilizer market, effects on fertilizer use and crop output.

The objectives of the study were to: (i) determine the distributional effects of government fertilizer subsidy; (ii) examine the effects of the subsidy program on private fertilizer market; and (iii) assess the effect of the fertilizer subsidy program on rural farmers' fertilizer use and farm output.

The study was based on an analysis of household survey data. The approach was to collect, organise and analyse data at the micro scale.

It was found that the number of bags of subsidized fertilizer purchased were strongly and positively associated with wealth. That is, resource rich famers purchased significantly more subsidized fertilizers to the disadvantage of resource poor smallholders. It was also observed that receipt of fertilizer does not improve the welfare of families that were most vulnerable to food insecurity. Evidence of crowding out was also found as purchases of subsidized fertilizer led to a displacement of commercial fertilizer. It was observed that farmers who had access to subsidized fertilizer used more fertilizer in the major season although this seemed not to impact on their output.

Fertilizer subsidies therefore appear not to be well targeted as the vulnerable benefited less from the policy than their wealthier counterparts.

¹⁵ This summary is from a dissertation submitted to the Kwame Nkrumah University of Science and Technology, Kumasi for the award of the degree of Master of Philosophy in Economics.

16. Financial viability and economic efficiency of cocoa agroforestry systems in Ghana¹⁶

Nunoo, Isaac

Most of the new cocoa plantings in Ghana are taking place in the Western region where approximately 80% of farms have been established without shade or less than 10% canopy cover. This indicates pronounced trade-off between short-term cocoa productivity, ecosystem health and biodiversity. Despite their higher yield potential, plantations exposed to sunlight and grown without fertilizer experience rapid yield declines with time, and often suffer from early senescence.

This current practice of cocoa production is making cocoa farming unproductive over time and reducing productivity without the heavy application of chemical inputs. Under such production systems two important questions beg answering: what is the financial viability of such production systems? and what is their economic efficiency? Consequently, this study had the primary objective of assessing the financial viability and economic efficiency of cocoa agroforestry systems in Ghana. Specifically, the study sought to: (i) investigate the perception of cocoa farmers about cocoa agroforestry systems; (ii) determine yield trends under various cocoa agroforestry systems and examine the Net Present Value, Benefit Cost Ratio and Internal Rate of Return to existing cocoa agroforestry systems in Ghana; and (iii) estimate the technical, allocative and economic efficiency of the various cocoa agroforestry systems in Ghana.

The study was based on a case study of one of the highest cocoa producing districts in the country, the Sefwi-Wiawso district of the Western region. The methodology of the study included: exploratory visit, reconnaissance survey and a socio-economic survey. A multistage sampling technique was used in selecting five communities from the district from which 40 cocoa farm households were randomly sampled from each community and interviewed using a structured questionnaire.

It was observed that the cocoa landscape in the district consisted of 25% production under no shade, 37% production under low shade, 23% under medium shade and 15% under heavy

¹⁶ This summary is from a dissertation submitted to the Kwame Nkrumah University of Science and Technology, Kumasi for the award of the degree of Master of Philosophy in Agricultural Economics.

shade. This suggests that the majority of cocoa farms in the sample will have to be replanted in less than 20 years because no shade cocoa has a shorter life span.

Under the no shade system, an initial sharp rise in yield is observed followed by a sharp fall till the end of the rotation period. This is not the case in the other cocoa agroforestry systems. For example, for the medium shade system there is first a gradual rise in yield reaching peak yield before gradually declining. It was also observed that medium shade cocoa agroforestry system was the most viable among the systems studied while the no shade system was the least viable.

The estimates show that mean economic efficiency was lowest under the no shade system and highest under the medium shade system. The study also found significant differences in technical, allocative and economic efficiency between the various cocoa agroforestry systems. The use of labor, insecticide, fungicide, fertilizer and weedicide were all significant determinants of technical efficiency under the various cocoa agroforestry systems.

17. Economic viability of the slash and char system for carbon sequestration and agricultural productivity among smallholder farmers in Ghana¹⁷

Otabil, Prince Kwesi

Slash-and-char has been identified as an alternative to the slash-and-burn method of land preparation as the former is noted to have less negative environmental consequences. Thus slash-and-char is seen as a climate change mitigation measure. An important question in the context of small-scale farming in Ghana is whether slash-and-char is a feasible alternative to slash-and-burn which is known to release significant amounts of carbon dioxide into the atmosphere.

This study thus set out to: (i) determine the operational cost and profitability of the slash-and-char system; and (ii) identify barriers to the adoption of slash-and-char.

The study was conducted in two agroecological zones—the semi-deciduous forest zone and the Guinea Savanna. Data was acquired from secondary sources but was supported by qualitative data obtained through interviews. Data on existing cost of production from the slash-and-burn system was obtained from the Ministry of Food and Agriculture (MoFA). There were also consultations with researchers from CSIR relating to yield projections and fertilizer requirements for both systems.

From the analysis, annual operational cost for maize production under slash-and-burn was estimated at between GH¢ 867 and GH¢ 1,774 per hectare depending on location. Under slash-and-char, the use of biochar increases total maize production cost to between GH¢ 7,054 and GH¢ 10,127 per hectare under the assumption of two tons of biochar application per hectare.

Depending on location and assuming biochar application rate of two tons/hectare, switching from slash-and-burn to slash-and-char results in a per hectare average income loss of GH¢ 5,141. So although slash-and-char promises to be more environmentally friendly practice there is a potential income loss to the farmer.

Since the application of biochar has long term agronomic benefits, the study examined possible effects over time. Considering the application of two tons of biochar and assuming a six-year time horizon, the simulation analysis suggests a negative Net Present Value at the

¹⁷ This summary is from a dissertation submitted to the Kwame Nkrumah University of Science and Technology, Kumasi for the award of the degree of Master of Philosophy in Agricultural Economics.

farmer level. So although slash-and-char sustains a cleaner environment, a farmer may not be financially motivated to change from slash-and-burn to the proposed carbon sequestration practice. Further simulation analyses suggest that switching from the slash-and-burn to slash-and-char would mean a farm income trade off of between GH¢ 466 and GH¢ 952 per hectare.

Looking beyond private benefits, however, the analysis suggests that the proposed carbon sequestration practice could have an overall positive welfare effect on the economy. A higher per hectare NPV was estimated for maize production under slash-and-char than under slash-and-burn when considering the entire economy. Thus although an individual farmer may find the slash-and-char practice less attractive, it is beneficial to the economy as a whole. The opportunity cost per ton of carbon sequestered was estimated at GH¢ 851.

It must also be noted that the adoption of the new carbon sequestration practice could be a leakage since resources for the production of biochar have alternative uses and thus using the resource for biochar production may have implications for forest depletion.

Barriers to the adoption of slash-and-char are low institutional capacity, inappropriate location of farmlands, inadequate knowledge and high initial cost of the technology.

18.Smallholder oil palm production schemes and oil palm productivity in the Mpohor-Wassa East district, Western region of Ghana¹⁸

Prempeh, Alexandra Boame

There is a large export market potential for Ghana's oil palm industry due to rising world demand. There is also a vastly unmet market demand for oil palm products in West Africa. However, this potential has not been fully exploited because oil palm production is dominated by smallholders whose productivity is low due to constraints related to input access, information and low technology. The introduction of production schemes in the Mpohor-Wassa East district could serve as a tool for smallholder commercialization by integrating their activities into formal agribusiness models to increase competitiveness and incomes.

An important research question is whether such schemes are indeed productivity enhancing. To answer this overarching question the study addresses the following research questions: *(i)* What types of oil palm production schemes exist in the district? *(ii)* Are there differences in input use patterns and improved production practices among farmers in the different schemes? *(iii)* What constraints do farmers face under existing schemes? *(iv)* What factors affect participation of smallholders in oil palm outgrower schemes in the district? *(v)* What is the productivity effect of participation in the schemes?

The methodology used to address the above questions was as follows. After purposively selecting the Mpohor-Wassa East district due to the presence of established oil palm processing companies implementing the production schemes of interest, a stratified random sampling technique was used to draw 148 participating farmers: 71 outgrowers (farms are scattered and the processing plants buy produce from them under some loose arrangements) and 77 nucleus-smallholders (farms are close to the processing plants and they are under obligation to sell to the plants). Given the unavailability of a sampling frame, 60 independent farmers were also selected using snowballing sampling technique. Key informant and individual interviews were conducted using unstructured and structured instruments respectively.

¹⁸ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

The findings of the study are as follows. The nucleus-smallholder and outgrower schemes were identified as the two formal oil palm production schemes in the study area. It was observed that nucleus-smallholders received more inputs in their input bundle (a package of different types of production inputs) than outgrowers. More intensive input use patterns which may be different from what they receive from the processing plants were observed among nucleus-smallholders than among outgrowers and independent farmers. Following nucleus-smallholders, it was observed that outgrowers use relatively higher quantities of inputs and apply them at regular intervals than independent farmers. Additionally, nucleus-smallholders had better oil palm production practices than outgrowers and independent farmers.

In respect of constraints, unavailability of credit facilities and low output price offers were ranked as the most important in the view of outgrowers and nucleus-smallholders respectively.

The econometric estimates show that the likelihood of participation in outgrower schemes was higher with increasing age, household size, land ownership holding size or tenure, farm size, risk attitude and access to cheaper seedlings, and lower with decreasing distance to nucleus-firm's processing mill. The results also suggest that participation in the schemes enhanced productivity relative to being independent. However, average productivity among participants in the nucleus scheme was approximately 1.8 times higher than that among participants in the outgrower scheme. Thus, it can be concluded that it is better to be in a scheme than to be independent, but within the schemes nucleus-farms are better than outgrowers.

19. The effect of land tenure security on the productivity of food crop farmers in the West Mamprusi district of Ghana¹⁹

Samwini, Cephas Joshua Beujung

Land tenure security is intimately tied to the productivity of land because security of tenure may influence access to credit, demand for farm inputs and medium to long term investment decisions. Ghana's recent poverty reduction and agricultural development policies have emphasized the strengthening of land tenure security through land reforms as an important priority.

This study therefore sought to provide an empirical analysis on the relationship between land tenure security and food crop productivity. Specifically, the study was to: (i) assess the land tenure security status of farm land; and (ii) examine the extent to which land tenure security affects food crop productivity.

The study was based on a random sample of 214 farmers chosen from the study district. The sampling frame, a list of farmers in the operational areas of the Ministry of Food and Agriculture, was obtained from the district. A structured questionnaire was administered to the selected farmers which solicited information on socio-economic characteristics, farm production for the 2012 season, sources of farmer land and land rights, among others.

The results of the study showed that about 48% of farmlands among the sampled households were acquired through inheritance, 30% through borrowing from other farmers and landlords and 2% as gifts. About 13% of farmland operated by women was obtained from their husbands.

It was observed that about 48% of farmlands were perceived to be held with maximum security while about 52% were held with moderate, limited or minimum security. Average size of land held under maximum security was significantly larger than those held otherwise. Most of the lands acquired through inheritance were deemed as having maximum tenure security.

The study found that holding land with maximum tenure security had a positive effect on crop productivity. Indeed, the estimated land productivity among farmers with high tenure

¹⁹ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agribusiness.

security was 21% higher than those that held land with low tenure security, all other factors held constant.

20. Economics of technical change in rice production in the Ejura-Sekyedumase and Atebubu-Amantin districts of Ghana²⁰

Tsinigo, Edward

Low productivity of rice in Ghana is a major concern for not only rice farmers but also for policy makers and crop breeders who are interested in increasing and sustaining agricultural productivity through productivity-enhancing technologies. One such technology is the improved rice variety called NERICA rice. Improved rice varieties may change the optimal levels of inputs used and therefore the productivity of farmers who embrace it. Adopting an improved variety may also increase demand for cash for the purchase/hiring of inputs and thus may translate into increased cost of production. For resource constrained farmers, this is a major limitation to the adoption of the improved variety. Consequently, in spite of NERICA's yield potential, adoption rate in Ghana has been reported to be only 6%. Therefore, an understanding of the economics of the NERICA variety might be important in explaining the unacceptably low adoption rate.

This study therefore was to investigate the economics of technical change in rice production in Ghana using the Ejura-Sekyedumase and Atebubu-Amantin districts as case studies. The study had two specific objectives: (i) to investigate the reasons for the low adoption of NERICA rice; and (ii) to establish the impact of technical change in rice production on productivity.

A three-stage stratified random sampling method was used for selecting 280 rice farmers from the two districts. A semi-structured questionnaire was administered to the sampled farmers while an interview guide was used for collecting information from key informants.

The results of the study suggest that the observed low adoption of NERICA was due to: high fertilizer and labour requirements; lack of adequate information on the variety; and difficulty in acquiring production inputs. These were in spite of the observation that NERICA increases average productivity and profitability by about 46% and 149%, respectively. It was observed that the high variability in rice yield was the result of reallocation of inputs from

²⁰ This summary is from a dissertation submitted to the Kwame Nkrumah University of Science and Technology, Kumasi for the award of the degree of Master of Philosophy in Agricultural Economics.

traditional to improved rice and the intensity of adoption of recommended technologies in rice production.

21. Economic efficiency of layer production in Brong-Ahafo and Greater Accra regions of Ghana²¹

Yevu, Mawuli

The role of poultry in rural livelihoods, employment, food security, poverty reduction as well as the supply of protein requirements cannot be overemphasized. Recognizing these, the poultry sub-sector over the years has received support such as the removal of duties on imported inputs, special tax of 20% on import of poultry products, training of farmers, among others. The sector has also received incentives such as subsidies on yellow maize and day-old chicks to help boost domestic production. It is also evident that the high cost of poultry production in Ghana, has promoted a shift from broiler (chicken) production to layer (eggs) production.

However, local production still does not meet local demand and this raises the issue of the efficiency of poultry farms under existing production systems. Assessing the level of economic efficiency of layer producers in the light of high cost of poultry operation in Ghana is pertinent. This can help unearth some of the key constraints militating against the attainment of 'achievable' output.

Given the above issues the primary objective of this study was to assess the economic efficiency of layer production in the Brong-Ahafo and Greater Accra regions of Ghana. Specifically, the study sought to: (i) estimate the level of economic efficiency of individual layer farms in the regions; (ii) identify the determinants of economic efficiency among layer producers; and (iii) identify and rank the major constraints facing layer production.

Data for the analysis was obtained through the administration of structured questionnaires to 300 selected layer farmers in the Brong-Ahafo and Greater Accra regions using a multistage sampling technique.

The results showed that the price of feed and wages had significant negative effect on economic efficiency in the study areas. It was observed that the average layer producer was only 54% economic efficient, meaning the average producer was not operating at the most efficient level. Training in poultry farming, membership of farmer-based organizations,

²¹ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

extension services, housing type and mortality rate explain variations in economic efficiency among layer producers in the study area.

The most pressing constraints facing the industry in the study areas were high cost of day-old chicks, feed, medicine and vaccines, difficulty in accessing subsidized yellow corn, poor quality day-old chicks, and inadequate government incentives.

C. FACTOR AND PRODUCT MARKET PARTICIPATION

22. Formal and informal credit demand by rice farmers in the Northern region of Ghana²²

Alhassan, Muhammed Munira

The lack of or inadequate access to credit, particularly in developing countries, constitutes an important constraint to agricultural production and productivity as it could hinder the adoption and use of improved technologies. It has been documented that credit constraints have important consequences for farm output. Even where financial institutions exist in rural areas the formality involved in obtaining credit from such institutions may be prohibitive, making informal credit sources the only avenue for overcoming the credit limitation.

This study was to assess the demand for formal and informal credit by farmers in the Northern region of Ghana using rice farmers as a case study. The specific objectives of the study were to: (i) identify sources of formal and informal credit available to rice farmers; (ii) estimate the determinants of rice farmers' demand for credit; and (iii) verify whether formal and informal credits are substitutes or complements.

A multistage sampling technique was used to select rice farmers in the Northern region. First, the two highest rice producing districts, based on 2011 production data, were purposively selected. Second, a simple random sampling technique was used to select 10 communities each from these districts. Finally, 10 rice farmers were drawn from each community yielding 200 rice farmers upon which the analysis was based.

The sources of formal credit identified in the study areas were commercial banks providing universal banking services, rural banks, savings and loan companies, NGOs, government, and credit unions provided credit. Informal credit sources were friends and relatives and money lenders. The most common source of credit was from informal sources, contributing 70% of all credit obtained by rice farmers. Credit from friends and relatives accounted for 93% of all informal credit.

Demand for credit for rice farming was fairly high as 67% of the sampled farmers demanded credit for rice farming. Overall demand for credit was influenced by household size, level of agricultural commercialization, engagement in other economic activities in

²² This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

addition to rice farming, use of hired labor, and spatial location. The determinants of formal credit demand

23. Analysis of farmers' access to farm investment credit in the Upper West region of Ghana²³

Bashiru, Motin

Most rural development strategies in Ghana promote the transformation of the smallholder subsistent farmer into one that can produce enough for the market. Policies for achieving this transformation include selective crop development and improvement of farmers' access to credit. In spite of the efforts, access to farm investment credit remains an important challenge to the agriculture sector in general and the smallholder farm sector in particular due to the high risk involved in lending to the sector. This is more so in a semi-arid region such as the Upper West region where rainfall is much more limiting.

Based on the above issues this study was to: (i) identify the sources of credit available to farmers; (ii) identify the determinants of farmers' access to credit; and (iii) ascertain the extent of credit allocation to farming activities. The analyses were based on a sample of 250 famers located in four districts of the Upper West region.

Relatives and friends, trade, 'Susu', NGOs, and government programs were identified as the sources of credit available to farmers in the sample. The most common source was relatives and friends with about one-third of sampled farmers receiving credit from this source. About 31% of the sample also reported receiving some credit through government programs. Credit from 'Susu', an informal way of saving money through a savings group or partnership, was the least common with only about 8% of the sample reporting credit from this source.

The likelihood of accessing credit was observed to be increasing with increase in farm size, participation in non-crop livelihood activities, membership of farmer-based organizations and past credit repayment record, but decreasing with decrease in household income. Loans were used mainly for purchasing inputs (seed, labor, fertilizer and insecticides). Among agricultural credit beneficiaries, 20% diverted part of the loans received for purposes other than farming. Indeed, about 5% of beneficiaries diverted all agricultural credit for other purposes. High credit diversion is most common among those who accessed credit from government programs.

²³ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agribusiness.

24. Microfinance programs in the Northern region: assessing women's participation and effect on household food security²⁴

Gyasi, Bertha

Poverty is more widespread in the dry savannah regions of Ghana and it has been documented that vulnerability to poverty is higher among women and their families, mostly children. A woman's wealth has also been noted to benefit their families greatly particularly in terms of their children's feeding and education. If microfinance programs reach women and help reduce their production constraints then one might expect this to have a positive effect on household food security which is a poverty indicator. But gender bias in the allocation of financial services has been reported particularly in parts of the northern regions.

For several years, however, a number of women in the Northern region of Ghana have received credit support from recognized NGOs through microfinance programs. What has been the effect of women's participation in these programs on household food security? This is the focus of this study and was motivated by the paucity of empirical literature. Specifically, the study sought to: (i) identify the main microcredit products available to women in the study areas; (ii) examine the factors that influence women's participation in such programs; (iii) identify the factors that explain the amount of credit received by women from the microfinance institutions; and (iv) evaluate the association between women's participation in microfinance programs and household food security.

The analysis was based on a sample of 200 women drawn from two districts, half of whom were microfinance beneficiaries. Data was collected through individual interviews using semi-structured questionnaires and focus group discussions. Secondary data was obtained from microfinance institutions and agricultural offices in the target districts. Household food security was measured using the hunger gap and the United States Household Food Security Survey module.

The results suggest that cash and in-kind loans, consultations and training were the main microfinance products and services available to women in the study areas. A woman's participation in microfinance programs was found to be associated with their household size, income, occupation type, savings behavior, and proximity to microfinance institutions. Also,

²⁴ This summary is from a dissertation submitted to the Kwame Nkrumah University of Science and Technology, Kumasi for the award of the degree of Master of Philosophy in Agricultural Economics.

participation was significantly higher among women agroprocessors than their counterparts involved in other types of economic livelihood activities.

The amount of credit received by women was found to be decreasing in distance to microfinance institutions. The size of credit received was also associated with household size, income and occupation type. Membership of a women's business organization was a prerequisite for obtaining credit.

With respect to the microfinance-food-security linkage, it was observed that the proportion of food secure households was significantly higher among beneficiaries than non-beneficiaries. However, from the multivariate regression analyses, no significant effect of participation in microfinance programs on food security was observed. This result is consistent with previous research that found that though microcredit may be helpful in reducing poverty, it is not a panacea. Other important determinants of food security included occupation type, income, marital status, and membership of a women's group.

25. Assessing the effect of contract farming arrangement on pineapple farmers' performance in the Eastern region of Ghana²⁵

Kufoalor, Doreen Selorm

Contract farming has the advantage of assuring ready market for farmers produce while at the same time may help farmers obtain production support from buyers prior to production. Such arrangements exist in pineapple production in Ghana and this study sought to identify if contract arrangements have improved smallholder farmers' output.

The study was specifically to: (i) identify and describe the types of contractual arrangements available to smallholder pineapple farmers; (ii) evaluate the impact of contract farming on pineapple yields and gross margins; and (iii) identify and rank the constraints facing contract farmers and inhibiting participation in contract farming.

The analysis was based on a case study of farmers in the Nsawam municipality, Akuapim South and Upper West Akim districts. These districts were purposively selected because they are well known for pineapple production. After listing pineapple producing villages within the districts, the snowballing technique was used to sample both contract and non-contract farmers from each village.

Using content analysis three types of contract arrangements were identified. The most common type was market specification contracts which constituted about 77% of all contracts, followed by resource-provision contracts (about 15%) and production management contracts (8%). It was observed that participants in contract farming achieved 15 mt/ha more yields than non-participants. Also gross margin per hectare obtained by participants was GH¢ 4,065 higher than that obtained by non-participants.

Inadequate access to credit, low prices of fruits and refusal of buyers to purchase fruits due to the inability to meet specified standards were the most important constraints faced by contract farmers. It was also observed that non-participation in contract farming was due to small farm sizes and misunderstanding of contract terms.

²⁵ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agribusiness.

26. Market participation of smallholder farmers in the Upper West region of Ghana²⁶

Musah, Abu Benjamin

Despite growing emphasis on market integration, smallholder farmer market participation is still considered low in Ghana. Though there are significant regional differences, the Upper West region has one of the least average marketed surplus ratios—average of 18% compared with the national average of 33%. Maize and groundnut are two of the major crops grown and are of high commercial value but are produced largely as staples. These issues raise the following questions which this study sought to address: why is maize and groundnut not making a transition from staple to commercial crop despite the potentials they present? Why is the level of smallholder farmer commercialization low in the region? What factors influence market participation in the region?

The study was based on a sample of 400 smallholder farmers drawn from 5 districts of the Upper West region. The districts were purposively selected and then 80 households randomly sampled from each district. The instrument used was a semi-structured household questionnaire.

The sample average commercialization of maize and groundnut was 24% and 52% respectively within a production season. The relatively higher commercialization index for groundnut than maize suggests that the latter is utilized more for household consumption while the former is considered more of a cash crop.

The decision to participate in maize and groundnut markets and the volume of sale are generally determined by farmer characteristics, private asset ownership, public infrastructure, and transactions cost. Commercialization was observed to be increasing with increase in household income, level of output, access to credit, availability of market information and price.

The highest ranked output market participation constraint was unfavorable market price. This was said to limit both the decision to participate in the market and participation intensity and had implications for smallholder income.

²⁶ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Economics.

Were sex of farmer, household size, education and level of agricultural commercialization. Informal credit demand on the other hand, in addition to being negatively influenced by age and education, is positively influenced by household size, level of agricultural commercialization, engagement in other economic activities in addition to rice farming and asset holdings.

The results suggest that formal and informal credits are substitutes. In fact, it was observed that no farmer in the sample borrowed from both sources.

27. Factors influencing soybeans producers' choice of marketing in the Saboba district of Northern region of Ghana²⁷

Udimal, Thomas Bilaliib

Small-scale farmer market participation has been an integral part of policy efforts aimed at getting smallholders out of poverty. Marketing of agricultural produce is an important part of the agricultural supply chain which has important financial and nutritional implications. Understanding the decision process and factors influencing choice of marketing channels thus has important implications for all market participants. Using soybean as a case study, this study examines factors that influence producers' choice of marketing channels under the maintained assumption that the various marketing channels provide services which affect the costs and benefits to the farmers.

The specific objectives of the study were to: (i) identify and examine available soybeans marketing channels in the study area and analyze the distribution of producers among the channels; (ii) examine the challenges that confront soybeans producers in marketing their produce through various marketing channels and identify and compare the services offered by the various channels; and (iii) examine the determinants of producers' choice of marketing channels.

The study area was the Saboba district of the Northern region. Methods of data collection were focus group discussions, field visits, and interviews using structured questionnaires and interview guides. With respect to sampling, the district was zoned based on the four operational zones used by the Evangelical Presbyterian Development and Relief Agency (EPDRA). Quota sampling was used in assigning the number of communities to be studied in each zone and the number of people to be interviewed from each community. Simple random sampling was then used in selecting the communities and farmers to be interviewed. In all, 240 soybeans farmers were interviewed in 22 communities.

Four soybeans marketing channels were identified in the study areas: NGOs and government institutions, itinerant wholesalers, sedentary wholesalers, and microprocessors. The most patronized marketing channel was NGOs and government institutions with 60% market share, followed by itinerant wholesalers holding 33% of the share. The NGOs and

²⁷ This summary is from a dissertation submitted to the Kwame Nkrumah University of Science and Technology, Kumasi for the award of the degree of Master of Philosophy in Agricultural Economics.

government institutions provide services such as agronomic training, transport, pre-finance, tractor services, seeds, and linking farmers to input suppliers. Itinerant wholesalers also provide financial support.

The econometric estimates show that the choice to sell through sedentary wholesalers relative to NGOs and government institutions is influenced by age, marital status, education, cooperative membership, having a contractual agreement, mode of payment, duration of payment, and legal system.

D. CROSS-CUTTING TOPICS

28.Utilization of indigenous technical knowledge for maize storage in the Yendi municipality of northern Ghana²⁸

Abdulai, Fauzia

Modern scientific technologies for crop output storage, though technically efficient, may be judged to be socially incompatible and economically infeasible from a smallholder farmer's perspective. The study set out with the overall objective of studying the utilization of indigenous technical knowledge for storing maize as an alternative to modern scientific methods. Specifically, the study has two objectives: (i) to identify indigenous maize storage knowledge and practices by farmers; and (ii) to identify the determinants of adoption of scientific maize storage technologies.

The analysis is based on a case study sample of 100 maize farmers and 20 traders from Yendi in the Upper East region of Ghana. The main survey instrument used was a pre-tested structured questionnaire. The maize farmers were drawn using the stratified simple random sampling technique as follows. Five communities were selected from the Yendi municipality, and then 20 farmers were randomly drawn from each community. Within each community, four traders were purposively selected and interviewed.

The findings of the study are as follows. Cribs, mud silos, sacks, warehouse, pots, bins and baskets were identified as the main traditional structures for maize storage in large quantities. The most common structure for large quantities was the mud silo, used by a third of all sampled farmers, with the the least common structure being pots, utilized by approximately 9% of sampled farmers. For small quantities, the majority of farmers (48%) stored in cobs while 16% used pots. The bin was the least structure used by farmers for small quantities with only 7% using this structure. Storage in jute sacks was considered a non-traditional storage method and is used by 72% of farmers.

It was observed that knowledge and practice of indigenous maize storage technology was high among farmers. Traders also held favorable views of the use of such methods. Results from a logistic regression suggest that sex, age, education, organizational affiliation, source of knowledge were important determinants of adoption of modern improved maize storage technologies.

²⁸ This summary is from a dissertation submitted to the University of Development Studies, Ghana, for the award of the degree of Master of Philosophy in Innovation Communication.

29. An analysis of willingness to pay for crop insurance: The case of cocoa farmers in Ghana²⁹

Afari, Sandra Owusu

Ghana's agriculture is almost entirely rainfall dependent. This increases the risk of crop failure. Adverse effects of climate change are expected to aggravate weather related threats to farmers' livelihoods. The situation is no different for the cocoa sub-sector in spite of the important role cocoa plays in the economy of Ghana. One of the ways of mitigating such weather-related risks is through crop insurance. Agricultural insurance markets in Ghana have been missing or largely incomplete. In recent times, however, there have been a number of initiatives to introduce crop insurance to the agriculture sector. This study aimed at investigating cocoa farmers' willingness to pay for crop insurance

The specific objectives of the study were to: (i) determine how much cocoa farmers are willing to pay for crop insurance; (ii) identify the determinants of cocoa farmers' willingness to pay for crop insurance

The study was carried out in four cocoa growing districts of the Western region. A sampling frame for cocoa growing communities in each district was obtained from cocoa district offices. Five communities were randomly selected from each of the four districts and then a random sample of cocoa farmers was drawn from each community, giving a total sample size of 608 cocoa farmers.

The results of the analysis identified bushfires, floods, pest and diseases as the most important risks faced by cocoa farmers in the study area and these resulted in significant output losses. Farmers consider droughts as the least severe peril. It was observed that majority of cocoa farmers' in the sample were willing to pay for crop insurance. The mean amount of money farmers were willing to pay for a crop insurance premium was GH¢ 141 with the median being GH¢ 60, meaning that the distribution is skewed by a small number of high bidders.

The determinants of cocoa farmers' willingness to pay for crop insurance were sex, age, level of education, non-farm employment, income, insurance awareness, vulnerability to crop risks, and access to credit.

²⁹ This summary is from a dissertation submitted to the University Of Cape Coast for the award of the degree of Master of Philosophy in Agricultural Economics.

30. Effect of school feeding programme on enrolment and academic performance of pupils in Garu-Tempene district, Upper East region of Ghana³⁰

Bukari, Musah

Of the three regions in northern Ghana, the Upper East region remains the poorest and most food-insecure. Vulnerability to food-insecurity has been found to be decreasing with educational attainment. This paints a gloomy picture when viewed against low access to primary education by children who live in poor households in the region.

The Ghana School Feeding Program (GSFP) which was introduced in public basic schools in 2005 was therefore seen as a major potential boost to school enrolment in such poor regions in particular. What is the effect of the program on enrolment and pupils' performance? This study aims at answering this important question in the context of the Garu-Tempene district of the Upper East region.

The main objective of the study was to examine the effects the GSFP has on enrolment, dropout, and absenteeism rates, and academic performance of participating pupils. The specific objectives of the study were to: (i) identify the socioeconomic determinants of academic performance in public primary schools; (ii) identify the socioeconomic determinants of enrolments in public primary schools; and (iii) identify constraints militating against the school feeding program in participating schools.

The study was based on district-level data covering the period 2008-2012. A randomized design was used to select 360 pupils from participating and non-participating public primary schools in the district in order to establish a credible comparison group of pupils who in the absence of the GSFP would have had outcomes similar to the participating group.

Results revealed that the feeding program had succeeded in increasing gross enrolment rate by almost 24% in participating schools. However, the enrolment rate in non-participating schools declined by 7%. In addition, more boys (51%) were enrolled compared with girls (49%). Significant decline in drop-outs and absenteeism rates were recorded in participating schools but increased in non-participating schools. Drop-out rate among girls was lower than

³⁰ This summary is from a dissertation submitted to the University of Development Studies for the award of the degree of Master of Philosophy in Innovation Communication.

among boys. Furthermore, gross absenteeism had reduced by more than a third in participating schools but increased by 25% in non-participating schools.

In terms of academic performance, gross pass rates in English, Mathematics and Science were 35%, 21% and 18% respectively in participating schools but 26%, 34% and 30% in non-participating schools. Meaning that aside from English language academic performance did not differ significantly between participating and non-participating schools. This could be due to the effect of increased enrolment on the quality of teaching and learning in participating schools.

It was observed that the socioeconomic characteristics of pupils in participating public primary schools were similar to that in non-participating schools. For instance, the level of literacy of parents/guardians, occupation and wealth status were all similar across the two groups.

31.Livelihood diversification and vulnerability of women farmers in Bole district of the Northern region of Ghana³¹

Deamanie Musu Beatrice Flomo

Previous research suggests that women farmers in the Northern region of Ghana are more susceptible to vulnerable livelihoods owing to the higher incidence of poverty and risks in the context of rain-fed agriculture. Moreover, more than 60% of these women farmers have limited resources to insure against risks in the absence of formal insurance markets. They also have limited capacity to diversify their livelihood portfolios, further increasing their vulnerability to livelihood shocks.

Although, a number of empirical studies have examined the pattern of diversification in Ghana, relatively little attention has been paid to livelihood diversification and vulnerability among women farmers. In addition, most policy discourse has failed to consider the impact of livelihood diversification on vulnerability of women farmers. The nature, determinants and effects of livelihood diversification strategies pursued by women farmers have been found to differ from those of men and there are also important spatial dimensions to livelihood diversification.

The Bole district of the Northern region of Ghana therefore offers an empirical case study for understanding the impact of livelihood diversification on vulnerability of women farmers. Specifically, the study sought to: (i) identify and describe the livelihood strategies of women farmers; (ii) identify factors that determine the choice of livelihood strategies among women farmers; and (iii) estimate the extent of livelihood diversification and its effects on vulnerability of women farmers.

The study identified two main livelihood strategies in the study area: the farm only strategy and the farm and non-farm livelihood strategy. The determinants of choice of diversified strategy were number of years of farming experience, income, land ownership and spatial location.

The analysis suggests that 59% of the women in the study sample were poor while 40% were vulnerable. About 60% of the women farmers in the district were identified as

³¹ This summary is from a dissertation submitted to the Department of Agricultural Economics & Agribusiness of the University of Ghana for the award of the degree of Master of Philosophy in Agricultural Administration.

moderately diversified. A significant reduction in livelihood vulnerability was observed as a result of diversification behavior.