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EFFECTS OF BLOCK FARM CREDIT PROGRAMME PARTICIPATION ON CROP OUTPUT IN THE NORTHERN REGION OF GHANA

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EFFECTS OF BLOCK FARM CREDIT PROGRAMME PARTICIPATION ON CROP OUTPUT IN THE NORTHERN REGION OF GHANA

BY

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THIS THESIS IS SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL AND RESOURCE ECONOMICS, FACULTY OF AGRIBUSINESS AND COMMUNICATION SCIENCES, UNIVERSITY FOR DEVELOPMENT STUDIES IN PARTIAL FULFILLMENT FOR REQUIREMENT OF AWARD OF MASTERS OF PHILOSOPHY DEGREE IN AGRICULTURAL ECONOMICS

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DECLARATION

I Abdulai Eliasu, hereby declare that with the exception of references duly acknowledged, this thesis is my original work towards the MPhil Agricultural Economics Degree and that, to the best of my knowledge it has not been presented for degree in any other university or any other award.

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DEDICATION

I dedicate this work to my mother Mariama Sulemana for all her struggle and prayers in raising me to this far. I also dedicate this work to my siblings; Abukari Amin, Abdulai Rashida and Asana Mohamed for their support.

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ABSTRACT

The study examined the effect of the MoFA Block Farm Credit Programme (BFCP) participation on crop output in the Northern Region. Structured questionnaires were used to gather data from 240 beneficiary and non-beneficiary farmers of BFCP. Descriptive statistics were used to analyse the socioeconomic variables of both participants and non-participants of BFCP. Treatment effect model was employed to analyse the socioeconomic factors that influence farmers' decision to participate in the BFCP and the effect of BFCP participation on crop output. The results showed that farming experience, membership of Farmer Based Organization and extension visits were the positive determinants of BFCP participation. Also, farm size, quantity of seed used, quantity of fertiliser used and BFCP participation positively influenced crop output. Inadequacy of BFCP input, late delivery of the BFCP inputs, low publicity about the programme and difficulty in accessing the inputs from the Districts Agricultural Officers were some of the factors that prevented farmers from the BFCP participation.

It is recommended that government should re-introduce the BFCP and mainstream it with the provision of agricultural extension services, as this would significantly improve the output of farmers.

Formation of FBOs should also be taken serious by farmers so that they can benefit from government interventions as well as other organizations since many NGOs and financial organisations prefer working with groups instead of individual farmers.

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ACRONYMS

AEA	Agricultural Extension Agents
AMSEC	Agricultural Mechanization Service Centres
BFCP	Block Farm Credit Programme
FASDEP	Food and Agriculture Sector Development Policy
FBOs	Farmer Based Organizations
GSS	Ghana Statistical Services
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institution
IMF	International Monetary Fund
METASIP	Medium Term Agricultural Sector Investment Plan
MOFA	Ministry of Food and Agriculture
NGOs	Non Governmental Organization

CHAPTER ONE

INTRODUCTION

Background of the study

Ghana's economy, like most other developing economies, is largely agro-based with the agricultural sector accounting for 22.0% of the Gross Domestic Product (GSS, 2014). In addition, agriculture provides the largest share of domestic food needs and its contribution to ensuring food security in the country is overwhelming. Agriculture employs majority of the working populace, especially the rural folks. About 45.6% of Ghanaian households are directly engaged in agricultural activities from production to marketing of various agricultural produce (GSS, 2010). It provides raw materials to the local agro-based industries and generates direct foreign earnings through the sale of cocoa and other non-traditional export commodities.

Due to these significant contributions of agriculture, governments, since independence, have been concerned about the development of the sector by initiating and implementing a number of policies. One of such policies is the Food and Agriculture Sector Development Policy (FASDEP II) and the corresponding Medium Term Agricultural Sector Investment Plan (METASIP, 2010). The METASIP "seeks to modernize Ghana's Agriculture which will culminate in a structurally transformed economy evident in food security, employment opportunities and poverty reduction".

requires timely and adequate supply of relevant inputs such as improved seeds, fertilizer, weedicide/herbicide, irrigation, and mechanization services. But, a large number of farmers in the country are not in the position to practice agriculture in a modernized way. This is because most of them are smallholders and their incomes from both on-farm and off-farm economic activities are often inadequate, hence very little or no savings are made for future investment in agricultural production. As a result of these financial limitations, they grow traditional crops and rear animals on small scale bases (Asiedu and Fosu, n.d.).

Credit is essential for the modernization of agriculture and commercialization of the rural economy. Farmers' access to easy and cheap credit is the fastest way for improving agricultural production (Mahmood, et al., 2009). It has been noted that farmers' access to credit is a possible factor for technology adoption. This is so because most farmers experience negative cash flows throughout the growing season. Thus, access to credit during planting periods could allow farmers to finance their farming activities without exhausting, or requiring savings from previous years (Diagne and Zeller, 2001). Availability of credit to farmers on time enables them to acquire the needed inputs and machinery for their farm operations (Saboor *et al.*, 2009).

In Ghana, agricultural credit can be accessed from two main sources; formal/semi-formal institutional and informal institutional sources. The informal sector, which is the oldest, is mostly common in the rural areas and they take various forms. One of the forms it takes is interpersonal lending, which includes loans extended among friends, relatives, neighbours or colleagues. Other forms include moneylenders, market queens and shop owners. These are the most basic strategies that majority

of the farmers in the country use to deal with financial requirements. According to Tang *et al.*, (2010), the informal credit has the advantages of flexible borrowing terms, and little restriction on how the loans should be used. However, with the rapid economic growth, informal credit supply may not be sufficient to meet the increased demand for relatively large amount of credit, as farmers start to engage in more diversified or more capital-intensive economic activities.

The formal/semi-formal credit source includes co-operatives, commercial banks, rural banks, NGOs and government loans. This notwithstanding, commercial banks and other formal financial institutions are situated in the urban areas and do not often offer credit to farmers. This is because, majority of the farmers in the country are regarded as not creditworthy due to lack of tangible collateral required by the banks. In addition, farming is regarded as one of the risky businesses in Ghana due to its sole dependence on natural rainfall. In response to these constraints from both the formal and informal institutional credit sources, Governments and NGOs have initiated and implemented a number of agricultural credit programs to augment their effort. One of the recent government agricultural credit programmes is the Block Farm Credit Programme (BFCP), which was introduced in 2009 as a pilot program in six regions of Ghana and subsequently expanded to other parts of the country.

1.2 Problem statement

The government of Ghana through the Ministry of Food and Agriculture (MoFA) implemented the Block Farm Credit Programme as a measure to reduce the impacts of credit constraint on agricultural productivity. The objective of this

programme was to exploit economies of scale and ensure that farmers benefited from subsidised credit in the form of mechanization services via the Agricultural Mechanization Service Centres (AMSEC), certified improved seed, subsidised fertilizer (through the Fertilizer Subsidy Program), herbicide and pesticides as well as extension services. By bundling the delivery of credit inputs and services, it was envisaged that they are delivered timely and at a lower unit cost. Designed to focus on the youth, it was expected to help generate employment among the rural poor especially the youth, increase farm productivity, improve incomes among farmers, and ensure food security. The credit was expected to be paid back in-kind or cash at the time of harvest (MoFA, 2012).

Freedman (2012), indicated that, providing credit to farmers in the form of inputs (e.g. fertilizer and improved seed) may increase adoption of hybrid crops by relaxing two market constraints, namely; access to financing and access to inputs. Credit markets may be underdeveloped or non-existent in certain farming locations due to the high transaction and overhead costs, low returns of providing small loans, or the limitations on available collateral. These conditions may prevent farmers from attaining the financing they would need to purchase inputs at the beginning of the growing season. Further, input supplies in these markets may be scarce due to the high costs of transporting goods to rural areas. Thus, credit in the form of inputs would simultaneously address both of these market imperfections, and could thereby facilitate technology adoption and improve farm productivity.

According to MoFA (2012), farmers who are participating in the BFCP have attested to the benefits they received, including access to low-cost credit in the form of inputs and mechanization services which have led to greater farm

productivity and high incomes. However, some of the participating farmers have complained about the late delivery of the credit package, which according to them, is affecting their time of cultivation and hence output.

Also, the youth who were supposed to be the main target of this credit programme are not actually participating in the program. More so, there are indications that some of the participating farmers are diverting the credit inputs for other purposes (MoFA, 2012). Evidence of low recovery rates has also been reported in the evaluation, which raises questions of the program's sustainability in the long run. The relevant question to ask is "whether the BFCP is actually improving farm level productivity"? This is because diverting credit package for other uses means that the objective of increasing farm level output of the crop in question may not be achieved (Nosiru, 2010; Girabi *et al*., 2013).

To be able to establish the effects of the BFCP on crop output, an independent evaluation is much needed. However, to the best of my knowledge, not much has been done in terms of investigating into the determinants and effects of the Block Farm Credit Programme, hence the need for this present study.

1.3 Research questions

The questions to be answered at the end of the research are as follows:

1. What are the factors that influence farmers' participation in the Block Farm Credit Programme?

2. What are the effects of the Block Farm Credit programme on farm output?

3. What are the constraints that are associated with the Block Farm Credit Programme participation from the viewpoint of farmers.

1.4.1 Objectives of the study

The main objective of the study is to examine the effect of Block Farm Credit Programme on farm level output in the Northern region of Ghana.

The specific objectives are:

1. To identify the socioeconomic factors that influence farmers' decision to participate in the Block Farm Credit Programme.
2. To determine the effects of the Block Farm Credit Programme participation on crop output.
3. To examine the constraints associated with the Block Farm Credit Programme participation from the viewpoint of farmers.

1.5 Justification of study

The role of credit in agricultural modernization and development cannot be overemphasized. Access to credit facilities by farmers would help in promoting agricultural development and also ensure efficiency in the production process.

A substantial amount of the literature has reported on the effect of agricultural credit on farm productivity, and there is considerable research showing positive impact of credit on farm level productivity. Hence, the Block Farm Credit Programme was introduced by government to provide subsidized credit to farmers. This programme since its inception has engaged significant number of farmers in

the country by providing them with subsidized credit in the form of improved seeds, tractors services, fertilizer and herbicide/insecticide. But, very little evaluation has been done on this program. Thus, the study seeks to examine the effects of the BFCP on crop output.

The findings from this study will be useful in the following ways:

1. It will provide useful information on the status of the Block Farm Credit Programme, which will help guide policy planning in the improvement of the program.

2. It will also serve as an input for further policy planning and formulation of new agricultural credit schemes, which in the end will improve the livelihood of the rural communities.

3. The outcome of this research will provide relevant information, which will help guide the private lenders on how best to effectively disburse and manage agricultural credits in the country.

4. This study will eventually contribute to the existing literature of agricultural credit programs in Ghana.

1.6 Scope of the study

The study was carried out in four districts of the Northern Region (Kumbungu, Sagnarigu, Tatali-Sanguli and Zabzugu). These districts are among the districts in which the BFCP had been carried out over years. The study mainly focused on farmers who cultivated maize, rice and soybean under the BFCP particularly those who cultivated these crops in 2013 farming season. This is because such farmers could easily recall their production activities since most of the small-scale crop farmers in Ghana do not keep proper records of their production (Drafor, 2011).

1.7 Organisation of study

The study is organised into five chapters. Chapter one provides the background information of the study, problem statement, objectives, justification and limitations of the study. Chapter Two gives an overview of literature relevant to the study. Chapter Three outlines the methodology employed to achieve the objectives of the study. In particular, it describes the study area, the study population, sample size and sampling techniques. Chapter four presents the results of descriptive statistics and treatment effect models. Chapter five presents the summary, conclusion and recommendation of the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Quite a lot of research has been done on agricultural credit participation and in particular concerning its effects on farm level output. This has great influence on the current study. This chapter covers the following: definitions and concepts of agricultural credit, classification and relevance of agricultural credit, overview of agricultural finance in Ghana including the BFCP, determinants of farmers' demand and participation of agricultural credit programmes, factors affecting farm level output and the theoretical framework of the study.

2.2 Definitions and concepts of agricultural credit

Credit is an important instrument for the growth of any business and for that matter agriculture. It is a contractual arrangement in which a borrower receives something significant now and agrees to repay the creditor at some later date. It includes all forms of deferred payment. Credit is the "sum of money in favour of the person to whom control is transferred. Credit provision involves two parties: the lender and borrower. It involves a price for the transfer of control over money, which is the interest rate charged by the lender to the borrower" (Ellis, 1992). It is the process of obtaining control over the use of money, goods and service in the present in exchange for a promise to repay in future date (Adegeye and Ditto, 1985).

Agricultural credit is any of several credit vehicles used to finance agricultural transactions, including loans, notes, bills of exchange and banker's acceptance. It is

a short-term substitute for personal savings, which facilitates the process of agricultural production and productivity (Kenneth and Kosgey, 2013).

Ijaiya and Abdulraheem (2000), defined agricultural credit as a loan advanced to farmers for production, storage, processing and marketing of farm produce. It could come from banks, credit unions, government, NGOs or individuals. Atieno (1995) viewed agricultural credit as just lending or borrowing mainly for the purpose of agricultural production, which includes lending to individual farmers, farmers cooperatives or associations and also direct lending to government and non-governmental parastatal for on-lending to grass root farmers.

According to Nwaru (2004; 2011), agricultural credit is defined as the present and temporary transfer of purchasing power from a person who owns it to a person who wants it, allowing the latter the opportunity to command another person's capital for agricultural purposes but with confidence in his willingness and ability to repay at a specified future date. It is the monetization of promise and exchanging of cash in the present for a promise to repay in future with or without interest. Without the willingness and ability to repay, the promise to repay at a future date would be futile. The control of another person's money, goods and services termed credit is at a price usually called interest rate which is required to be paid in addition to the amount borrowed at a specified time.

2.3 Classification of agricultural credit

Agricultural credit is classified on the basis of time, purpose, security, lender and the borrower (Pandey 1990).

In terms of time, agricultural credit is categorized as short, medium and long term credit. Atieno (1995), defined short-term credit as loans advanced for annual re-current expenditures such as purchase of seed, fertilizer, hired machinery charges, hired labour, pesticide weedicides among others. This kind of loans has an amortization period of less than two years. The medium-term loans are meant for relatively long lived assets such as tractors, thrashers, draught animals etc. The repayment period of such loans is between two to ten years. The long- term credit are for making permanent improvement of development in the farm or for the purchase of land.

Agricultural credit is also classified based on the purpose as: crop loan, poultry/diary/piggery loan, irrigation, machinery and equipment loan etc. credit can also be grouped as production and consumption loans due to the fact that production loans are diverted for consumption purpose by the weaker sections in the society. Additionally, on the basis of the type of security offered by the borrower, credit can be regarded as mortgage loans, where the legal mortgage of some property such as land is offered to the lender. Hypothecated loans, which is where the legal ownership of the asset financed remains with the lender though physical possession is with the borrower. For borrower category, credit is grouped as; crop farmers, poultry farmers, fishermen, rural artisans etc. (Pandey, 1990).

On the basis of the lender, credit is categorized in to formal/semi-formal and informal institutional credit (ISSER 2012). Ellis (1992), Ghate (1992) and Tang (1995), defined formal institutional credit as those financial activities that are bound by the legal regulations of a country. They include private banks, state banks, registered cooperatives, rural and community banks, NGOs and many

others. The informal institutional credits are financial transactions that operate outside the regulations of central monetary authority Aryeetey and Udry (1995). There are activities of various financial intermediaries ranging from rich farmers, moneylenders, friends, relatives, shopkeepers, merchants, traders, and Rotating Savings and Credit Associations. The formal/semi-formal and informal financial markets co-exists and operate side by side with one another. Each of the financial market provides credit services that differ from each other with respect to target group, loan duration, amount of loan, its use, interest rate and transaction cost (Zeller, 1994).

Formal institutional credits have the potential of facilitating the process of agricultural production and thus boosting farmers' income and bettering their standard of living (Jan and Khan, 2012). Nonetheless, these credit systems can only satisfy the needs of a limited portion of the population that is cooperatives or individuals who are capable of providing tangible collateral or documented credit references (Manig, 1990). Again, the loans required by most farmers are so small that administrative cost for lenders usually outweighs expected returns. As a result, the credit needs of the poor and many small entrepreneurs/farmers remain unsatisfied through the formal financial system (Tang, 1995). Also, formal institutional sources of credit have some uncertainties and laborious procedure which most of the times do not favour small holder farmers (Omonona, *et al.*, 2010).

The informal institutional credit lenders are willing and able to offer credit to borrowers who do not have any valuable collateral. They are able to do so because they often have personal relations with the borrowers and besides they have better

information about borrowers' transactions, which help them to ensure that the borrowers do not default. According to Tang (1995), the operations of the informal sector are highly flexible because governments do not have direct regulation on their activities. However, their operations are not without some challenges. Participants in the informal credit market normally operate illegally and they are vulnerable to potential losses and abuses. As a measure to reduce the default risk in the absence of valuable collateral, Informal credits are often small and short term. Farmers often obtain informal credit for other purposes than agricultural production, with social purposes (wedding, funeral, education, house construction, medical expenses, etc.), and consumption being dominant.

Ghana has a mature informal credit system in the rural areas that satisfies the urgent demand of the people for production and consumption. The informal credit in the country also helps to meet the pressing social commitments such as paying the cost of the sick and funerals expenses (Ekumah and Essel, 2001).

2.4 Relevance of agricultural credit

Ghana's move towards ensuring food security is heavily dependent on the agricultural sector. Agricultural productivity in turn depends on the adoption of improved agricultural technologies such as certified seeds, weedicides, fertilizer, irrigation facilities and mechanization tools. However, majority of the farmers in the country do not have the capacity to acquire these essential inputs due to low incomes from both on-farm and off-farm activities thus the need for external support (Asiedu and Fosu, n.d.). Farm credit is among the essential factors needed

for agricultural production and with it, farmers can secure the needed inputs for higher productivity (Odoh *et al.*, 2009).

Agricultural credit is a major component of agricultural production, and access to it ensures increased output and food security, (Diagne and Zeller, 2000). Credit enhance the purchasing power of farmers and enables them to acquire modern inputs and technologies such as high yielding seed varieties, fertilizer and install irrigation facilities to increase production (Etonihu,et al.,2013; Omonona et al., 2010; Siddiqi, et al., 2004; Chowdhury and Garcia 1993). Access to credit reduces the opportunity cost of capital intensive assets relative to family labour, thus encouraging labour-saving technologies and raising labour productivity, a crucial factor for agricultural development (Zeller *et al.*,1997),

According to Akudugu (2012), "credit is a strategic empowerment tool that has the potential to change the life of a person, family or community from a situation of abject poverty to a more dignified life. It can transform self-image, unlock potential and boost the productivity and well-being of vulnerable people, especially farm families". Thus, credit plays a critical role in household strategies to reduce vulnerability.

Kenneth and Kosgey (2013), citing Kebede (1995), stated that agricultural credit makes traditional agriculture more productive through the purchase of farm equipment and other agricultural inputs, the introduction of modern irrigation system and other technological developments. It serves as an instrument for market stability as farmers can use credit to establish storage facilities and provide transport systems, which could help, improve their bargaining power. Credit plays

a key role in covering consumption deficit of farm household, which in turn enable the farm family to work efficiently in agricultural activities. It helps creates employment opportunities and it can be used as an income transfer mechanism to remove the inequalities in income distribution among the small, medium, and large-scale farmers.

Credit is considered as a catalyst that activates other factors of production and makes under-used capacities functional for increased production (Ijere, 1998).). It can significantly increase the ability of poor household with no or little savings to acquire needed agricultural inputs (Diagne *et al.*, 2000). Therefore, credit plays a crucial role in agricultural and rural development as it enables farmers reap economies of scale, venture into new field of production, employ new technologies and empower them to provide utilities for widening markets (Ayegba and Ikani, 2013).

According to Adebayo and Adeola (2008), agricultural credit enhances productivity and promotes standard of living by breaking the vicious cycle of poverty of small scale farmers. Availability of credit enables farmers to diversify the agricultural sector by undertaking new investment or adopting new technology (Ayaz *et al.*, 2011). It also leads to increase in farm productivity and incomes, encourages capital formation and improves marketing efficiency (Nwaru *et al.*, 2006). Access to credit may allow for consumption smoothing behaviours that minimize use of risk reducing but ultimately unprofitable savings activities, such as holding cattle or cash , these strategies often generate no, or even negative returns (Freedmnan, 2012 ; Reyes, *et al.*, 2012).

Ogunfowora *et al.*, (1972) reported that credit is not only for farming purposes but also for family consumption expenses; particularly during the off- season period. It is an important instrument for improving the welfare of the poor directly through consumption smoothening that reduces vulnerability to short-term income (Afolabi 2005; Gonzalez-Vega, 2003). Credit plays an important role in the sense of food security and increasing opportunities for employment and acts as a catalyst for rural development by motivating latent potential or making under-used capacities functional (Oladeebo and Oladeebo, 2008; Khan *et al.*, 2011). Mere access to credit may allow farmers to feel more comfortable with the prospects that a failed investment will lead to insufficient income, as producers would know they have a financial buffer to fall back on (Eswaran and Kotwal 1990).

2.5 Overview of agricultural finance in Ghana

Prior to the introduction of formal banking systems in Ghana, rural dwellers mostly farmers, relied mainly on semi-formal and informal financial services for their financial needs. The main source of finding included thrift groups and money lenders among others (Egyir, 2010).

The first cooperatives in Ghana were formed in the 1920s among cocoa farmers, and in 1946, the Gold Coast Cooperative Bank was established to serve the financial needs of cocoa farmers (Egyir, 2010). In 1955, credit unions were introduced in Jirapa in the Upper Region of Ghana (now Upper East and Upper West).The main aim of these unions were to encourage thrift and savings among members for productive ventures. These cooperative unions were expected to take over some of the lending being done by moneylenders (Egyir, 2010). According to

Bortey (1979), the advantages of credit union include regular savings, access to financial counselling, and relatively low rates of interest, dividend rebate and access to loans/savings insurance.

In the late 1950s, government instituted loan scheme for rural and agricultural ventures as these areas were not being catered for by the commercial banks. Then in the 1963 and 1965 the National Investment Bank and Agricultural Development Bank were established. Formal financial institutions in Ghana are incorporated under the companies' code 1963 which gives them legal identities as limited companies and subsequently licensed by the Bank of Ghana (BoG) under either the banking financial institutions law 1989 or non-banking financial institutions law 1993 to provide financial services under Bank of Ghana Regulation (ISSER 2012).

According to Bortey (1979), the Agricultural Development Bank was established to provide financial and related services to farmers, fishermen, agricultural processors and other customers whose activities add value to the agricultural component of Ghana's GDP. The Agricultural Development Bank however requires that farmers and fishermen present business proposal for assessment before loan is granted. The bank also requires a collateral security in the form of fixed assets, savings and deposits. As a result, beneficiaries of such credit are mainly large scale farmers who can provide collateral in the form land and houses and this kind of farmers constitute only 20 percent of the farming population in Ghana (Owusu-Antwi,2010).

According to IFPRI (2010), formal financial institutions such as commercial banks have demonstrated lack of interest in agriculture finance due to four main reasons:

First, many agricultural households were located in remote parts of the country and were often so widely dispersed that financial institutions found it challenging to provide cost-effective and affordable services. Second, big swaths of the agricultural population were subject to the same weather and climate risks, making it hard for providers of financial services to hedge risks or operate profitable insurance pools. Third, service providers mainly unban based, simply did not know enough about the business of agriculture to device profitable financial products. Fourth, most small agricultural producers in developing countries had little education and little knowledge of how modern banking institutions work.

The need for rural banking arose by the turn of 1970s. It became apparent that commercial banks, instead of providing credit to the rural producers, were rather draining rural areas of savings, which were invested in the commercial and housing sectors in the urban areas (Egyir 2010). According to Bortey (1979) and Egyir (2010), rural banking started in Ghana in 1976 with 31 banks. Rural banks are established by the initiative of the community members and managed by Board of Directors. It should operate within a catchment area of 25 kilometers from its headquarters. The objectives of rural banks include mobilising funds in the rural communities and providing credit and other services to customers. It is also an instrument of rural development as well as contributing to national development (Bortey, 1997; Egyir, 2010). Credit disbursed to agriculture by rural banks should constitute at least 45% of its total credit (Bortey, 1997).

Following the down turn of the Ghanaian economy in the late 1970s and early 1980s, the government in 1983 started implementing a Structural Adjustment Program (SAP) from the International Monetary Fund (IMF) which aimed at

reforming key sectors of the economy. By 1986, it was accepted that reforms were needed to encourage the development of financial sectors in order to deepen financial intermediations and create new investment instruments, as well as encourage establishment of new financial. As a result, a number of new banks were established. In 1990s, both formal and semiformal microcredit institutions were also established in Ghana (Egyir, 2010).

Despite all these efforts, majority of Ghana's population do not still have access to credit from the formal financial system. According to IFAD, (2000), Northern Ghana, (which includes Northern, Upper East and Upper West regions), is the most "under-banked" part of Ghana. A number of reasons account for this but the common explanation is that there are no formal financial institutions in over 60% of the districts in the north. Except where semi-formal financial services such as NGOs operated special programmes have come in, farmers and agro-processors rely on other sources including "susu" collectors, moneylenders, group lending and middlemen. Also, even where there are financial institutions they often tend to focus on their best clients to improve portfolio performance, rather than to reach out to new, smaller clients (IFAD, 2000).

2.6 Block Farm Credit Programme

The Block Farm Credit Programme, which was launched in 2009 as a pilot in several locations in six regions, was intended to bring in large tracts of arable land (in blocks) for the production of selected commodities in which the locations (regions and districts) have comparative advantage. The notion was to exploit economies of scale and ensure that the block farms benefited from subsidised

mechanisation services and inputs (fertilizers, improved seed, and pesticides) in the form of credit, as well as extension services that were delivered to the farmers by MoFA. By bundling the delivery of inputs and services, it is envisaged that they are delivered timely and at a lower unit cost. Agricultural Extension Agents (AEAs) were supposed to work closely with the farmers so that they follow recommended practices to meet yield expectations. Following harvest, AEAs recover in kind, the cost of the services and inputs provided by the government to the block farmers (MoFA, 2012).

The BFCP was based on the crop cluster concept by Porter (1998). Cluster is defined as "a geographical proximate group or geographic concentration of interconnected companies, or firms in related industries in particular fields that compete but also cooperate and are linked by commonalities and externalities. The initial idea behind the National Block Farm Credit Programme was having several farmers on a large track of a single piece of land (in blocks) for the production of selected commodities in which the locations (regions and districts) have comparative advantage. However, due to existing land tenure system in Ghana, it was highly impossible for government to procure large tracts of farmland in all the regions for the Block farms. Therefore, most farmers were allowed to use their own lands for the Block Farm Credit Programme. Under the block farm, state lands or land acquired by the government from private individual is ploughed and shared among young farmers in blocks. Inputs such as fertilizer, improved seeds, weedicide and insecticides are supplied at subsidized prices on credit as well as extension services (MoFA, 2011a). Other farmers who farm on individual plots where large tracts of land cannot be obtained also received the same assistance as

block farmers (general crops). The main crops cultivated include maize, rice, sorghum, soybean, and vegetables (MoFA, 2011a).

The objectives of the Block Farm Credit Program were to;

- generate employment among the rural poor, especially the youth; at least 60,000 farmers.
- improve incomes among farmers by at least 50 percent.
- increase food security through the use of science and technology leading to increased productivity and higher yields; and
- improve farming as a business.

For the pilot phase in 2009, potential beneficiaries of the programme were initially identified, following a campaign on awareness of the programme and registration of interested participants. The strategy for the devolution of the programme to the regions and districts involved communications with regional directors of MoFA to organize and implement the programme by executing the following:

- Formation of regional block farm management committees;
- Formation of district block farm management teams;
- Identification of block farm locations and selection of crops;
- Identification and registration of beneficiaries;
- Sensitization and organization of youth into groups;
- Development of implementation plans and schedules of operations; and
- Determination of inputs and services requirements (crop budgets).

The two main things that were considered under the program for crops to be cultivated in any of the four agro ecological zones of Ghana are the suitability of the crop and comparative advantage that the district/region has on the chosen crop. For the pilot phase in 2009, six regions—Ashanti, Brong Ahafo, Central, Northern, Upper East, and Upper West were selected to participate in the program, focusing on the following crops: maize seed and grain, rice seed and grain, and soybean. By 2010, all 10 regions of Ghana were participating in the BFCP, and more crops had been added, including sorghum, tomato, and onions (MOFA, 2012).

2.7 Theoretical framework

Given the objective of study, which is to examine the determinants and effect of BFCP participation on farm level output, we assumed that farmers have two choices; that is to participate in BFCP or not to participate. An individual farmer may decide whether or to participate or not on the basis of his/her perceived utility of participating relative to that of not participating. Assuming that farmers are risk neutral, following Abdulai and Faltermeier, (2009), it may be further assumed that in the decision-making process on whether to participate or not to participate in BFCP, farmers compare the expected utility of wealth from participating denoted as $U_p(\pi)$ to that of non-participating represented as $U_{np}(\pi)$ with net returns of (π) representing wealth. Participation then occurs if $U_p(\pi) > U_{np}(\pi)$. Farmers expected utility of participating can be related to a set of explanatory variables (Z) as:

$$(\pi) = \alpha Z_i + \varepsilon_i \qquad 2.1$$

Where α is a vector of parameters. The error term ε distributed as $N(0, \sigma^2)$ captures the measurement errors and factors unobserved to the researcher but known to the farmer. Z_i is a vector of exogenous variables including the determinants of participation decisions. The utility derived from participation in BFCP is not observable but actions of farmers can be observed through the choice they made by participating or not participating in BFCP. This can be represented by a latent variable P^* that equal 1 if a farmer participate in BFCP (P^* =1 if $U_p(\pi) > U_{np}(\pi)$), and 0 otherwise ($P^* = 0$ if $U_p(\pi) \leq U_{np}(\pi)$).

The probability of participating may then be expressed as;

$$\text{Prob}(P^* = 1) = p(U_p(\pi) > U_{np}(\pi).$$

$$\Pr(\varepsilon_i > -\alpha Z_i) = 1 - F(-\alpha Z_i) \qquad 2.2$$

Where F is the cumulative distribution function for ε

Participation in BFCP often influences factors such as the level of input use and the output levels. The relationship between BFCP participation and the crop output variable can be specified as;

$$Y_i = \beta_i X_i + u_i \qquad 2.3$$

Where Y_i is the outcome variable (farm level total output or the total crop value), X_i is a vector of explanatory variables including the farmers' status (Participants or non-participants); and u_i is the error term which is assumed to be distributed asith $u \sim N(0, \sigma^2)$.

There are many problems in which data is generated by an individual making a choice of participating in a programme or not by self-selectivity. Key among them is the issue of selectivity bias. According to Barnow *et al.*, (1980), selectivity bias arises in program evaluation when the treatment (or control) status of the subject is related to unmeasured characteristics which themselves are related to the program outcome under study. This situation could potentially lead to misestimation of the treatment effect. In other words, if the unobservable factors that affect the likelihood of the programme participation equally affect the performance of the participating individuals, then the effect of programme participation on output would be overestimated by simply regressing the output on a dichotomous variable that indicates programme participation (Greene, 2003; Warning and Key, 2002). In this present study, participants may have unobservable characteristics that are correlated with their decision to participate in BFCP and if these characteristics also correlate with their farm level output, it may be difficult to isolate the effect of BFCP participation on farm level output. Therefore, estimates of the BFCP effect computed from the estimated coefficients on participation status will be biased. When selectivity bias is inevitable, the parameter estimates from simple OLS regression model will be inconsistent and biased (Heckman 1976).

The concern of the selection bias due to unobservable was first addressed by Heckman (1976; 1979) and Lee (1978). When the dependent variable of interest (Outcome equation) is continuous, there are two basic choices of estimators—a maximum likelihood model sometimes called the Full Information Maximum Likelihood (FIML) and the Heckman two-step estimator. The FIML is a straightforward maximum likelihood model, like a probit or logit, that maximizes a specified likelihood function. By definition, when the error assumptions are met,

the FIML will always be more efficient than the Heckman two stage. However, the FIML relies greatly on the normality assumption, which therefore makes it less robust than the Heckman two-step to the deviance from that assumption. The FIML may have difficulty converging, particularly in the absence of exclusion restrictions, while the Heckman two-step model can almost always be estimated (Bushway *et. al*, 2007). Due to these advantages of Heckman two stage, the study therefore used the Heckman two step estimator (treatment effect model) to estimate the effect of BFCP on farm level output.

2.7.1 Treatment effect model

The major econometric problem faced when estimating the effect of programme participation where an individual can self-select himself/herself into the programme is selectivity bias (Maddala, 1983). When selectivity bias is inevitable, the parameter estimates from simple OLS regression model will be inconsistent and biased because the conditional mean of the error term is not included as one of the explanatory variables (Heckman 1976). Hence, the need for an appropriate estimator to correct the problem of selection bias (Heckman 1979). Heckman traditionally proposed two stage approach to evaluating programmes for which treatment choices are binary and the programme outcome depend on a linear combination of observable and unobservable factors. The model consists of two equations; i.e. the regression equation considering mechanisms determining the outcome variables and the selection equation considering a portion of the sample whose outcome is observed and mechanisms determining the selection process (Heckman, 1978, 1979).

Since the development of Heckman two-stage model, many statisticians and econometricians have formulated new models and estimators. One of the most important of these developments was the direct application of Heckman two-stage model to estimation of treatment effects in observational studies. The Heckman traditional two-stage and treatment effect models are quite similar except that in the case of treatment effect model, the treatment condition (in this case BFCP Participation) enters into the substantive equation to measure the direct effect on output (Maddala, 1983).

The treatment effect model has been widely applied in evaluating program benefits (treatment effects) (Maddala 1983, Greene 2003). It estimates the effect of an endogenous binary treatment on a continuous fully observed variable, conditional on the independent variables. In this case, it is the effect of BFCP participation (P_i) on farm level output (Y_i).

The treatment effect model, just like the Heckman two stage, involves two equations i.e. the regression equation considering mechanisms determining the outcome variables as follows:

$$Y_i=\beta_i X_i+\gamma P_i+u_i \qquad 2.4$$

where Y_i is the outcome variable such as total crop output or the total crop value. X_i is a vector of explanatory variables, γ measures the effect of participation and P_i is participation decision which is either equal to 1 or 0 and u_i is the error term which is assumed to be distributed as u ~N(0, σ^2).

The selection equation considering a portion of the sample whose outcome is observed is;

$$P_i^* = \alpha_i Z_i + \varepsilon_i \quad 2.5$$

P_i^* is the latent endogenous variable such that the variable P_i takes the value 1 if ith farmer participate in BFCP and 0 otherwise (non-participant) which is specified as;

$$P_i = 1 \text{ iff } P_i^* > 0$$

$$P_i = 0 \text{ iff } P_i^* \leq 0 \quad 2.6$$

The error term ε_i is distributed as $N(0, \sigma^2)$ and captures the measurement errors and factors unobserved to the researcher but known to the farmer, while Z_i is a vector of exogenous variables explaining the factors influencing farmers decision to participate in BFCP or not and α_i is a vector of parameters.

The model corrects the selection bias that arises from unobservable factors by estimating the two equations; the selection equation (participation) and the outcome equation.

The participation equation is used to generate the selection correction variable by first estimating equation 5 using a probit model as;

$$\text{Prob}(P_i=1/Z_i) = \int_{-\infty}^{\alpha_i Z_i} \emptyset(t)dt = \Phi(\alpha_i Z_i). \quad 2.7$$

The selection correction variable is obtained from the estimates of each observation i as;

$$\lambda_i = \sigma_{u1} \frac{\emptyset(\alpha_i Z_i)}{\Phi(\alpha_i Z_i)} \quad 2.8$$

where $\emptyset$ and Φ are normal probability distribution function and normal cumulative distribution function respectively. The ratio $\emptyset/\Phi$ evaluated at $\alpha_i Z_i$ for each P_i is known as the Inverse Mills Ratio (IMR).

The second step consists of running an OLS regression on equation 4 with λ_i as one of the explanatory variables to obtain consistent and unbiased estimates β_i as;

$$Y_i = \beta_i X_i + \gamma P_i + \sigma_{u1} \frac{\emptyset(\alpha_i Z_i)}{\Phi(\alpha_i Z_i)} + e_1 \quad 2.9$$

Taking log of equation 9,

$$\ln Y_i = \beta_i(\Phi ln\, X_i) + \gamma(\Phi P_i) + \sigma_{u1}\emptyset + e_1 \quad 2.10$$

(Maddala,1983)

Where e_1 is the new error terms which have zero conditional means, σ_{ui} is the covariance of u_i and ε_1.

2.8 Determinants of farmers' demand and participation on agricultural credit programmes

Many researchers (Diagne, 1999; Tang *et al.*, 2010; Mpuga, 2008; Kofarmata *et al.*, 2014) have conducted studies on factors determining farmers' demand and participation in agricultural credit programmes. Some of these factors include individual/household demographic and socio-economic characteristics as well as

the attributes of the credit institution. These factors influence individual farmer's decision differently, to such an extent that what influence one particular individual farmer's decision to participate in agricultural credit programme might be different from another individual.

In analysing the determinants of credit programme participation and socioeconomic characteristics of Beneficiaries in Sargodha Pakistan, Shah *et al.*, (2008) found that household size, interest rate, earners of household, ownership of a house and existence of financial institution or NGO in the locality were the significant factors that positively influenced household credit participation. Age, education and income of household were also significant but negatively related to credit participation. According to Shah *et al.*, (2008), younger farmers were more energetic and motivated and so might not participate in credit programs. In addition, household heads with higher education might be able to find paid jobs and thus, might not participate in credit programmes. Amazingly, households were indifferent about the interest rate because, they still preferred liquidity at high interest rate. On the other hand, Jan and Khan (2011) observed that age, education and annual income did not have any significant effect on household credit participation when they conducted a similar study in Pakistan.

A study conducted by Muhongayire *et al.*, (2013) to estimate the determinants of farmers' participation in formal credit market in Rural Rwanda revealed that the likelihood of farmers' participating successfully in formal credit market increased with education, off-farm income and access to extension service. However, it decreased with the availability of informal financial system in the locality. They indicated that educated farmers have better understanding of banking procedures

and rules for acquiring and using formal banking financial products and services. They added that, given the unpredictable nature of farm income coupled with lack of land tenure security in Rwanda, off-farm activities played an important collateral function in the credit market. More so, farmers who received technical information from agricultural extension agents were more likely to use formal credit.

While examining formal and informal credit market and rural credit demand in China using a multinomial probit model, Tang *et al*., (2010) observed that farmers credit demand is significantly and positively affected by age, household size, land ownership, household headed by a female and educational level of farmers. Nevertheless, this decreased with higher interest rate, credit transaction cost and off-farm commitment. In a related study in Nigeria, Kofarmata *et al*., (2014) also found that higher off-farm commitment reduce the likelihood of credit participation. Meanwhile, the educational level of the farmers was found to have significant and positive effect on credit market participation.

Hussein (2007), conducted empirical studies on Farm Household Economic Behaviour in Imperfect Financial Markets in Ethiopia and found that, the probability of a farmer choosing formal credit sector was positively affected by gender, educational level, household labour, farm size, credit information and extension visit but negatively related to non -farm income, dependency ratio and interest rate. In the semi-formal sector, the probability of household credit participation was positively affected by age, religion, education, extension visits, repayment flexibility and cash/kind type of credit. However, gender, non-farm income, household savings, credit information, loan processing time and interest

rate negatively affected farmers' participation in the semi-formal credit market. Hussein (2007) further added that education, credit information and extension visit are more likely to increase the information base and decision making abilities of the farm households including the ability to compare the pros and cons of choosing appropriate credit and production technology.

In examining factors determining access to formal credit, Dzadze *et al.*, (2012) found that extension contacts, educational level and saving habit were the significant factors that positively influenced farmers' access to formal credit in Ghana. They explained that higher level of education is associated with the ability to access and comprehend information on credit terms and conditions, and ability to complete loan application forms properly. Also, Yehuala (2008) observed that extension services, experience in borrowing, size of land holdings and membership of associations were the significant variables that positively influenced smallholder farmers access to formal credit program in Ethiopia. However, the number of livestock owned by a farmer was negatively related to credit participation. According to Yehuala (2008), livestock rearing increase the wealth and income level of farmers and so they might not be financially constrained.

Mpuga (2008) examined the constraints in access to, demand for rural credit in Uganda, and found that; age, gender, marital status, education, location and value of assets were the most significant variables that positively influenced an individual farmer's decision to demand for credit. Age squared, household size and a farmer being female were also found to be significant but negatively related with an individual decision to demand for credit. He indicated that at the intermediate

ages, demand for credit increased with age but declined as the age of the individual advanced.

Etonihu *et al.*, (2013) studied the determinants of access to agricultural credit among crop farmers and observed that the educational level of farmers had significant and positive effect on their access to credit. However, the type of credit sources and distance to the credit sources were found to reduce farmers' access to credit. In addition, Akpan *et al.*, (2013) found that age, farm size and membership of social organization were significant variables that positively influenced farmers' access to credit. Nevertheless, gender, household size, extension visits and distance from farmers' residence to the credit source reduces farmers' access to credit. Also, Asogwa *et al.,* (2014) observed that farm investment, access to extension services, household size, awareness, education, farm size and membership of cooperatives society were the significant factors that positively influenced farmers' access to agricultural credit. Moreover, Akinbode (2013) also observed that only gender of the farmers had positive influence on their access to credit. However, farmers' age was found to reduce their access to credit. Furthermore, Okurut and Schoombee (2007) found that age, education, household expenditure per adult equivalent were significantly variables that influence credit access.

The social capital dimension and other determinants influencing household participation in micro-credit groups was investigated by Kangogo *et al.*, (2013). The result revealed that age, experience in borrowing, total farm income and decision making index were the significant variables that positively influenced household decision to participate in micro-credit groups but, farm size,

heterogeneity index and membership density negatively influenced farmers' participation in the microcredit groups. Moreover, Nouman *et.al* (2013) observed that farm status and farm size were significant and positively related to credit participation in Pakistan. Marital status and education level of the farmers were also significant but negatively influenced credit participation.

Balogun and Yusuf (2011) conducted a survey on the determinants of demand for microcredit among rural households in South-Western State of Nigeria. The result of the survey revealed that organizational membership, meeting attendance, cash contribution index, membership heterogeneity, credit distance and interest rate were the most significant variables that influenced the demand for credit. It also revealed that while the likelihood of household demand for credit from commercial bank and NGOs increase as interest rate increased; it decreases with that of local moneylenders. In a related study, Bakosi (2001) observed expenditure and family size were the significant factors that positively influenced credit demand in Malawi. Bakosi (2001) indicated that larger family size put forth pressure on household, which is mostly reflected through an increased probability of borrowing

Empirical assessment of formal and informal institution's lending policies and access to credit by small-scale enterprises was conducted by Atieno (2001) and the result revealed that farmers' income level, distance to credit source, past credit participation and assets owned were significant variables that positively influenced farmers' access to the formal credit market. In a related study, Baiyegunhi and Fraser (2014) found that gender, education, household saving, value of productive assets and social capital were the positive factors that affect credit access.

However, dependency ratio and loan repayment capacity had negative relation with credit access in the Eastern Cape Province of South Africa.

The shifters of participation in microcredit and credit in general in Pakistan was investigated (Imran *et al.*, 2013) and the result revealed that educational level and family size were the significant variables that positively influence credit market participation. However, the number of income earners in a household negatively affected the probability of entrance in to the credit market. Sekyi *et al.*, (2013) also observed that age, household size, education, income and wealth were the significant variables that influence entrepreneurs' decision to access in the credit market in Ghana.

Probit analysis was employed (Ajagbe, 2012) to assess factors affecting small-scale enterprises decision to take credit in Oyo state, Nigeria. The result of the study revealed that gender, location, value of assets and other dwelling characteristics have positive influence on small-scale enterprises demand for credit. Nonetheless, education, interest rate and past and present credit use negatively influence credit demand. Sebopetji and Belate (2009) also observed that gender, farming experience and marital status were significant variables that positively influence farmers' decision to take credit. However, age, education and membership of an association were found to have negative effect on farmers' decision to acquire credit. On the other hand, Amao (2013) observed that age, household income, farm size, gender and membership of an association were the significant variables that positively influenced farmers' credit demand in Nigeria.

In examining micro-finance services in agricultural development in Tanzania, Rweyemamu *et al.*, (2003) observed that household size, years of schooling, expenditure and household income were significant and positively influenced household demand for credit. However, borrowing transaction cost negatively influenced credit demand. They indicated that, for the household expenditure, the positive and significant relationship is due to household desire for more income to meet their desire consumption.

Udoh (2005) investigated the demand and control of credit from informal sources by rice producing women in Nigeria. The result of the study revealed that farm expenditure and experience in credit demand were significant variables that positively influence credit demand. However, education, interest rate, personal income as well as spouse income negatively influenced credit demand. Udoh (2005) added that the more women are educated the less credit they obtain from informal sources. Also, a woman who is married to a man with high income status, will hardly ever collect credit from informal sources.

Ilembo *et.al,* (n.d) studied the determinants of adoption on input credit in Tanzania and the result revealed that off-farm income was the only significant variable that has positive effect on adoption of input credit. However, farm size and type of wall negatively related to the adoption of input credit. Variables such as household size, age, age square, farming experience and educational level farmers did not have any significant effect on the adoption of the input credit.

2.9 Factors affecting farm level output

There have been many studies on the factors affecting farm level output. For example, in analysing factors that affect agricultural productivity in Imo state, Nigeria, Obasi *et al.*, (2013) found that educational level, farming experience, farm size, extension contacts and labour had positive and significant relationship with farm level productivity. On the other hand, age, chemical fertilizer used and planting material (seed) were inversely related to productivity. They concluded that, farm productivity increase if there are increased levels of extension contacts and also if farmers with higher educational level and greater years of farming are engaged in agriculture.

In studying the socio-economic determinants of small-scale maize farmers' output, Ajah and Nmadu (2012), observed household size, amount of land cultivated and quantity of fertilizer applied were significant and positively related to maize output. Farming experience and land rent were also significant but negatively related to output. However, age, literacy level, membership of cooperative, cost of seed and cost of chemicals other than fertilizer were not significant. Amaza et,al (2006) also observed that farm size, fertilizer and high labour had significant and positive effect on output.

Factors affecting productivity and profitability of vegetables production was examined (Xaba and Masuku 2013) and the result revealed that access to credit, quantity of fertilize , gender and selling price were the significant variables that positively influenced farm level productivity. They indicated that access to credit

enhances the financial capacity of the farmers to purchase the essential inputs for improve productivity.

The determinants of farm productivity among smallholder rice farmers in Anambra State, Nigeria was examined (Mbah and Edeh,2011) and the result revealed that education, fertilizer and use of improved crop varieties were significant and positively related to output. However, farm size, cost of labour and frequency of extension visits were negatively related farmers' productivity level. They indicated that better education promotes the adoption and use of yield-increasing technologies/inputs and encourages more efficient farm management practices. Also, provision of credit in the form of improved rice varieties and fertilizer will help improve farmers' level productivity. Adebayo and Moses (2007) also observed that size farm and quantity of seed used were the variables that influenced farm productivity in Adamawa state,Nigeria.

An empirical analysis on the impact of agricultural credit on agricultural production was conducted (Das *et al.,* 2009) and the result showed that direct agriculture credit amount received by farmers has a positive and statistically significant impact on agricultural output. On the contrary, Nosiru (2010) indicated that credit received by farmers did not have significant effect on their productivity. Nosiru added that the non-significant relation between credit and productivity may be as a result of non-judicious utilization, or diversion of credits obtained to other uses apart from the intended.

In analyzing the long-term determinants of agricultural output in smallholder farmers, Musifiri and Mirzabaev (2014) found that labour, capital, land and land

quality were the significant factors that had positive on higher output. According to them, increasing productivity of labour over time does not mean agricultural output will continue to increase, considering the law of marginal productivity of labour in the long run. In addition, Bakari *et al.*, (2015) observed that farm size, quantity of seed used, quantity of fertilizer applied, quantity of herbicide used and labour used have significant effect on output.

The impact of fertilizer credit on crop production and income was investigated (Matsumoto and Yamano (2010) and the result showed that, the fertilizer credit increase input application for crop production and consequently has substantial impact on crop yield. Also, Wang *et al.,* (2013) observed that fertilizer application has positive effect on crop yields in china.

In examining the impact of institutional credit on agricultural production in Pakistan, Iqbal *et al.*, (2003) revealed credit has a positive effect on agricultural production. They indicated that access to credit enabled farmers to purchase quality farm inputs such as seed and fertilizer that help contribute to output levels. On the other hand, Reyes *et al.*, (2012), observed that short- term credit did have significant effect on farm level output

The impact of institutional credit on agricultural output was analysed (Ahmad, 2011) and the result showed that land area cultivated and credit received were significant variables, which positively influenced farm level output. Sial *et al.,* (2011), also observed that agricultural credit, availability of water, cropping intensity and agricultural labour were the significant variables that positively influenced agricultural production.

Bashir *et al*., (2010) examined the impact of agricultural credit on productivity of wheat crop and found that quantity of seed used, fertilizer applied, irrigation, land preparation and credit were the significant variables, which positively influenced the yields of the wheat crops. Saeed *et al*., (2014) and Shah *et al.,* (2008) revealed that household size, income of household, education of farmers and credit are the significant variables positively influencing agricultural yield in pakistan. They added that the positive association between credit and farm level productivity could be attributed to timely availability and application of required inputs.

Relationship between formal credit and agricultural productivity was investigated (Ammani, 2012) and the result showed that formal credit has a positive relation with the productivity of crops, livestock and fishing sectors in Nigeria. Obilor (2013) also observed that agricultural guarantee scheme and government funds allocated to agriculture produced a significant and positive effect on agricultural productivity in Nigeria.

In an evaluation conducted on agricultural productivity and rural development, Ekwere and Edem (2014) observed that access to agricultural credit had positive impact on agricultural productivity. In addition, Girabi *et al*., (2013) revealed that higher agricultural productivity was recorded for credit beneficiaries. Moreover, Chisasa and Makina (2013), showed that bank credit had positive and significant impact on agricultural output.

In Nigeria, Bolarinwa and Fakoya (2011) examined the impact of farm credit on farmers socioeconomic status in Ogun state and the result revealed that securing credit have direct effect on farm production level. Also, in Bangladesh, Hasan *et*

al., (2013), used a Cobb-Douglas production function to estimate the effect of microcredit on agricultural output and the result showed a marginal effect of capital received and laobur force which are positive and significant influencing farm level output.

2.10 Factors limiting farmers' access to and demand for agricultural credit

In developing economies such as Ghana, a large share of the population typically depends on agriculture mostly subsistence farming for their livelihood. Farming like any other business requires capital for its operations. Timely availability of capital leads to adoption of improved technologies such as certified seed, fertilizer and other modern agricultural technologies that help improve farm production. Therefore, agricultural credit is an essential element for modernization of agriculture. However, most of the farmers in Ghana do not have access to agricultural credit due to a number of reasons. For instance, in a study conducted by Owusu -Antwi and Antwi (2010) on the "rural credit market in Ghana", it was revealed that; high default risk, uncertainty and risk inherent in agricultural production and marketing and high cost of lending to small farmers were the reasons that banks do not often offer credit to farmers. Lack of collateral, low rate of interest on agricultural loans and long-term nature of agricultural loans were also cited as reasons that banks do not give loans to farmers in Ghana.

In Nigeria, Okojie *et al.*, (2010), examined the "the institutional environment and access to microfinance by self-employed women in rural areas of Edo". The result of study revealed that, lack of bank accounts, collateral and information regarding

the procedure for accessing credit from formal institutions were the factors that hindered women farmers from accessing credit from formal institutions.

In determining credit access and productivity growth among subsistence food crop farmers in Ikole local area in Nigeria", Ugwumba and Omojola (2013) observed that higher interest rate, cumbersome processing procedures, delays in disbursement, lack of collateral, lack of awareness of loans packages and government officials attitude were the constraints which impeded farmers from accessing credit packages. Adejobi and Atobatele (2008) added that loan default could limit farmers' access to credit.

Philip *et al.*, (2009) studied the constraints to increasing agricultural productivity in Nigeria, and found out that, high interest rate and short-term nature of agricultural loans with fixed repayment periods do not suit cropping and thus constitute a hinderance to credit access. Similarly, Asogwa and Abu (2014), observed that delay of approving and disbursing credit, lack of collateral, complicated procedures and higher administrative cost are the main constraints to accessing by smallholder farmers.

Sadiq *et al.*, (2015) in examining the determinants of credit constraints found that lack of collateral, inadequate information, untimely credit delivery, rejected application , diseases outbreak, domestic and family problems, inadequate extension contacts, market imperfection, administrative procedure and high interest rates were the main constraints preventing farmers from accessing agricultural credit. Lastly, Ololade and Olagungu (2013) observed that lack of collateral

security, lack of guarantor, higher interest rate, mode of repayment and lack of information were the main constraints faced by farmers in accessing credit.

Conclusion

From the discussion, it can be concluded that agricultural credit enhances the purchasing power of farmers and enables them to acquire improved technologies and inputs needed for higher production. Similarly, agricultural credit can be accessed from either formal/semi-formal or informal sources. Factors influencing farmers' decision to demand and participate in agricultural credit are diverse and different studies have identified age, education, gender, household size, off-farm commitment, extension contacts, membership of FBO and interest rates as the most influencing factors. However, higher interest rates, lack of collateral, untimely agricultural credit delivery, inadequate extension contacts and fixed repayment period of agricultural credit have been identified by many researchers as factors limiting farmers' ability to participate in agricultural credit programmes.

In this study, the objective is to investigate the specific factors that influenced participation in the BFCP as well as the effect of participation on crop output. This is because programme participation may depend on project specific, location specific as well as farmer specific factors, among others.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the methodology used in the study. Specifically it presents a description of the study area, population, sampling procedure and the sample size, research design, data collection and analytical methods.

3.2 Study Area

The northern region is one of the regions in Ghana in which the BFCP was piloted in 2009. Since then, almost all the 26 districts in the region have benefited from the programme. This study was conducted in Kumbungu, Sagnarigu, Tatali-Sanguli and Zabzugu districts of the Northern Region. Northern region covers an area of about 70,384 square kilometer, which is the largest in Ghana in terms of land size. It has a total population of 2,497,461 representing 10.1% of Ghana's population with a total of 26 districts. The region has predominantly rural population, which is about 69.7% (GSS, 2012).

Northern region is bordered on the north by Upper West Region and Upper East region, on the east by the eastern Ghana-Togo international border, on the south by the Black Volta and the Volta region and on the west by the Western Ghana-Ivory coast international border. It lies between latitude 9.16^0 and 9.34^0 North and longitudes 00.36^0 and 00.57^0.

The region experience uni-modal rainfall pattern, which normally starts in May, and rise steadily to peak in August and September and gradually decline by the end of October. Averagely, northern region records an annual rainfall of between 750mm to 1050mm. The vegetation is guinea savannah with soils which are suitable for cultivation cereals such as maize, rice, sorghum, millet and legumes and tubers which groundnut, cowpea, soybean and yam (MoFA, 2011b). Agriculture therefore is the main economic activity in northern region employing about 70.9% of the entire population (GSS, 2012).

Kumbungu district with the capital Kumbungu was carved out of Tolon-Kumbungu with a population of about 56,166. It is located about 6Km North West of the Northern Regional Capital, Tamale. The District shares boundaries to the north with West Mamprusi, North Gonja to the West and Tolon to the South, whilst Tamale Metropolitan, Sagnerigu District and Savelugu/Nanton Municipal share the Eastern boundaries with it, (Kumbungu District Composite Budget , 2013).

The average annual rainfall in the district is 1,000mm. The vegetation cover is guinea savannah with short drought resistant trees and grassland. The district has the largest irrigation facility in the Northern Region with 800 hectares of irrigatable land. There are several lowland areas suitable for rice cultivation. The soils are generally sandy loam, which is suitable for the cultivation of cereals such as maize, rice, groundnut, cowpea and soybeans. The communities in which the data was collected are Jakpahi and Kpulingeng.

Sagnarigu district was carved out of the Tamale Metropolitan Assembly in 2012. It has a total land area of 114.29 km^2. It shares boundaries with Savelugu-Nanton Municipal to the North, Tamale Metropolitan to the South and East, Tolon the West and Kumbungu to the North-West. The population of the district is estimated at 148,099. Geographically, the district lies between latitudes 9°16 and 9° 34 North and longitudes 0° 36 and 0° 57 west. The vegetation in the area is guinea savannah and the crops grown include; maize, rice, cowpea and vegetables (Sagnarigu District Composite Budget, 2013). The communities in which the data were collected include Yilonaayili and Zagyuri.

Tatale-Sanguli district shares boundaries with the Republic of Togo to the East, Zabzugu to the West,Nanumba North and South and Nkwanta to the South , Saboba and Chereponi to the North. It has a total land area of 1,232 km^2 with a population of 61,927. The district records an annual average rainfall of 1200mm. The vegetation of the area is guinea savannah but some part of it falls within the Transition zone. Farming (crop and livestock) is the mainstay of the people employing about 98% of the entire population of the district. The types of crops normally cultivated in the district include cereals (Maize, Millet, and Sorghum), Legumes (Groundnut, cowpea and soybeans) and tubers (yam, cassava), rice, (Tatale-Sanguli District Composite Budget, 2013). Kuyuuri and Binaatabe are the communities in which the data was collected for the study.

Zabzugu district with its capital Zabzugu has a total land area of 1,332km^2. It shares boundaries with Tatale-Sanguli to the East, Yendi to the West, Nanumba North and South Mkwanta to the South and Saboba Chereponi to the North. It has a population of 63,815 out of which 98% are farmers. The vegetation of the

District is guinea savannah, though some areas in the Southern aspect fall within the transitional zone. Soils in the district are generally sandy loam with alluvial deposits in the lowlands. It is a very rich soil, which results in the growth of yam, cassava, maize, groundnuts, millet, sorghum, rice and other foodstuff (MoFA 2011b). The communities in which the data was collected are Kalegu and Sabare.

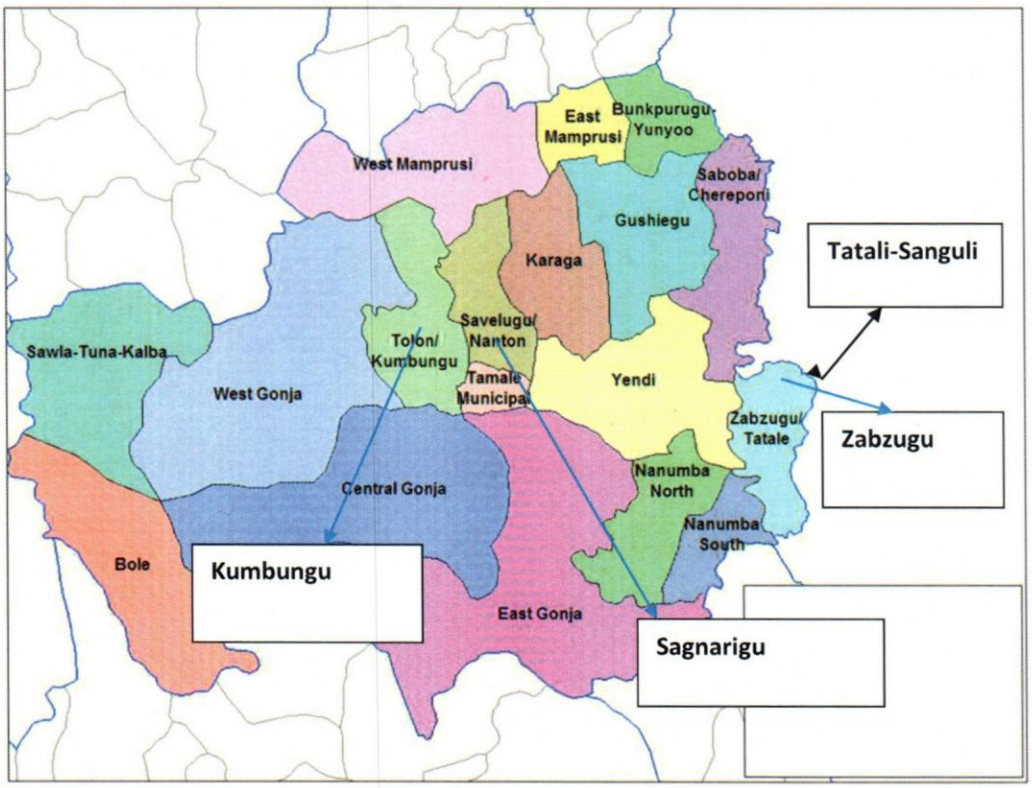

Figure 3.1: Map of Northern Region

3.2 Target population

The population of interest for this study is all participants and non-participants of the Block Farm Credit Programme especially those who participated in the program during the 2013 cropping season as well as a sample of non-participants in the study communities.

3.3 Sampling methods and sample size

Multi-stage sampling was used and this involves both probability and non-probability sampling techniques. The first stage of sampling involves purposive sampling where lists of 24 beneficiary districts in the northern region were obtained from the Regional Agricultural Development Unit (RADU), Tamale. Due to time and resources constraints, four districts namely; Kumbungu, Sagnarigu, Tatale-Sanguli and Zabzugu districts were randomly selected from 24 districts obtained.

In each of the districts, cluster sampling was used to select two BFCP beneficiary communities. From these communities, stratified sampling was used to categorize farmers into participants and non-participants. In each of the communities, 15 BFCP participants were randomly selected in each of the community for study. In order to get a balance effect of programme, an equal number (15) of non-participants were also randomly selected from each of the communities for the study. In all, 240 respondents (120 BFCP participants and 120 non-BFCP participants) were selected for the study.

3.4 Research Design

The study used quantitative descriptive research design. Survey method was used in collection of data under this design. Descriptive research is used to describe what is in existence in respect to conditions or variables that are found in a given situation. The researcher does not have direct control of independent variables as their manifestation has already occurred. According to Kothari (1999), descriptive research design describes the state of affairs, as it exists. Mugenda (2008)

describes descriptive research as the study performed within communities with the main aim of establishing the extent of the range of problems, issues or concerns that have not been investigated earlier. Therefore, this research design was considered appropriate for the study because the researcher was to establish the effect of Block Farm Credit Program on farm level output.

3.5 Data Collection

Data were collected from both primary and secondary sources. Primary data was collected from both participants and non-participants of the Block Farm Credit participants especially those who participated in 2013. Information on demographic characteristics, land tenure, Farmer Based Association, access to extension service, Block Farm Credit program and other farming activities were collected by use of structured questionnaire. The structured questionnaire consisted of both open-ended and closed-ended questions. The open-ended questions gave the farmers the chance to express themselves whereas the closed-ended questions on the other hand gave the farmers pre-coded responses in which they selected the option they agreed most or the option to specify otherwise. Secondary data were collected from both the regional agricultural development unit and the districts department of agriculture.

Questionnaire administration was done by the researcher and two field enumerators. The enumerators were trained on how to administer the questionnaire, the nature and how to probe further in order to get the right data for the study. Before administering the questionnaires, they were pre-tested with the

help of the trained enumerators and necessary adjustments made before beginning the actual data collection.

3.6 Analytical framework

The study employed both descriptive and econometric techniques. Descriptive analysis was performed using frequencies, percentages, t-test for continuous variables and χ^2 for categorical variables. The econometric analysis employed treatment effect model to analyze the factors that influence farmers' decision to participate in the BFCP and the effect of BFCP participation on farm level output.

3.6.1 Empirical specification of the model

The empirical model needed to estimate the effect of Block Farm Credit program participation on farm level output is represented as;

The outcome equation is;

$$\ln Y_i = \beta_0 + \beta_1 (\Phi ln X_1) + \beta_2(\Phi lnX_2) + \beta_3(\Phi lnX_3) + \beta_4(\Phi lnX_4) + \beta_5(\Phi lnX_5) + \beta_6(\Phi lnX_6) + \gamma(\Phi P_i) + \sigma_{u1}\emptyset + e_i \quad 3.1$$

Where Y_i is the total crop value of maize, rice and soybean measured in Ghana Cedis, X_1 = Total farm size cultivated (acres), X_2 = Plough cost in (GH¢), X_3= Quantity of fertilizer applied (Kg), X_4= Quantity of seed used (Kg), X_5 = Total labour cost incurred (GH¢), X_6 = Quantity of weedicide used(litres), and P_i= Participation status (1= Participants 0=Non-participants).

The participation equation is also given as follows:

$$P_i^* = \alpha_0 + \alpha_1 Z_1 + \alpha_2 Z_2 + \alpha_3 Z_3 + \alpha_4 Z_4 + \alpha_5 Z_5 + \alpha_6 Z_6 + \alpha_7 Z_7 + \alpha_8 Z_8 + \alpha_9 Z_9 + \alpha_{10} Z_{10} + \alpha_{11} Z_{11} + \varepsilon_i \quad 3.2$$

Z_1= The age of the respondents, Z_2= Sex of respondent Z_3= Marital status of respondent, Z_4= Educational status, Z_5= Household size of farmers, Z_6 = Farm experience, Z_7= Land ownership, Z_8 = Membership of an FBO, Z_9= Livestock ownership, Z_{10}= Extension visit and Z_{11}= Income generated by the respondent outside the farming activities. The description of the variables are given in section 3.7 below.

3.7 Description of variables used in the probit and OLS models

The selection of variables for the above models was based on related studies reviewed in the in chapter two.

The age a farmer (Z_1) is a continuous variable, defined as the farmers' age at the time of interview measured in years. It was included in the model because it is used as a proxy for maturity and potential ability to utilize and repay credit borrowed Akudugu *et al* (2009). It was hypothesized that age of farmers will have positive relation with their decision to participate in agricultural credit programmes. This is because older farmers are usually more experienced in farming and will be able to utilize credit facility effectively in order to increase revenue and repay back the loan. On the other hand, younger farmers are assumed inexperienced in farming and so may not be able to utilize credit effectively and to repay back the loan and therefore may not participate in agricultural credit programs. A number of researchers including Tang *et.al* (2010) Nnadi and Akwiwu, (2008) and Nxumalo and Oladele, (2013) have observed a positive

relationship between age of farmers and their participation in agricultural interventions. However, Jan and Khan (2011) and Korfomata *et al* (2014) did not observe any significant relationship between farmers' age and their decision to participate in agricultural credit programs.

The sex of a farmer (Z_2) is a dummy variable which assumed a value of 1 if the farmer is male and 0 otherwise. The sex of a farmer may have a negative or positive effect on the decision to participate in agricultural credit programs. Male farmers are known to have greater chances of participating in agricultural credit as compared to female farmers because they are usually mobile, and also participate in community meetings and hence are more exposed to information than their female counterparts (Kenneth Y. Kosgey K. (2013). However, Hussein (1988) observed that in the informal arena, women in the areas are known to have greater chance of participating in credit market than men.

Marital status of a farmer (Z_3) is considered as a dummy which takes the value 1 if a farmer is married and 0 otherwise. Married farmers may have access to information and resources from their spouses and may therefore be more likely to participate in an agricultural project as compared to one who is not married. According to Nnadi and Akwiwu (2008), marriage increases a farmer's concern for household welfare and food security which is therefore likely to have a positive effect on their decision to participate in an agricultural program. Hence, marital status was hypothesized to have either positive or negative effect on farmers decision to participate in the Block Farm Credit Program.

Educational status of a farmer (Z_4) is a dummy which takes a value 1 if a farmer is literate and 0 otherwise. Farmers with education are capable of receiving information, process it and understand the information that comes out regarding any new technology or programme. Therefore, farmers who have some form of education are more likely to participate in the BFCP than those who do not have education. Thus, the education of the farmer is expected to have a positive impact on the decision to participate in the BFCP.

Household size (Z_5) is a continuous variable indicating the number of people who live and eat from the same pot and at the time of the research. Household size serves as a form of family labour and complements the effort of the landlord. However, this could only happen if all the family members are older enough to perform the farm activities. The availability of family labour provides the farmer the opportunity to share responsibility and save time for other activities. Also, with larger household size, a farmer has greater responsibilities of meeting the family income and social needs and therefore the need for external support. Therefore, the household variable is expected to have a positive influence on BFCP participation.

Farming experience (Z_6) is measured as the number of years the farmer has been engaged in farming as at the time of the research. A farmer with more experience may have a higher tendency to participate in agricultural credit programs because he/she might have seen or experienced the benefits of previous credit programs. Also, farmers with more experience will know how to utilize credit efficiently and be able to repay the loan. Therefore, farming experience is hypothesized to have positive effect on Block Farm Credit Program participation.

Land tenancy (Z_7) was included the probit analysis to examine the effect of land ownership on farmers decision to participate in the Block Farm Credit Program. It is a dummy which takes the value 1 if a farmer is a land owner and 0 otherwise.

Membership of Farmer Based Organization (Z_8) assumes the value 1 if a farmer belongs to Farmer Based Organization and 0 otherwise. Farmers who belong to such groups may have access to information including agricultural interventions. Therefore, it is expected to have a positive relationship with BFCP participation.

Extension visits (Z_9) is measured as the number of extension visits a farmer received per month during the 2013 cropping season. Extension agents are responsible for educating farmers on new and improved agricultural technologies. Thus farmers who participated in the BFCP might have received information about the program from extension agent. Therefore, extension visits is expected to influence farmer decision positively to participate in the Block Farm Credit Program.

Livestock ownership (Z_{10}) is a dummy variable which takes the value 1 if a farmer owned animals and 0 otherwise. It is expected to have a negative relation to Block Farm Credit Program participation. This is because; farmers who rear livestock may have additional income to support their farming activities so therefore might not be financially constrained as compared to those who did not rear livestock.

Off-farm Income (Z_{11}) is dummy which took the value 1 if a farmer had additional income apart from that from farming and 0 otherwise. This is expected to have a negative relation with the Block Farm Credit Program participation because

farmers who have off farm income may not be constrained financially and hence might not participate in the Block Farm Credit Program.

Total farm size (X_1) is measured as the total area of land in acres of maize, soybean, rice and groundnut cultivated during the 2013 cropping season. A number of researchers (Sen1962:1966; Bardhan 1973; Dyer 1991; Byiringino1996 and Masterson 2007) found an inverse relationship between farm size and productivity. Cornia (1985) and Bakari *et al.*, (2015) however have observed positive relationship between farm size and farm level productivity.

Plough cost (X_2) is measured in Ghana cedis. It is the amount of money spent on the ploughing the maize, rice, soybean and groundnut farms during the 2013 cropping season.

Quantity of Fertilizer used(X_3) was included in the OLS estimation and it refers to the quantity of both organic and inorganic fertilizer applied on maize, soybean and rice farms during the 2013 crop season. A number of researchers (Braimoh and Vlek 2006; Xu *et al.* 2006; and Onasanya et al. (2009) have found fertilizer use to positively affect farm level output. Thus in this study also fertilizer is expected to have a positive effect on yield.

Quantity of Seed used (X_4) measures the quantity of maize, rice and soy as well as groundnut seed in kilograms used by farmers during 2013 cropping season. The quantity of seed used determines the plant population which has an influence on yield. Oyewo *et al.* (2009) observed a positive relationship between quantity of seed used and maize output when they examined the determinants of maize

production in Ogbnomoso South Local Government area in Oyo state,Nigeria. The quantity of seed used is expected to have a positive influence on farm level output.

Labour cost (X_5) is refers to the total cost of labour incurred by the respondents during 2013 farming season. It is measured in Ghana cedis. This is expected to have negative effect on total crop value because an increased in cost of labour may result in a reduction of total crop value.

Quantity of weedicide used (X_6) was included in the OLS estimation. It measures the quantity of weedicide used in litres on maize, soybean, rice and groundnut during the 2013 farming season.

BFCP participation (P_i) as indicated earlier, this takes the value 1 if a farmer participates in the Block Farm Credit Program and 0 otherwise. A farmer who participated in the BFCP is expected to have a higher yield than the one who did not because he will have the opportunity of using certified seeds, right quantity of fertilizer and weedicide. Therefore BFCP participation is expected to have a positive effect on farm level output.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the descriptive and econometric analyses of the study. The descriptive analysis focused on the socioeconomic characteristics of the respondents, land tenure, Farmer Based Associations, access to extension services, farm characteristics and Off-farm income. Information on the constraints faced by farmers in accessing the Block Farm Credit is also analysed descriptively. The econometric analysis focused on the factors that influenced farmers' decision to participate in the Block Credit Program and the effect of the Block Farm Credit program participation on farm level output

4.2.1 Socioeconomic characteristic of the sample farmers

From table 4.1, the age distribution of the respondents shows that 44.6% of the sampled farmers were between the ages 30-39 years, followed by those within the age range of 20-29 years. Across the categories, 43.3% participants were found to be between the ages of 30-39 years as compared to 45.8% non- participants. In addition, 16.7% participants and 22.5% non-participants were between the ages of 20-29 years. This therefore implies that most of the respondents fell within the most economically active age group and can still work actively for a relatively long period.

Table 4.1 Age distribution of respondents

Age category	Participants		Non-participants		Pooled	
	Frequency	Percentage	Frequency	percentage	Frequency	Percentage
20-29	20	16.7	27	22.5	47	19.6
30-39	52	43.3	55	45.8	107	44.6
40-49	23	21.0	21	17.5	44	18.3
50-59	18	15.0	12	10.0	30	12.5
60-69	7	5.8	5	4.2	12	5.0
Total	120	100.0	120	100.0	240	100.0

Source: survey results 2014

The gender distribution of the respondents shows that most of the sampled farmers were male. Out of the 120 participants, 91.7% of them were male while 8.3% were female. Also for non-participants, 87.5% were male and 12.5% of them were female as shown in figure 2.

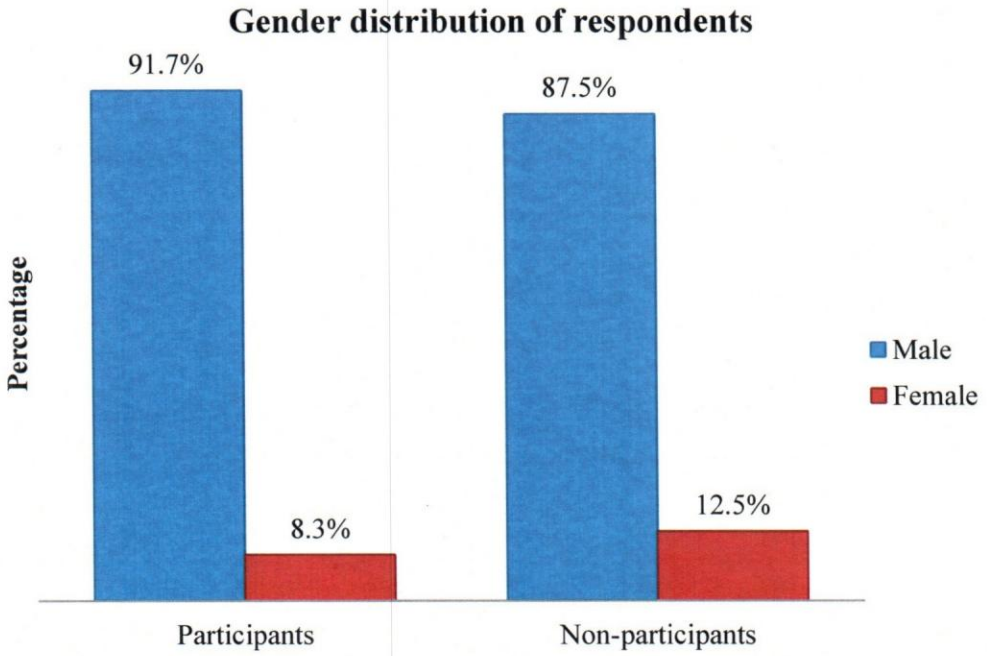

Figure 4.1: Gender distribution of the sampled farmers

Source: survey results 2014

Out of the 240 respondents, 93.3% of them were married and only 0.9% of them were divorced. Between participants and non-participants, the percentage of married participants is 3.3% higher than the married non-participants. Marriage is one of the most respected and sacred institutions in Northern Ghana particularly in the rural communities. It is mostly regarded as a source of prestige and may serve as a source of additional labour for farming activities. A couple can practice division of labour on their farms and those who have children can even benefit the more.

Table 4.2 Marital status of the respondents

Marital status	Participants		Non-participants		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Single	5	4.1	9	7.5	14	5.8
Married	114	95.0	110	91.7	224	93.3
Divorce	1	0.8	1	0.8	2	0.9
Total	120	100.0	120	100.0	240	100.0

Source: survey results 2014

The distribution of the household size for the sampled farmers is presented in table 4.3. The result of the study revealed that 38.8% of the respondents had a household size ranging from 6-10. Across the different category, 15% participants and 20.8% non-participants had a household size ranging from 1-5. Also, the household sizes of 19.2% participants and 15% non-participants were either within the range of 16-20 or greater than 20. The average household size is 10.7, which is more than twice the national average of 4.4.

Table 4.3 Distribution of respondent household size

Category	Participants		Non-participants		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1-5	18	15.0	25	20.8	43	17.9
6-10	49	40.8	44	36.7	93	38.8
11-15	30	25	33	27.5	63	26.3
16-20	12	10	11	9.1	23	9.6
>20	11	9.2	7	5.8	18	7.4
Total	120	100.0	120	100.0	240	100.0

Source: survey results 2014

In terms of education level, the study shows that 70.8% of the respondents did not have any formal or non-formal education. Across the categories, 67.50% participants and 74.17% non-participants had not been to school. For those who had some form of education, 7.50% of both participants and non-participant had primary school education, 14.17% of participants and 13.33%% of non-participants had either Junior high or middle school education, 2.50% of participants and 3.33% of non-participant had either senior high or vocational school education. While 0.83% of the participants had university education, none of the non-participants had similar qualification as presented in table 4.4.

Table 4.4 Educational level of respondents

Level of education	Participants		Non-Participants		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
No Education	81	67.5	89	74.1	170	70.8
Primary	9	7.5	9	7.5	18	7.5
JHS/Middle School	17	14.1	16	13.3	33	13.8
SHS/ Vocational	3	2.5	4	3.3	7	2.9
Training College/HND	2	1.6	1	0.8	3	1.3
University	1	0.8	0	0.0	1	0.4
Non-formal	7	5.8	1	0.8	8	3.3
Total	120	100.0	120	100.0	240	100.0

Source: survey results 2014

From table 4.5, the study revealed that while 35.8% of the farmers had been farming for between 1-10 years, only 1.7% of them had been into farming for more than 40 years. Across the categories, whereas 19.2% participants had been farming for 21-30 years, 10.8% non-participants had similar experience. On the contrary, while 33.7% non-participants had between 11-20 years experience, 31.7% participants had similar farming experience.

Table 4.5 Farming experience

Number of years	Participants		Non-participants		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1-10	37	30.8	49	40.8	86	35.8
11-20	38	31.7	44	33.7	82	34.2
21-30	23	19.2	13	10.83	36	15.0
31-40	21	17.5	11	9.2	32	13.3
>40	1	0.8	3	2.5	4	1.7
Total	120	100.0	120	100.0	240	100.0

Source: survey results 2014

With regards to membership of Farmer Based organization, the result of the study revealed that 74.2% of the participants belonged to Farmer Based Organizations as compared to 12.5% of non-participants as shown in figure 3. This therefore implies most of the participants were members of Farmer Based Organizations and so could easily have access to information about the Block Farm Credit Programme.

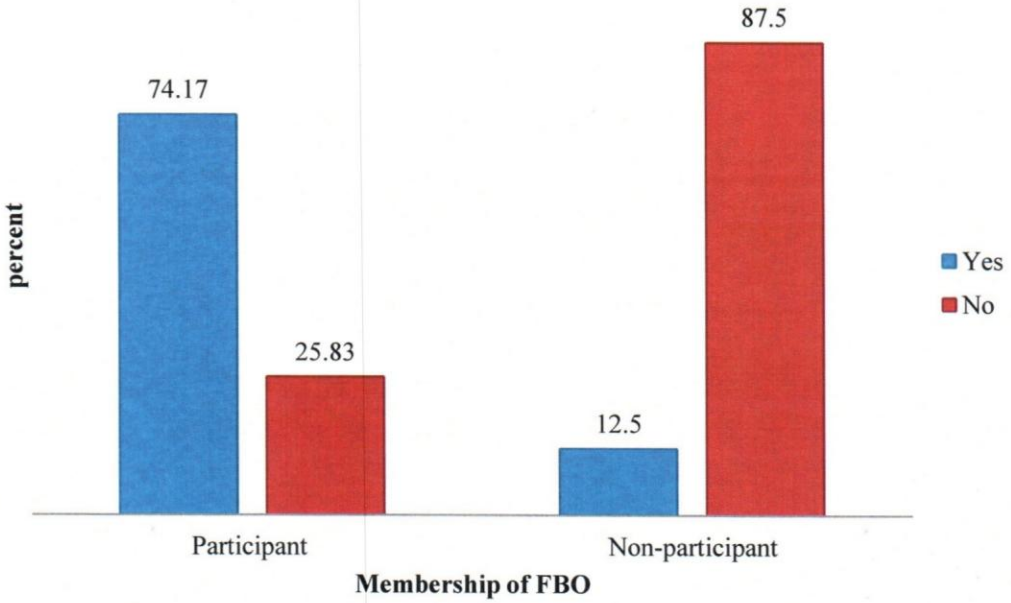

Figure 4.2: Membership of Farmer Based Organizations

Source: survey results 2014

In terms of access to extension services, the study revealed that 95% of the participants indicated that they had access to extension services as against 30% of non-participants as shown in figure 4. This implies that most of the non-participants did not have access to extension services. This may be the reason why they did not participate in the National Block Farm Credit Programme.

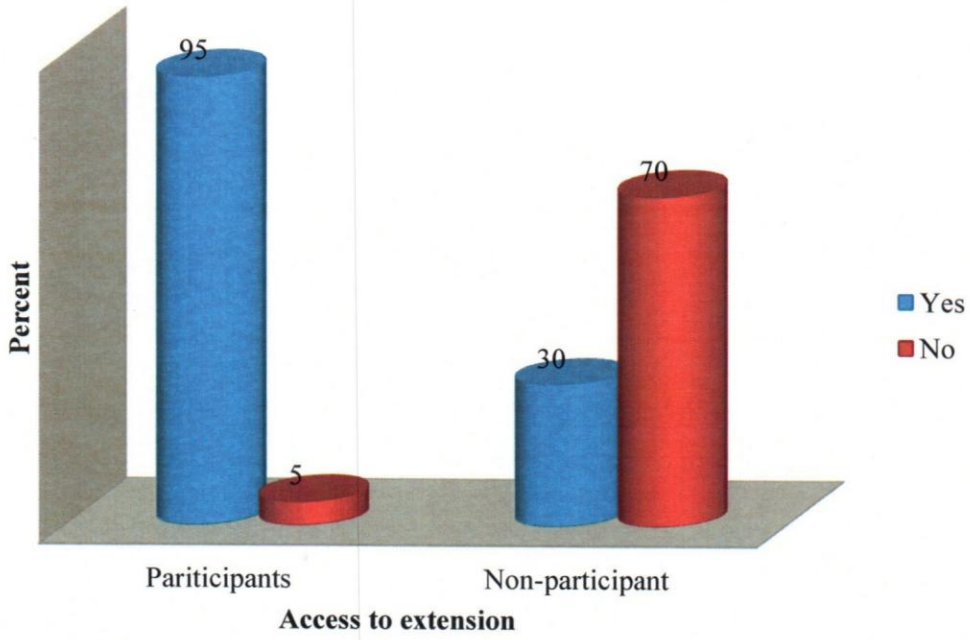

Figure 4.3: Access to extension services

Source: Survey result 2014

Livestock is one of the most important assets for farmers in the study area as revealed by the results of the study. About 86.7% of participants and 88.3% of non-participants owned livestock during the time the study was conducted. Most of the farmers in the Northern region undertake both crop and livestock production mostly small ruminants and cattle.

Table 4.6 Livestock ownership

Livestock ownership	Participants		Non-participants		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Yes	104	86.7	106	88.3	210	87.5
No	16	13.3	14	11.7	30	12.5
Total	120	100.0	120	100.0	240	100.0

Source: Survey result 2014

The study also sought to find out the source of the Block Farm information. The results in figure.5 revealed that, most of the respondents did not have information about the Block Farm Credit Program as a result they did not participate in the program. On the other hand, 31% of the respondents indicated that they had the Block Farm information from Agricultural extension agent. While 18% of the respondents said they had the Block Farm Credit Program information from a group member, only 2% indicated that they had the information from either radio announcement or other sources.

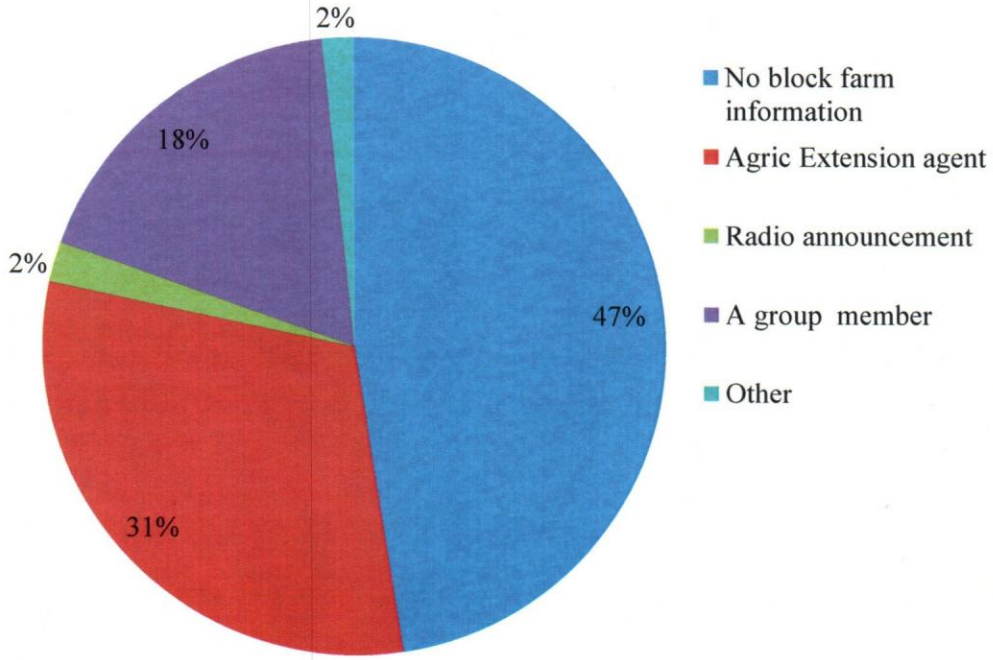

Figure 4.4: Source of Block Farm Information

Source: Survey result 2014

The study also sought to establish the land tenure status of the sampled farmers. The findings show that, most of the land parcels used by farmers for both the Block Farm Credit Program and other farming activities was owned by individual farmers. While 7% had their land parcel from either friends or village chief, only 3% rented their farmlands as shown in figure 6.

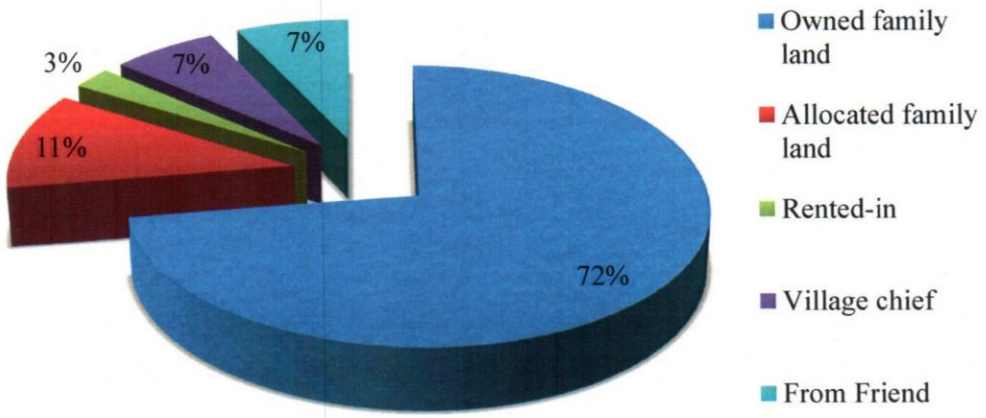

Figure 4.5: Land tenancy

Source: Survey result 2014

The result of the study revealed that majority of the sampled farmers (69.2%) had between 1-5 acres of farms. Comparatively, 65% participants and 73.3% non-participants had between 1-5 acres. In addition, 28.3% of participants and 21.7% of non-participants had between 6-10 acres. Furthermore, 3.3% of participants and 2.5% of non-participants had between 11-15 acres and only 1.7% of participants and 0.8% of non-participants had a farm size greater than 20 acres as shown in table 4.7.

Table 4.7 Distribution of farm size

Farm size (Acres)	Participant		Non-participant		Pooled	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
1-5	78	65.0	88	73.3	166	69.2
6-10	34	28.3	26	21.7	60	25.0
11-15	4	3.3	3	2.5	7	2.9
16-20	2	1.7	2	1.7	4	1.7
>20	2	1.7	1	0.8	3	1.2
	120	100.0	120	100.0	240	100.0

Source: Survey result 2014

In terms of the type of seed used by farmers, the study revealed that while 36.7% participants used only improved seeds, 0.8% of non-participants used only improved seed. In addition, as 66.3% of the participants used both improved and traditional seeds, none of the non-participants used both seeds. On the other hand, while about 99.2% of the non-participants used only traditional seed, none of the participants used only traditional seed as shown in figure 7. This therefore confirms that participants were provided with improved seeds.

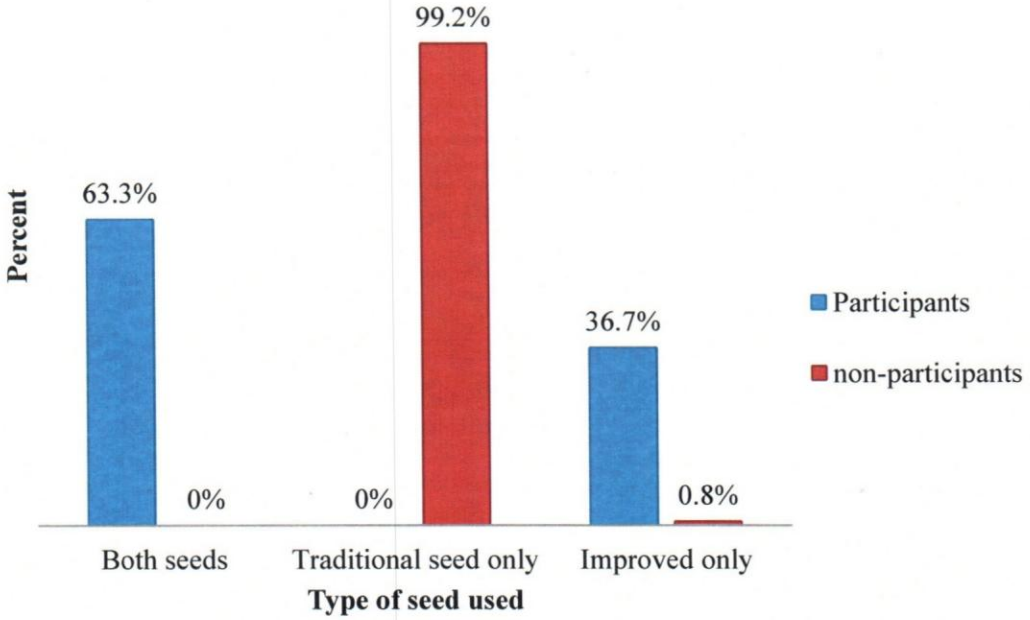

Figure 4.6: Type of seed used

Source: Survey result 2014

With regards to the type of fertilizer used, the result shows that majority of the respondents used inorganic fertilizer on their farms. As shown in figure 8, 80% of participants and 88.2% of non-participants used only inorganic fertilizer. In addition, while 20% of participants used both organic and inorganic fertilizer only 6.3% of non-participants used both fertilizers. Also, while 5.0% of non-participants did not use fertilizer on their farms, almost all the participants used either inorganic fertilizer or both organic and inorganic fertilizer on their farms.

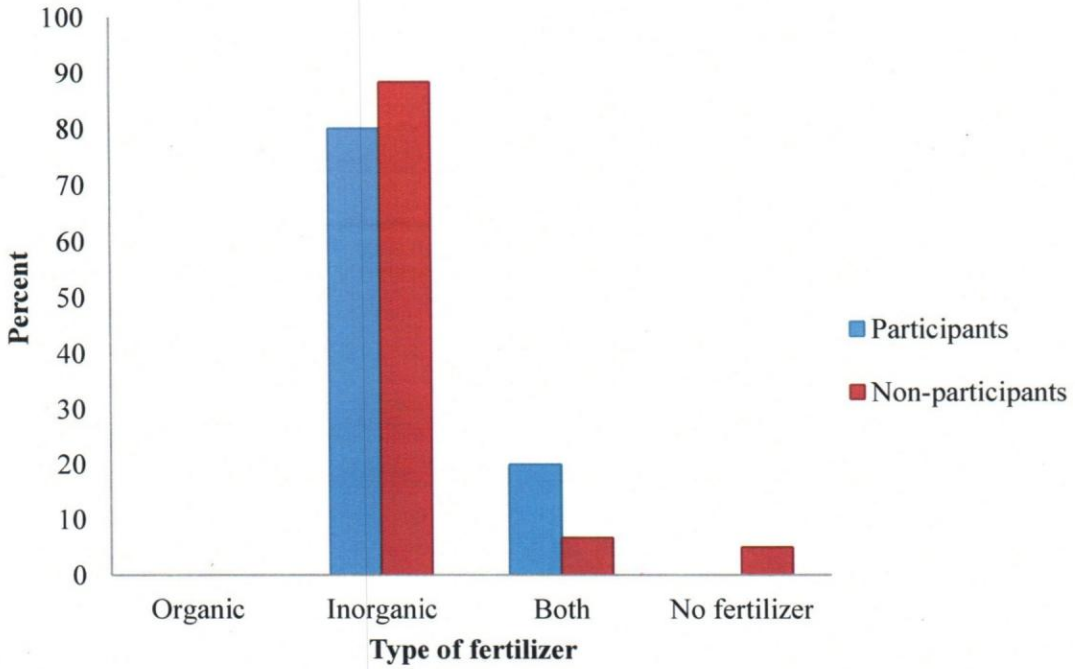

Figure 4.7: Distribution of the type of fertilizer used by both participants and non-participants

Source: Survey result 2014

The study sought to examine the sources of labour force for both participants and non-participants. The result of the study revealed that both participants and non-participants used more hired labour than family and communal labour. For participants, while 60.2% of them used hired labour, 39.8% of them used family and communal labour. Also, while 52.1% of non-participants used hired labour, 47.9% of them used family and communal labour. This therefore implies that farmers in the study rely heavily on hired labour for their farming activity.

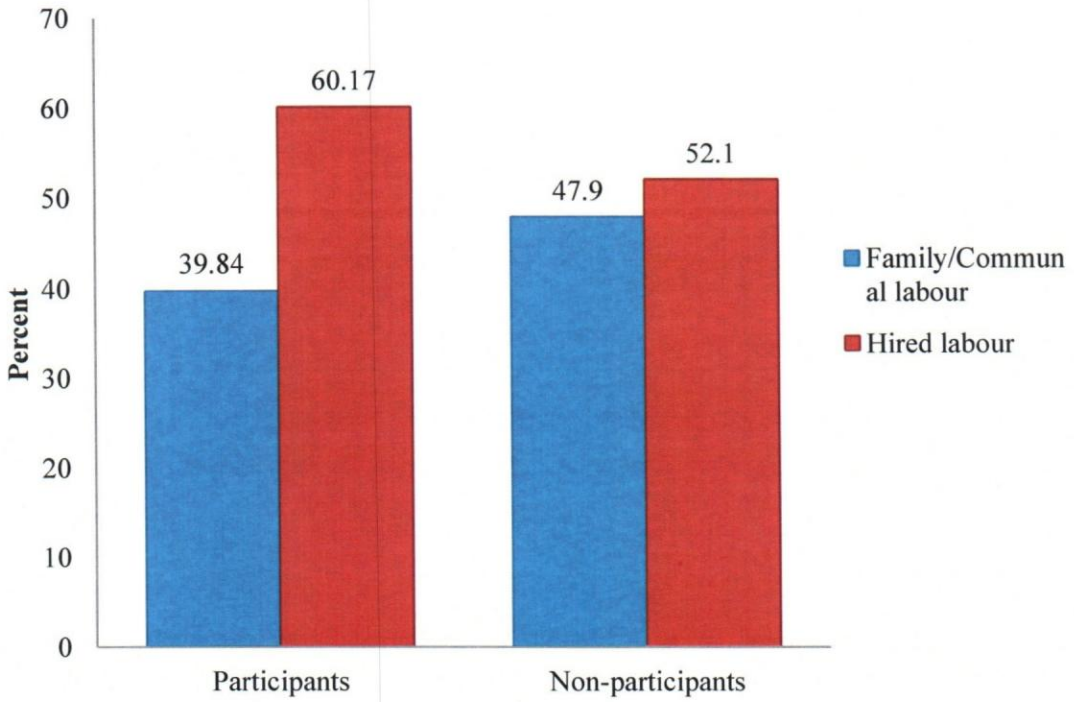

Figure 4.8: Distribution of labour source for both participants and non-participants

Source: Survey result 2014

The results revealed that most of the respondents did not engage in off-farm activities and hence did not earn off-farm income as shown in figure 10. For BFCP participants, out of 120 respondents, only 36 of them earned off-farm income. Similarly, for non-participants 69 farmers out of 120 did not earn off-income. These therefore suggest that most of farmers in the study area rely solely on farming for their livelihood.

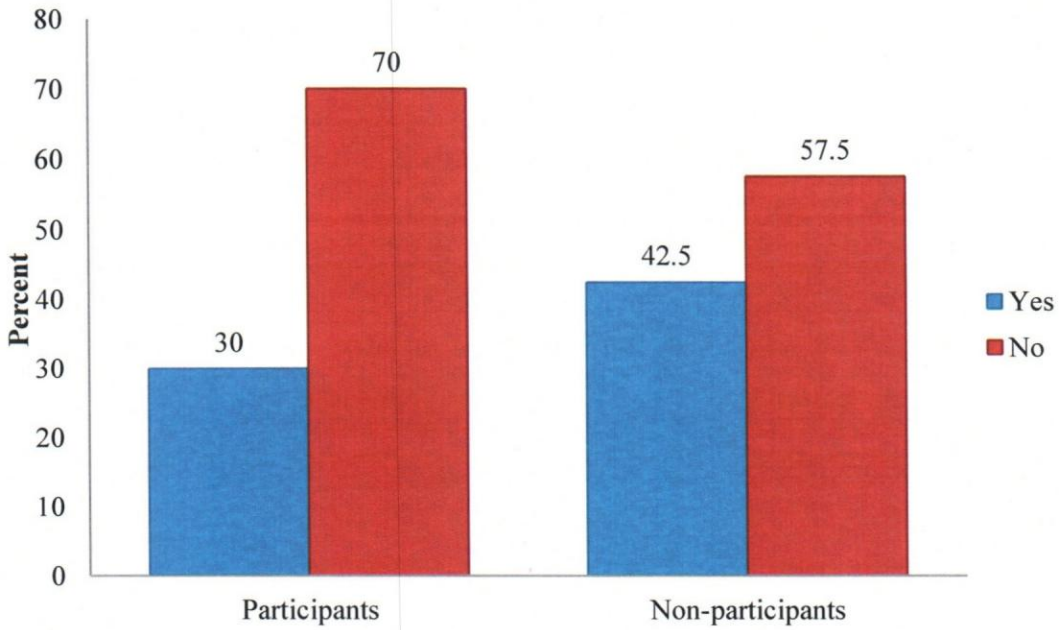

Figure 4.9: Off-farm income

Source: Field survey 2014

As shown in table 4.8, the *t*-statistic of the mean difference indicates that participants and non-participants are partly different in their socioeconomic characteristics such as age, farm experience, extension visits and for how long respondents had been members in Farmer Based Organization. For instance, the average number of extension visits received by a participant farmer per month is significantly higher at 1% than that of a non-participant. Similarly, the average number of years a farmer had been with a Farmer Based Organization is also significant at 1%. Moreover, participants are significantly different from non-participant in terms of age as well as farming experience. Variables such as gender, marital status, education, household size, land ownership were however not significant, meaning participants and non-participants were not different in terms of these variables.

Table 4.8 Comparisons of mean values of continuous variables between participants and non-participants

Variable	Participants		Non-participants		Mean difference
	Mean	Std dev.	Mean	Std dev.	
Age	39.5	10.2	37.2	10.1	2.3*
Farm experience	19.1	11.4	15.9	11.1	3.2**
Extension visits/Month	4.7	6.9	1.1	1.9	3.6***
Duration of FBO membership	3.8	5.5	0.5	1.6	3.3***
Farm size (acre)	5.9	9.9	5.0	3.9	0.9
Seed (Kg)	28.3	57.6	27.5	0.7	0.7
Labour cost (GH¢)	109.5	299.0	52.4	83.0	56.9**
Fertilizer (Kg)	283.8	546.0	144.2	116.5	139.6**
Weedicide (lt)	4.5	10.3	2.3	2.3	2.28
Yield (Kg)	39.9	68.0	28.2	19.3	11.7*
Annual Farm Income (GH¢)	3037.0	1804.9	2431.0	678.3	36.7

NB: *, ** and *** indicate significance of t-statistics of the mean difference at the 10%, 5% and 1% level respectively.

Source: Survey result 2014

The result also revealed significant mean differences between participants and non-participants in terms of labour cost, quantity of fertilizer used and crop yield. The average cost of labour for a participants is GH¢109.54 while that of non-participants is GH¢83.00. It is observed in the study that the average cost of labour is statistically different at 5% between participants and non-participants.

For quantity of fertilizer used, the study also revealed a statistically different at 5% significant level between participants and non-participants. The average yield was statistically significant at 10% between participants and non-participants. Variables such as farm size, quantity of seed used, quantity of weedicide used and annual income were however not significant between participants and non-participants.

The result of the Chi square test in table 4.9 revealed that there was significant difference between participants and non-participants in terms of their access to extension services, membership of farmer based organizations, type of seed and fertilizer used and off-farm income. For instance, while majority of the participants indicated that they had access to extension services, only few of non-participants reported having access to extension services. In addition, as most of the participants have reported belonging to Farmer Based Organizations, few (25%) of the non-participants reported same. Concerning the type of seed and fertilizer used by farmers, the results revealed that while 36.7% participants used only improved seed, only 0.8% of the non-participants used only improved seed. For the fertilizer usage, while none of the participants reported no fertilizer usage, 5% of the non-participants indicated that they did not use fertilizer at all on their farms. They were however not different in terms of their socioeconomic variables such as sex, marital status, educational status land and livestock ownership.

Table 4.9 Comparisons of categorical variables between participants and non-participants

Variable	Response	Participants (%)	Non-participants (%)	X^2 test
Land ownership	0= No	1.7	3.3	0.684
	1= Yes	98.3	96.7	
Education	0= No	67.3	73.3	0.980
	1=Yes	26.7	26.7	
Membership of FBO	0=No	25.8	87.5	92.919***
	1=Yes	74.2	12.5	
Farmer access to extension service	0=No	5.0	70.0	108.160***
	1=Yes	95.0	30.0	
Type of seed used	1= Only Traditional	0.0	99.2	236.089***
	2=Only Improved	36.7	0.8	
	3= Both	63.3	0.0	
Type of fertilizer used	1=No fertilizer	0.0	5.0	14.399***
	2= Inorganic only	80.0	88.2	
	3= Both	20.0	6.7	
Livestock ownership	0=No	13.3	11.7	0.152
	1= Yes	86.7	88.3	

Off-farm Income	0= No	70.0	57.5	4.057*
	1= Yes	30.0	42.5	

NB: *, ** and *** indicate significance of t-statistics of the mean difference at the 10%, 5% and 1% level respectively.

Source: Survey result 2014

4.2.2 Factors influencing farmers' participation in the BFCP

The factors that influenced farmers' decision to participate in the BFCP are discussed in this section using the probit model. The estimated factors influencing farmers' decision to participate in BFCP included the age, education, Household size, land ownership, membership of Farmer Based Association, extension visits, livestock ownership and off-farm income. The estimated probit regression model gave a Pseudo R^2 value 0.43, which implies that all the explanatory variables included in the model were able to explain about 43% of the variation in farmers' decision to participate in BFCP. The Log likelihood ratio is significant at 1%, meaning that the explanatory variables included in the model jointly explained the probability of farmers' decision to participate in the Block Farm Credit Program. The model's results also gave a predicted probability of participation of 0.55. This means that there was about 55 percent probability that farmers in the study areas were willing to participate in the BFCP.

Given the above goodness of fit measures, it was concluded that the probit model used was reliable and appropriate.

Table 4.10 Predictors of factors that determine Block Farm Credit Program participation; Probit regression result

Variables	Marginal effects	Std. err
Age	-0.0041	0.0069
Education	0.1378	0.0957
Household size	-0.0015	0.0075
Farm experience	0.0121**	0.0059
Land ownership	0.1336	0.3669
Membership of FBO	0.4979***	0.0736
Livestock ownership	-0.1906*	0.1058
Extension visits/Month	0.1005***	0.0220
Off-farm income	-0.1471*	0.0880
Constant	-1.1547	1.0936

Source: Survey result 2014

***, Significant at 1%, ** , significant at 5%, *, Significant at 10%.

Predicted probability is: 0.55, Number of observation =240, LR Chi2(9) =142.86*** Pseudo R^2 = 0.43

The results showed that factors such as farming experience, membership of a Farmer Based Organizations, extension visits, livestock ownership and off-farm income were the significant variables that influenced farmers' decision to participate in the Block Farm Credit Program. While factors such as faming experience, extension visits and membership of an FBO were found to be positively related to BFCP participation, livestock ownership and off-farm income were found to be negatively related to BFCP participation.

Farm experience met the *apriori* expectation of positive relationship with the farmers' participation in the BFCP. The results revealed that farming experience was significant at 5% with a marginal effect of 0.01. This implies that an increase in farming experience by one year will result in an increase in the likelihood of BFCP participation by 0.01. This finding regarding the experience is consistent with the findings of Sebopetji and Belate (2009) who observed that experience in farming had significant effect on farmers' decision to take credit. On the contrary, Ilembo et al., (n.d) observed that farming experience do not significantly influence household demand for credit.

Membership of Farmer Based Organization also met the *aprior* expectation of positive relationship with the BFCP participation. Membership of FBO was found to be highly significant at 1% with a marginal effect of 0.50. This means that farmers who belonged to Farmer Based Organizations had a 50% greater chance of participating in the BFCP than those who did not belong to any Farmer Based Organization. In recent times, as a result of farmers' high loan default rate and lack of collateral security, credit institutions have found it necessary to advance credit on group basis so that the group acts as a guarantee. In this case when a member defaults, the entire group is made to pay back the loan. Thus, the positive and significant coefficient of the FBO variable is also plausible in the sense that farmers who belong to FBOs had the opportunity to participate in the BCFP. This findings is in line with the findings of some previous studies such as; Yehuala (2008), Balogun and Yusuf (2011) , Akpan *et al.*, (2013) and Amao (2013), that membership of FBO positively influence farmers decision to participate in agricultural credit programmes.

As expected, the number of extension visits was found to be positively related to BFCP participation. The result revealed a marginal effect of 0.10 at 1% significant level implying that a unit increase in the number of extension visits by agricultural extension agent to farmers will results in an increase in their probability of participating in BFCP by 0.1. The role of agricultural extension service in the adoption of agricultural technology cannot be over-emphasized. This is especially so in Ghana where majority of the farming population have no formal education to be able to read and understand the application of some technologies. Extension staff act as intermediary between farmers and researchers, thereby explaining and encouraging agricultural technologies to the farmer and also giving feedback to the latter for improvement. Therefore in this study, the positive and significant effect of extension contacts on participating in the BFCP is understandable. Farmers who had contacts with extension staff would have had the opportunity to learn about the importance of participating in the programme and also the use of the technologies extended to the farmer. This finding is also consistent with the result of Akpan *et al.*, (2013) and Muhongayire *et al.*, (2013) who observed that the number of extension visits increases the chance of farmers' participation in agricultural credit program.

Livestock ownership also met the *aprior* expectation of negative relationship with the Block Farm Credit participation. The result revealed that Livestock ownership was found to be significant at 10% with a marginal effect of -0.19. This means that a farmer who owned livestock will have 19% less chance of participating in BFCP than a farmer who did not own livestock. Two reasons may account for this finding. First, farmers who are into serious livestock rearing may not be serious crop farmers and consequently not see the need to participate in a programme that

is crop biased. Second, livestock farmers are likely to be better off financially than non-livestock owners. In this case, the former may not find it necessary to go in for credit to support their crop farming work. Livestock ownership effect on BFCP participation is in line with the finding of Yehuala (2008) that the number of livestock owned by a farmer significantly decreases his/her probability of participating in a credit programme.

Off-farm income again met the *aprior* expectation of negative relationship with the participation of Block Farm Credit Program participation. Off-farm income was found to be significant at 10% with marginal effect of 0.15 implying that a farmer who is engaged in off-farm activities will have 15% less chance of participating in the Block Farm Credit programme than a farmer who does not engage in off-farm activities. The two reasons that may account for low participation of livestock farmers in BFCP are also relevant for the effect of off-farm involvement on BFCP participation. Other things being equal, a part time crop farmer may not have the commitment and interest in his/her crop farm compared with a full-time crop farmer. Secondly, the part-time farmer may borrow from his/her other sources of income for his crop farm and may not find it necessary to borrow from an external source such as the BFCP. Tang *et al.*, (2010) and Koformata *et al.*, (2014) made a similar observation. However, in Muhongayire *et al.*, (2013) study, off-farm income had positive influence on credit participation in Rwanda because it served as an important collateral security in the acquisition of credit.

4.2.3 Effect of BFCP participation on crop value

This section discusses the results of the substantive estimation as presented in Table 4.11.The coefficient of the Inverse Mills Ratio (λ) is not statistically significant indicating that there is no evidence of selection bias at the conventional 10% significant level. This findings implies that there are no unobservable farmer characteristics which determine the likelihood of BFCP participation and at the same time on crop value.

The result of the study showed that variables such as total farm size, quantity of seed used, quantity of weedicide used and BFCP participation were significant at 1%. While labour cost was significant at 5%, fertilizer application was significant at 10%. The cost of ploughing however was not significant. Also, while quantity of seed used, farm size, fertilizer applied and BFCP participation have positive effect of total crop value, quantity of weedicide used had negative effect on total crop value.

Total farm size cultivated was found to be positive and statistically significant at 1% to the total crop value with a coefficient of 1.0885. This indicates that holding other explanatory variables constant, an increase in total farm size by one acre will lead to an increase in total crop value by GH₵ 1.0885. This result confirms the result of Ajah and Nmadu (2012); Obasi *et al*., (2013) and Bakari *et al*., (2015) who observed that an increase in area of land cultivated resulted in an increase in crop output. As noted from the literature, one of the limiting factors to the effective implementation of the BFCP is inadequate land. The initial plan of the programme was to use government land for the purpose. However, the complex land tenure arrangements meant that MoFA could not secure the needed hectares for the purpose and so had to depend on

private lands. These were not adequate. From the findings, any opportunity for farmers to increase their plot would mean that output could be increased.

With regards to the quantity of seed used by the farmers, the result revealed that an increase in quantity of seed used by 1kg will result in an increase in total crop value by GH¢0.2699. This result is line with the findings of Bakari *et al.*, (2015) who indicated that in increase in quantity of seed used will lead to an increase in crop output. This finding also confirms the fact that maximum crop yield is dependent on the right seed density. It is for ensuring that farmers plant the right seed density that they are taught to plant in rows. As part of the BFCP package farmers are taught to plant in rows and also to ensure the right seed density. However, it is one thing teaching the farmer the right thing and another, he/she going by it. Also, farmers may know the right thing to do but this would not be done because of financial constraint.

The quantity of fertilizer applied was found to be significant with a coefficient of 0.0565 implying that an increase of fertilizer applied by 1kg will lead to an increase in total crop value by GH¢0.0565. This finding is consistent with the results of other studies, including Matsumoto and Yamano (2010) who indicated that fertilizer credit helps increase inputs applied by farmers and consequently contributes significantly to crop yield. Like seed density, two reasons may account for low application of fertilisers by farmers. These are ignorance and financial constraints. In a situation where the farmer has no knowledge and does not also have access to extension or research staff, it may be difficult for him/her to apply the right quantities of fertilisers on his/her plot, even if he/she has the means. Similarly, if he/she has the knowledge

but the means is not there it would be difficult for him/her to apply the right quantities.

The BFCP participation was also found to be significant and positively related to total crop value with the coefficient of 0.1037. This means that a farmer who participated in the Block Farm Credit Program will acquire an additional crop value of GH¢0.1037 than a farmer who has not participated in the BFCP. This finding is also in line with that of MoFA (2012) which indicated that farmers who participated in the BFCP have access to low cost credit in the form of inputs and this has resulted in greater farm productivity and higher incomes. The result is also in line with that of other empirical studies including Iqbal *et al*., (2003); Bashir et al., (2010) and Das *et al*., (2009).

The quantity of weedicide used by farmers was found to be negatively related to total crop value with a coefficient of -0.1849. This means that, a litre increase in the amount of weedicide used will result in a decrease in total crop value by GH¢0.1849. This finding is inconsistent with the result of findings of Bakari *et al* (2015) who observed that increase in quantity of weedicide used by farners would lead an increase in crop output.

Labour cost was also found to have negative effect on total crop value with the coefficient of -0.0386. This also means that a unit increase in labour cost in GH¢ would result in a total decrease in crop value by GH¢ 0.0386.

Table 4.11 Effects of Block Farm Credit Programme on crop value; OLS results

Variables	Coef	Std. err
Farm size(acres)	1.0885***	0.2889
Quantity of Seed used (kg)	0.2699***	0.0699
Plough cost (GH¢)	-0.3653	0.27751
Labour cost (GH¢))	-0.0386**	0.0172
Weedicide (litres)	-0.1849***	0.0558
Quantity of Fertilize used (Kg)	0.0565*	0.0336
BFCP participation (1= yes, No =0)	0.1037***	0.0357
Constant	2.9849***	0.4563

Source: Survey result 2014. ***, Significant at 1%, ** , significant at 5%, *, Significant at 10%. Number of observation =240, Hazard Lambda (λ) = -0.0050375, Rho (σ) = -0.02059, F-test= 52.24***

4.2.4 Constraints associated with BFCP participation

This section discusses the constraints that are associated with effective implementation of the BFCP participation as presented in figure 11.

The main constraints were; inadequacy of the BFCP inputs, late delivery of BFCP inputs, difficulty in accessing the BFCP program inputs from MOFA offices, difficulty in paying back the BFCP credit due to low yields. Agriculture officers dealing mostly with members of FBOs, high cost of transporting inputs to homes and farms, low publicity about the existence of the BFCP and unfavourable terms of payments.

Out of the 240 respondents, 28.75% of them indicated that the BFCP inputs were not adequate and so they could not participate. Also, 12% of the respondents indicated that it was difficult to pay back the BFCP credit due to low yields and a similar number of them stated that there was low publicity about the existence of the BFCP. In addition, 9.12% of the respondents reported that it was difficult to access the inputs from the District Agricultural Development Units. Furthermore, 7.9% respondents reported late delivery of BFCP inputs as the main reason why they did not participate in the program. Other respondents indicated that they could not participate in the Block Farm Credit Program because they did not belong to any Farmer Based Organizations. It was however revealed that 20% of the respondents indicated that they did not face any constraint in accessing the Block Farm Credit Program. The result of the study is consistent with some of the findings of Ugwumba and Omojola (2013) who observed that higher interest rate, cumbersome processing procedures, delays in disbursement, lack of collateral, lack of awareness of loans packages and

the attitude of some government officials are the constraints which impeded farmers from accessing credit packages.

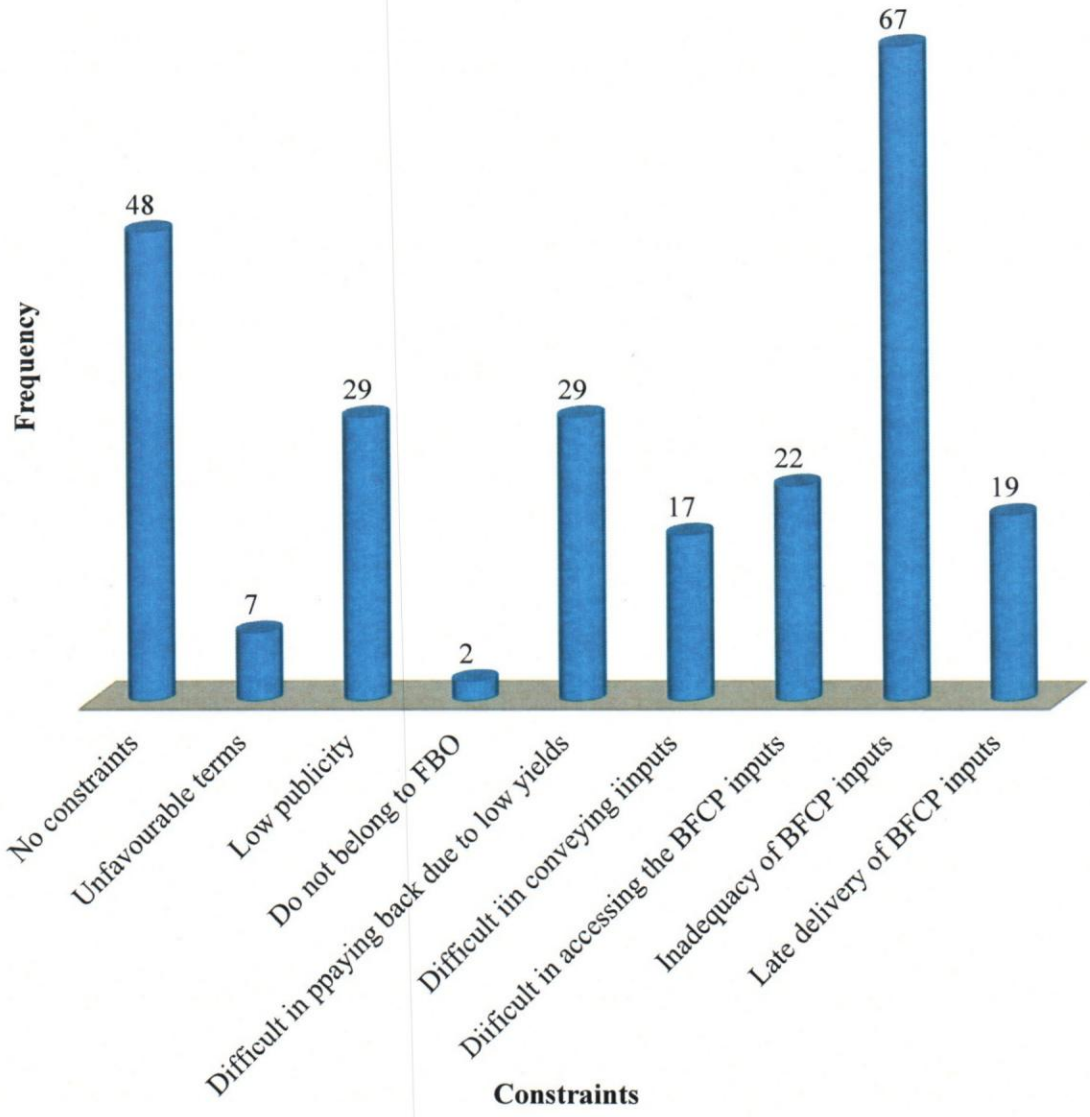

Figure 4.10: Constraints faced by farmers in accessing the Block Farm Credit Program

Source: Survey 2014

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study as well as conclusion and recommendations. The chapter is divided into three sections. The first section summarizes the results of the entire study, whilst the second and third sections present the conclusions and the recommendations.

5.2 Summary

This study sought to assess the effect of the Block Farm Credit Programme participation on farm level output in some selected districts in the Northern region of the Ghana. Specifically, the objectives were to: identify the socioeconomic factors that influence farmers' decision to participate in the Block Farm Credit Programme; determine the effects of the program on farm output for both participants and non-participants; and to examine the constraints associated with the Block Farm Credit Programme participation from the viewpoint of farmers. Treatment effect model was used to analyse both objective one and two while descriptive statistics was employed to analyse objective three.

The t-statistics on the difference of means of some of the responses revealed that participants and non-participants are partly different in terms of their ages, farming experience, extension visits received and FBO membership, labour cost, quantity of fertilizer used and yields. They were however not different with regards to the

size of their households, total farm size, quantity of seed used, quantity of weedicide used, and their annual incomes.

The χ^2 test results on some categorical variables also showed that participants and non-participants were statistically different in terms of their access to extension services, membership of Farmer Based Organizations, type of seed and fertilizer used as well as off-farm incomes.

The probit analysis indicates that collectively, all estimated coefficients jointly determined participation in BFCP.

Analysis of the probit model revealed that the main predictors of BFCP participation were farming experience, membership of FBOs, extension visits and livestock ownership. Farming experience, membership of an FBO and extension visits were variables that were found to be positively related to BFCP participation while livestock ownership was negatively related to BFCP participation.

The results of the OLS estimation revealed that variables such as total farm size, quantity of seed used, quantity of fertilizer, labour cost, quantity of weedicide and BFCP participation are the significant variables influencing total crop value. Total farm size, seed, fertilizer and Block Farm Credit Programme participation were variables that positively influence total crop value. On the other hand, Labour cost and weedicide usages were variables that negatively and significantly influenced total crop value.

The constraints that were associated with the BFCP participation included late delivery of BFCP inputs, inadequacy of inputs, difficult in accessing the inputs

from agriculture offices, low publicity about the existence of the program and difficulty in paying back the credit due to low yields.

5.3 Conclusions

The study sought to examine the socioeconomic factors influencing farmers' decision to participate in the Block Farm Credit Programme and the effect of participation on crop output. Besides these, the study also examines the constraints associated with the BFCP participation from the viewpoint of farmers.

Based on the study's findings, the following conclusions are made:

1. Longer farming experience, membership of FBOs and greater number of extension visits positively influence farmers' participation in the Block Farm Credit Programme.

2. Participation in the BFCP leads to increased crop output. A part from the BFCP participation, other variables that lead to increase crop output are farm size, quantity of seed used and fertilizer used.

3. Some farmers could not participate in the BFCP because the BFCP inputs were inadequate. In addition, the inputs were also delivered late to farmers and it was quite challenging for some of the farmers to access the BFCP inputs from District Agricultural Offices.

5.4 Recommendations

The study observed that access to extension services enhanced both the probability of participating in BFCP and BFCP having effect on crop output. Based on this finding, it is recommended that the BFCP should be re-introduced and mainstream with the provision of agricultural extension services, as this would significantly improve the output of farmers.

Formation of FBOs should also be taken serious by farmers so that they can benefit from government interventions as well as other organizations since many NGOs and financial organisations prefer working with groups instead of individual farmers.

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APPENDICES

APPENDIX A: QUESTIONNAIRE

This study is being undertaken to find out the effect of Block Farm Credit Program participation on farm level output particularly in some selected districts in the Northern Region of Ghana. The information provided will assist the researcher to recommend the formulation and review of policies and programmes that will improve the National Block Farm Credit Program.

A1: QUESTIONNAIRE FOR BLOCK FARM CREDIT PARTICIPANTS

Questionnaire identification

Questionnaire Number:……

Date of Interview:…….

Name of Interviewer……..

District:……

Community ……..

Demography

1. Age:……
2. Sex: (i) Male [ ] (ii) Female [ ]
3. Marital status: (i) Single [ ] (ii) Married [ ] (iii) Divorced [ ] (iv) Widow [ ] (v) Widower [ ]
4. Religion: (i) Christianity [ ] (ii) Islam [ ] (iii) Traditional [ ] (iv) Other [ ]

5. How many people are in your household?.....
6. Have you attended School: (i) Yes [ ] (ii) No [ ]
7. If yes to (7), what is the highest level: (i) Primary [ ] (ii) JHS/Middle School [ ] (iii) SHS/ Vocational [ ] (iv) Training College/HND [ ] (V) University education [ ] (vi) Non- formal education [ ]

Land tenure, association and access to extension service

8. Do you have a farm land: (i) Yes [ ] (ii) No [ ]
9. If yes to 8, how did you acquire it: (i) (i) Owned family land [ ] (ii) Allocated family land [ ] (iii) Rented-in [ ] (iv) Village chief [ ] (v) From friend [ ] (vi) Other [ ]
10. How long have you been farming?.....
11. Do you belong to a farmer group: (i) Yes [ ] (ii) No [ ]
12. If yes to 11, how long have you been in the group?.....
13. Do you have access to extension service: (i) Yes [ ] (i) No [ ]
14. If yes to 13, how many times last year?.....

Block Farm Credit Program

15. Did you participate in the Block Farm Credit Program in 2013: (i) Yes [ ] (ii) [ ]
16. How did you get to know about the Block Farm Credit Program: (i) Agric Extension Agent [ ] (ii) Radio announcement [ ] (iii) A group member [ ] (iv) Other [ ]
17. What were the requirements for slection?.....

.....

u confirm you received these inputs in 2013 farming season if yes indicate the quantities

Improved seed/crop (kg)	Fertilizer (kg)	Weedicide (litres)	Insecticide (litres)	Fungicide (litres)

p/s cultivated under the block farm credit program and input usage in 2013

	put usage									Output (bags) (100kg)	Output price Per bag (GH₵)
	ghing s)	Seed (kg)		Labour source (nos.)			Fertilizer (Kg)		Weedicide (litres)		
		Traditional	Improved	Family	Hired	Communal	Organic	inorganic			
Bean											
Other											

20. What was the average annual income from the Block Farm Credit Program in 2013 (GHc)?.....

21. What were the benefits of the Block Farm Credit Program?.....

22. Did you face some challenges in accessing the Block Farm Credit: (i) Yes [ ] (ii) No [ ]

23. If yes to 23, list the challenges?.....

24. What recommendations would you give to reduce the challenges?.....

Other farming activities

25. Did you cultivate other crops apart from those in the Block Farm Credit Program: (i) Yes [ ] (ii) No [ ]

yes to 25 indicate the following;

Input usage									Output (bags) (100kg)	Output price Per bag (GH₵)
Ploughing (acres)	Seed (kg)		Labour source (nos.)			Fertilizer (bags)		Weedicide (litres)		
	Traditional	Improved	Family	Hired	Communal	Organic	inorganic			

27. Do you rear animals (i) Yes [ ] (ii) [ ]

28. If yes to 27 indicate the following:

Livestock	Number	Annual Income (GH₵)
Cattle		
Sheep		
Goat		
Pig		
Guinea fowl		
Fowls		
Ducks		
Turkey		
Others		

Off-farm income

29. Do you have other source/s of income apart from farming: (i) Yes [ ] (ii) No [ ]

30. If yes to 29, specify the sources and the annual income (GH₵) ……

A2: QUESTIONNAIRE FOR NON- PARTICIPANTS

Questionnaire Number:……..

Date of Interview:……

Name of Interviewer……

District:……

.Community……

Demography

1. Age:……
2. Sex: (i) Male [ ] (ii) Female [ ]
3. Marital status: (i) Single [ ] (ii) Married [ ] (iii) Divorced [ ] (iv) Widow [ ] (v) Widower [ ]
4. Religion: (i) Christianity (ii) Islam [ ] (iii) Traditional [ ] (iv) Other [ ]
5. How many people are in your household?.....
6. Have you attended School: (i) Yes [ ] (ii) No [ ]
7. If yes to (6), what is the highest level: (i) Primary [ ] (ii) JHS/Middle School [ ] (iii) SHS/ Vocational [ ] (iv) Training College/HND [ ] (V) University education [ ] (vi) Non- formal education.

Land tenure, association and access to extension service

8. Do you have a farm land: (i) Yes [ ] (ii) No [ ]
9. If yes to 8, how did you acquire it: (i) Owned family land [ ] (ii) Allocated family land [ ] (iii) Rented-in [ ] (iv) Village chief [ ] (v) From friend [ ] (vi) Other [ ]

10. How long have you been farming?.....

11. Do you belong to a farmer group: (i) Yes [ ] (ii) No [ ]

12. If yes to 11, how long have you been in the group?.....

13. Do you have access to extension service: (i) Yes [ ] (i) No [ ]

14. 14. If yes to 13, how many times last year.....

ction characteristics

cultivated and input usage in 2013

	Input usage								Output (Bags) (100kg)	Output price per bag (GH₵)
	Ploughing (acres)	Seed (kg)		Labour source (nos.)			Fertilizer (bags)		Weedicde (Litres)	
		Traditional	Improved	Family	Hired	Communal	Organic	Inorganic		

16. What was your average annual income last year (GH₵)?.....

17. Do you have other source/s of income apart from farming: (i) Yes [ ] (ii) No [ ]

18. If yes to 17, specify the sources and the annual income (GH₵) .....

19. Have you ever participated in a government credit program before: (i) Yes [ ]

(ii) No [ ]

20. If yes 19, specify the program you participated in.....

.....

21. Have you heard of the National Block farm credit program: (i) Yes [ ] (ii) No [ ]

22. If yes to 21, why didn't you participate in the credit program?.....

.....

23. What benefits do you think those participating derives from the Block Farm Credit?.....

24. Do rear animals: (i) Yes [] (ii) No [ ]

24. If yes to 24 indicate the following;

Livestock	**Number**	**Annual Income (GH₵)**
Cattle		
Sheep		
Goat		
Pig		
Guinea fowl		
Fowls		
Ducks		
Turkey		
Others		

Off-farm income

26. Do you have other source/s of income apart from farming: (i) Yes [ ] (ii) No [ ]

27. If yes to 26, specify the sources and the annual income (GH₵) ……

……

28. Did you face some challenges during last farming season: (i) Yes [ ] (ii) [ ]

29. If yes 28, what are the challenges? ……

Appendix B: Results of treatment effect model

Treatment-effects model -- two-step estimates Number of obs = 240

Wald chi2(7) = 378.20
Prob > chi2 = 0.0000

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lnCropvalue						
lnTFS	1.089335	.2840567	3.83	0.000	.532594	1.646076
lnTotalseed	.2698237	.0686868	3.93	0.000	.1352	.4044473
lnPloughcost	-.3673544	.2731146	-1.35	0.179	-.9026491	.1679403
lnLabourcost	-.0390163	.0171464	-2.28	0.023	-.0726227	-.0054099
lnTQF	.0567246	.0330904	1.71	0.086	-.0081314	.1215805
lnTotalweedi	-.1838144	.0552709	-3.33	0.001	-.2921434	-.0754855
BlockFarm	.1089269	.0471668	2.31	0.021	.0164817	.201372
_cons	2.986987	.4487255	6.66	0.000	2.107501	3.866473
BlockFarm						
Age	-.0102449	.0173671	-0.59	0.555	-.0442837	.0237939
AttendSchool	.3542119	.2525738	1.40	0.161	-.1408237	.8492475
HHSize	-.0037986	.0190698	-0.20	0.842	-.0411747	.0335776
FarmExperi~e	.0305338	.0148662	2.05	0.040	.0013966	.059671
FarmLand	.336499	.9377913	0.36	0.720	-1.501538	2.174536
FarmerGroup	1.375782	.2350106	5.85	0.000	.9151693	1.836394
ExtensionV~s	.2539331	.0567295	4.48	0.000	.1427454	.3651208
Rearani	-.5076263	.3052378	-1.66	0.096	-1.105881	.0906288
Otherincome	-.3719532	.2242095	-1.66	0.097	-.8113956	.0674893
_cons	-1.154668	1.093607	-1.06	0.291	-3.298098	.9887613
hazard						
lambda	-.0059898	.0358084	-0.17	0.867	-.0761729	.0641934
rho	-0.02449					
sigma	.24461984					
lambda	-.00598976	.0358084				