UNIVERSITY FOR DEVELOPMENT STUDIES

CREDIT CONSTRAINT AND PEPPER YIELD OF FARMERS IN BONGO DISTRICT IN THE UPPER EAST REGION

FRANCIS AWINE ANABILA

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BY

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(BSc. Agriculture)

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A LONG ESSAY SUBMITTED TO THE DEPARTMENT OF AGRICULTURAL AND FOOD ECONOMICS, FACULTY OF AGRICULTURE, FOOD AND CONSUMER SCIENCES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF SCIENCE DEGREE IN AGRICULTURAL ECONOMICS

OCTOBER, 2025

DECLARATION

I hereby declare that this thesis is the results of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate name and ID	Signature	Date
Francis Awine Anabila	.....	13/10/2025

Supervisor

I hereby declare that the presentation and preparation of the thesis was supervised following the guidelines on supervision of dissertation/ thesis laid down by the University for Development Studies.

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Head of Department	Signature	Date
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ABSTRACT

Credit access is regarded as a key input in agricultural production. Farmers are highly constrained with credit access, which is a barrier to higher productivity. Thus, this study seeks to investigate the effects of credit constraint on pepper yields in Bongo District, by identifying the sources of credit for pepper farmers, identifying the constraints faced in accessing credit for pepper production, and determining the effect of credit constraint on pepper productivity in Bongo District. The study used questionnaires and interviewed 327 pepper farmers from the Bongo District. A multi-stage sampling technique was used. Data were analyzed using descriptive statistics, Kendall's coefficient of concordance, and Cobb-Douglas stochastic model. The results show that 222 respondents had credit access, and 105 respondents did not have access to credit for pepper farming. The dominant credit sources for pepper farmers were friends/relatives, banks, and Farmer-Based Organization. The three major constraints affecting credit access were high interest rates, high collateral requirements, and cumbersome application procedures. The Cobb-Douglas model revealed that total machinery service hours, quantity of pepper seeds utilized, credit constraint levels, farming years' experience, education, and type of seed were the significant input variables affecting pepper productivity. The credit constraint levels (low, moderate, and high) were negatively affecting pepper productivity compared to no credit constraint effect, and the others affected pepper yield positively and negatively. The results recommended that the government, in collaboration with credit providers, should address credit access constraints such as high interest rates, high collateral requirements, and cumbersome application procedures. Also, the government should introduce more agricultural programs that will support pepper farmers with key inputs like fertilizer, certified seeds, and cash.

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To God Be the Glory

DEDICATION

I dedicate this piece of work to God Almighty, my source of inspiration, wisdom, knowledge, and understanding. I also dedicate this milestone achievement to my beloved family, who have continually encouraged and supported me throughout this work.

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LIST OF ABBREVIATIONS

AVRDC	Asian Vegetable Research and Development Center
EPA	Environmental Protection Agency
FBO's	Farmer Based Organizations
HA	Hectare
ICOUR	Irrigation Company of Upper East
MiDA	Millennium Development Authority
MOFA	Ministry of Food and Agriculture
MT	Metric Tonnes
NGOs	Non-Governmental Organizations
QTY	Quantity
sp.	Species
SRID	Statistics, Research and Information Directorate

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Agriculture is the backbone of the Ghanaian economy, contributing significantly to food security and livelihoods (Kuwornu et al., 2012). A study by Amfo and Ali (2020) found that vegetable production forms a major part of the agricultural sector of Ghana. But in the Upper East Region, vegetable farming plays a critical role in both subsistence and commercial agriculture, and its production serves as a livelihood opportunity for many rural dwellers and a source of income. Vegetables are important from both the nutritional and health points of view as they supply essential nutrients, including vitamins and minerals often lacking in most traditional staple crops (AVRDC, 2006). Exploring more on the importance of vegetables has to talk about its serving as a source of fiber in allowing other staple foods to digest, and in the case of food shortage, vegetables can be consumed by families as a full meal. Common vegetables like okra and jute give a slippery texture to soup and stews, thus facilitating the swallowing of rough, starchy foodstuffs and dishes (Norman, 1992). Aromatic vegetables and herbs contain essential oils and compounds that enhance flavor and taste when incorporated into otherwise tasteless foods, thus improving appetite. (Norman, 1992; Waaijenberg, 2003). Pepper (Capsicum sp.) is a typical vegetable crop commonly cultivated in Ghana. Pepper production has gain weight in modern agriculture.

In spite of improving pepper production and yields in the Upper East Region because of the several supports given by both governmental and non-governmental organizations in the region, pepper productivity is rather sub-optimal. The main challenges affecting the intensification and yields of vegetables, according to Tanzubil et al. (2004) include the low level of technology use,

proliferation of pests and diseases, declining soil productivity, inadequate groundwater reserves as well as socio-economic factors. Tanzubil et al. (2004) added that there has been a serious intensification of vegetable production at most dam and river sites over the years, with the vegetables grown yearly on the same plots for up to 10 years in some cases. This strengthening has come with negative results, such as pest and disease infestation, and has negatively affected the vegetables production sector and leading to abandonment of cultivated lands (Tanzubil et al., 2004). Insects, especially Whiteflies (Bemisia tabacci), leafhoppers (Empoasca spp), and fruit borer (Heliverpa armigera) have often caused severe destruction to pepper and tomato farms every growing season. The result is that yields and quality of harvests are negatively affected, and farmers get caught up in debts arising from bank loans (Tanzubil et al., 2004).

Furthermore, Tanzubil and Boatbil (2014) conducted a study on the constraints to profitable dry season tomato and pepper production in two districts of the Upper East Region of Ghana and discovered that one of the most important production constraints of tomato and pepper farmers is insects and diseases that limit the production and hence profitability of these crops in the region.

However, improving pepper production yields will demand high access to credit, either in cash, in-kind, seeds, agro-chemicals, and mechanization services, or a combination of both (Balana et al., 2022; Martey et al., 2019). Despite the important role of credit access in pepper production, farmers in the Bongo District face numerous challenges in accessing credit, which limits their yields as well as profits. Identifying these constraints is crucial for improving pepper yields and productivity in the Bongo district.

Surveys are useful tools for gathering ideas and opinions from farmers about the key factors affecting pepper production and yields. This study was carried out to determine the constraint factors affecting the yield of pepper production among farmers in Bongo district, Upper East

Region, to identify the credit sources and constraints affecting pepper farmers' access to credit, which, from previous studies, appeared to be of increasing importance in the vegetable production industry.

1.2 Problem Statement

Vegetable production forms a major part of the agricultural sector of Ghana (Amfo & Ali, 2020). Pepper (Capsicum sp.) is an important high-value cash crop in Ghana, and it is largely cultivated for export and domestic consumption by both the urban and rural poor (Asravor et al. 2016). Its cultivation and consumption have long been part of Ghana's agriculture and diet (MiDA, 2010). Ghana has been identified as having both comparative and competitive advantages over other African countries in terms of pepper production. By this advantage, the country is currently ranked fourth in chili production in Africa after Egypt, Nigeria, and Algeria (MiDA, 2010). In the year 2014, the average yield of pepper in Ghana was 8.30 Mt/ha (MoFA, 2014). Pepper cultivation is reported to be a highly profitable venture, and more rural residents are now fully engaged in it for their livelihood (Asravor et al. 2016).

Vegetables are the major source of plant proteins, vitamins, minerals, plant fibers, and various functional nutrients. In addition, vegetables also contain bioactive compounds such as simple phenols, carotenoids, flavonoids, indoles, glycosinolates, organosulfides, polyphenols, protease inhibitors, phytoestrogens, isothiocyanates, and others. Therefore, vegetables have an extremely important role to play in human nutrition and health (Pichop, 2009). Pepper (Capsicum sp.) is an important condiment in India and in many countries around the world. It is also a major source of a number of antioxidants, including carotenoids, ascorbic acid, tocopherols, and phenolics (Pichop, 2009). However, Graham and Welch's (1996) studies revealed that more than 2 billion people worldwide, especially those living in poorer countries, suffer from micronutrient deficiency. This

is due to the low productivity challenges in pepper farming. In Ghana, this challenge can be attributed to some key constraints militating against the attainment of the potential frontier output. Such constraints may include the attack of pests and diseases, limited land, poor prices of produce, low adoption of improved pepper cultivation technologies, and inefficiencies arising from the allocation of production resources (Asravor et al. 2016).

Moreover, the constraining factors affecting yields and productivity of vegetable production (pepper, tomato, onion, okra, etc.) are notably; lack of access to credit, pest and disease, shortage of water, lack of information or extension, labor problems, lack of good quality or certified seeds and poor soil fertility (Tanzubil et al. 2004; Tanzubil & Boatbil 2014). This implies that efforts at improving the productivity of pepper production cannot overlook identifying and addressing these key factors.

Pepper farmers in the Bongo District face significant challenges in accessing credit resources (own preliminary survey, 2025). Factors such as high interest rates, lack of collateral, and cumbersome administrative procedures hinder the ability of vegetable farmers to secure credit from financial institutions (Oladele et al., 2024) for up scaling their production. Likewise, financial bodies hesitate in giving loans to farmers in the agricultural sector, especially smallholder farmers, because of the risky nature of farming (Akosa, 2011; Baffoe and Matsuda, 2015). Additionally, long distances to credit sources further exacerbate these challenges (Oladele et al., 2024). These barriers not only limit production capacity but also impact the socioeconomic well-being of the farmers and their households (Sekyi et al., 2017).

Understanding the specific constraint factors affecting the yield of pepper production and their effects is essential for designing effective interventions and policies. Therefore, this research was conducted in Bongo district to identify the credit sources available to pepper farmers, investigate

the constraint factors affecting the yield of pepper production in Bongo district, and identify the constraint factors affecting credit access.

1.3 Research Objectives

Main objective: To investigate the effects of credit constraint on pepper productivity in the Bongo district.

Specific objectives:

1. To identify the sources of credit for pepper farmers in the Bongo district.
2. To identify the constraints faced in accessing credit for pepper production in the Bongo district.
3. To determine the effect of credit constraint on pepper productivity in the Bongo district.

1.4 Research Questions

1. What are the sources of credit for pepper farmers in the Bongo district?
2. What are the constraints faced in accessing credit for pepper production in the Bongo district?
3. What is the effect of credit constraint on pepper productivity in the Bongo district?

1.5 Significance/Justification

This research is significant for the following reasons:

1. Policy development: It will provide insights for policymakers to address yield barriers of pepper production and enhance pepper productivity.
2. Farmer empowerment: The study will highlight challenges faced by farmers, offering solutions to improve their access to essential production inputs such as credit, good quality seeds, fertilizer, pesticides, and water.

3. Agricultural development: Addressing these constraints will promote the scaling up of vegetable production, increasing pepper yields, boosting food security, and rural income.

4. Institutional strengthening: Financial institutions and the Ministry of Food and Agriculture can use the findings to refine their products and services tailored to farmers' needs.

1.6 Organization of the study

The study was organized into five chapters as follows: The Chapter one which comprised background to the study, the problem statement upon which the research is conducted, objectives of the study, research questions, and significance of the study. Chapter two, which reviewed the literature relevant to the issues raised in the problem statement, while chapter three tackled the methodology. Chapter four comprised the results and discussion of the data analyzed, while the summary of findings, conclusions based on the results in chapter four, and recommendations were presented in chapter five.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter of the long essay explored the key literature relevant to the topic under study, and it discussed six (6) main themes which are related to the topic. The literature review discussion begins with an overview of vegetable production in Ghana. This is followed by a review of the production of pepper (Capsicum sp.) in Ghana; credit access, constraints faced by pepper farmers in accessing credit, influence of credit access on improving yields of pepper production. The chapter ends with a review of the factors militating against high yield of pepper production. The chapter considered all these themes very important and relevant to the topic under study.

2.1 Overview of vegetable production in Ghana

Vegetable production is a strategic sub-sector in Ghana's food system, contributing to diets, rural employment, and incomes. In Ghana, the vegetable production industry is thriving hard, especially in northern regions where irrigation schemes for dry-season vegetable production are common. A study by Amfo et al. (2018) reported that indigenous/local/traditional vegetables produced in Ghana consisted: hot pepper (Capsicum frutescens L.), okra (Abelmoschus esculentus L.), tomato (Solanum lycopersicum L.), onion (Allium cepa L.), African eggplant (S. aethiopicum L.), and local leafy vegetables: jute mallow (Corchorus olitorius L.), Amaranth (Amaranthus cruencus L.), Roselle (Hibiscus sabbariffa L.), common bean (Phaseolus vulgaris L.), kenaf (H. cannabinus L.), and bitter leaf (Vernonia amygdalina L.). Amfo et al. (2018) added that Exotic/foreign vegetables cultivated in Ghana are cabbage (Brassica oleracea var. capitata L.), green/sweet pepper (C. annum L.), carrot (Daucus carota L.), lettuce (Lactuca sativa L.), and shallot (A. ascalonicum L.). Despite

the strong potential of the vegetable industry in the country, its productivity remains constrained by input access, pest and disease attacks, and market bottlenecks.

2.2 Overview of pepper (Capsicum sp.) production in Ghana

Vegetable crop production remains a key source of livelihood and income for many rural communities in the Upper East region (Tanzubil and Boatbil, 2014). Confirmed by Asare-Bediako et al. (2015), pepper (Capsicum sp.) is an herbaceous biennial of the Solanaceae family and one of the most important spices and condiments in the world. It is consumed daily by a quarter of the world population, and the rate of consumption is growing. The world pepper production countries include (China, Mexico, Turkey, Ghana, etc.). Pepper production is a source of livelihood for many farmers across the country (Asare-Bediako et al., 2015).

2.3 Credit access

Agricultural credit is considered one of the strategic resources for pushing production to high horizons, consequently raising the living standards of the rural poor farming community (Nzomo & Muturi, 2014). Kuwornu et al. (2012) reported that credit in the context of agriculture is described as the immediate and deferred transfer of purchasing ability from an individual who possesses it to someone in need, granting the latter the ability to utilize another person's capital for agricultural endeavors. This arrangement is based on trust in the borrower's inclination and capacity to settle on an agreed future date (Kuwornu et al., 2012). Credit to farmers can be categorized into cash credit (loans given to farmers by financial institutions), and non-cash credit, which comprises the supply of inputs to farmers by companies, individual entrepreneurs/businessmen, etc., for which these farmers make payments after harvesting (Kuwornu et al., 2012).

Akudugu (2016) conducted a study and found that agricultural credit is given in various forms, including in-kind, cash, or a combination of both, and can be sourced from either informal or formal channels. In the realm of farm credit, in-kind support primarily originates from informal channels such as pesticides, chemicals, fertilizers, mechanization services, and seeds. Conversely, cash-based credit predominantly stems from formal sources (Abdallah et al., 2019). Informal credit sources include friends, moneylenders, relatives, agricultural output, and input dealers. In contrast, formal sources include banks, credit unions, microfinance institutions, and formal sector employers, who extend credit through salary loans (Akudugu, 2016; Abdallah et al., 2019). Credit access is crucial for smallholder farmers as it empowers them to invest in the restoration and enhancement of their farms, facilitates market access, improves post-harvest practices, ensures quality, and promotes smoother household cash flow (Bonnieux, 2019). Through pre-harvest financing, growers can obtain quality inputs that enhance crop quality and productivity, leading to increased income and a more dependable supply for purchasers (Balana et al., 2022; Wessel & Quist-Wessel, 2015). Oladeebo & Oladeebo's (2008) study revealed that credit is more than just another resource, such as land, labor, and equipment, because it determines access to most of the farm resources required by farmers. The explanation is that farmers' adoption of new technologies necessarily requires the use of some improved inputs, which may be purchased (Oladeebo & Oladeebo, 2008). Credit also acts as a catalyst for rural development by motivating latent potential or making underused capacities functional (Oladeebo & Oladeebo, 2008). To enhance yields of pepper production in Bongo district, timely access to finance is crucial for acquiring inputs such as seeds, pesticides, fertilizers, herbicides, transport, machine services, fuel, and labor (Boansi et al. 2024)

2.4 Factors affecting pepper farmers' access to credit

Past research and much of the policy discourse associate agricultural credit constraints with supply-side factors, such as limited access to credit sources or high costs of borrowing. However, demand-side factors, such as risk-aversion and financial illiteracy among borrowers, could also affect credit-rationing of smallholder agricultural households (Balana et al., 2022). It is noteworthy that credit obtained from the formal sector has adverse effects on rural communities, and its accessibility is significantly limited, as this is evident from the excessively high interest rates and high collateral demands associated with formal credit sources (Oke et al., 2019). This credit constraint is directly affecting farmers' productivity (Mukasa et al., 2017).

2.5 Influence of credit access on improving the yields of pepper production

Agricultural credit is considered a strategic resource that plays a crucial role in pushing crop productivity to its limits, ultimately improving the quality of life of many impoverished farmers (Nzomo & Muturi, 2014). Therefore, the availability of farm credit is expected to empower farmers to effectively utilize their resources (Kehinde & Ogundeji, 2022). Supported to Attipoe et al. (2020) that in developing countries, where smallholder farms often face financial constraints, farm credit plays a crucial role in facilitating the acquisition of modern technology and farm inputs. This, in turn, contributes to the enhancement of farm productivity and growth rates (Chandio et al., 2016; Dziwornu et al., 2024). According to Attipoe et al. (2020), access to credit is essential for the acceptance and spread of innovative and influential farming technologies, thereby fostering agricultural growth. Furthermore, the provision of farm credit will enhance timely purchase and efficient allocation of farming inputs to produce the maximum possible output (Martey et al., 2019) as well as offers farming households the liquidity they require to purchase agricultural inputs,

adopt technology, or undertake other investments that are associated with higher yields and to increase their capacity to make longer-term investments (Balana et al., 2022).

2.6 Factors militating against high yield of pepper production

Evidence from Northern Ghana underscores biotic stresses as first-order yield limiters under both rain-fed and irrigated systems. In reference to Tanzubil and Boatbil's (2014) studies on the constraints to profitable dry-season tomato and pepper production in two districts of the Upper East Region of Ghana (Kasena-Nankana & Talensi), farmer rankings and field diagnoses identified whiteflies (Bemisia tabaci), viral diseases (leaf curl, mosaic), and vascular wilts as top constraints. Additional issues were poor access to certified seed, high agrochemical costs, and limited knowledge of information/ extension. A study conducted by Asare-Bediako et al. (2015) confirmed diseases as a major constraint in hot pepper production, with Phytophthora capsici, viruses, and fungi responsible for significant yield losses. Moreover, poor extension contacts, unreliable rainfall, and weak postharvest/ marketing systems compound the problem (Asare-Bediako et al., 2015). In addition, input price inflation and soil fertility constraints also depress yields across food crops, a recent Ghana evidence study confirmed this by ranking high fertilizer and herbicide costs among the top impediments to crop productivity, which includes pepper (Capsicum sp.) whose cultivation are input-sensitive (Acheampong et al., 2023), they added that access to credit is the second most constraining factor for food crops production. Acheampong et al. (2023) also reported that farmers expressed the problem of inaccessible credit facilities in the farming setting, and that demand for collateral and high interest rates deters farmers from accessing credit. Also, the lack of guarantees for outputs due to climate variability makes food crop production unattractive to commercial banks and other loan facilities (Acheampong et al., 2023).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The methodology chapter discusses how the study was conducted. It explores the type of research design used and the reason for using that particular design. The chapter elaborated on the study area, the target population, sample size, and sampling technique, data types, data collection methods, and data analysis models considered in the study.

3.1 Study Area

Bongo district is one of the 15 administrative districts in the Upper East Region, created as an ordinary district assembly in 1988. The Bongo District lies within the Sudan savannah agro-ecological zone (Ashong et al., 2024). The study area's latitude and longitude are 10◦54′ 28″ north and 0◦48′ 29″ west (Ashong et al., 2024). The map of the Bongo district is illustrated in Figure 1 (Kumasi Tyhra, 2017) with a total land area of 488 square kilometers. The district shares borders with Burkina Faso to the east and north, the Bolgatanga municipal district to the south, and the Kassena-Nankana district to the west (Ashong et al., 2024). The unimodal rainfall pattern permits one main farming season, from May/June to September/October (Antwi- Agyei et al. 2013). The average annual rainfall is 600 - 1,400mm with a maximum temperature of 35°C and a mean monthly minimum temperature of 21°C (EPA-Ghana, 2003). The major economic activity is subsistence agriculture, with about 90% of the total population (120,254) in the district dependent on rain-fed agriculture for their livelihoods (GSS, 2021). The major crops grown include sorghum (*Sorghum bicolor*), millet (*Pennisetum glaucum*), rice (*Oryza sativa*), groundnut (*Arachis*

hypogaea), guinea corn (*Sorghum vulgare*), and maize (*Zea mays*) (Antwi-Agyei et al., 2013). The area is also vulnerable to drought, with high poverty rates and poor soil fertility (GSS, 2013).

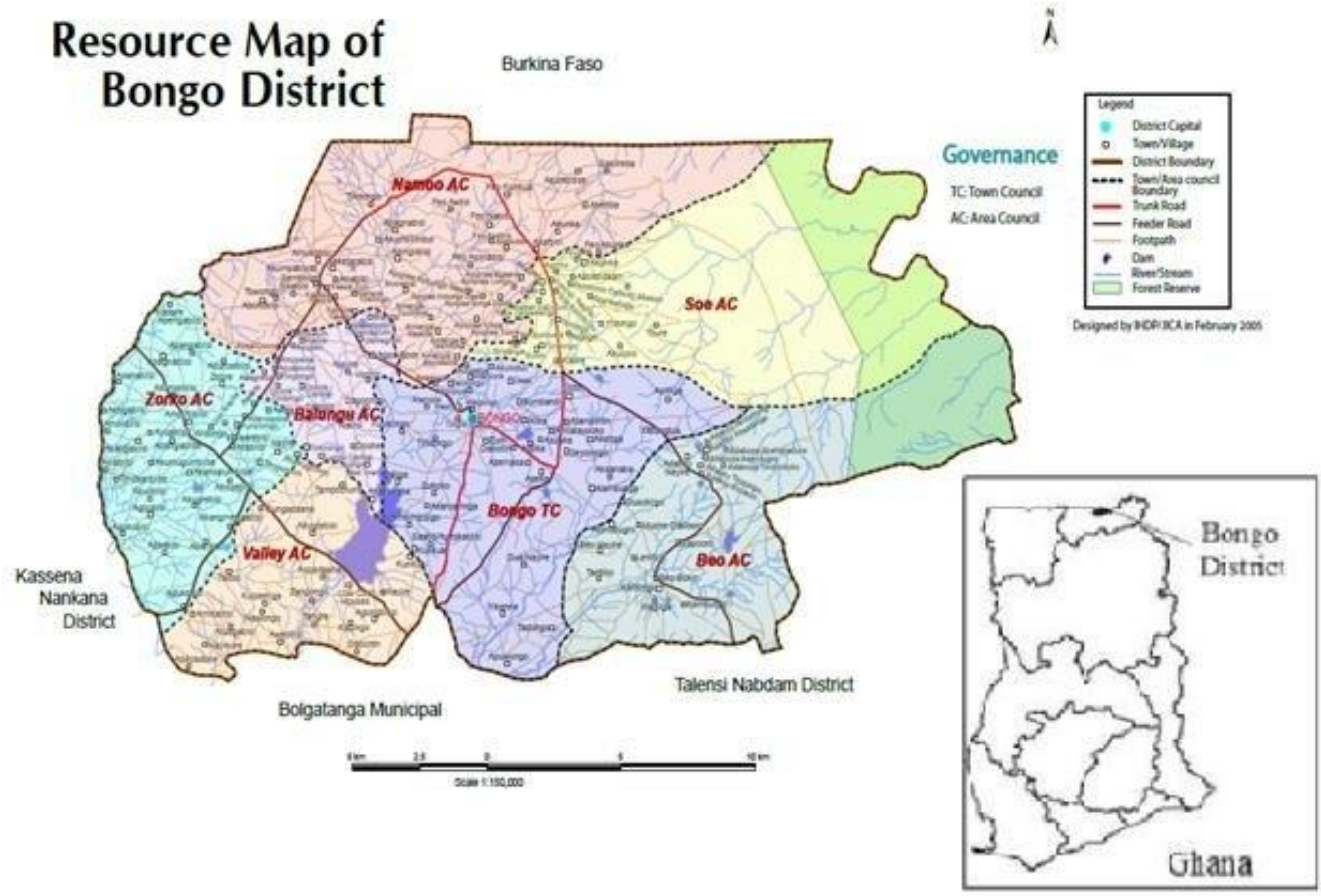

Figure 3.1: Map of the study area (Bongo District*)*

(Source: Kumasi Tyhra, 2017)

3.2 Population, Sample Size, and Sampling Technique

3.2.1 Population

The target group for the study was pepper farmers in the Bongo district. This referred to farmers who cultivate pepper either using irrigation schemes or rainwater.

3.2.2 Sample Size

The data gathered from the Directorate of Crop Services in the Department of Agriculture at Bongo district revealed that the population of pepper farmers in the district is 1,800. Hence, using the Taro Yamane formula below,

$$n = \frac{N}{1+Ne^2}$$

Where n = sample size

N = population = 1,800

e = error margin at 95% reliability level = 0.05

$$n = \frac{1{,}800}{1+1{,}800(0.05)^2}$$

The total sample size = 327

3.2.3 Sampling Technique

Three hundred and twenty-seven (327) pepper farmers were sampled from the total population of pepper farmers in the Bongo district using a multi-stage sampling technique.

The Bongo district is first selected from the 15 districts in the Upper East Region using a purposive technique. This is because Bongo district has a sunny climate and its soil is suitable for vegetables like pepper, and also because of ICOUR and government support through the Vea and other irrigation schemes establishment in the district, together with supply of inputs and extension services to its vegetable farmers (Bongo district Department of Agriculture).

The second stage was done by selecting three (3) pepper cultivation communities: Nyariga, Gowrie, and Vea from the district using a purposive sampling technique. This selection is based on the availability of a water source (dam) for all year-round pepper production in these communities, contributing significantly to the pepper production industry in the district.

Finally, the respondents were selected using random selection criteria, and 109 pepper farmers were selected from each community. The respective number of respondents from the three (3) chosen communities is illustrated below,

Table 3.1: Selected Communities and Selected Respondents

COMMUNITY NAME	SELECTED RESPONDENTS
Nyariga	109
Gowrie	109
Vea	109
Total	**327**

Source: Authors' field survey, 2025

3.3 Type of Data and Data Collection Approach

The study used the quantitative research design in collecting data. The quantitative design allowed the researcher to gather quantitative data from the target population (pepper farmers), which helped to achieve the purpose of the study. Also, the data collection process was done using the one-time survey approach (cross-sectional design), where primary data was collected from pepper farmers in Bongo district and secondary information gathered from extension Officers, journals, articles, websites and other relevant research works to aid the study.

The respondents were interviewed using a well-structured questionnaire comprised of both closed and open-ended questions. A pilot survey was first carried out to pre-test the questionnaire so as to assess its clarity, ambiguity, reliability, and validity. The questions elicit information on factors militating against high yields of pepper production, sources and type of credit, credit access constraints, household demographics, socio-economic characteristics, and institutional factors.

3.4 Data Analysis

The researcher, after collecting the data from the 327 pepper farmers, cleaned the data and prepared it in a format for analysis. The data gathered was analyzed using descriptive and inferential statistics. The descriptive analysis explored mean, frequency distribution, and charts (pie chart). The study also used Kendall's coefficient of concordance (Kendall's W) and Cobb-Douglas stochastic production model to summarize the data to help make informed decisions.

3.4.1 To identify the sources of credit for pepper farmers in Bongo district.

Data was gathered from respondents on the various sources of credit used by pepper farmers in the Bongo district. The data was collected and analyzed using frequencies and percentages, expressed as the sources available and the number of farmers who used that particular source (formal and informal financial institutions) in the district. The percentage distribution of the respondents on the various credit sources was estimated and presented together with the frequencies in a pie chart for a clear understanding of the results.

3.4.2 To identify the constraints faced in accessing credit for pepper production in the Bongo district.

The identified constraint variables faced by pepper farmers in accessing the sources of credit in Bongo district were ranked using Kendall's coefficient of concordance (Kendall's W). The constraints were ranked based on the severity of the constraint factor using the model (Kendall's W). This was done in descending order based on the mean scores obtained. The lowest among the scores was ranked one (1), an indication of its high severity, and the highest score showed its low level of severity. The significant constraint variables for this objective included: cumbersome application procedure, high risk perception of pepper farming, high interest rate, high collateral requirements, unfavorable repayment period, and long distance of credit sources/ lenders. The Kendall's coefficient of concordance (Kendall's W) was able to test the agreement among the pepper farmers about the ranked challenges. A higher coefficient implies there is a higher level of agreement among the respondents, and the lower the coefficient, the lower the level of agreement. The Kendall's W model used to rank the constraints is illustrated below;

$$W=\frac{12\left[\Sigma T^2-\frac{(\Sigma T)^2}{n}\right]}{nm^2-(n^2-1)}$$

Given, W = Kendall's coefficient of concordance

T = Sum of ranks for factors being ranked

m = number of respondents

n = number of factors (6) being ranked

3.4.3 To determine the effects of credit constraint on pepper productivity in Bongo District.

In this objective, Cobb-Douglas stochastic model was utilized to determine the effect of credit constraint on pepper productivity in Bongo District. This model was employed to determine whether credit constraint is a factor militating against high yields and the increase of pepper productivity in the district. Based on the data collected from the respondents on the possible inputs required for pepper productivity including; seeds, fertilizer, credit constraint, agrochemicals for pest and disease control, labor, machinery service, gender, years of experience, education, irrigation, FBO membership and extension services, the Cobb-Douglas stochastic model was estimated to identify the constraint factors significantly affecting the pepper productivity among farmers in the Bongo district. The researcher used the log likelihood estimation to determine if the data were fit for Cobb-Douglas model or otherwise the translog production model was to be used. The log likelihood estimation confirmed that Cobb-Douglas model was the best fit for the data, hence it was accepted and used. The generalized Cobb-Douglas stochastic production frontier model can be written as follows (Cobb and Douglas, 1928):

$$Q=AL^{\alpha}K^{\beta}$$

Where;

Q = the dependent variable; the yield attained by a pepper farmer.

L & K = Inputs or factors affecting pepper productivity for all respondents (i); Seeds, fertilizer, credit constraint, agrochemicals for pest and disease control, machinery service, labor, gender, years of experience, education, irrigation, FBO membership, and extension services.

α & β = coefficients/ parameters of the independent variables

A = constant

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The results and discussion chapter presents the findings of the research conducted, which comprises presentation, interpretation, and discussion of the responses gathered from respondents (pepper farmers). The chapter discusses the results in reference to findings from the existing literature. The findings discussion is structured according to the research objectives and is presented in the headings as follows: demographic and socio-economic characteristics of the respondents, the credit sources available to pepper farmers in Bongo District, constraints faced in accessing credit for pepper production in Bongo District and the effect of credit constraint on pepper productivity in Bongo District. This Chapter presented the results using frequency distribution tables and a pie chart, which makes understanding easier.

4.1 Demographic and Socio-economic characteristics of pepper farmer's in Bongo District.

The demographic and socio-economic data gathered from respondents (pepper farmers) give basic information about pepper farmers in Bongo District. The section presents results about these demographic and socio-economic features, including gender, marital status, educational level, household size, land sizes, yields, etc. These variables give a broader understanding of the respondents' concerns in the study. The presentation follows a discussion on the meaning of the results and makes reference to the available literature. The discussions helped to understand the situation of the pepper farmers in Bongo District.

Table 4.1: Summary of demographic and socio-economic characteristics of pepper farmers in Bongo District

Categorical Variables	Frequency	Percentage
Gender		
Male	292	89.3
Female	35	10.7
Marital status		
Married	269	82.3
Separated/divorced	4	1.2
Single	46	14.1
Widowed	8	2.4
Education		
No formal education	82	25.1
Primary school	49	15.0
Junior high school	89	27.2
Senior high school/Vocational	76	23.2
Tertiary level	31	9.5
Occupations		
Farming	283	86.5
Wage employment	16	4.9
Trading	20	6.1
Artisan	8	2.4
Extension service contact		
No	164	50.2
Yes	163	49.8
FBO's membership		
No	79	24.2
Yes	248	75.8
Credit access for pepper farming		
No	105	32.1
Yes	222	67.9
Type of seeds used for pepper farming		
Local	55	16.8
Improved	265	81.0
Both local and improved	7	2.1
Type of irrigation used for pepper farming		
Furrow	291	89.0
Drip	20	6.1
Sprinkler	0	0
None	16	4.9

Source**:** Authors' field survey, 2025

Continuous variables	Unit of measurement	Mean	Std. deviation	Minimum	Maximum
Age	Years	36.5	7.8	22	63
Years of farming experience	Years	5.3	2.8	1	15
Household size	Number	5.6	2.5	1	17
Pepper farm size	Acres	1.8	1.1	0.5	6
Distance to pepper farm	Meter	943.1	1,340.7	60	6,000
Qty of Agro-chemicals used	Liters	13.5	9.8	1	41
Total Machinery Services	hours	21.5	17.9	1	96
Labor used	Number	29.4	15.0	2	95
Qty of Fertilizer used	Kilogram	847.2	320.3	100	1,600
Qty of Pepper seeds used	Kilogram	2.2	1.3	0.5	7
Pepper productivity	Kilogram	3,268.2	1,613.8	300	9,000

Source**:** Authors' field survey, 2025

The respondents of the survey were primarily pepper farmers in the 3 communities (Nyariga, Vea, and Gowrie). Table 4.1, indicates that males dominated pepper farming in Bongo District, constituting 292 (89.3%) of the total respondents, while there were 35 females constituting 10.7% of the total respondents. Meaning that there are more males in pepper production than females. This result is in line with Amfo & Ali (2020), who discovered that male farmers had higher access to credit, extension services, training, and information in crop farming than females.

More so, it contradicts the findings of Trauger (2004) that the state of agriculture is in a period of crisis, but it appears that female farmers are more than males, perhaps due in part to females being more likely to operate smaller-scale farms.

The majority of the respondents (82.3%) were married, and those who were single accounted for 14.1% of the total respondents. 2.4% of respondents have lost their spouses (widowed), and as low as 1.2% of respondents were divorced/separated. Again, from the survey, about 25.1% of the pepper farmers had no formal education, and 15.0% confirmed they completed primary school. However, 89 (27.2%) of the respondents had completed junior high school, while 23.2% had

completed or are currently in senior high/vocational schools. The highest education level is tertiary, representing 9.5%. Since most of the respondents had formal education, it means they can understand basic calculations (Umidjon et al., 2014), which helps them in their daily activities. The education characteristics of pepper farmers in the study support Umidjon et al. (2014), who reported that farmers' education had a positive relation to their information processing capability, cognitive ability, and propensity to innovation.

With regards to farmers' main occupations engaged, the majority, 283 (86.5%) had farming (vegetables, cereal, legume, and tubers farming) as their primary occupation, followed by 20 (6.1%) respondents engaged in trading as a main occupation. Also, 4.9% of the respondents were engaged in waged employment occupations, such as teachers, nurses, cleaners, and cooks, while 8 (2.4%) respondents were in artisan occupations (mason, seamstress, carpenter, welder). In matters of farmer contact with extension officers, 163 (49.8%) respondents of the total respondents had extension contact, while the majority of the respondents, 50.2% did not have contact with extension officers. The least percentage of farmers having extension service contact in the study supports Asare-Bediako et al. (2015) findings that poor extension contacts are a barrier to pepper productivity. Those privileged to benefit from extension agents/Officers' education are exposed to new and improved technologies, and are more likely to adopt more technology (Amfo & Ali, 2020). Also, an interaction with the respondents revealed that there were fewer extension officers in the district, which resulted in some farmers not getting extension contact. Most of the respondents, 75.8% were found belonged to Farmer Based Organizations (FBOs), and as low as 24.2% respondents had no FBO membership. The results indicated that most of the pepper farmers have joined FBOs and there are FBO groups available for pepper farmers in Bongo District.

Moreover, the majority (67.9%) of the respondents were privileged to access credit for pepper farming in the previous year, while 32.1% were highly credit-constrained for their pepper production. The results showed that the majority of the pepper farmers had access to credit in the previous year to aid the production and help achieve high yields and improve pepper productivity. The result confirmed that credit access offers farming households the liquidity they require to purchase agricultural inputs, adopt technology, or undertake other investments that are associated with higher yields (Balana et al., 2022). Furthermore, the type of seeds utilized by pepper farmers in Bongo District showed that improved seeds (81.0%) were the most commonly used seeds compared to local seed varieties (16.8%). The least number of respondents indicated that they used both improved and local seeds (2.1%) (Author survey, 2025). The results also revealed that the majority of the pepper farmers used furrow irrigation (89%), followed by 6.1% respondents who used drip irrigation for the pepper production. No farmer (0%) used sprinkler irrigation, and a few respondents (4.9%) indicated that they do not use irrigation but rely on natural rainfall.

In addition, the average age of pepper farmers in Bongo district from the survey was 36.5, with the minimum years being 22 and the maximum of 63 years. This implies majority of the pepper farmers were of middle age and possessed adequate energy for pepper production, and this is in line with Chandio and Jiang (2018), who stated that older people do not have sufficient energy to carry out agricultural activities as compared to the young people.

Furthermore, the average farming years of experience for pepper farmers in the Bongo District were 5.3, with the minimum years being 1 and the maximum of 15 years. This implies that pepper farmers in the communities have reasonable experience, which enables them to understand and perform farming activities well since experience offers the farmer the opportunity to gain and accumulate better knowledge and skills to better handle innovations (Baete, 2012). Also, on

average, Bongo District pepper farmers have a household size of 5.6 members, with the minimum household size being 1 and the maximum household size being 17. The results on household size are clear that pepper farmers with higher household size have the capability of providing adequate labor required in their pepper production. The pepper farmers agreed that the average farm size used for pepper production in the Bongo District was 1.8 acres. The average farm size results imply that most of the pepper farmers in the Bongo District are smallholder farmers. The distance from farmers' homes to the pepper production farms was noted to be an average of 943.1 meters and with a minimum distance of 60 and a maximum of 6,000 (6 km). This meant that the pepper farms are outside the farmers' home and take the farmers quite longer distance to go there.

In addition, the demographic and socio-economic results showed that the average quantity of agro-chemicals used for controlling pests and diseases in Bongo District was 13.5 liters. The minimum and maximum quantities of agro-chemicals used were 1 liter and 41 liters respectively. The average total machinery service hours according to the pepper farmers in Bongo through the survey was 21.5, and the average labor utilized was 29.4 people. The respondents (pepper farmers) second that 847.2kg of fertilizers or 16.9 bags of fertilizer were average used for pepper production in Bongo District. More so, the results showed that the minimum quantity of seeds used by pepper farmers in production was 0.5kg and up to a maximum quantity of 7kg. The results came out with an average quantity of 2.2kg of seeds utilized by pepper farmers in Bongo District. Finally, the average quantity of pepper produced in the previous year was 3,268.2kg, and the minimum and maximum quantities harvested were 300kg and 9,000kg of pepper.

4.2 Source of credit for pepper farmers in Bongo District

Table 4.2 and the pie chart below present the sources of credit available for pepper farmers in Bongo District. The sources of credit, such as banks, micro finance institutions, Farmer-Based Organizations, NGOs/projects, susu groups, traders/input dealers, friends, and relatives, were identified through literature and were confirmed by the respondents. Table 4.2 and Figure 4.1 results showed that NGOs/projects were the least source of credit for pepper farmers, representing 0.3% respondents out of the total respondents in the three (3) communities, and this was due to the inadequate number of NGOs/projects supporting farmers with credit in the district. Followed by susu groups (0.9%), with a smaller number of respondents reporting to have benefited credit support from susu groups. About 1.8% of the respondents had gotten credit support from traders/ input dealers, while 5.8% and 11.3% respondents were privileged to have gotten credit from micro finance institutions and Farmer-Based Organizations (FBOs), respectively.

Table 4.2: Sources of credit for pepper farmers in Bongo District

Credit Source	Frequency	Percent
Bank	43	13.1
Micro finance institutions	19	5.8
NGOs/projects	1	0.3
Friends/relatives	120	36.7
Traders/input dealers	6	1.8
Farmer-Based Organization	37	11.3
Susu group	3	0.9
None	98	30
Total	**327**	**100**

Source**:** Authors' field survey, 2025

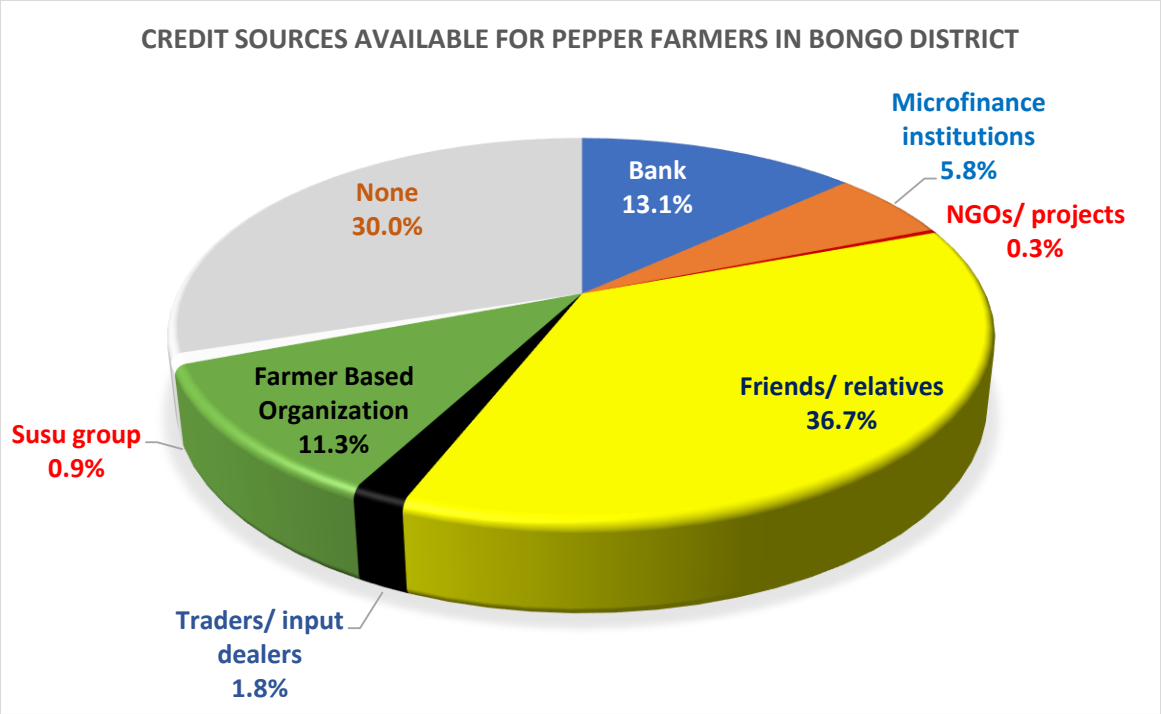

Figure 4.1: Sources of credit in Bongo District utilized by pepper farmers.

(Source: Authors' field survey, 2025)

Furthermore, 13.1% respondents had access to credit from banks representing the second highest source of credit for pepper farmers in the district and this contradict with Apori-Buabeng (2009) who asserted that none of his respondents acquired a loan from the bank and the reasons given for not accessing the loan were lack of collateral, cumbersome nature of the application process and high interest rate. The most common source of credit for pepper farmers was friends/relatives, representing 36.7% respondents. This implies that most pepper farmers obtain credit from their friends or relatives compared to other sources. On the contrary, 98 (30%) respondents did not have access to any of the available credit sources in the district. This means that a moderate number of the respondents (30%) were highly credit-constrained. This result contradicts the findings of Tamga (2017) that the rural population hardly has access to credit for their agricultural activities

and supports that the provision of credit will enhance timely purchase and efficient allocation of farming inputs to produce the maximum possible output (Martey et al., 2019).

4.3 Constraints faced in accessing credit for pepper production in the Bongo District

Table 4.3 below shows the constraints that affect pepper farmers when accessing credit from credit sources in the Bongo District. Some constraints, such as cumbersome application procedure, high risk perception of pepper farming, high interest rate, high collateral requirements, unfavorable repayment period, and long distance of credit sources/lenders, were presented to the pepper farmers to identify the main credit constraint faced in the Bongo District. The results on this objective showed that the major and the least ranked constraints for pepper farmers were high interest rate and unfavorable repayment period. These constraints were analyzed and confirmed to have 1.66 and 5.43 mean scores, respectively. The second (2^{nd}) and third (3^{rd}) positions were filled by high collateral requirements and cumbersome application procedure respectively.

Table 4.3: Kendall's Coefficient of Concordance (Kendall's W[a]) estimation of the constraints faced in accessing credit by pepper farmers in the Bongo District.

Constraints	Mean Rank	Position
High interest rates	1.66	1st
High collateral requirements	2.25	2nd
Cumbersome application procedures	3.18	3rd
Long distance to the credit source/lenders	4.07	4th
Perceived high risk of pepper farming	4.41	5th
Unfavorable repayment conditions	5.43	6th

Source: Authors' field survey, 2025

Test Statistics

N	327
Kendall's W[a]	0.565
Chi-Square	924.508
Df	5
Asymp. Sig.	0.000

a. Kendall's Coefficient of Concordance

The results presented in Table 4.3, imply that the three (3) major challenges affecting credit access for pepper production in Bongo District were high interest rate, high collateral requirements, and cumbersome application procedure. This result is confirmed by Oladele et al. (2024) that factors such as high interest rates, lack of collateral, and cumbersome administrative procedures hinder the ability of vegetable farmers to secure credit from financial institutions. This result is supported by Balana et al. (2020), who found that agricultural credit constraints comprised high costs of borrowing, high transaction costs, and limited access to credit sources.

The Kendall's coefficient of concordance (W^a) for the rankings of the constraints faced in accessing credit in the Bongo District for pepper production was 56.5%. Thus, implies that there is a good agreement among the pepper farmers in Bongo District on ranking the six (6) constraints. The asymptotic distribution in the table above is significant at 1%.

4.4 Credit constraints and pepper production

Table 4.4 below presents the level of pepper farmers' credit constraint in the study area (Bongo District). The study questioned respondents on the status of credit access, whether they requested credit for pepper production, and whether they were given the amount or quantity requested. Based

on the responses, the researcher classified the farmers into four (4) groups: no credit constraint, low credit constraint, moderate credit constraint, and high credit constraint.

Table 4.4: Credit constraints levels of pepper farmers in Bongo District

Credit constraints	Frequency	Percent
No credit constraint	38	11.6
Low credit constraint	140	42.8
Moderate credit constraint	74	22.6
High credit constraint	75	22.9
Total	**327**	**100.0**

Source: Authors' field survey, 2025

From the results presented in Table 4.4 above, the farmers who received the same amount of credit requested were grouped as no credit constraint farmers, those who were denied about 1% to 25% of the amount requested were grouped as low credit constraint farmers. Also, those respondents who were denied 26% to 50% of the amount requested were classified as the moderate credit constraint group, and the farmers who were denied above 50% of the amount requested were classified as the high credit constraint farmers. The grouping was done negatively in line with Martey's (2013) classifications, where the low category was assigned to those who achieved (<= 25% of the total volume), the medium category for achieving (26%-50% of the total volume), and the high category to those achievements of (>50% of the total volume). From Table 4.4, it revealed that the majority of the respondents (42.8%) were in the low credit constraint category, while the least percentage (11.6%) of respondents were not credit constrained. The results showed that credit constraint is a challenge to pepper farmers in Bongo District.

4.5 Effect of credit constraint on pepper productivity in Bongo district

The Cobb-Douglas model was used to identify the significant input variables that affect pepper productivity in the Bongo District. The studies solicited data from the 327 respondents (pepper

farmers) on the input variables that contribute to pepper productivity in the district. The input variables for which data was gathered were quantity of seeds, quantity of fertilizer, credit constraint level, quantity of agrochemicals used for pest and disease control, labor, machinery service hours used, farming years' experience, extension service access, education, FBO membership, irrigation types, gender, and type of seeds used for production. The researcher used the log likelihood estimation to determine if the data collected was fit for Cobb-Douglas production function, and the results confirmed that the data were consistent to Cobb-Douglas stochastic model. The results are presented in Table 4.5 below. The discussion is based on only the significant variables and from the stochastic frontier normal/half-normal model estimation, six (6) out of the thirteen inputs variables had a significant effect on pepper productivity which include (total machinery service hours, quantity of pepper seeds utilized, credit constraint levels, farming years' experience, education and type of seed used for production). The results revealed that a unit change in total machinery service hours used in pepper farming will increase pepper productivity by 0.059 units and is statistically significant at 5%. The farmers agreed that machinery is useful in performing several activities in the pepper farms, including traction service, planting, watering, spraying, etc., and the more the farmers employed the service of machinery, the higher the returns on productivity (According to Bongo District pepper farmers). Again, a unit change in the quantity of pepper seeds used for production will increase pepper productivity by 0.11 units and is significant at 1%. Furthermore, the results revealed that the credit constraint, which is the input variable of interest of the topic under study, was statistically significant at 1% for each of its dummy variables, relative to the base category variable (no credit constraint). The credit constraint effect on pepper productivity in the Bongo District results showed that the low credit constraint problem of pepper farmers has the ability to decrease pepper yield by 0.428 units compared to the no credit constraint

effect on productivity.

Table 4.5: Cobb-Douglas stochastic frontier model estimation of the factors affecting pepper productivity in the Bongo District.

Stochastic Frontier normal/half-normal model

Yields_kg	Coef.	St.Err.	t-value	Sig
Quantity of Agrochemicals used	0.017	0.027	0.63	
Total Machinery Service hours	0.059	0.028	2.13	**
Labor	0.021	0.038	0.55	
Quantity of Fertilizer used	0.059	0.049	1.20	
Quantity of Pepper seeds used	0.11	0.04	2.75	***
Credit Constraint: base (No credit constraint)				
Low credit constraint	-0.428	0.073	-5.86	***
Moderate credit constraint	-0.627	0.081	-7.75	***
High credit constraint	-1.034	0.088	-11.78	***
Gender	0.023	0.074	0.31	
Farming Years' Experience	0.018	0.009	1.99	**
Extension service	-0.022	0.046	-0.48	
Education	-.159	0.054	-2.94	***
FBO	-.019	.058	-0.33	
Irrigation types : base (None)				
Furrow irrigation	-0.005	0.105	-0.05	
Drip irrigation	0.007	0.136	0.05	
Type of Seed used	-0.159	0.065	-2.44	**
Constant	-1.462	0.231	-6.32	***

Mean dependent var	7.955	SD dependent var	0.567
Number of obs	327	Chi-square	236.958
Prob > chi2	0.000	Akaike crit. (AIC)	363.595

*** p<.01, ** p<.05, * p<.1

(Source: Authors' field survey, 2025)

Also, moderate credit constraint of pepper farmers has the ability to decline pepper productivity in Bongo District by 0.627 units than no credit constraint effects and farmers with high credit constraint conditions had a higher reduction in yields (1.034 units) than farmers with no credit constraint effect. The results indicated that the higher the credit constraint by pepper farmers, the greater the reduction of pepper productivity according to the pepper farmers in Bongo District.

The credit constraint results were in agreement with the a priori expectations and consistent with the studies of Amfo & Ali (2020), who found that credit access was significant and a negative variable affecting exotic vegetable farmers' adoption of technologies, but the result was different from Akudugu et al. (2012) findings.

Moreover, the study findings agrees that credit access offers farming households the liquidity they require to purchase agricultural inputs, adopt technology, or undertake other investments that are associated with higher yields (Balana et al., 2022) and Abdallah (2016), whose study came out that credit market efficiency is a major determinant to the adoption of yield enhancing technologies in Sub- Saharan Africa.

More so, the stochastic results showed that a unit change in farming years' experience will directly increase pepper productivity by 0.018 units and is significant at 5%. This supports Chandio and Yuansheng (2018), who revealed that farming experience is a significantly positive variable that influences farmer adoption of modern agricultural technologies for higher crop yield. Table 4.5 results above confirmed that a unit change in farmers' education has a direct effect of decreasing pepper productivity by 0.159 units and is significant at 1%. Lastly, the stochastic frontier results showed that a unit change of the type of seeds used in pepper production will directly decrease pepper productivity by 0.159 in Bongo District, and this is significant at 5%.

A recent Ghana evidence study confirmed this by ranking high fertilizer and herbicide costs among the top impediments to crop productivity (Acheampong et al., 2023) and another study by George (2015) revealed that the partial elasticity estimated for fertilizer (0.57) and improved seed (0.44) used by rice farmers contributed largely to lowland rice productivity in the study area. Hence, farmers need to be supported with more fertilizer and improved seed to increase production (George, 2015).

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.0 Introduction

Chapter five consists of a summary of the key findings from the study, conclusions, recommendations, limitations, and suggestions for future research.

5.1 Summary of findings

The study's primary goal was to investigate the specific constraint factors that affect pepper productivity in the Bongo District. Three hundred and twenty-seven (327) pepper farmers were interviewed. The following are the study's three specific objectives: to identify the sources of credit for pepper farmers in Bongo District, to identify the constraints faced in accessing credit for pepper production in the Bongo District, and to determine the effect of credit constraints on pepper productivity in the Bongo District. Data collection was done through the use of a structured questionnaire, through personal interviews, and journal review. After successful data collection and analysis, there were a series of findings that were realized and presented in this report. To begin with, the study revealed that 89.3% of the pepper farmers in the Bongo District were males, whereas females represented 10.7%. In addition, it was also revealed that the majority (82.3%) of the pepper farmers were married, with a least of respondent (1.2%) being divorced/separated, and the others representing single and widowed respondents. Again, 25.1% of the pepper farmers had no formal education, whilst 15.0%, 27.2%, 23.2%, and 9.5% of the respondents had attained primary, junior high, senior high/vocational school, and tertiary education, respectively. Furthermore, it was revealed that the mean age of pepper farmers in Bongo District was 36.5 years, and the average years of farming experience was 5.3. More so, the average household size and

farm size were 5.6 and 1.8 acres, respectively. Additionally, the average yield recorded by pepper farmers in Bongo District was 3,268.2 kg, while the average labor employed, fertilizer used, and seeds used were 29.4 people, 847.2 kg, and 2.2 kg, respectively.

The key empirical findings from the study are:

1. The findings revealed that, majority of the pepper farmers were privileged to access credit from various sources to undertake pepper production. The study revealed that friends/relatives are the dominant source of credit for the pepper farmers in Bongo District, representing 36.7%, followed by banks (13.1%), Farmer-Based Organizations (11.3%), and micro finance institutions (5.8%). Also, 1.8% and 0.9% of the pepper farmers had their credit access from traders/input dealers and susu groups, respectively, with the least percentage of farmers (0.3%) accessing credit from NGOs/projects. More so, about 30% of the pepper farmers did not utilize any of the available sources of credit. It can therefore be noted that credit sources are available to Bongo pepper farmers, but some pepper farmers are not able to access credit due to the constraints association with credit access.
2. It was again revealed that the three (3) major challenges affecting pepper farmers' credit access in Bongo District were high interest rates, high collateral requirements, and cumbersome application procedures.
3. The Cobb-Douglas model used to determine the effects of credit constraint on pepper productivity revealed that total machinery service hours, quantity of pepper seeds utilized, credit constraint levels, farming years' experience, education and type of seed used for production were the key significant factors affecting pepper productivity in Bongo District and the interest input variable (credit constraint) was statistically significant at 1% for each of its dummy categories (low, moderate and high credit constraint) and the three categories will

directly reduce productivity by 0.428, 0.627 and 1.034 units respectively relative to no credit constraint category effects. Moreover, total machinery service hours, quantity of pepper seeds, and farming years' experience were statistically significant and have the effect to increase pepper productivity by 0.059, 0.11, and 0.018 units respectively, whilst education and type of seeds used for pepper production have the effect to decrease productivity by 0.159 units each.

5.2 Conclusions

The study found that pepper production is a male-dominated occupation, and the majority of the farmers are young and energetic, since the average age was 36.5 years. Also, the result of the study revealed that pepper farmers easily have access to credit from credit sources such as friends/relatives, banks, Farmer-Based Organizations and micro finance institutions but, a moderate percentage of respondents (30%) have not been able to access credit from the available credit sources and this is attributed to the constraints associated with credit access discovered in the study. It was also concluded that the dominant source of credit was friends/relatives, attributed to the fact that this source of credit does not require collateral and has lower or no interest rate as compared to the other sources of credit.

Furthermore, the major constraint affecting pepper farmers' credit access in the Bongo District from the constraint analysis was the high interest rate.

Moreover, the empirical results revealed that pepper farmers' productivity was significantly affected by the total machinery service hours used, quantity of pepper seeds utilized, credit constraint levels, farming years' experience, education, and type of pepper seed used for production. Credit constraint categories were revealed to be negatively affecting pepper productivity in Bongo District and therefore need to be considered as the key concern of pepper farmers in the district.

5.3 Recommendations

The findings of the study have come out with the following policy recommendations:

1. It is recommended that credit providers should give out credit to pepper farmers with attractive credit packages, such include lower interest rates, lower collateral demands, and make the credit application process flexible and easy.
2. Also, the Government should introduce more agricultural programs which will support farmers, especially pepper farmers, with key inputs like fertilizer, certified seeds, and cash to help reduce poor yields, improve income, and livelihood of pepper farmers in the country.
3. It is finally recommended that credit constraints such high interest rate, high collateral requirements, cumbersome application procedure, high risk perception of pepper farming, unfavorable repayment period and long distance of credit sources/lenders affecting pepper farmers should be addressed by the Government, financial institution and other relevant credit sources to help increased credit access and boost pepper productivity and income of pepper farmers.

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APPENDIX A

University for Development Studies

Faculty of Agriculture, Food and Consumer Sciences

Department of Agricultural and Food Economics,

Master of Science degree in Agricultural Economics

TOPIC: CREDIT CONSTRAINT AND PEPPER YIELD OF FARMERS IN BONGO DISTRICT IN THE UPPER EAST REGION

Enumerator name: _____ Date: ____ / ____ / ____

Respondent ID: _____ Location (Community): _____

Introduction & Consent

I am a MSc. student at the University for Development Studies and I am conducting academic research on credit constraints and pepper yields of farmers in the Bongo District. All responses will be kept confidential and anonymous. No personally identifiable information will be collected or shared with anyone outside the research team. Information gathered from respondents will be used strictly for academic research purposes in partial fulfilment for the award of **MSc. Agricultural Economics.** Respondent participation is voluntary. Do you consent to participate? Yes [ ] No [ ].

Section 1: Socio-demographic characteristics of respondent

1. Gender? Male [ ] Female [ ] Other [ ]

2. Age (years)? _____

3. Marital status? Single [ ] Married [ ] Divorced [ ] Widowed [ ]

4. Education level? No formal education [ ] Primary [ ] JHS [ ] SHS/Vocational [ ] Tertiary [ ] Other [ ]

5. If other, specify? _____

6. Household size? _____

7. Main occupation? Farming [ ] Trading [ ] Wage employment [ ] Artisan [ ] Other [ ]

8. If other, state? _____

9. Years of pepper farming? _____

10. Beside pepper farming do you cultivate any crop? Yes [ ] No [ ]

11. If yes, which crop do you cultivate? Rice[ ] Millet[ ] Sorghum[ ] Maize[ ] Groundnut[ ]

10. Farm size for pepper production (acres)? _____

12. What is the total land size you currently hold for your farming (acres)? _____

13. What is the distance from your house to the farm?

14. What is the distance from your house to the market?

15. Land tenure type? Own [ ] Rent/Lease [ ] Family land [ ] Other [ ]

16. If other, state? _____

17. Do you have access to extension service? Yes [ ] No [ ]

18. If yes, how many times did you access extension service/ information last season for your pepper production? _____

19. Do you have FBO's membership? Yes [ ] No [ ]

20. If yes, how many times do you meet? _____

21. What is your main source of labour for your pepper production? Family labor [ ] Hired labor [ ] Exchange or reciprocal labor [ ] Communal labor [ ]

22. Is labour easily accessible in the community? Yes [ ] No [ ]

23. Do you used agro-chemicals for the purpose of controlling pest & disease in your pepper production? Yes [ ] No [ ]

24. Which agro-chemicals do you used most on your pepper farm? Weedicides [ ] Fungicides [ ] Nematicide [ ] Pesticides [ ] None [ ]

25. What is your main source of water for the pepper production? Rainfall water [ ] Ground water [ ] Surface water [ ]

26. Type of irrigation scheme used in your pepper production? Furrow irrigation [ ] Drip irrigation [ ] Sprinkler irrigation [ ] None [ ]

Section 2: Sources of credit for pepper farmers in Bongo district (Objective 1)

1. Do you have access to credit for agricultural purposes? Yes [ ] No [ ]

2. If yes, indicate the main sources of credit (select the main) ? Bank [ ] Microfinance institutions [ ] Farmer Based Organization [ ] Traders/ input dealers [ ] Friends/ relatives [ ] NGOs/ projects [ ] Other [ ]

3. If other specify? _____

4. Have you taken credit specifically for pepper production in the last 3 years? Yes[ ] No[ ]

5. Which type of credit did you accessed for your pepper production? Cash [ ] In-kind [ ] Both (cash & In-kind) [ ] None [ ]

6. What was the interest rate of the credit accessed (% per month)? _____

7. How many months were given to pay back the credit? _____

8. Was collateral required? Yes [ ] No [ ]

9. If yes, please specify the requirement that was requested? Farm produce [ ] Breeding stock [ ] Equipments [ ] Buildings [ ] Real estate (land) [ ]

10. Was the credit sufficient for your production needs? Yes [ ] No [ ]

11. How much did you request (Gh₵)?_____

12. How much did you get (Gh₵)?_____

Section 3: Constraints faced in accessing credit for pepper production in Bongo district (Objective 2)

1. Base on your past experience, did you faced challenges in accessing credit specifically for pepper production? Yes [ ] No [ ]

2. If yes, what was your greatest constraint faced (tick only 1)? High collateral requirements[ ] High interest rates[ ] Cumbersome application procedures[ ] Long distance to credit source/ lender[ ] Risk perception of pepper farming[ ] Unfavorable repayment conditions[ ] Other[ ]

3. If other, state? _____

4. Please rank the constraints below from one (1) to six (6) based on severity. The most constraint should be ranked one (1) followed in that order till the least constraint ranked as six (6).

- High collateral requirements? _____

- High interest rates? _____

- Cumbersome application procedures? _____

- Long distance to credit source/ lender? _____

- Perceived high risk of pepper farming? _____

- Unfavorable repayment conditions? _____

Section 4: Constraint factors affecting Pepper productivity in Bongo district (Objective 3)

1. Which type of pepper seed do you cultivate? Local [ ] Improved [ ] Both [ ]

2. What was the quantity of pepper seeds used last season for pepper production (kg)? _____

3. What was the quantity of fertilizer used last season for your pepper production (kg)? _____

4. What was the total hours spent in machinery services (hours)? _____

5. What was the quantity of agro-chemicals used last season for your pepper production (litres)? _

6. What was the frequency of water application per week last season for your pepper production (number of times)? _____

7. How many people were employed to do work on your pepper production farm?

8. What was the quantity of pepper produce harvested last season (kg)?

Thanks so much for your time.

Francis Awine Anabila

CREDIT CONSTRAINT AND PEPPER YIELD OF FARMERS IN BONGO DISTRICT IN THE UPPER EAST REGION

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