

MENDEL UNIVERSITY IN BRNO
Faculty of Regional Development and International Studies

Department of Territorial Studies



BACHELOR THESIS

Income Seasonality and its Impact on Farmers' Livelihood: A case study of the Agogo Township

Written by: Ellen Amoako

Supervisor: Ing. Samuel Antwi Darkwah, Ph.D

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God richly bless you all.

Declaration

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In Brno, 03.04.2016

Ellen Amoako

Abstract

Real income is an essential component that constitutes to the well-being of individuals and households. The welfare of every household relies heavily on the level of income generated at a particular season. For farmers to survive and to get out of poverty it is imperative that they earn a good and stable income. The income of farming households in Agogo Township has seasonal patterns. The thesis examines the implications of seasonal incomes on household expenditure. Primary research was conducted on households in the Agogo Township in Ghana. Data was collected to determine the seasonal patterns of income on expenditure. The findings showed that seasonal incomes of the farmers have an impact on expenditure. It was discovered that household income becomes unstable, mostly throughout the lean seasons where limited farming activities occur. During this season, most farmers survive on the little amount of money that has been saved or the least amount of crops left in storage for sale. Furthermore, lack of storage facilities to store produce after harvesting, fluctuating market price, bad weather and high transportation cost are some the major problems that cause income variation among households. However, as a result of income seasonality, households encounter challenges with consumption, household expenditure and farm extension. Due to the seasonality of income, some households have adopted other non-farm activities to supplement their income.

Key words: Agogo, agriculture, diversification, farmers, income, poverty, rural households, seasonality

Abstrakt

Stabilní příjem je klíčovou proměnnou, která má vliv na kvalitu života jednotlivců a domácností. Kvalita života v domácnostech značně záleží na míře příjmů vyprodukovaných během určitého ročního období. Zejména pro farmáře je stabilní příjem rozhodující proto, aby přežili a vymanili se z chudoby. Příjem domácností farmářů z Agogavykazuje sezónní charakteristiku. V této práci je analyzován vliv sezónních příjmů na výdaje domácností v této oblasti. Primární výzkum byl realizován v domácnostech v ghanské oblasti Agogo. Data byla sbírána za účelem stanovení výše sezónních příjmů. Výsledky dokládají, že sezónní příjmy farmářů mají vliv na jejich výdaje. Bylo zjištěno, že příjmy domácností se stávají nestabilními zejména během období ladu, kdy probíhá omezený počet farmářských aktivit. Toto období většina farmářů přežívá pouze s

minimálními finančními prostředky, které naspořili, příp. ze zbytku uskladněných zásob. Mezi hlavní problémy, které ovlivňují výši příjmů domácností, dále patří nedostatek skladovacích prostor používaných pro uskladnění produkce, proměnlivé tržní ceny, špatné počasí a vysoké přepravní náklady. Výsledkem sezónních příjmů mají vliv na spotřebu domácností, výdaje a rozlohu farem. Kvůli nepříznivým důsledkům sezónních příjmů se některé domácnosti přiklánějí k jiným než zemědělským aktivitám, jimiž nahrazují nedostatek finančních prostředků.

Klíčová slova: Agogo, diverzifikace, farmáři, chudoba, příjem, sezónnost, venkovské usedlosti, zemědělství

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1.0 INTRODUCTION

1.1 Background to the study

The agricultural sector has for long become the backbone of many countries across the world. Aside the sector, providing food, it has become the main source of occupation for rural inhabitants in developing countries. The majority of the food consumed in the world today is produced by small-scale farmers living in the rural communities across the world. Farming has become an important economic activity for farmers to depend on for their daily livelihood and in taking care of the household expenses. A typical rural farmer has varieties of crops which are sufficient to feed the family and to partake in trade because of market demand, with the purpose of generating income. Knowing the market demand and family need enables a farmer to have a fair idea on the types of crops to cultivate within a particular planting season. Predominantly, future food supplies and cash income depend on the timely planting of crops. Most of the time, poorer farmers are often hindered by lack of inputs, whether seeds, fertilizer, irrigation water or drought power (Chambers, Longhursts and Pacey, 1981). Since rural farmers are also dependent on the weather patterns for crop yield, productivity is largely affected. All these problems result in unstable income among farming households. The income variability is reflected in household expenditure. Conversely, farmers that depend on rain-fed agriculture are more likely to experience seasonal income in their daily activities.

In Ghana, the income of rural farmers varies seasonally because of the challenges surrounding the agricultural sector. Lack of farming equipment, incentives, subsidies, inadequate infrastructures and limited government investment constitute to the challenges of rural farming.

The incomes generated from farming activities are known to be the only source of revenue for most farmers in the rural communities of Ghana. The incomes of farmers vary as a result of seasonality. Seasonality has been acknowledged by rural development experts since the seventies and by communities for centuries” (ACF, 2013, p. 2). Households can cope with expenditure depending on the income generated in a particular season. Rural households are capable of taking care of the household expenses during the post-harvest period, after farm produce is harvested and sold. The challenges of income seasonality push rural households into hardship and poverty.

In response to seasonality poor farming households are compelled to embrace various coping strategies throughout the annual hungry season, they migrate to explore other areas in search of work (Devereux and Longhurst, 2009). Farmers earn additional income from other activities to get them reinstated and to maximize productivity. In such non-farm activities, farmers can generate extra income to increase welfare. Non-farm livelihood strategies that household takes up results in positive outcomes, such as income generation and improved livelihood and reduce vulnerability (Rahut, 2006). *“Livelihood strategies are dynamic, they respond to changing pressures and opportunities, and they adapt accordingly. In the case of shocks, households may adopt strategies; that may result in an entire different livelihood mix emerging from a crisis from that which was obtained before”* (Ellis, 2000, p. 40).

The consequences of the pronounced income seasonality on expenditure can be observed on health, consumption patterns, education, and general household expenses. An individual’s well-being and comfort are significantly determined by the level of invariable income.

1.2 Statement of the problem

In recent years, it has become increasingly difficult for many farming households to obtain an adequate level of income from the farm omitting other income sources (Frawley, 2000). Seasonal change in household’s income has major consequences on household expenditure. The impact of the seasonal change in the income of farmers can be attributed to many factors surrounding the whole farming activities, and thus the distinctive nature of each issue to a wider extent generate a correlation with the other. Rural farmers in Agogo Township depend on income generated from farming activities for household expenses. The incomes they earn vary with seasons. Because the income of the farmers varies during seasons, it will, in turn, generate an effect on household expenditure. The study proposes that the expenditure of the household of Agogo Township is receptive to changes in their seasonal income and that the income response to household expenditure will change from one season to another.

1.3 Objective of study

The general objective of this study is to examine the effect of seasonal income on the livelihood of farmers in the Agogo Township. The study is established on the hypothesis that changes in the income of farmers from one season to other translates into household expenditure and thus affect living conditions.

The specific objectives of the study are:

- 1) To describe the seasonal change in household income and how it translates into expenditure.
- 2) To identify the patterns that cause changes in household income.
- 3) To examine the diversification strategies that farmers use to generate extra income to supplement expenditure.

1.4 Research Questions and Hypothesis

The problem and the information discussed above bring up the accompanying research questions: What is the impact of seasonal changes in household income on household expenditure? More precisely

Question 1. Why do household incomes vary from season to season?

Hypothesis: Household income may rise or fall depending on the conditions surrounding a specific season. The income of farmers may also vary based on the level of yield in a particular harvesting season. The magnitude of the constraints encountered in a season determines the corresponding effect it will generate on the income that will be acquired.

Question 2. Does the seasonal change in farmers' income affect household expenditure?

Hypothesis: The relative amount of money reserved for household expenses during a particular season may differ. The returns generated from farming activities, mostly influence the distribution of income on expenditure. However, households will have to acquire more income in specific seasons to stabilize expenditure.

Question 3. Do Farmers sort for diversification strategies to support and sustain household expenditure?

Hypothesis: Most households in rural communities find it challenging to cope with expenditures, especially during the lean season. As such, non-farm activities are adopted beside the farming activities. The alternative ways that are taken could result in positive outcomes in helping farmers to remain out of hardship and poverty.

1.5 Significance of the Study

The finding of this study is intended to investigate the seasonal income of rural farmers in the Township of Agogo and its impact on their livelihood. It evaluates the adopted diversification strategies that are carried out by the farmers to stabilize household expenditure. The findings will show the importance of rural farming to income generation and poverty reduction. Also the role of government in agriculture and the need to invest in the development of rural farming.

2.0 LITERATURE REVIEW

In this section some major research done by other researchers and scholars is reviewed. The research was based on current knowledge and major findings that have been established on the thesis topic. Additionally, some reports and information on seasonality and income seasonality were highly considered. Subsequently, the key developments in this field are explored, creating a more detailed understanding of the distinct basic components.

2.1 Understanding Seasonality

“Seasonality refers to any regular pattern or variation that is correlated with the season. Adverse seasonality describes the potentially damaging consequences of human well-being of the seasonal fluctuation in the weather and the full range of its impacts on the lives and livelihoods” (Devereux, Sabates-Wheeler and Longhurst, 2013, p. 1). Seasonality affects and shapes the lives of rural households since they are most susceptible to the seasonal patterns. Their daily activities are built around the seasonal patterns which result in diverse changes in their lives. Rural households are known to be victims of poverty, hunger, sicknesses and malnutrition. Agricultural production relies heavily on the Seasonal temperature. In absolute terms, the nature of agriculture and farming practices in any particular location is strongly influenced by the long-term mean climate (Gornall et al., 2010). This in the long run is likely to affect the overall productivity level. Besides climatic variability is one of the many factors that affect agricultural production. Notwithstanding the enormous improvement in crop yield potential as a result of improvement in technology, production of food is exceptionally reliant on climate, on the grounds that sunlight based radiation, temperature and precipitation are the fundamental drivers of crop growth (Rosenzweig et al., 2001). The environment also plays a considerable role in climate change. Gill (1991) elaborated on the four different ways by which environment has an influence on climate change, which helps shape the conditions surrounding agriculture production. He explained the four ways as the aerographic lifting and the rain shadow effect, the features of the physical environment as rocks, soil and landform, different varieties of species and finally the topography of the environment. Natural alteration of the atmosphere is essential to the degree that it makes for different qualities in agro-climate conditions and therefore encourages the seasonal staggering of production and the use of resources within an available geographical area (Gill, 1991).

Seasonality in agriculture affects household's consumption and welfare, this is due to fluctuating food stock, mostly after the main annual harvest food is in abundance and prices are low, but the preceding month leading up to next harvest, food becomes scarce, food prices rise and so do malnutrition (Devereux and Longhurst, 2009). In the tropics, seasonality in agriculture is accompanied by a series of uncertainties. These uncertainties are highly interconnected, as less rainfall will cause low yield, as implication, will lead to low income. The intrinsic concept of seasonality in agriculture has for some time been a disturbing issue for those who are interested in the living standards, nutrition and health of individuals in developing countries (Paxson, 1993). The climate condition in African contributes immensely to the overall agricultural activities in the region. This is largely due to the region's vulnerability to cope with seasonality. Partly because of inadequate irrigation, Sub-Saharan Africa generally has more extreme seasonality, but less inequality among the poor rural dwellers, than other developing countries in some continent (Lipton, 1986). Nevertheless, the situation of seasonality is variable to location, occupation, gender, wealth and poverty, age, caste, class and control of resources (Devereux, Longhurst and Sabates-Wheeler, 2013).

In regions where the seasons are not clearly distinguished, the poor may encounter difficulties all year round, but not in a severe sense, but no let-up either. However, where there is a sharp seasonal contrast, there are times every year when life is simple and in some cases when the experience of neediness achieves emergency points (Chambers, Longhurst and Pacey, 1981). Seasonality may likewise influence consumption patterns as a result of fluctuating agricultural incomes as well as less accessibility of certain food items leading to what is often regarded as the 'lean season' (Handa and Mlay, 2006).

2.2 Seasonality and agriculture in the developing world

The significance of seasonality depends not just on the planning of environment and resource variances however on its size and consistency as well. As climatologist has since quite a while ago called attention to, the lower the rainfall, the higher the variability (Huss-Ashmore, Curry and Hitchcock, 1988). According to Gill (1991), the causes of seasonality in the developed and the developing countries differ sharply. However, the difference in effect differs greatly because of the contrast between the social, economic and physical environment in which seasonality works in the developing world. The continuous crises for traditional agriculture systems in

developing areas of the world have been identified with various political, economic and environmental factors. These elements are known to influence an agricultural system's capacity to guarantee food availability and security, and can affect the well-being and nutrition of the human populace (Huss-Ashmore, Curry and Hitchcock, 1989).

Across the developing world, the dominant part of poor people and a significant portion of the hungry people live in rural areas, where family farming and small holder agribusiness is triumphing, though no widespread method of farm organization (FAO, 2015). Gill (1991) discovered that seasonal variations in agricultural production results in two sets of interacting problems, they include unevenness in resource requirement and the flow of output that is found in every type of agriculture. Inadequate or lack of requirements creates vulnerability among farmers and results in low production. This is widely associated with the farm setting.

Conversely, in the developing world, small-scale farmers would not have a problem with agricultural inputs if they produce on a small-scale, this in effect is different for households that produce on a large scale for market demand. Lack of farming inputs may result in a decline in production by implication food supply is affected. In the developing world, food insecurity is high due to inconsistencies in production. Approximately 98% out of 795 million people who are hungry in the world are in developing countries. Three- quarter of the people that are hungry resides in rural areas, predominantly in the villages of Africa and Asia (WFP, 2015). Conversely, every farming household expects a bumper harvest to generate a good income, but this is different in the case of many rural households in the developing world as they sometimes have to deal with price fluctuations. Occasionally, price change due to seasonality may result in change in production (deBeurs and Brown, 2013).

Climatic seasonality in the tropics has differential effects on the various segments of rural society. It is contended that a stamped climatic seasonality unfavorably, influences the rural poor and as such makes the poor liable to exploitation than in bimodal or non-seasonal climates (Chamber, Richard and Arnold, 1981). In sub-Saharan Africa in a peasant community livelihood activity anytime are an element of open doors and challenges they confront and the previous conditions or setting controlled by financial, political, social and physical components (Hesselberg and Yaro, 2006).

2.3 Seasonality and agricultural income

Rural farmers in the developing world are known to produce most of the food consumed in the world. They invest their time and resources in farming work and yet they are confronted with poverty in their daily strive for survival. In the face of such difficulties, they work hard with the expectation of obtaining a good income to be able to cope with household expenditure and additionally save money for future use. Income levels among rural farmers vary seasonally because they are more likely to be influenced by seasonal patterns. Furthermore, rural farmers that live in poverty stricken areas have limited potential dealing with income seasonality (Khandker and Mahmud, 2012).

Adverse changes in temperature, give rise to bad pricing, low yield, high transportation cost, the emergence of pest and other related problems. With these constraints, the income of farmers will be considerably affected. Most rural farmers in the developing world have had no access to formal education; they depend on indigenous language to access information and in improving farming systems. Rural farmers have for years relied on farming experience gained through practices and traditions across many generations and also many years of engaging in farming. They encounter challenges daily in their activities, which includes access to information on best farming practices, better access to input materials and improving productivity. They tend to use information that is only at their disposal. To achieve better crop yield, access to current information is very essential, as it promotes sustainability and productivity. It is likely to facilitate consistency in income as well. Rural farmers find it a challenge to record relevant information, making bookkeeping and accounting impossible, and limits their capacity to arrange contracts with external operators (Perret and Mercoiret, 2003). Moreover, difficulties participating in external markets.

Income of farm households depends highly on access to land and human capital (Otsuka, Estudillo and Sawada, 2008). Enlargement of farm business by acquiring different land is the apparent procedure of increasing farm income rather than through intensification of production (Frawley, 2000). Land ownership challenges can negatively influence the level of production, as farm size can also determine the level of productivity.

Households are affected by seasonal income, mostly during the lean season, which leaves them vulnerable (Khandker and Mahmud, 2012). During the lean season their income is mostly low

(Maheswari, 2000) thus affects expenditure and consumption patterns. The lean season is the period where less or no farming activities occur; it is also termed as the hunger season. The lean season can also be termed as the resting period for some farmers, a time they get the chance to relax from their activities. During this season if farming households do not have enough income retained for future use then financial distress materializes. Regardless, during the harvesting season, activities on the farm is at its peak, more money is generated, by implication household expenditure increases. Highly seasonal income causes poverty among households, this is largely because when cash flow is limited households are trapped in an interlocking cycle of lack, unable to afford the basic necessities of life.

Seasonal change in a family's income consequently alters the quantity (level) of food consumed in the household from one season to another. Acquiring a stable income from one period to another contributes to food security, as such, households can smooth their consumption levels consistently (Camara, 2004). Payne and Lipton (1994) described the season in agriculture, which is accompanied by high prices, lack of food, constraints in storage or borrowing as seasonal stress that tends to hit most rural households. For most farming households, it is a challenge to survive only on the income generated from farming activities. Therefore, they are compelled to engage in other activities to generate income to take care of family expenses. Such livelihood strategy creates a channel for them to escape hardships. By taking on the diverse livelihood activities and appropriate interventions can influence household expenditure and improve the lives of individuals. The importance of non-farm employment, especially for the rural poor, promotes and enhance their lives, which is also of great importance to rural development (Rahut, 2006). The development of the non-farm sector enables households to invest in children's schooling because of the non-farm labor employment opportunities that tend to increase returns to schooling (Otsuka, Estudillo and Sawada, 2008). Rural non-farm income may involve long-term employment, particularly if the job is a non-agricultural work, acquiring this type of job requires exceptional abilities or a higher educational attainment (Ellis, 2000). The motivation for diversification among households differ significantly across various income groups, proposing a vital significance between the number of objectives, some diversifications are embraced mainly by "pull factors" and diversification taken fundamentally to manage risk, adapt to shock, those are determined by "pull" factors (Hagglade, Hazell and Reardon, 2007).

2.4 Seasonal dimensions and welfare

Economic growth is the primary objective of most modern states due to the conviction that an increase in income leads to an increase in welfare (McBride, 2001). Income includes both cash and in-kind contributions to the general welfare of the individual or household acquiring from the set of livelihood activities in which household members undertake (Ellis, 2000). Particularly, maintaining a constant income level is paramount to streamline consumption and expenditure.

The intricate extent of seasonality affects the comfort, health and happiness of households, especially for the poor people who are more vulnerable to seasonal constraints and are incapable of coping with the challenges of seasonality. In exceedingly seasonal conditions being poor is being helpless, particularly toward the end of each dry season, to any delay or insufficiency of the rain and after that, in each wet pre-harvest period, being short of food and being compelled to obtain it on adverse terms (Chambers et al., 1981). A household might resort to begging and borrowing at the time when they cannot afford to cope with the harsh realities of seasonality. Unfavorable seasonality is unsuitable for children's health, education and nutrition (Devereux, Sabates-Wheeler and Longhurst, 2013). There is the emergence of sicknesses such as diarrhea and cholera, especially among children in such occasions. The education of children is affected, they are unable to concentrate in school, because mostly some of them may go to school hungry. Shortage of food causes hunger and malnutrition among households and under-nourished in children. Pregnant women are also affected by food shortage as they tend to consume less nutritious food. Furthermore; access to health care becomes a challenge for households that are immensely affected by seasonal constraints. Given that families hardly afford hospital bills, some of them resort to non-conventional medicine to cure their illnesses.

Seasonal shortage of food, money and lack of access to market put rural households into more stress. The pressure they experience makes it impossible for them to save money for future use, as during those times rural unemployment is also on the rise. Households respond less to seasonal stresses when they are less poor. The overall welfare of families is affected by the immeasurable extent of seasonality.

2.5 The challenges of income seasonality

Income plays a vital role in the lives of individuals and households. In most rural household's income generated varies throughout the year due to seasonality. Seasonal variations affect the

income of rural farmers in more diverse ways. Low income affects the distributed of the income on household expenses. The amount of income generated determines the affordability and preference potential of households in a particular season. Prices of food and other expenses during a given period affect a household's demand. Conversely, being able to afford food is not exclusively controlled by food prices; it is likewise identified with purchasing power which can change substantially between seasons, (ACF, 2013). Households are vulnerable when their incomes become precarious, because of that, they are exposed to the risk of food insecurity and other related problems. Primarily, poor people encounter challenging adapting to seasonality due to its capricious nature.

2.5.1 Income and expenditure

The prospects of future production and henceforth employment opportunity and incomes, clearly, changes from year to year within the same season, particularly in climate-dependent sectors like agriculture (Gill, 1991). Fluctuations in income influence expenditures and affect the general well-being and welfare of households, by implication spending is not kept at a consistent level. Budget constraints influence household expenses, by repercussion household's choice may alternate between, affordability and preferences, which might be an indication of social and economic inequalities (Noll, 2007). However, an individual's demand for goods and services is always high, but the tendency of being able to manage expenditure is largely dependent on the amount of income, by definition a household can purchase whatever they desire and require with a good amount of income without restrictions. On the contrary low and unstable income leads to a cut down on expenditure. The welfare and happiness of a person depend not just on the accomplishment and salary in outright term, but additionally on one's relative position income wise (Ferrer-i-Carbonell, 2005).

Obviously everybody desires to have a better life which doesn't happen by chance, it is highly dependent on the level of one's income. Being able to live to one's expectations brings happiness and comfort. Conversely, high income streamlines consumption in effect provides a better utility (Stutzer, 2004). Most rural households are able to manage household expenses after the harvest season when sufficient income has been generated.

2.5.2 Income and Consumption

Seasonality influence farmer's income and affects food security between a few effects, including instability in food stock and prices, by implication poor household consumption is affected (Devereux, Sabates-Wheeler and Longhurt, 2012). According to Gill (1991), seasonal consumption varies with the social and economic status. He further elaborated that there are those classes of individuals who can keep their utilization level, all through the seasons and the other group of people on the lower range who encounter the difficulties adapting to seasonal variations. The classifications of individuals on the lower range are those that are effectively powerless to handle the dangers of malnutrition, and hunger. Malnutrition and food insecurity are the greatest challenges facing the world today, which results to negative repercussion on the health of people, especially children. Nearly half of all deaths that occur in children under five years is generally attributed to undernutrition (UNICEF, 2015). Empirical evidence from rural economics suggest that household consumption levels differ seasonally, which results in seasonal variations in nutritional status and wellbeing (Chaudhuri, Paxson, 2001). Many of the people living in the developing countries encounters food insecurity issues daily, consequently, more people go hungry. Hunger increases vulnerability to pre-Mature death and reduces a person's ability to earn a living not least through cultivation and generating income (WHO, 2003). Seasonality influence farmer's income and food security through diverse effects, including fluctuating prices and food stock, which often translate into fluctuating food consumption in poor households (Devereus, Sabates-Wheeler and Longhurst, 2012).

The Seasonal variation in nutritional status is an incident that is predominantly reported in the developing world. While seasonal changes in nutrition and diet are discovered throughout the rural tropics, it is in Africa, where these progressions have the best effect (Huss-Ashmore, Curry and Hitchcock, 1988). Hunger is also located in rural areas, regardless of the fact that, it is the place where food production takes place (Dixon, Gibbon and Gulliver, 2001). The emergence of high workload during the pre-harvest season may result in remarkable inconsistencies between energy requirement and energy intake. This period of seasonal energy disparity has been called the "hungry season" (Huss-Ashmore, Curry and Hitchcock, 1988). The shortage of starchy staple (energy foods) during this time of the season may impede the ability of farmers to work and hence earn (Gill, 1991). The most obvious case of seasonal variation in supplement necessity is

the excessive energy that is needed during the season of hard physical work and the relating drop in energy within the slack season (Gill, 1991).

Payne and Lipton (1994) explain that the diet of poor people, especially in rural communities is frequently dependent on a couple of foods, as such there is a decrease in appetite, due to the unavailability of quality foods. Since access to nutritious food becomes scarce and the emergence of lack of food, rural inhabitants often consumes whatever is accessible to them. A stable household income is an essential determinant of household security, as it allows a household to smooth consumption (Camara, 2004). It is vital to note however that expenditures are not as a matter of course, indistinguishable with consumption, which may even be a superior pointer of well-being for different reasons (Noll, 2007). Since seasonal hunger is an indication of poverty, the solution to the issue is fostering the development and utilization of poverty-alleviation economic growth (Khandker and Mahmud, 2012).

2.5.3 Income and illiteracy level

Literacy has been a key factor in ensuring sustainable human development. However; it remains among the most neglected in certain parts of the world. Arguably illiteracy levels are high among minority groups and indigenous people. It has a tendency to be higher in poorer regions; country zones and spontaneous settlements (UNESCO, 2015). A large portion of the improvement field inspirations who has real contacts with the country grass root poor, portrays provincial destitution as a reason for lack of awareness and inhabited places of illiterates (Sambou, 2010). In Sub-Saharan Africa's illiteracy rate among all adults is higher at 41.6 percent (The Statistics Portal 2013, report). It is considerably higher among women (Egbo, 2000).

The high Illiteracy rate in rural communities can be attributed to the low and unstable income among farming households. Majority of rural household lacks the capability of securing education for their children because of the prevalence of poverty incidence found in rural settings. In respect to that, children living in rural areas are obliged to take on farming activities at a very young age. Alternatively, they are enrolled in apprenticeship as this requires no education. The level of farm income that is acquired among rural households largely influences education.

Low literacy is associated with low income (Lindau et al., 2002). For societies, families and individual alike, literacy is an instrument of strengthening to enhance one's well-being, one's

income, and one's association with the world (UNESCO, 2015). In regions where households earn good income, there is the existence of literates and massive development. Illiteracy contributes principally to underdevelopment of rural communities, because of the absence of a functioning social capital.

2.5.4 Seasonal poverty

Poverty among rural households is a situation that has transpired for a long time. Poverty persists among rural households as a result of the uncertainties and volatilities associated with farm incomes. It has become habitual to associate rural inhabitants with poverty, mainly also because of the socioeconomic exclusion and the poor state of rural areas. Regardless of this less attention is barely given to rural development in most developing nations. Seasonality is a common phenomenon, which is mostly unforeseeable and occurs with distinctive effects.

The seasonal pattern of agriculture production has plugged smallholder farmers in a vicious cycle of household insecurity trapping them into poverty.

Rural farmers are easily susceptible to poverty due to the interaction between seasonal unemployment and the participation rates in rural communities. That is terrible for the poor individuals since there are mostly excess workers during the slack seasons. Within the season smallholder farmers preferably employ family workers, discharging casual workers, particularly women (Lipton, 1986). Vulnerable to sickness, and hunger, poor people becomes undernourished and loss weight. Seasonal pressure drives them into debt and dependence (Chambers, Longhurst and Pacey 1981). Thus, their inability to take good care of themselves. Poverty may also be as a result of market failure, for instance, lack of access to credits and the inability to save and non-attainment of investment, hinders the ability of the poor household to gather income producing assets (Fan 2008). In seasons when households generate low-income, they are impelled to sell family properties when they are confronted with the hardships accompanied with the season. This approach equips them financially to survive, therefore, deal effectively with their basic needs. Resultantly, rural households become poor in such seasons. For the most part, the family assets are sold without hope of recovery. The peculiar thing about rural poverty is the likelihood to be rich by owning assets, on the other hand, income poor. In essence, households need resources such as buildings, lands, and livestock to generate income (Frawley, 2000). A quick

growth in agriculture production and productivity is a prerequisite to sustaining poverty reduction in Africa (Olomola, 2010). Likewise, other parts of the developing world.

2.5.5 Storage

Storage and marketing of food grains, if carried out effectively will contribute significantly to solving hunger in the world (Hall, 1970). A remarkable amount of the food produced in the developing countries is lost after harvesting. A major part of the food supply is removed from the market by reason of the food loss, thereby causing high food prices (Tefera et al., 2011). Producing food crops in large quantities is paramount, in the sense that it helps to satisfy the demand in the society. Everyone is happy when food is plentiful as it becomes more affordable. It is always a constraint for small-scale farmers to avoid crop loss after harvesting due to the inappropriate handling of the crops. Due to lack of storage facilities, crops are sold at a low price to prevent them from spoiling immediately after harvesting. In seasons when food becomes bountiful buyers are the ones that gain, as they propose their own price tag. They chose to buy from farmers that agree to their proposal. The problem of food waste is an implication of the problem of inadequate infrastructure and poverty that small holder farming households encounter throughout the developing world (IFAD, 2015). Storage is very important; it ensures the preservation of foodstuffs for future use, since farming produce is mostly perishable. Storing food and delivering it to consumers at the right time is necessary to facilitate consistent supply and the promoting of food security.

Storing farm produce for future use is also very important for farmers; it enables them to cope with the lean season where there is normally the prevalence of food scarcity. They can generate money by selling the crops that has been previously stored and hence avoid hardships. If those strategies are adopted farm produce will not be wasted. Rural farming households through their own means have often invented traditional methods for storing their products. These conventional methods safeguard and preserve the product moderately well and need at most slight improvement. Then again, it is conceivable that these conventional methods are unacceptable, and lead to high loss (Hayma, 1982). However, proper storage mechanisms will help protect the products from being infested by fungus, bacteria and insects.

2.5.6 Production technology and value addition

The optimum way whereby farmers can generate more income is to streamline productivity by adopting efficient mechanisms (Frawley, 2000). Most developing nations lack the innovation and technology that will add more value to farm produce. Agricultural produce are not effectively utilized due to lack of innovation. In this sense farmers gain little returns by selling their farm produce in their primary state. Due to the absence of innovation agricultural products in their primary state are exported to the developed countries for processing, which is then imported back for sale. Production technology is creating the physical raw products to finished goods to add more value using sophisticated machines. The adoption of agricultural production technology can enhance agricultural productivity and promote sustainability. The precondition for sustainability is by ensuring that the farming system in place is adequately beneficial such that it is economically feasible over the long term (Debertin and Pagoulatos, 2015). There is no sustainability in agricultural production in most developing nations because production is not consistent and demand exceeds supply in most instances. The development of a country is affected, as a government will require a lot of money and also must adopt effective and efficient mechanism to streamline food supply. Owing to the ineffective utilization of locally available recourses, the development of infrastructures and the creation of jobs are considerably undermined. The old system of agriculture production is what is commonly practiced in many agrarian economies, by implication threatening long term productivity. Countries that have adopted and incorporated the use of modern technology in their agricultural sector, have far advanced in productivity, attracting more investment in the form of FDI's. The vital objective of rural advancement is the effective utilizing of the local resource using local skills to fulfill local needs (Shukla, 2014). With the introduction of innovation and technology in agriculture production, smallholder farmers will be motivated to work hard and produce in large quantities, knowing that whatever they produce will equally generate more returns.

3.0 AGRICULTURAL IN GHANA

3.1 Ghana Profile

Ghana is located in the western part of Africa, bordering the Gulf of Guinea to the South, Togo to the east, Cote d'Ivoire to the west and Burkina Faso to the North. The country has a total land size of 227 540km² with an estimated population of 27.04 million inhabitants. The capital city is Accra. The official language is English respectively. The GDP of Ghana released in 2014 was estimated at US\$38.61 billion. Growth decreased from 7.3% in 2013 to 4.2% recorded in 2014. The service sector accounted for the highest growth of 5.7 %, followed by agriculture (4.6%) and the industry with 0.9 % growth (Ghana Statistical Service). The share of Agriculture in the overall economy reached its peak in the late 1760's and early 1980's when the sector contributed about 60 percent to total GDP (Breisinger, Diao, Thurlow and Al-Hassan, 2008).

Table 1: Ghana's largest crop production (tonnes, 1,000) 2009-2013

Crops	2009	2010	2011	2012	2013
Cassava	12,230.6	13,504.1	14,240.9	14,547.3	15,989.9
Cocoa, beans	710.6	632.0	700.0	879.3	835.5
Groundnuts	526.0	530.9	465.1	475.1	408.8
Maize	1,619.6	1,871.7	1,684.0	1,949.9	1,764.5
Oil, palm fruit	2,103.6	2,004.3	2,125.6	2,196.1	232.7
Plantain	3,562.5	3,537.7	3,619.8	3,556.5	3,675.3
Rice, paddy	391.4	491.6	464.0	481.1	569.5
Taro (cocoyam)	1,504.0	1,354.8	1,299.6	1,270.3	1,261.5
Yams	5,777.9	5,960.5	6,295.5	6,638.9	7,074.6

Source: FAOSTAT, 2016

Agricultural production in Ghana is a significant economic activity that contributes to the social and economic development of the country. Ghana has a great amount of arable land (30%) which is used for agricultural production. The sector serves as a source of employment for a larger portion of the country's population, especially the rural inhabitants, in addition to providing food and raw materials. The sector is dominated by numerous smallholder farmers and few farming enterprises. Agriculture dominates the country's export earnings. The major crops produced in Ghana include maize, plantain, yam, cassava, grains, cocoa beans, palm oil and coffee (Table 1).

Cocoa, palm oil and cassava are the dominated crops, serving as a source of income for many farmers. Ghana is the second largest producer of cocoa, dominating the world market. Ghana's major imported commodities include rice, refined sugar, meat (chicken), tomatoes (paste) and wheat. Some of the main exported commodities comprise of cocoa beans, cocoa butter, palm oil, cashew nuts with shell, refined sugar, and pineapple (FAOSTAT, 2011)

3.2 Types of farming in Ghana

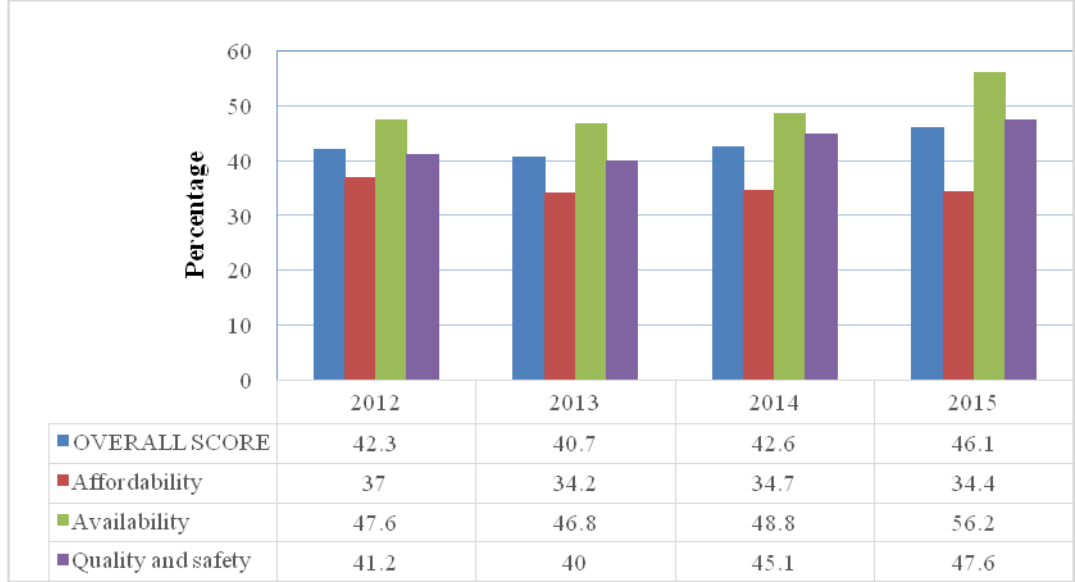
There are diverse agro-ecological zones which characterize Ghana's farming systems, nevertheless the characteristics are evidently common across the country. The main farming systems commonly practiced in Ghana are mixed cropping and mono-cropping. Mixed cropping is the process whereby different types of crops are grown on the same piece of land at the same time. This kind of farming system has often been stable cropped. The second type of farming system is mono-cropping. This is also the procedure whereby a single crop is grown year after year on the same piece of land, the type of crops is mainly cash crops. In the forest zone there are tree crops such as cocoa, oil palm and rubber being of particular importance. The middle belt is characterized by mixed crops (Oppong-Anane, 2006). The agricultural sector of Ghana consists of livestock, such as cattle, goat, and chickens that are commonly segregated into Ghana's farming systems-a practice commonly known as mixed crop-livestock production. Ghana's livestock production is mainly located in the Northern regions (Wood, 2013). Livestock production contributes to Ghana's agriculture, primarily for food provision. Ghana practices the bush fallow system of farming. This is a practice by which the land is cleared from virgin land and subsequently allowed to lie for a while before cultivation begins. The bush fallow system prevails wherever there is ample land to permit a plot of land to be rested enough to recoup its fertility after one to three years' of cultivation (Oppong-Annane, 2006).

3.3 Food security in Ghana

The idea of food security is characterized as including economic and physical access to food that meets people's dietary needs as well as their food preferences (WHO, 2016). The three components of food security, according to the World Health Organisation (WHO) are; food availability - having sufficient amount of food consistently. Secondly, food access - having adequate amount of income to secure proper food for a nutritious diet. Lastly, food use - having an adequate dietary intake and the capacity to retain and utilize supplements in the body.

Food is essential for human existence, without it mankind cannot survive. The importance of food security is very critical to the socioeconomic development of Ghana. From a report on the 32nd RECA Seminar Mr. Emmanuel Kwasi Hedzro-Garti stated that Ghana faces the challenge of making substantial progress towards food security because average yield has remained stagnant. Rainfall being a major determinant in the annual fluctuations of households and national food output, creates food insecurity at household levels, which can be transitory in poor communities and chronic in distressed areas (RECA Report, 2010). About 5 percent of the people in Ghana are food insecure; this means that they lack access to good food and better nutrition. The Northern, Upper East and Upper West Regions in Ghana have some of the highest rates of malnutrition in the country. Nearly 30 percent of people in the Upper East region does not have adequate access to food, as compared to the national average of 5 percent (WFP, 2016). Proper nutrition is essential to human development; it helps to obtain the necessary strength to go on with daily activities. A right amount of nutrition contributes to improving the health conditions of urban households.

Figure 1: Food Security Status (score/100 means food secured) in Ghana, 2012-2015



Source: The Economist Intelligent Unit, 2016

The state of food security trend in Ghana has not been much encouraging for the past four years (2012-2015). Even though there was some slight improvement recorded in the year 2015, growth has consistently remained uneven (Figure 1). The overall score indicates strength and weakness in food security. A score of 100 specifies maximum food security. According to Figure 1, the

overall score recorded in 2012 was 42.3, it decreased to 40.7 in 2013 and further increased to 42.6 in 2014. An improvement occurred in 2015 with an overall score of 46.1. This score was attributed to an enhancement in all three food security components, especially the food availability which increased from 48.8 in 2014 to 56.2 in 2015.

3.4 Income and expenditure in Ghana

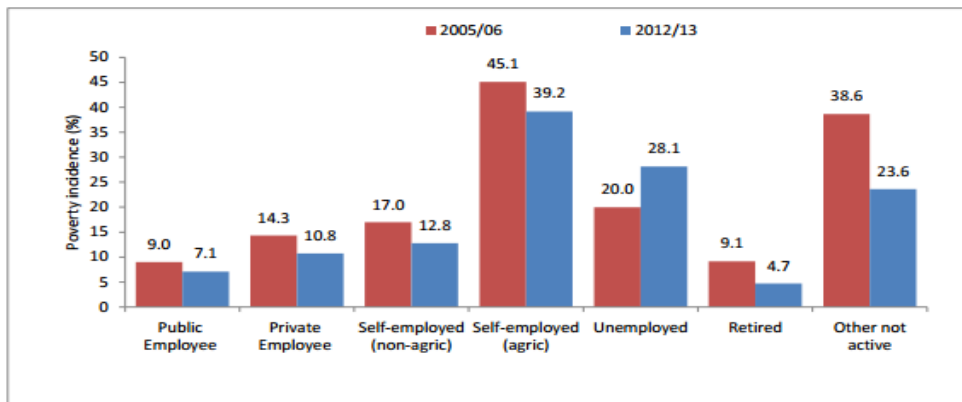
Ghana is considered a low middle-income country as stated by the World Bank. Ghana's Human Development Index for 2014 was 0.579 which places the country in the medium human development index category. According to what constitute the HDI, Life expectancy at birth is 61.4 years, expected years of schooling is 11.5years and Gross national income per capita is 3,852 (dollars) respectively (UNDP, 2015). Although poverty is still prevailing in Ghana and some people cannot afford the basic necessities of life, Ghana has made magnificent improvement in reducing poverty, and was able to fulfill the Millennium Development Goal (MDG) of halving poverty rates from 53% in 1991 to 21% in 2012 by the year 2015 (World Bank, 2015).

The three top sources of income in Ghana is income from agriculture accounting for (35%) of the population, income from self-employment, making (25%) and finally income from employment (29%) (GLSS, 2014). Those categories of people that can earn a good amount of income and are able to live comfortable lives are the employed. These people have stable jobs and a surety of insurance. They do not encounter variation in income, in other words, their income is not precarious. The other groups of people that are self-employed, own their own businesses. They work mostly in the informal sector, which is known to be unregulated, characterized by bad working conditions and low wages. Though the informal sector is accompanied by many uncertainties, it is said to be the suitable way to generate money faster because there are no strict regulations or guidelines to follow. In Ghana the informal sector is said to be a source of employment and income generation for the unemployed and school dropouts, it also promotes poverty reduction. Those people who work in the informal sector are likely to succeed based on the effort they put into their work and the quantity of resources invested in the businesses. Many people have been able to achieve their desired aim in this area of work and as such live comfortable lives. The last categories of individuals that earn their income from farming are more vulnerable to hardship and poverty; there is a high tendency that their income will

consistently vary as a result of the uncertainties in their daily activities. Poverty incident is higher among households where the head is engaged as self-employed in the agricultural sector as compared to those that are engaged as self-employed and privately employed in the non-agricultural sector (Figure 2). Poverty among the self-employed in the agricultural sector declined from 51.1% to 39.2% between 2004/06 and 2012/13. As it was still recorded the highest among all income groups. The self-employed in the non-agricultural sector registered a reduction from 17.0% to 12.8% between 2004/05 and 2012/13.

Poverty rate is counted very low among households in which the head is retired, with 4.7% in 2012/13 (Figure 2). The standard of living of individuals is largely dependent on the income generated by the household head. The measure of the standards of living in Ghana According to the Ghana Living Standard Survey (GLSS) is based on household consumption expenditure covering food and non-food items including housing (GLSS, 2014). When household income is precarious, expenditure and consumption are affected, as such the overall household welfare is under threat.

Figure 2: Poverty rate of households by employment status (2005/06-2012/13) (Poverty line=GH¢1,314)



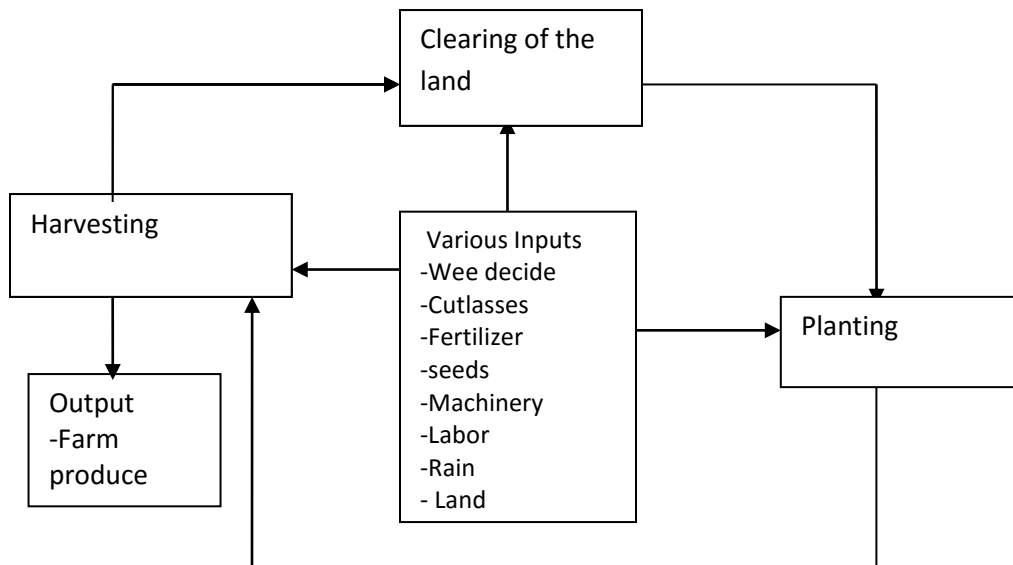
Source: Ghana Statistical Service (GLSS) 2014

3.5 The agriculture production cycle

The agricultural production cycle is the pattern in agricultural production. It comprises of the various activities that take place in agricultural production. The various stages in the production cycle are, land clearing, planting and harvesting (Figure 3). It is very imperative for a farmer to know the times the cycle begin and when it ends. Future food supplies and cash income depends upon timely planting of crops. Lack of inputs often delays poorer farmers- whether seeds,

fertilizer, irrigation water, or drought power (Chambers, Longhurst, Pacey, 1981). The whole cycle is affected by lack of timely acquisition of agricultural inputs. A successful cycle produces good yield, yet it is dependent on the efficient acquisition of all farming inputs.

Figure 3: The Agricultural Production Cycle



Source: Own work

In Ghana, the agricultural production cycle normally begins in January, when the land is cleared. Prior to the clearing of the land, it is important to obtain the necessary input equipment and materials, which includes weedicides, cutlasses, seedlings, and crops. It is also recommended to ensure that the land is properly cleared during this time to avoid crops from being destroyed in the future by leftover weeds.

The second stage of the cycle is the planting phase, which begins from April through May to June. At this time the rains have already begun. Considering the unpredictable nature of the weather pattern, it is advisable that farmers know the appropriate crops to plant in case the weather is unfavorable. When there is insufficient rain, it hinders productivity as most of the crops are destroyed. Those plants that require enough rain can be postponed to the next planting season when there is the evidence of less rainfall.

The final phase is the harvesting season, it mostly occurs from July through to October until November, also in December for some special types of crops. Conversely, the time between planting and harvesting varies with the types of crops.

3.6 Agricultural challenges in Ghana

Agriculture has an important role to play in promoting development, enhancing food security and reducing poverty in Ghana yet little has been done in making agriculture the engine of growth. Notwithstanding, farming creation has developed over the years, this has largely been accomplished by bringing new land into development. Ghana needs an agrarian transformation taking into account efficient processes that will foster sustainable development. There are peculiar problems affecting the growth and development of the agricultural sector. Ghana's agriculture has been living below its potentials. Crop yields have demonstrated insufficient development in the past years, this is due to inadequate infrastructures, limited agricultural inputs and insufficient funding. In Ghana's poor rural communities, small-scale farmers have restricted access to the benefits that would encourage a movement from subsistence farming to modern, commercial agriculture (IFAD, 2013). The challenges of Ghana's agricultural sector have foreshortened the interest of individuals with the intent of taking on farming as a major economic activity.

3.6.1 Limited infrastructure

Infrastructure development constitutes a great deal to the development of any country, yet it does not receive enough recognition from policy makers. Lack or limited infrastructure slows down the growth and development of a country.

Better infrastructure, reduces transportation cost, road accidents, and provides better road connections. It enhances the effective movement of goods from farm to market, especially for rural farmers. Road transport plays a major role in Ghana's economy. Approximately, road transport is deemed 96% of passengers and freight traffic in Ghana and about 97% of travelers in the country (GIPC, 2016). In Ghana, infrastructure development is concentrated in urban areas, whereas the rural areas have been neglected. Most rural communities are deprived of the fundamental systems and facilities such as roads, water supply, power supply and other public utilities which are essential for the functioning of societies. Lack or inadequate infrastructure has caused underdevelopment of rural areas. For the agrarian sector to accomplish its potential, investing in both hard and soft infrastructures are necessary (Wanmila and Islam, 1997). Almost all of the foodstuffs produced in Ghana to feed the 27 million inhabitants is generated from the urban areas notwithstanding the challenges of rural agriculture.

The limited infrastructure in Ghana's rural area has largely affected agricultural productivity. In spite of the available productive farm lands and the agricultural potential of the country, a large amount of food is imported due to seasonal food shortage. Rural farmers in Ghana are confronted with bad roads when transporting crops from the farm to the point of sale. Especially when it rains, the path from farms to the major roads becomes very muddy, making it difficult for big trucks to permeate their way through. In most cases the trucks get staked in muddy areas after heavy rainfalls. Occasionally the trucks with the crops are abandoned on the farm for days until movement becomes possible.

Infrastructure development can cause rural development. By investment in rural infrastructure, it will cause a decline in rural- urban migration as the inflow of investment will stimulate high migration rate in producing areas, subsequently causing job creation. Good road connections create easy access to urban areas and other rural sectors fostering agriculture productivity. Transportation infrastructure investment could have large externalities as they promote trade integration and economic growth (Jedwab and Moradi, 2011).

3.6.2 Inadequate funding

Inadequate support to farmers results in limited production. Most farmers in Ghana receive no support from government, whether in the form of subsidy or incentives. Regarding an article that was published by the Ghana Business and Finance, government budget for agriculture in 2016 was reduced by 10.1 percent despite a growth in the agricultural sector. Budget insufficiency and delays are not uncommon in Ghana as the budget processes of many other developing countries (Mogues, Omusu-Baah, 2014). Rural farmers have limited access or in some cases no access to agricultural input and facilities that can help them increase productivity.

Agricultural subsidy that serves as a means to supplement income and to manage the supply of agricultural commodities has consistently been a challenge for the government of Ghana to provide for farmers. A National Fertilizer Subsidy Programme (NFSP) was re-launched in 2008 as a temporary response to promote domestic food production and stabilize fertilizer prices that year. Nevertheless, the whole subsidy was reduced to 21 percent in 2013 due to high fertilizer prices and budget limitations (FAO, 2015). High prices in fertilizer and weedicides can limit the potential for farm extension. Support from donors to Ghana's agriculture has been entirely huge

throughout the years, however, depending totally on donor funding can be both unsustainable and dangerous for a sector like agriculture (Mogues, Omusu-Baah, 2014).

3.6.3 Inadequate irrigation system

Crop production in Ghana is highly dependent on natural rainfall, which is mainly unpredictable and unreliable. Since the rain pattern cannot be controlled it is significant always to have an alternative water supply to promote consistency in production. That proves the importance of irrigation to Ghana's agriculture. In Ghana irrigation is one major challenge to crop production. The development of irrigation is limited; as a result, farmers depend on only rainfall that is seasonal. Irrigation development began in Ghana in the 1960s, which is about a century ago. However, effective irrigation efforts can be dated in the past fifty years. Between its inception up until 1980, approximately 19,000 ha of irrigated land has been developed. By 2007 the area of irrigation had expanded to 33,800 ha. (Namara et al., 2011). The Total irrigation potential is estimated at 1.9 million ha, this potential however, remains largely underdeveloped (FAO, 2005). The Ghana Irrigation Development Authority (GIDA) is responsible for providing irrigation system for the agricultural sector to promote agricultural growth. It started its operations in the early sixties.

Ghana has a warm, humid climate. Mean annual rainfall in the country is estimated at 1,187 mm. Only in some parts of the country is the climate favorable for non irrigated agriculture. Even in the Southern part of Ghana, where rainfall is at its highest, irrigation is still essential during the dry periods. The major irrigated crops in Ghana are rice, tomatoes, okro, pepper, sugar cane, cucumber, cowpea and maize (FAO, 2005). The problem of the non irrigation affects mostly rural farmer who have their farms nowhere near streams by which they can have easy access to water for crop production. Ghana's immense accessible land, ample water supply, fertile soils, and a reasonable climatic condition present significant potentials to grow the commercial farming sector and new irrigation technologies (FAO, 2005).

3.6.4 Climate change

Climate change affects agricultural production and influences food productivity. A change in the weather pattern, influences the agricultural system in a specific season. The climate is changing globally and will have an effect on agriculture, especially in the developing countries. Undoubtedly the impacts of climate change are more severely felt by the poor (Ramachandran,

2011). The climatic condition of Ghana can be characterized by two forms, namely the dry season, which is a yearly period of low rainfall and the wet season where most of the region's annual rainfall occurs. The wet season, notably is the hungry season in most areas, but it is also the season when the scale of the poverty issues is most likely to be recognized (Gerard, 1991). A change in the climate means a shift in production. Some regions in Ghana are less affected by climate change, whereas other regions are more endangered. Unlike certain rain-fed regions in Ghana, where rainfall is favorable, other areas experience shorter rainy seasons. For instance, rural population in the Upper East, Upper West and Northern regions (which are the savannah zones of the country) are more vulnerable to climate change than the people in other regions. This is attributed to the regions stagnated development and the dry-land agriculture's vulnerability to climate stresses (Alessandro de Pinto et al., 2012). The agricultural sector of Ghana is liable to be influenced by climate change that can result in unpredictable harvest; this can lead to food insecurity, low productivity, high food prices and economic loss.

3.6.5 Agriculture and illegal mining

Mining in Ghana can be dated back during the colonial rule. It is considered an important economic activity in Ghana, which attracts more than half of all foreign Direct Investment, generates more than one-third of all export revenues, it is the largest tax paying sector in the country and a significant contributor to GDP and employment creation. Ghana's mining production is largely driven by gold, contributing more than 95 percent of the country's total mineral revenue (The Ghana Chamber of Mines Report, 2015). Even though mining positively influences the economy of Ghana, it causes a negative effect on the environment, households, and lands. There are two ways in which mining activities take place in Ghana; that is the legal and illegal way. The legal form of mining is regulated whereas the illegal way is unregulated. Since illegal mining is not controlled and monitored, its effects on the lives of people and the environment are enormous.

For years, illegal mining in Ghana has become a major problem for both smallholder farmers and communities that are located in mining areas. Illegal mining causes harm to the environment (lands and water bodies), and gives rise environmentally related diseases and water born disease. Some of the diseases include tuberculosis Onchocerciasis and schistosomiasis. Aside from the health impact illegal mining hinder agricultural productivity and food security, in the sense that

vast areas of farmlands are destroyed to make way for mining. Illegal mining is mostly practiced by the youth who are inhabitants of mining communities, they are mostly unemployed, and so taking up mining becomes the only source of income generation. Farm lands are taken from farmers and in exchange, they are granted compensations for the loss of the lands and crops. Some farmers may not even receive any compensation for the farm loss. This situation destroys most arable lands and reduces the magnitude of food produced in Ghana.

3.6.6 Pest and diseases

Pest and disease in agricultural production is as old as agriculture itself (Russell 2013). Pests or disease destroys crops and animals. Crop damage by pest is a consequence of a complex ecological dynamics between two or more organisms. As a weak plant is likely to be affected by fungus during drought (Rosenzweig et al., 2001). Pest affects almost all crops, therefore, agricultural crops are less likely to be affected when they are exposed to more humidity. Pest on crops threatens food production and farmer's livelihood, it affects agricultural productivity and cause food loss, thereby causing food insecurity. Most smallholder farmers in Ghana use pesticides that are purchased from local agro shops without any detailed knowledge of their contents. They depend on information or advice given by people who possess less experience or basically little knowledge of these chemicals. In most instances, one type of pesticide is used on crops for a longer period, making the pesticide no longer effective in producing the intended or desired results. Furthermore, the continuous use of one particular pesticide cases plant resistance. Conversely, there are different patterns in the distribution of pesticides on the environment. Exposure to these chemicals is through air, water and soil. Therefore, an understanding on how chronic and severe exposure can be threatening is paramount (WHO, 2009). The side effects of the chemical can detrimental to the crops and consumers of the foodstuffs.

3.6.7 Rural Urban Migration

Migration is the permanent or the temporal movement of people or groups of people from one geographical location onto the other for different reasons varying from a more desirable employment opportunities to persecution (Hagen-Zanker, 2008). In order to seek for comfort and better living conditions people tend to migrate every day from the rural communities to the urban centers. Migration has been on a rise throughout Ghana. People migrate whether for social or economic reasons. The main motive for migrating to the urban centers has been primarily

attributed to what is known as the push and pull factors. The push factors include unemployment, limited infrastructure, poor health services and poor educational services, preferably for better employment and access to infrastructure, which are known to be the pull factors. People with jobs as well as married people are less unlikely to migrate to urban areas as compared to those that are single and jobless. Conversely, the agricultural sector is no longer lucrative, especially for the youth. They would rather prefer taking on other jobs in the cities, leaving behind the aged men and women who do not have enough strength to farm. The labor potential in the agricultural sector will decline as people migrate to the urban centers. Loss of labor in the agricultural sector will generate a negative effect on production. A primary research conducted in the northern part of Ghana indicated a reduction in agricultural production and the region's vulnerability to poverty and food insecurity issues as a result of migration (Adaku, 2013).

3.6.8 Agricultural Extension

Agricultural extension is the method of using scientific research and information to agricultural practices. Agricultural extension assumes an essential part in advancing agricultural productivity, enhancing rural livelihood, expanding food security, and advancing farming as a mechanism of economic development for the pro-poor. It is a rural support service expected to meet the new difficulties in agribusiness (IFPRI, 2016)

Agricultural research is a valuable tool that leads to policy improvement and the generation of new technologies which are known to be the essential drivers that increase agricultural productivity and resilience (USAID, 2015). Research in agriculture leads to sustainable development. The current agricultural extension policy of Ghana was initiated in 1992 under a Unified Extension System (UES), through the National Agricultural Extension Policy (NAEP) and funded by the Government of Ghana and the World Bank (Gurr, Wratten and Snyder, 2000). Its aim was towards the funding of extension services. However, the aim has been achieved due to insufficient funding, absence of extension logistics and lack of extension field staff (Annan, 2012).

Small-scale farmers in Ghana practice the old system of agriculture, which is becoming more outdated and less competitive with other advanced countries that practice the modern type of farming. The use of manual labor and frequent farm extension is the basic approach used to increase yield. They have become accustomed to the old system as such there is some level of

unwillingness embracing a new system. For example, farmers in Ghana's rural communities have insufficient knowledge on new types of seeds, the modern method of production, the best farming practices and the use of technology. The extension services are not made readily available to them. In essence, production is done consistently through the traditional way, which undermines productivity.

4.0 MATERIALS AND METHODS

4.1 Study Area

In this thesis, a survey was collected on 100 farmers in Agogo Township. Agogo is a town located in the Ashanti Akim North District of the Ashanti region of Ghana. It has a population of approximately 32,859 inhabitants. The main occupation of the people is farming constituting about 70 percent of the population. The area has a huge productive arable land, and the weather condition is characterized by high relative humidity. The inhabitants belongs to the Ashanti tribe of the Akan ethnic group in Ghana, with a common language known as Ashanti Twi. There are two weather seasons in the area, namely the dry season, which ranging from October to February and the wet (rainy) season, which begins from March to August. The major crops that are cultivated in the area are plantain, cassava, maize, yam, tomatoes, garden eggs, pepper, cabbage, okro, groundnut and onion.

4.2 Data Analysis and Interpretation

In this study, mainly descriptive analysis is used. Specifically, sample questionnaires are used to determine the situation in the study area. The sample of questionnaires were distributed to some selected farmers from the Agogo Township for their responses. The selection process was done randomly and was based especially on the number of years the farmers have been engaged in farming activities, farm size, family size, income levels and off-farm activities among others. In the end, 100 respondents were sampled and interviewed. Each farmer's view was noted and subsequently analyzed.

5.0 RESULTS AND DISCUSSIONS

5.1 Socioeconomic characteristics of respondents

5.1.1 Sex of respondents

During the interview, 100 farmers were selected from the Agogo town, out of that number 59 respondents were males representing 59% of the selected farmers; the remaining 41 were females representing 41% (Table 2). The data indicated that most of the women are in agricultural production. This is attributed to the reason that the women desire to be productive and not dependent on the income of their husbands. Women in the area engage in farming in order to support household expenditure and food consumption. Most of the women that went into agricultural related activities have succeeded. By implication, it has partly motivated other women to take advantage of farming activities as an indispensable source of income generation and food security in the area.

Table 2. Sex of respondents

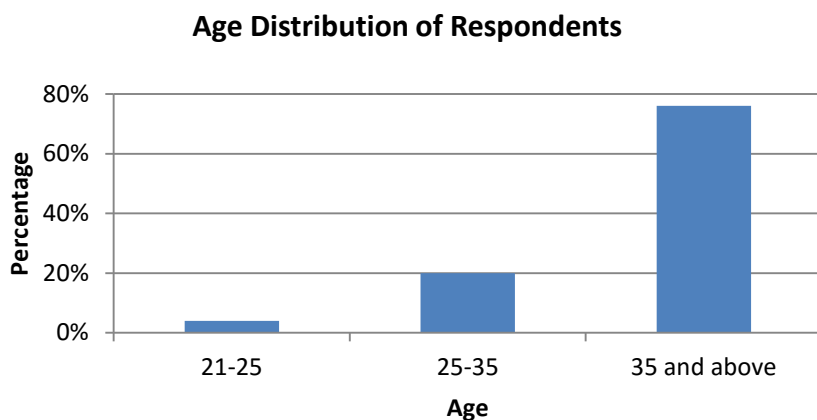
Sex	Total number	Percentage
Male	59	59%
Female	41	41%
Total	100	100%

Source: Data from household survey, own calculations

5.1.2 Age distribution of respondents

The majority of the selected farmers making 77 percent were within the age group of 35 years and above. Those within the group of 26-35 represented 20percent, while 3 percent were between the ages of 21-25 (Figure 4). The few young people who are into farming are those that could not further their education to the higher institutions or have taken on farming as a major economic activity by reason of lack of access to formal education. Most of them stopped schooling either after primary or secondary education due to financial constraints.

Figure 4. Age distribution of respondents



Source: Data from household survey, own calculations

5.1.3 Marital status

As represented (Table 3) 90 percent of the respondents were married. Only 10 percent were single. None of the respondents were divorced. From the information obtained the respondents that were single are in their youthful stage. A lot of the youths are involved in agricultural production basically to improve their standards of living with the income they generate. They are also able to support household expenditure. It was noted that the youths get sponsorship from potential donors to start the farming, after they generate returns, the money is paid back. This has drawn more youths into agriculture production. Conversely, few retired workers also go into farming with the intention of creating a lifetime source of income and food.

Table 3: Marital status of respondents

Marital status	Number of respondents	% of respondents
Single	10	10%
Married	90	90%
Divorced	0	0%
Total	100	100%

Source: Data from household survey, own calculations

5.1.4 Family Size

The size of each household is a great determinant for the effective distribution of income on expenditure. A household is burdened when income is not sufficient to afford the basic needs in life. From the information gathered majority of the respondents has large family sizes. In most households members are close relatives who live together and support each other that is the justification for the high number of people in one household. The household head is required to support all members of the household and provide them with food and other basic needs, attributable to that, there is a high dependency ratio between a household that has many children and older people. As presented in (Table 4) majority of the respondents (42) own a household size between 4-7 members. Only 7 members owned the highest household size, which is 10 and above. However 36 members owned a family size of 1-4, this number is ideal for a household whose income is unreliable.

Table 4: Family size of respondents

Members per household	Number of respondents	% of respondents
1-4	36	36%
4-7	42	42%
7-10	15	15%
10 and above	7	7%
Total	100	100

Source: Data from household survey, own calculations

5.1.5 Educational background

The respondents with Junior High School Education (Middle School Leaving Certificate, MSLC) were the majority representing 40 % of all the farmers. The next highest educational attainments were the group with Senior High School Education forming 28%, followed by tertiary education constituting 23% (Table 5). The number of respondents with no formal education represented only 9 %. Education is vital for the inhabitants, for that reason, both sexes were able to achieve some level of formal education at least to the primary school level. The reason why most of the farmers could not achieve education to the highest level was as a result of financial constraints, gender inequality and poverty in the past. Those farmers that have had some level of formal

education are able to read and write, as a result, they have more advantage over the others with access to the formal market, access to current inputs and knowledge on better farming practices.

Table 5. Educational background of respondents

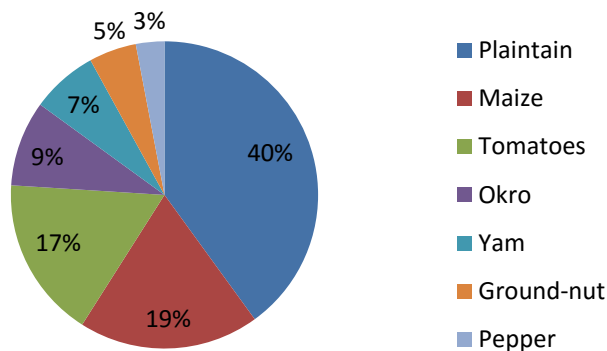
Level of education	Total Number	Percentage %
No formal education	9	9%
Junior High School	40	40%
Senior High School	28	28%
Tertiary	23	23%
Total	100	100%

Source: Data from household survey, own calculation

5.2 Crop production

The main crops that the farmers produce in the area are Plantain, maize, tomatoes, okro, yam, groundnut and pepper (Figure 5). Plantain is the dominant crop, followed by maize and then tomatoes. The other crops are produced in small quantities. Plantain yield has consistently remained high for many years in the area. It is an important crop that does not require much stress in producing because of the nature of the plant. An important factor about this crop is that, it is harvested even during the lean seasons. Also, they are not easily susceptible to diseases; ultimately, it is a very reliable plant.

Figure 5: Crops produced by the respondents



Source: Data from household survey, own calculations

Plantain is a major household staple for the region where the study areas are located. People consume it on a daily basis because of the health benefits it generates. The farmers generate much income from the crops they produce, however, because of fluctuating market prices, their income is primarily unstable. When the crops are plentiful, there is a high tendency that the prices will go down, and a lot of the harvested crops will go to waste. In some cases, the farmers get a good price when there is a high market demand.

Lack of innovation or technology and the absence of proper storage mechanisms for preserving most of the crops that are harvested contributes to food loss. The majority of the harvested crops are sold to the market immediately after harvesting, and if the market is not able to absorb all of them, the rest is left to spoil. This situation causes seasonal food shortage and low income among the farmers.

5.3 Total farm size

As ascertained by the respondents, acquiring farmland is not a constraint to agricultural production in the areas. In the olden days, farmlands were owned by the chiefs, they were then distributed freely to families who were willing to farm. Since then land ownership has been passed on from generation to generation through the family lineage. As a result of this practice, most families are full custodians of farm lands. However, few of the farmlands are government owned. These types of farm lands are leased to interested households who wish to go into farming, in return for a little amount of money. The ability to enlarge farm size depends on the farming inputs that are available to these farmers. Attributable to financial constraints, most of the farmers are only capable of extending the farm size between the ranges of 4 to 7 hectares (Table 6). Few of them own farm sizes around 7-10 hectares.

Table 6. Total Farm size in hectares

Hectares	Total number	Percentage %
1-4	28	28%
4-7	32	32%
7-10	19	19%
10 and above	21	21%
Total	100	100%

Source: Data from household survey, own calculations

All the respondents indicated that they finance their activities by the income they generate from the farm, none of them take loan from the bank, they are reluctant to do so because they might not be able to pay it back and eventually run at a loss. Moreover, the farmers receive no support from the government, no incentives or farm subsidies. According to the farmers, lack of government assistance highly affects farm extension.

5.4 Years of farming

The number of years of farming determines the level of experience obtained by the respondents (Table 7). For most of them, farming has been a family activity for years, which they got engaged in at a very young age. By accompanying their parents to the farm, they acquired farming experience and knowledge, which have been passed on from generation to generation. Long years of farming experience are gained through the old system of agricultural practices. The majority of the farmers comprising of 33 have been practicing farming from the period of 5-10 years, whereas 28 farmers have 1-5 years' experience. From the information gathered, more people have been getting involved in farming for the past decade. This shows the importance of agriculture as an income generating activity to the local population.

Table 7: Years of farming by respondents

Years of farming	Number of respondents
1-5	28
5-10	33
10-15	21
15 and above	18
Total	100

Source: Data from household survey, own calculation

5.5 Respondents income

The income of the farmers varies in different seasons. In some seasons, they can generate an appreciable earning after selling the farm produce, whereas in other seasons they do not generate enough income. From the data gathered, in some harvesting seasons, majority of the farmers (52 %) can generate income within the range of 500 to 1000 Ghana cedis. Others can make between 1000 to 3000 Ghana cedis. Few of them can generate an income above 3000 Ghana cedis. (Table

8). This income Levels recorded among the farming households in this data varies in every season. However, it gives a fair idea of what a house can earn in moderate terms.

Table 8. Respondents income (in Ghana cedis)

Income in Ghana cedis	Number of respondents	Percentage (%)
500-1000	52	52%
1000-3000	36	36%
3000 and above	12	12%
Total	100	100%

Source: Data from household survey, own calculations

In reference to Table 8, the income that is generated by the farmers depends on the number of crops harvested in a particular season and also on the market price. Most of the respondents indicated that they mostly get bad price for the farm produce when there is a bumper harvest and when there is insufficient buyers. The crops are sold immediately after harvesting owing to lack of storage facilities. Other farmers attributed their low income to high transportation cost and bad weather conditions. As noted the farmers pay transportation prices based on the location of the farm not on a broad range of crops that is being transported, by implication, transportation costs is always high for farmers that have their farms located at long distances.

5.6 Diversification strategies

The increasing vulnerability associated with agricultural production in the areas has compelled most of the farmers to seek for other sources of income through diversification. The farmers engage in off-farm activities to supplement the farm income. Table 9 shows that 36% of the respondents engage in off farm activities, indicating that the income they generate from farming is not enough to support household expenditure. Those farmers that have diversified benefit immensely from the extra income that they earn from the off farm activities.

As shown in Table 9, the majority of the respondents engages in trade. The type of trade is mainly retail store management, which includes trade in food and non-food items. The farmers can establish these businesses with the proceeds obtained from the farm income. Out of the 100 respondents, only 11 have full-time careers; they are teachers and civil servants.

Table 9. Respondents that engage in non-farm activities

Type of work	Number of respondents	Total percentage
Trade	23	23%
Civil Servant	8	8%
Teaching	3	3%
Driving	2	2%
Total	36	36%

Source: Data from household survey, own calculations

The farmers can cope with household expenditure, especially during the lean seasons with the earnings from the off-farm activities. They can afford their children's education to the tertiary level and also expand farm size.

5.7 Income and expenditure patterns

The income level of the farmers has a major effect on household expenditure. Income distribution is prioritized towards areas that are considered most important. Although each household has its own priority, 99 percent of the respondents indicated education as the main area of concern. Thus, the income of the farmers is disbursed in the following areas.

The farmers acknowledge that investing in education is the best decision anyone could ever make. In itself, they spend their income on education which they regard or treat as more important. According to the data collected all the farmers that have children, have them enrolled in schools. In situations when the farmer's income becomes unreliable and can no longer take care of education, the children are compelled to stop schooling and take on trade or apprenticeship. This condition only occurs when the farmers have exhausted all possibilities in generating extra income. Ultimately, when the income of the farmers becomes unstable, it mainly affects the education of their children.

Household expenses are considered the succeeding concern after education. Income on household expenditure is disbursed on food, health, clothing, rent, water bills and other house utilities. When income is insufficient to sustain expenditure, households are persuaded to borrow from other relatives.

Other areas where the farmers' income is disbursed are; farm extension, building houses, buying cars and establishing of family businesses. This section is also considered significant in the lives

of the farmers. The majority of them work hard to be able to save money to achieve comfortable lives and have their dreams realized. However, it is a challenge for them to attain this aim since they end up spending all their income on what they set as precedence. Arguably, this area is one of the major reasons why most of the farmers diversify.

5.8 Constraints to agricultural production in the study area

There are some major challenges to agricultural production in the study area that hinders productivity. Predominantly, there is no support from the government for the farmers as was previously discussed in the work. Furthermore, there is no form of innovation or technology in the area that can assist in adding value to the primary commodities.

The farmers indicated that there is a high cost of some agricultural inputs such as weedicides and fertilizers and their inability to afford them has largely affected productivity. Additionally, lack of irrigation system in the areas substantially affects the overall agricultural activities and negatively influence yield and efficiency. In some seasons, the farmers experience bad weather condition, their dependence on rainfall as the only means of production affects crop yield.

Additionally, bad road connections to the farm and high transportation costs are other issues to agriculture production in the area. Some major roads linking to the farms are in bad shape in essence, farmers find it challenging transporting the crops from the farm to the market. All these problems together constitute greatly to the vulnerability surrounding agriculture production in the areas.

6.0 CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

In concluding the findings, the goal of the research was to determine the implication of the seasonal income of farmers in the Agogo Township on their livelihood. The goal of the research was answered through the following questions.

- Does household expenditure differ from season to season?
- Does the seasonal change in farmer's income affect household expenditure?
- Do Farmers sort for diversification strategies to support and sustain household expenditure?

Income seasonality and its related effect on the lives of farmers in Agogo Township can be considered a significant challenge to the well-being of households. There are many issues that constitute to the variation in the income of these farmers and thus, affect its disbursement on expenses.

From the findings, the incomes of farmers in Agogo Township vary from season to season on account of the major challenges affecting agricultural production in the area. When income cannot be kept constant, these farmers, as a result, encounter various problems coping with household expenditure. Thus, the seasonal income of the farmers in Agogo Township has an effect on their livelihood. The majority of the farmers encounter challenges with household expenditure, especially during the slack seasons where there are limited farming activities. Some of the problems may include the inability to afford hospital bills, failure to pay house rent, incapability to afford their children's education and the lack to sustain other basic living expenses. Nonetheless, the households that have taken on off-farm work are less affected or mostly not burdened with household expenditure, when farm income becomes unstable and unreliable.

6.2 Recommendations

Agricultural production is undoubtedly a significant economic activity for the inhabitants of Agogo. The problem of income seasonality can be minimized with the effective consideration of some key components in agricultural production.

The implementation of irrigation system is of major importance to agricultural production. Since the farmers depend on rainfall that is not consistent, an irrigation system will go a long way to ensuring consistent water supply for the crops.

Furthermore, it is important for the farmers to be involved in cooperatives for easy access to current agricultural inputs, credits and storage facilities, also access to information on best farming practice and access to the formal markets. Most rural farmers do not plan when it comes to what goes into cultivating and how much they are expected to get. The income they generate is always determined by how good the season will be, as such forming a cooperative will provide them with the necessary education that can help them take on the best farming practices to guide them in data keeping and management.

Agricultural production in the study area has the potential of improving the lives of the farmers and keeping them and their families out of poverty and hardships. It can also contribute tremendously to food security, income generation, poverty reduction and GDP growth in Ghana. Therefore, there is the need for the government of Ghana to invest in agricultural production by providing infrastructure development in the area. Better road networks will eliminate the high transportation cost and also facilitate easy access to the farms. Also allocating incentives and subsidies to the local farmers will greatly assist in production and enable the farmers to produce in larger quantities, this will promote sustainability.

Other ways the government can support to boost productivity is to introduce a production technology. A system whereby the primary crops can go through a manufacturing process to gain value, this will largely reduce the quantities of crops that go to waste. The use of innovation and technology will particularly ensure the effective utilization of agricultural produce. Additionally, it will contribute to the efficient exploitation of locally available resources, the development of infrastructures and the creation of jobs.

Ultimately, effective government support to the overall agricultural sector is undoubtedly an important measure that can primarily ensure agricultural productivity in the area. The development of the agriculture sector can immeasurably pull more people out of poverty and enhance provincial occupations essentially.

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9.0 LIST OF ABBREVIATIONS

ACF	Action Contra la Faim
FAO	Food and Agricultural Organization
FDI	Foreign Direct Investment
GDP	Gross Domestic Product
GLSS	Ghana Living Standards Survey
GCM	Ghana Chamber of Mines
GIPC	Ghana Investment Promotion Center
GFSI	Global Food Security Index
GIDA	Ghana Irrigation Development Authority
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
IDACA	The Institute for the Development of Agricultural Cooperation in Asia
MDG	Millennium Development Goals
NAEP	National Agricultural Extension Policy
RECA	Research and Education Center of AARDO
UES	Unified Extension System
SSA	Sub-Saharan Africa
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNDP	United Nations Development Programme
UN	United Nations
USAID	United States Agency for International Development
WFP	World Food Programme
WHO	World Health Organization

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APPENDICE

Questionnaires for farmers

A: DEMOGRAPHIC INFORMATION/ FAMILY

1. Respondent's Name

2. Sex: Male Female

3. Age of Respondent

- A. 21 to 25 years
- B. 26 to 35 years
- C. 35 years and above

4. Marital Status

- A. Single
- B. Married
- C. Divorce

5. Are you the head of the house?

- A. YES
- B. NO

5. Educational Background

- A. No education
- B. Primary
- C. Junior High School
- D. Senior High School
- E. Tertiary

6. What is the size of your family?

- A. 1-4
- B. 4-7
- C. 7-10
- D. 10 and above

6. Are your children going to school?

- A. YES

B. NO

B: FARMING ACTIVITIES

1. What is the size of your farm?

- A. 1 to 4 acres
- B. 4 to 7 acres
- C. 7 to 10 acres
- D. 10 acres above

2. What are the varieties of crops you plant?

Specify

3. How many years have you been farming?

- A. 1 to 5 years
- B. 5 to 10 years
- C. 10 to 15 years
- D. 15 years and above

4. How many times do you harvest in a season?

- A. 1 to 3 times
- B. 4 and above

5. Do you experience favorable weather conditions in this area?

- A. YES
- B. NO

C: ASSISTANCE/FINANCIAL

1. Do you get loans from the bank?

- A. YES
- B. NO

2. If "yes" what is the purpose of the loan

- A. Education

- B. Farm expansion
- C. Household
- D. Other

3. Do you get assistance from government?

- A. YES
- B. NO

4. If “yes” what kind of assistance

- A. Fertilizer
- B. Subsidy/Money
- C. Other

5. Do you get financial support from anywhere?

- A. YES
- B. NO

6. If “yes” what kind of support

- A. Specify

D: POST HARVEST AND OTHER ACTIVITIES

1. Do you do any other work apart from farming?

- A. Yes
- B. No

2. If “yes” what is the type of work

- A. Specify

3. Do you store some of the crops after harvesting?

- A. Yes
- B. No

4. If “no” what is your percentage post-harvest loss?

- A. 10 to 40 percent
- B. 40 percent and above
- C. None of the above

5. How do you sell your produce?

- A. At the farm
- B. At the house
- C. At the market

6. Do you get a good price?

- A. YES
- B. NO
- C. Sometimes

7. What are the problems you encounter with transporting your produce from the farm?

- A. Bad roads
- B. Bad weather
- C. Transportation cost
- D. Other

8. How much do you earn in a season (in Ghana cedis)

- A. 500 to1000
- B. 1000 to 3000
- C. 3000 and above

9. What is the purpose of your earnings?

- A. Education
- B. Household
- C. Other

10. Does your income vary in harvest seasons?

- A Yes
- B No

10. What do you consider been the cause to your income variation?

- A. Bad weather
- B. Pest

C. Bad pricing

D other.....

10. Is your income enough for household expenditure?

Yes

<input type="checkbox"/>
<input type="checkbox"/>

No...

If No, do you seek for money elsewhere to survive?

A No

<input type="checkbox"/>
<input type="checkbox"/>

B Yes

If yes where do you get additional money to survive?

.....

ADDITIONAL INFORMATION

1. Do you have other issues relating to your farm activities?

A.YES

<input type="checkbox"/>
<input type="checkbox"/>

B.NO

2. If “yes” what are the issues

Specify

3. Do you need any help or support?

Specify