

UNIVERSITY FOR DEVELOPMENT STUDIES

**PRODUCTION AND MARKETING PROSPECTS OF CHILLI
PEPPER IN THE UPPER MANYA DISTRICT, GHANA**

NICHOLAS KWEKU TEYE



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BY

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**DISSERTATION SUBMITTED TO THE DEPARTMENT OF
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DECLARATION

Student

I hereby declare that this dissertation is the result of my own original work and that no part of it has been presented for the award of another degree in this University or elsewhere.

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Date



ABSTRACT

This study primarily examines prospects and constraints of pepper production and marketing in the Upper Manya Krobo District of the Eastern Region of Ghana. Data were collected from fifty (50) farmers and thirty (30) marketers through interviews using structured questionnaires. Data were evaluated using mainly descriptive statistics such as means, frequencies and percentages. Results reveal the pepper farming serves as a powerful source of food and nutrition security, as well as income for farmers since over 70% of the farmers cultivates Chilli pepper for food and income purposes. Results also indicate that chilli pepper production has a great potential for export in the study area. The results further show that chilli pepper farmers face many challenges including pest and disease infestations, poor infrastructure (for transportation), lack of storage and cooling facilities, lack of irrigation facilities, high post-harvest losses, price fluctuations, lack of credit facilities, high cost of inputs, and lack of certified seeds. The total revenue for fresh and dried chilli pepper and its gross total cost were estimated to be GH¢ 957.90 and GH¢ 955.92 and GH¢ 621.60 respectively. The farmers made a gross profit of GH¢ 336.30 from fresh pepper and GH¢ 334.32 for dried pepper. The highest price for fresh pepper was recorded in the month of February and March for both fresh and dried pepper respectively. Also for pepper marketing, seasonality or fluctuation of supply are major constraints faced by operators in the chain. Other constraints include low quality and price of produce, poor transportation services, high postharvest losses and non-compliance with export regulations.



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DEDICATION

I dedicate this work to my son Carlos Teye Angmor Elikem and my dear wife Mary
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LISTS OF ACROYNOMS

EU	European Union
Ghana Veg	Ghana Vegetables
GHC	Ghana Cedi
GSS	Ghana Statistical Service
MASTESS	Ministry of Environment Science and Technology Scholarship Secretariat
MiDA	Millennium Development Authority
MOFA	Ministry of Food and Agriculture
PHC	Population and Housing Census
SPSS	Statistical Package for Social Scientists
UMKD	Upper Manya Krobo District
NTR	Net Total Revenue



CHAPTER ONE

INTRODUCTION

Background

Scientific evidence suggests that several varieties of pepper grown and consumed across the world are likely to have been found in Asia, as early as 6000 years ago (Hill *et al.*, 2013). Other studies (e.g., Bosland and Votava, 2000) believe that pepper has its origin in North (Mexico) and Central American regions, introduced to Europe and subsequently spread into Africa and Asia. Bosland and Votava (2000) acknowledged in their work that pepper is an important vegetable crop widely consumed by majority of people across the world. Research shows that pepper, including Chilli is sufficient in vitamins A and C which are good for optimal function of the body. It has several important uses such as adding flavour, taste, colour and pungency or condiment to meals (Mohammed *et al.*, 2016; Kumar and Rai, 2005). It is widely alleged that embracing pepper inclusive diet can substantially treat fevers, colds, indigestion, constipation and pain in human beings (Dagnoko *et al.*, 2013).

Academic literature also shows that pepper is ranked the world's second most important vegetable crop after tomato (Dessie *et al.*, 2017). The name Chilli is popular among the ancient Indians and early Aztecs of Mexico. They are known to have originated from the lowlands of Brazil in a location called the "nuclear area". In other regions of Asia, Chilli peppers are called "ema", thus in Bhutan, "la-jiao" in China "cabe" in Indonesia and "prik" in Thailand (Dessie *et al.*, 2017). The name Chilli is widely used around the world, with slightly different spellings such as Chile, Chili and Chilly as noted by Berke (2002).



Chili pepper is one of the most popular vegetables grown by smallholder farmers because they are relatively easy to grow, and tolerant to a wide range of climatic conditions (Saavedra *et al.*, 2014), with around 31 million tons produced on approximately 1.9 million hectares of land. According to Mohammed *et al.* (2016), production by smallholder farmers in Ghana is highly profitable. Besides, demand for the crop is growing strongly in both domestic and international markets, presenting great opportunity for farmers to expand production in the country, maximize their profits and eventually improve their economic situation. Indeed, Asravor *et al.* (2016) referred to Chili pepper as "green gold" because of its economic value to the farmers who cultivate them. Globally, china is the world leader in Chilli production followed by Indonesia (Saavedra *et al.*, 2014).

In Ghana, Chili peppers are the fourth most cultivated crop after cassava, plantain and yam, with about 984,586 farmers engaged in its cultivation (GSS, 2014). Different varieties, especially the legon 18 are highly produced for local consumption and export to the EU markets (MiDA, 2010) due to its great taste and long shelf-life (Asravor *et al.*, 2016). However, reports show that presently, exports originate almost exclusively from southern Ghana. In terms of export, Ghana was recently ranked as the fifth largest exporter of Chili to the European Union, where demand has been growing annually by 17% on average, since the year 2000 (MIDA, 2010). In 2012, world production of fresh Chilli and sweet pepper was estimated to be 27.6 million tons (MIDA 2010). Of this output, Ghana and Nigeria contributed 888,400 tons. Ghana was also ranked the 11th largest producer of pepper in the world and the 2nd largest producer in Africa with an estimated total production of 88,000 metric tons in 2011, which accounted for \$96,397 (FAOSTAT, 2011).



Notwithstanding the enormous benefits of the crop, MoFA (2010) maintained that chilli pepper production is typically organized under rain-fed conditions resulting in a drop in production and shortage of fresh pepper during the dry season. This supply-demand gaps result in increase in the market price of both fresh and dried pepper. According to MiDA (2010), Ghanaian farmers are only able to meet 50% of the achievable yields of Chilli pepper. Therefore, this current study seeks to assess prospects and constraints to chilli pepper production and marketing in the study area.

Problem Statement and Justification

Pepper plays significant traditional role in most household's diets, food and income security. Ghana has comparative advantage to be a leading exporter of chilli, which can earn foreign exchange to support socio-economic development of the country. Production however, seems to be challenged by seasonality of the produce due to unpredictable rainfall patterns as well as diseases and pest, low soil fertility, unavailability and high cost of irrigation systems. With their small landholdings, farmers lack the needed capital for investment, and have little or no access to storage facilities. Poor infrastructural facilities, particularly road networks appear to make transportation of both inputs and produce difficult for the farmers. These problems, coupled with the generally poor agronomic practices lead to poor quality of produce and low yields (MiDA, 2010). Most of the pepper varieties farmers cultivate are unimproved, which gives rise to low yields and eventually affecting farmers' income significantly. With an average yield of 8.30Mt/ha Ghana is currently ranked fourth in chili production in Africa after Egypt, Nigeria and Algeria (MiDA, 2010). This yield is supposedly far below the achievable yield of 32.30 Mt/ha (MoFA, 2014).

Many studies on pepper in Ghana focused on genetic diversity of genotypes, assessment of the level of production and postharvest handling, with limited focus on



marking. Limited access to markets (local and international) also results in exploitation by various intermediaries who eventually determine how much to pay for the unit of product (pepper). This undermines the benefits farmers gain from their toil (MOFA, 2016). Uncertainty over the market, caused by weak and informal relationships between actors in the value chain are among the constraints faced by smallholder farmers, preventing them from adopting improved varieties that can give them better returns. Literature abound on aspects of economics of Chilli pepper along the value chain which examined various market channels, market participants and performance as well as the determinants of red pepper supply (Abbay, 2010; Tesfaw, 2013; Ali et al., 2016; Dessie *et al.*, 2017). This study therefore sought to explore the prospects and constraints of the chilli pepper enterprise and marketing in the Upper Manya District. The researcher is of the view that if the necessary interventions are put in place to offset such constraints, it will go a long way to improve farmer's economic status. This will in turn motivate the youth to embrace pepper production as a better option of employment and reduce unemployment rate among the people in the rural communities of Upper Manya District.

Research Questions

- i. What are the prospects and constraints in chilli pepper cultivation in the Upper Manya District?
- ii. What are the major prospects and constraints facing chilli pepper marketers in Upper Manya District?
- iii. What is the profitability level of chilli pepper production and the factors influencing chilli pepper profitability in the study area?
- iv. What are the preferences of buyers about chilli pepper quality (appearance, flavour, taste)?



Research Objectives

The general objective for this study is to investigate prospects and constraints of chilli pepper production and Marketing in the Upper Manya District.

The specific objectives for this study are to;

- i. Determine the prospects and constraints of chilli pepper production in Upper Manya District.
- ii. Determine the prospects and constraints of chilli pepper marketing.
- iii. Evaluate the profitability of chilli pepper production, and the factors influencing profitability in the study area.
- iv. Determine buyers' preference for quality (appearance, flavour, taste) of chilli pepper

Limitations of the Study

The research was limited by poor terrain leading to poor accessibility to farmers. High rate of illiteracy among respondents contributed to the formation of certain perceptions, particularly related to superstitions that affected farmer responses to specific issues in the communities. Aside from that, inadequate or complete lack of record keeping by farmers made it difficult to obtain certain facts and events related to the subject matter under study. Also, resources such as finance, access to university library, poor communication network, limited access to internet facilities were critical limitations that affected overall quality of work and speed of completion.

Organization of the Study

The study is organized into five (5) chapters. Chapter one contains the introduction, which entails the background to the study, a research problem and questions. It also highlights on the research objectives, and the justification as well as the organization of the study is likewise displayed in this chapter. Chapter two presents the review of



literature pertinent to the study. Chapter three elaborates on the methodological approaches used to collate process and analyse the data. Chapter four provides the results and discussion from the data and its relation to literature. Lastly, chapter five provides the summary of key findings, conclusions and recommendations for future research.



CHAPTER TWO

LITERATURE REVIEW

2.1 Origin of pepper and Chilli

Pepper is believed to be the first spice to have been used by human beings (Hill *et al.*, 2013). The authors indicate that even though ancient history of it and other fossil foods from as early as 6000 years ago exist, the literature does not have explicit and constant origin for the crop. For instance, Piekersgill (1997) proposed that pepper is typical to South and Central America while other authors like Ayorinde (2011) suggest variant locations such as Bolivia. Whereas the Chile Pepper Institute (CPI) propose Brazil (nuclear area) as the point of origination of Chilli (CPI, 2007), Mohammed *et al.* (2016) claim the crop was domesticated as *capsicum frutescens*, in the northern half of South America and spread to parts of Central America and Caribbean area, Asia and Africa. The literature shows that birds were the transmission agents for the spread of wild chilli pepper. Others also believe that Chilli peppers were spread to Spain and the Eastern hemisphere through Christopher Columbus' mission of looking for a new spice trade (Mohammed *et al.*, 2016). Today, Chilli peppers are cultivated and consumed in almost every country in the world (CPI, 2007 cited in Mohammed *et al.*, 2016).

2.2 Chilli Production and Related Challenges

Chilli pepper is a major vegetable crop of huge market potentials. Globally, 31 million tons are produced on approximately 1.9 million hectares of land (MiDA, 2010). Global production over the past 1-2 decades has increase on average by about 3.9% per year during the last 10 years, leading to a steady increase of global demand. Reports show that China, Mexico and Turkey are the leading producers of Chilli pepper. Together, the three countries account for more than 70% of the global



production. Evidences also indicate that the bulk of Chillies produced in each of these countries is consumed locally (FAOSTAT 2010). Table 2.1 shows estimates of the contribution of some major Chilli producing countries across the world to global output.

Table2.1: Global chilli pepper production

Country	Global Output
China	56%
Maxico	8%
Turkey	7%
Indonesia	5%
Spain	4%
USA	3%
Nigeria	3%
Egypt	2%
Korea	2%
Others	10%

Source: FAOSTAT (2010)

In Ghana, the Asian vegetables and Chillies were introduced by Indian immigrants in the early 90s. The current average yield of Chili pepper in Ghana is 8.30Mt/ha which is far below the achievable yield of 32.30 Mt/ha. It is important to know that even higher yields have been realised in Chilli producing countries like Nigeria where average yield of 1,021 kg/ha are reported (Alegbejo *et al.*, 2006). Although Ghana did not feature as one of the recognised producers of Chilli (table 2.1), area of production and output levels for pepper have been increasing steadily, in absolute terms over the last decade (Table 2.2).



Table 2.2: Vegetable production (ha) vs quantity (tons) in Ghana

Area cultivated	Production volume	Area cultivated	Production volume	Area cultivated	Production volume
81, 105	191, 049	13, 400	95, 000	13, 700	110, 100

Ghana Veg (2014)

Previous studies (Mohammed *et al.*, 2016; Asase, 2014; Abbay, 2010) have identified several challenges facing Chili farmers. They include the spread of pests and diseases on the farm, difficult harvesting due to handpicking (bending over for long periods of time). Production is largely seasonal due to lack of irrigation facilities. In addition, the farmers, face various challenges trying to access credit facilities to sustain and expand production. Problems related to wrongful application of pesticides are also common among farmers. Overall, price fluctuations have been identified as the most severe constraint in Chilli pepper production and marketing (Mohammed *et al.*, 2016). This is believed to be driven by speculative activities of middlemen (Suleiman and Isah, 2010) whose role in the value chain seems to be assuming exploitative status, to the disadvantage of the farmers.

According to MoFA (2015), Chilli pepper farming in the region is mainly carried out by the old people who do not have the necessary energy to work and manage the farms. As such, they depend heavily on household and hired labour, which are increasingly becoming scares and expensive. The use of hired labour becomes evident around the peak labour period, especially during land clearing and weeding activities. The cost of labour is high for most farmers, whose resource capacities are often limited relative to what they actually need. As a result, the farms are often not properly maintained and these, in the long run, affect output. The different forms of



labour and their challenges, according to Jeremy *et al.* (2014) have different impacts on productivity.

2.3 Varieties of pepper produced in Ghana

Pepper produced in Ghana is grouped into two main varieties. These are “sweet pepper” (*capsicum annum*) and hot pepper (*capsicum frutescens*) (Tweneboah, 2000).

A number of the hot pepper varieties are cultivated in Ghana, some of which include *Bird’s eye*, *Legon 18*, *M12*, *Frenso* and *Jalapo* (Obeng-Ofori *et al.* 2007). These varieties have been categorised as fast growing. Exotic types include *California wonder*, *world beater*, *Florida giant*, *Neopolitan* and *Cuban*. Some local types found in *Aseewa* and surrounding communities (the study area) are listed in table 2.3 below.

Table2.3: Local types of hot pepper

Local name (Dangme)	Meaning (English)
1. <i>Sorkwer</i>	Legon 18
2. <i>Kpakpo shito</i>	Trini congo
3. <i>Yolornguer</i>	Bird’s eye
4. <i>Daliwa</i>	Scotch bonnet
5. <i>Yowi</i>	Bird’s eye
6. <i>Tongor</i>	Seven pod
7. <i>Toku kwadaa</i>	Goat pepper
8. <i>Kwadaa yumu</i>	Black pepper

Same local types (Akan) described by (Tweneboah, 2000) include *kokromotie* (thumb) *hwe-nyame* (pointed upwards) *hwenta* (pointed hoses) *Oheneba nsansia* (six-fingered prince), *mako hwam* (fragrant pepper) and *basatia* (short arm) *ogyenma* and *legon 18*. The *Legon 18*, selected from an original cross from Sri Lanka is known for



its high yielding characteristics and resistant to the leaf curl viral disease (Norman, 1992). It is thus the most commonly produced variety in Ghana. Although Scotch Bonnet and Bird-Eye Chilies are also produced, they are often in smaller quantities.

2.4 Economics of chilli pepper production

In recent years, interest and demand for pepper has increased dramatically across the globe, making the produce to achieve economic significance in the global market (International Pepper, 2012 cited in Mohammed, 2015). Bunyinza and Mugagga (2010) reported that despite the fact that the price of pepper varies widely within the season, it can be cultivated as a cash crop which can help reduce poverty. Asase (2014) suggests that Chili cultivation delivers higher and more stable incomes to farmers, as production is highly profitable despite the many associated production challenges (Mohammed *et al.*, 2016). Ayinde (2013) also found pepper production to be a profitable enterprise, yielding a 2.62 return on investment for producers. Mohammed *et al.* (2016) thus contend that Chilli pepper contributes about 42% of the total farm income in the study area. This finding corroborates that of Suleiman and Isah (2010), who reported that pepper production is very important to addressing food security issues among the farmers. They further highlighted the industrial use of Chilli pepper, particular for use in pharmaceutical industries and in food manufacturing industries, where it is used for seasoning of processed foods in the preparation of curry powder, hot sauce and in pickling (Ayorinde, 2011).

2.5 Pricing and marketing of pepper

Marketing refers to the performance of activities involved in the movement of goods and services from the point of production to the final consumer. In other words, agricultural marketing expresses all processes that occur from when a farmer plans to meet stated demands and market prospects to when the produce reaches the consumer



(Haruna *et al.*, 2012). Unlike other agricultural commodities, vegetable marketing may not need so much capital (Aminu, 2009). However, it requires a great deal of experience and good relationship with all the relevant agents in the value chain.

The high cash income potential of pepper production, coupled with its fast-growing nature makes it suitable for poverty reduction. However, the price paid to farmers locally is often far lower than what pertains on the international market (Darkoh, 2002). Records show that the Legon 18 variety has over the years built a very good reputation for taste and quality in the European market (MiDA, 2008). Its relatively long shelf life (more than 1 week), makes it the preferred choice by most of its customers because it reduces the rate of losses. The market window for Ghana (March-September) coincides with the European growing season in southern Europe, which makes it less beneficial to the local producer and exporter.

2.6 Chili exports from Ghana

While a world Bank report indicates that increasing volumes of Chilli pepper have been exported from Ghana to the European Union (EU) in the recent past (World Bank, 2011), checks at the Ghana Export Promotion Authority (GEPA) suggests something to the contrary. Available data rather suggests a decline in the volumes of exports as can be seen in table 2.4. The total value of vegetable trade between Ghana and the EU accounts for USD 7m. Majority (91%) of these products are shipped to the UK. Chili pepper constitutes the largest share of the vegetable export, with a total value of USD 3.7m. This translates into volumes between 1,500 and 3,000 tons per annum. From table 2.4, imports of fresh chilli pepper in the European market decreased from 96,700 tons in 2009 to 85,600 tons in 2013. This includes import from outside the EU (32,464 tons), as well as from other EU countries (53,112 tons) (Ghana Veg, 2014).



Table2.4: Chilli pepper exports from Ghana (2006-2013)

1, 958, 734	646, 081
1, 578, 055	622, 219
1, 619, 830	714, 614
951, 905	470, 148
984, 374	350, 442
1, 002, 710	1, 174, 964
734, 000	720, 911
984, 503	586, 089

Source: MoFA (2014)

2.7 Quality standards and consumer preferences

The food safety standards for chilli peppers are basically similar to other fresh fruit and vegetables. In other words, buyer requirements, particularly for European markets is categorised into “*musts*” (e.g. legal requirements), which are expected to be complied with before a product qualifies for the market; “*common requirements*”, which farmers need to comply in order to stay abreast of the market and “*niche market requirements*”, which are meant for specific sections in the industry.

Pesticide residues are an essential concern for suppliers of fruits and vegetables. As a means of avoiding injury to both human and environmental health, the European Union has set maximum residue levels (MRLs) for pesticides in and on food products. This means that, products entering the European markets should not contain more pesticides than the allowable limit. Otherwise, such goods will be withdrawn. It is important to note that authorities in many European jurisdictions have put extra focus on control in the chilli pepper trade because many challenges with respect to excess MRLs have been reported.



2.7.1 Quality

In terms of quality chilli peppers are required to be intact, clean and sound. They are required to be essentially free of pests, damage, abnormal external moisture and internal browning, in addition to being able to withstand transport and handling.

2.7.2 Size

The regulations state that chilli peppers intended for the European market must be uniform. In other words, packages should contain peppers of the same variety from identical source, quality and size (where applicable). However, a mixture of noticeably different colours may be packed together so long as they are of the same origin and uniform in quality. The length or diameter of chilli peppers is what is used to determine size. The various size codes are shown in table 2.5 below

Table 2.5: Criteria for selecting pepper (for export)

Size by length	Length (cm)
Size code 1	<4
Size code 2	4 – 8
Size code 3	8 – 12
Size code 4	12 -16
Size code 5	>16

Source: **CODEX STAN (2011)**

Size by diameter: The difference between the diameters of chilli peppers in the same package may not exceed 2cm.

2.7.3 Packaging

Packaging is expected to be done in a way that ensures adequate protection for the chilli pepper. The materials used for packaging must also be clean and of a quality that protects the produce against any potential damage, both external or internal.



Traders are allowed to use paper materials for packaging. In addition, stamps bearing trade specifications on the packaging material is allowed, provided that the printing or labelling is done using non-toxic ink or glue.

2.7.4 Complying with phytosanitary requirements

Fruit and vegetables exported to the European Union have to comply with the European legislation on plant health. These requirements are enforced in order to help prevent introduction and spread of potentially harmful plant organisms and products from elsewhere into Europe. It is the duty of food safety authorities in both the importing and exporting countries to ensure that such requirements fully met.

2.7.5 Requirements of niche markets

Literature shows that there is a growing demand for organic food products, including chilli peppers. In recent times, more European consumers are opting for organically produced and processed food products. Currently, the market for organic chilli is relatively small, but demand is still growing while supply remains very limited. The need to develop a niche market for naturally produced chilli pepper is thus becoming evident by the day.

Table 2.6: Selecting levels of pungency of pepper for export

Pungency	Scoville unit	Total capsaicinoids
Mild	900-1,999	60-133
Medium	2,000-19,999	134-1,333
Hot	20,000-100,000	1,334-6,600
Extra hot	>100,000	>6,600

Source: **CODEX STAN(2011)**

Shewfelt (2000) cited in Barrette *et al.* (2010) reported that colour and appearance are characteristics that attract consumers and sometimes cause them to engage in impulse



buying. He further indicated that at a point of purchase the consumer uses appearance factors such as flavour and freshness as an inductor for ripeness, although these two could be misleading. Barrette *et al.* (2010) stated that the analytical sensory method for scoring colour is faster and better than using instruments but its disadvantage is that differences in human perception and human error may cause variations in scoring. That notwithstanding, textural attributes of fruits and vegetables are generally perceived using the sense of touch or taste (chewing) (Barrette *et al.*, 2010). This age old approach is still used because research has shown that the sensory perceptions about crispness and crunchiness, as described by experts correspond with consumer terms for preference (Laurence and David, 2002).



2.8 Conceptual Framework

2.8.1 Analyzing farm profitability

Profitability analysis involves the estimation of farm returns and costs. Profitability analysis can be traced to Gomez (1975) and Adeleke *et al.* (2008). These authors measured profitability as the difference between value of yield and cost of production. Abedullah and Mushtaq (2007) also suggest the use of gross margin and returns to variable cost, where only capital is affected; yield/labour ratio, where only labour is affected, and gross margin return to variable costs and monetary return to labour, where capital and labour are affected as measures of profitability.

In economics, the reward to the producer for performing better and efficiently is usually the profit. In other words, the prospect of earning and maintaining profitability serves as the incentive for creativity and efficiency among farmers. Economists explain profitability of an investment as the comparison of the returns and cost of the investment. Every profitable producer seeks to reduce processing costs and increase the efficiency of production (Masters *et al.*, 2005). In other words, profitability of crop production depends on reducing the farming cost as much as possible, and at the same time maximizing the income from the sale of crop. Profitability stimulates risky ventures and drives farmers to develop ways of cutting cost and improving technology always in an effort to satisfy consumer interest (Troke, 2008).

Gross farm profit (Gross margin) is the difference between total income (revenue) and gross total cost of production (total variable cost only). Olukosi and Ogungbile (2006) have examined two major categories of costs involved in crop production. These are fixed and variable cost. Fixed costs (FC) are the costs that do not vary with the level of production or output while variable cost (VC) refers to those costs that vary with



the level of output. The total cost (TC) is thus the sum of total fixed cost (TFC) and total variable cost (TVC).

$$\text{GFP} = \text{TR} - \text{TVC} \quad \text{-----} \quad (8)$$

Where:

GFP= Gross Farm Profit (Ghana cedi)

TR= Total Revenue (Ghana cedi)

TVC= Total Variable Cost of Production (Ghana cedi)



CHAPTER THREE

RESEARCH METHODOLOGY

3.0 The study area

This study was carried out in the Upper Manya Krobo District (UMKD), which is one of the twenty-six districts in the Eastern Region of Ghana. It was carved out of the then Manya Krobo District in February 2008 by Legislative Instrument 1842 in pursuance of the Government's decentralization policy. The historic trading post of Asesewa serves as the district capital. Per its nature and location (a trading post; 45km from Koforidua), Asesewa attracts a mix of cultures from all over the country.

UMKD, with an altitude of 457.5 m is located at the north-eastern corner of the Eastern Region of Ghana and lies between latitudes 6.2-6.5⁰N and Longitudes 0.3-0.0⁰ W of the Greenwich Meridian. The district shares common boundaries with Afram Plains to the North, Lower Manya Krobo (south east), Yilo Krobo District (south west), Asuogyaman District (east) and Fanteakwa District to the west. It covers an area of 859.1 square kilometers, constituting 4.6% of the total land area of the Eastern Region of Ghana (19,323km²).

3.0.1 Climate and soil

The district lies within the semi-equatorial climate belt with a mean annual rainfall ranging between 900mm to 1,500mm (Ghana Meteorological Service). Relative humidity is high during the wet season and low in the dry season. The district experiences two major seasons. April to early August as well as September to October is the wet season whereas the dry and warm season is experienced from November to March. Temperatures are generally high with average temperatures ranging between 26°C to 32°C. The pattern of temperature, winds, and rainfall distribution in the



district presents a climate that is conducive for agricultural production throughout the year.

The district lies within the semi-deciduous forest and savannah zone. Trees commonly found include the Dawadawa, Palm, Mango, Ceiba, Neem, and Acacia. These trees are of varying sizes and are dispersed in the midst of secondary forest and perennial grasses with associated herbs. The vegetation is gradually being degraded because of overdependence on it for daily livelihood activities such as charcoal production and farming as well as lumbering. As a result of these activities, the forest vegetation is being reduced into savannah trees and shrubs. The predominant soils in the area are developed over sandstone (Yaya-Pimpimso-Bejna association). They stretch from the northern part of the district through Asesewa to Otokper. With suitable drainage, the soils are considered good for cultivation of rice, sugarcane and vegetables. Soils developed over Buem Series such as shale and mudstones (Dewasi-Wayo association) are generally found around the Apimsu area. There is Wayo series which are poorly drained and are not suitable for most crops.

3.0.2 Political and administrative structures

Like other districts in Ghana, the Upper Manya Krobo District has a decentralized political and administrative structure. The district is divided into six (6) area councils namely Asesewa, Bisa/Anyaboni, Sekesua, Mensah Dawa, Ternguanya and Konkoney/Sisiamang. Each Area Council has the responsibility for the overall development of the area under its jurisdiction. The district also has one constituency and thirty-three (33) electoral areas. The District Chief Executive is the political head of the District Assembly while a District Coordinating Director is responsible for the administrative work at the assembly.



The people of the land are predominantly Krobos, who according to history acquired the land from the Akyems. However, there are Ewes, Akans, Hausas and other ethnic groups as well. The widely spoken language in the district is Dangme which is the dialect of the Krobos. Most of the people in the district are Christians. Other religious faiths such as Islam and Traditional religions are also practiced.



Figure 3. 1: Map of Upper Manya Krobo District

3.0.3 Economy of the area

The district economy is dominated by agriculture and related trade employing more than 73.0% of the population. Most of those engaged in agriculture are into crop farming while the rest are into livestock rearing, fishing and marketing of agricultural

produce. Also, most of the farmers in the district are subsistence farmers with few commercial ones. The farmers produce food crops such as maize, cassava, plantain, cowpea and vegetables. Mango and oil palm are also cultivated on large scale. Livestock reared in the district include poultry, sheep, goat, pigs, cattle and non-traditional animals such as grass cutters. Fishing is the main activity carried out by the people along the Volta Lake. The district has vast untapped aquaculture advantage due to a long stretch of the Volta Lake which acts as a boundary with the Afram Plains and Asuogyaman districts respectively from the north-eastern part of the district.

In addition, the district is blessed with the Volta Lake as a reservoir for commercial irrigation, potable water projects and aquaculture. Available market infrastructure in the district consists of the physical places where periodic buying and selling takes place. The district has three large market centres at Akateng, Sekesua and Asesewa (popularly remembered in the history of Ghana by a phrase “Market Day at Asesewa”), which form the vibrant commercial hubs of the district. These market centres operate interchangeably five days in a week where one can get almost all kinds of food stuff to buy at affordable prices. Also, a bulk of livestock in the Eastern region such as cattle is traded in the district (<http://www.statsghana.gov.gh> retrieved 30/7/2016 5:45am).

3.1 Research design

According to Burns and Grove (2010), a research design demonstrates the blueprint for conducting the research or the plan of the research, which describes how, when, and where data are collected and analyzed (Parahoo, 2007). According to Burns and Grove (2010), a research design is used for conducting a study with maximum control over factors that may interfere with the validity of the findings. It can also be the



researcher's overall frame for answering the research question or testing research hypothesis (Polit and Beck, 2010). This study employed cross-sectional research design and descriptive research designs to collect and evaluate the data. Labaree (2009) argued that cross-sectional research provides a clear 'snapshot' of the outcome and the characteristics associated with it, at a specific point in time. For this study, cross-sectional research was used to obtain data from consumers in a survey (using methods and tools such as, multi-stage sampling, personal interviews and questionnaire). On the other hand, Burns and Grove (2010) indicate that descriptive research is designed to provide a picture of a concept, as it answers questions “what/which” and “how” associated with a concept and it does not draw a conclusion to ascertain answers to why (Labaree, 2009).

3.2 Sampling techniques and sample size

The multi-stage sampling technique was employed to select the target population, thus, pepper producers, agro-dealers and marketers in the Upper Manya Krobo District (UMKDA). The district consists of four agriculture production zones namely, Asesewa, Anyabony, Sekesua and Sisiamang. In the first-stage, the purposive sampling technique was used to select Asesewa and Sekesua because of their high engagement in pepper production in the Upper Manya Krobo District. In the second-stage, five (5) farming communities were selected from each of the two (2) production zones using the simple random sampling method. In the third-stage, five (5) pepper farmers were selected using the simple random sampling technique. In all, twenty-five (25) pepper farmers were selected from each production zone, giving a total of fifty (50). In selecting the marketers, the simple random sampling technique was employed. In total, thirty (30) marketers in the two production zones were selected.



3.3 Data collection methods

Data was obtained from a primary source, which was cross-sectional. Both quantitative and qualitative data were obtained for the study. Quantitative data were those that are continuous or numerically meaningful in nature and qualitative data are those that are categorical in nature. Primary data was collected for the study using structured questionnaires. Data were collected from the respondents through face-to-face interviews. In the construction of the questionnaire, questions on respondents, varieties of pepper under cultivation, cultural practices adopted for production, post-harvest handling, use of agro inputs, labour activities, buyer's perception about quality of produce and marketing were taken into consideration. Both open-ended and closed-ended questions were formulated to obtain the data. Questionnaires were being administered in the four major agricultural production zones by the researcher and the extension agents of Ministry of Food and Agriculture (MOFA) in the Upper Manya Krobo District.

3.4 Data analysis approach

The data obtained from the survey was analysed using analytical package-SPSS (version 20) and Microsoft Excel (2010). The analysis include descriptive statistics and the results were presented in the form of frequencies, pie charts and graphs.

Gross profit (margin) analysis was also conducted as the difference between total revenue obtained from chilli pepper production and gross total cost. The Net Total Revenue (NTR) is the total output multiplied by the price per unit output and the gross total cost is the addition of total variable costs. The gross total cost includes the following:



Variable cost	Unit of measurement
(1) Land rent	Acre
(2) Seeds	kilogram
(3) Labour	wage
(4) Inorganic fertilizer	kilogram
(5) Weedicide/pesticide	kilogram

The formula for calculating gross profit is given by:

$$\text{Gross Profit } (\pi) = \text{Total Revenue (NTR)} - \text{Gross Total Cost (NTC)}$$

Ethical considerations

Data were obtained from farmers and marketers upon a letter of introduction, written by the author and endorsed by the University, indicating the originality and main objectives of this study to participants. Aside, all protocols and due procedures were followed in conducting this study. Key informants were consulted for access to members of their communities, and to conduct the survey. The study also employed appropriate procedures of data collection and asking of questions were conducted in the local dialect. Respondents' consents were observed before questions asking took place.



CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Descriptive results

These describe the gender distribution, age distribution, family size, educational background of respondents, years of service in the business, varieties of pepper cultivated in the Upper Manya Krobo District and reasons for cultivating pepper.

4.1.1 Sex of respondents

Table 4.1 portrays the distribution of respondents based on sex. The results show that 25 (50.0%) are males and the remaining 25 (50.0%) are females. Although vegetable production, especially pepper cultivation in Ghana has been described as a female-activity (MoFA, 2010), findings by Osafo (2013) indicate that males dominate the industry in the Upper Manya Krobo District with a greater percentage of 71.7%. The result also conflicts what (Alexandra, 2001) said that policy makers have denied women the opportunity to participate in farming making them lag behind their male counterparts. The 50% representation achieved for both males and females in this study suggests that the level of participation of both sexes in pepper cultivation is not as skewed as it used to be and that female involvement has improved.

The results further reveal that 5 (16.7%) of the marketers are males and the majority 25 (83.3%) was females. This is a reflection of the general trend in Ghana where women dominate in most trade and marketing enterprises across the country, and confirmed by GSS (2010) data that majority of the female population in Ghana are into trading.



Table 4. 1: Distribution of sex of respondents by occupation

Variable	Actors	
	Farmers (%)	Marketers (%)
Sex		
Male	50.0	16.7
Female	50.0	83.3
Total Percent	100.0	100.0
<i>n</i>	50	30

Source: Field Data, 2016

4.1.2 Age of respondents

Table 4.2 shows the age distribution of the sample respondents. Among the farmer category, more farmers (about 29.5%) are between the ages of 46-55 years. The study results also show that the highest percentage (36%) of male farmers was between the ages of 46-55 years whereas majority of the female farmers, (36%) was between the ages of 36-45 years. This implies that majority of the youthful population in pepper farming is dominated by women compared to their male counterparts. About 35% of the marketers were between the ages of 36-45 years. The results also reveal that the highest percentage (40%) of male marketers are between the ages 36-45 years, whereas in the female population for marketers, the highest percentage (48%) was above 46 years.



Table 4.2: Distribution of age by occupation and sex

Actors						
Age range	Farmers			Marketers		
	Male (%)	Female (%)	Overall (%)	Male (%)	Female (%)	Overall (%)
16-25 years	4.0	8.0	7.5	0.0	20.0	15.0
26-35 years	16.0	20.0	19.0	20.0	16.0	13.5
36-45 years	28.0	36.0	25.0	40.0	16.0	35.0
46-55 years	36.0	24.0	29.5	20.0	24.0	16.0
Above 55 years	16.0	12.0	19.0	20.0	24.0	12.5
Total Percent	100.0	100.0	100.0	100.0	100.0	100.0
<i>n</i>	25	25	50	5	25	30

Source: Field Data, 2016

4.1.3 Family Size

The results in Table 4.3 indicate that the highest percentages of the respondents held family sizes of more than 5 persons in a household. This result suggests an important source of family labour for the production of pepper. In the case of the marketers, the majority (80.0%) of male respondents had family size of 5 persons or more, compared to the females (56%).



Table 4. 3: Distribution of family size by occupation and sex

Actors						
	Farmers			Marketers		
Family size	Male (%)	Female (%)	Overall (%)	Male (%)	Female (%)	Overall (%)
1-5 people	64.0	54.0	61.0	20.0	44.0	33.0
Above 5 people	36.0	46.0	39.0	80.0	56.0	67.0
Total Percent	100.0	100.0	100.0	100.0	100.0	100.0
<i>n</i>	25	25	50	5	25	30

Source: Field Data, 2016

4.1.4 Educational background of respondents

The results on education show that majority (76.0%) of the male farmers had no formal education compared to 60.0% of the female farmers. This signifies a generally low level of education in the study area. The low level of education among the farmers could have implications for compliance in the area of production and product handling for maximum safety measures. This concern was expressed in the Ghana Veg (2014) report which states that challenges facing the vegetables sector in Ghana is non-compliance with sanitary and phytosanitary standards. Truly, education is a good source of information on application rate of pesticides. This conforms to Quinn (2011), who proposed that knowledge about background levels of pesticides is very crucial to production. Higher education is also likely to cause increase in productivity which is in line with the findings of Weir (1999). Research has shown that farm returns is likely to increase with education because education provides the needed skills useful for the allocation of inputs or resources. This presupposes that education, which is vital to modern agriculture will help farmers to accept and adopt innovations to increase production. Regarding the marketers, 56.0% of the females had primary school education while 28.0% had tertiary education. Also, 80.0% of the male marketers had primary to junior high education while the remaining 20.0% had



tertiary education. This shows that the farmers had the requisite basic knowledge that can be applied in sorting, grading, assembling and marketing of their produce. This literacy rate could be a good starting point that may be leveraged to promote compliance of sanitary and phytosanitary standards set by the Ghana export promotion authority on marketing of vegetables to the outside world.

Table 4. 4: Distribution of education by occupation and sex

Actors						
Level (school)	Farmers			Marketers		
	Male (%)	Female (%)	Overall (%)	Male (%)	Female (%)	Overall (%)
No school	76.0	60.0	68.0	0.0	0.0	53.3
Primary	0.0	8.0	4.0	40.0	56.0	16.7
Junior high	12.0	8.0	10.0	40.0	12.0	0.0
Senior high	4.0	0.0	2.0	0.0	4.0	3.3
Tertiary	8.0	24.0	2.0	20.0	28.0	26.7
Total Percent	100.0	100.0	100.0	100.0	100.0	100.0
<i>n</i>	25	25	50	5	25	30

Source: Field Data, 2016

4.2 Pepper production by Communities

From figure 4.1 below, out of fifty (50) respondents that were sampled in five communities for the study in the Upper Manya District, 9 representing 18% cultivate pepper in Asesewa town, 36% cultivate pepper in Sekesua, while only 4% cultivate pepper in Akorkoma. Sekesua is therefore a major centre in the district where pepper cultivation is carried out, follow by Akrusu Yiti (32%) and Asesewa (18%).



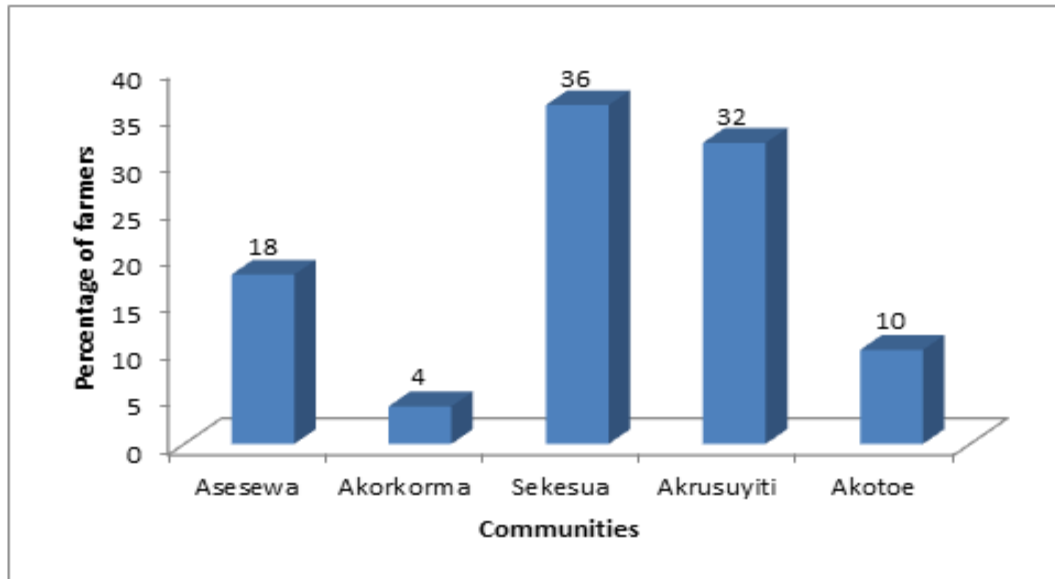


Figure 4. 1: Communities and number of pepper farmers

Source: Field Data, 2016

4.2.1 Pepper varieties cultivated in upper Manya district

Table 4.5 indicates that there are six different varieties of peppers cultivated in the Upper Manya District. These varieties include *Kpakposhito* (trini congo), *tokukwadaa* (goat pepper), *tongor* (seven pod), *daliwa* (scotch bonnet), *sokwer* (legon 18) and sweet pepper. Out of these 10% cultivate *Kpakposhito*, 16% cultivates *tokukwadaa*, 2% cultivates *tongor*, 22% cultivates *daliwa* while 48% cultivate *Sokwer* and 2% cultivates sweet pepper. Out of the six varieties of pepper produced in the District, the most popular ones are *sorkwer* (legon18) *daliwa* (scotch bonnet), *Tokukwadaa* (goat pepper) and *Kpakposhito* (Trini Congo) for which most of whom are chilies. This result conforms to a report by (MIDA, 2010) which states that chilies have widely been cultivated in Ghana for local consumption.



Table 4. 5: Varieties of pepper cultivated

Varieties of pepper	Frequency	Percentage (%)
<i>Kpakposhito</i> (Trini Congo)	5	10.0
<i>Tokukwadaa</i> (goat pepper)	8	16.0
<i>Tongor</i> (seven pod)	1	2.0
<i>Daliwa</i> (scotch bonnet)	11	22.0
<i>Sorkwer</i> (legon 18)	25	50.0
Total	50	100.0

Source: Field Data, 2016

4.2.2 Reasons for cultivating pepper

Chilli pepper production in the study area is organized on small-scale level under rain-fed conditions. A multiple response analysis revealed that farmers cultivate the crop for various reasons. The findings show that all the farmers (100%) engage in pepper cultivation mainly for economic reasons. In other words, the activity is their main source of income in the communities. The finding is consistent with Abay (2010), Sanusi and Ayinde (2013) and Mohammed *et al.* (2016), who identified red pepper production as a good source of income for most farmers. Some 70% of the respondents also indicated that they cultivate pepper for food and nutrition reasons. For this group of farmers, chilli pepper serves as an important ingredient in traditional diets in the study area. Only 10% of the respondents cultivate the crop for export. This means majority of the output (90%) is targeted at the local market. Given the high export market potential for Ghana's chilli pepper, the current 10% export market targeting seems rather disappointing.



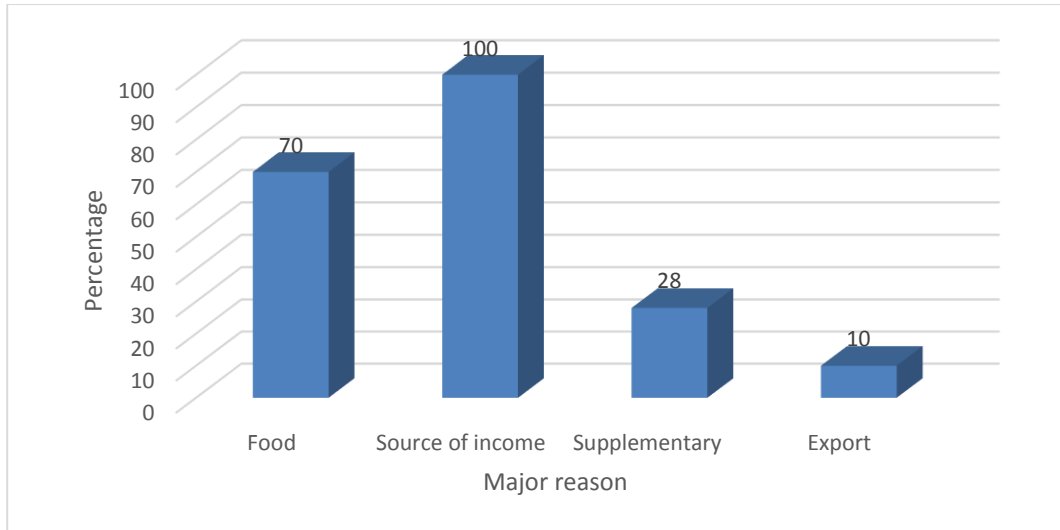


Figure 4. 2: Major reasons for cultivating pepper

Source: Field Data, 2016

4.3 Constraints in pepper production

Farmers were made to rank the constraints affecting pepper production in the study area. The results show that pest and disease infestation was the most pressing production constraint followed by poor transportation, lack of storage and cooling facilities, lack of irrigation facilities, high post-harvest losses, among others (table 4.6). Difficulty in complying with export standards also featured as one of the important constraints, confirming the observed low levels of export market targeting. These findings are in tandem with Abbay (2010), Tesfaw (2013), Ali *et al.* (2016), Dessie *et al.* (2017) and Mohammed *et al.* (2016). Rutgers (2010) reviewed that the pepper production sector in Ethiopia is also plagued by plant diseases, bad weather conditions and a deteriorating variety. In terms of capital, most farmers lack sufficient farm income to enable them to purchase the required inputs. Regarding standard requirements, Hena (2016) reported that India pepper famers were not able to meet quality standards of importing countries.



Table 4. 6: Constraints of pepper production

Constraints	Mean score	Ranking
High cost of inputs	4.86	10 th
High post-harvest losses	3.86	5 th
Inability to comply to consumer preference and export standards	8.29	14 th
Lack of credit	4.85	9 th
Lack of irrigation facilities	2.95	4 th
Lack of proper measuring scale	12.61	15 th
Lack of quality/certified seeds	7.01	13 th
Lack of storage and cooling facilities	2.46	3 rd
Limited access to land	5.43	11 th
Low purchase price/price fluctuation	4.23	6 th
Low quality yields	4.27	7 th
Low use of improved inputs/technologies	6.7	12 th
Pests and diseases' infestations	2.02	1 st
Poor transportation	2.18	2 nd
Poor weather	4.43	8 th

Source: Field Data, 2016

4.4 Post-harvest handling of pepper

The study assessed the different types of post-harvest handling of pepper by farmers.

Figure 4.3 shows the results of the various cooling/storage systems for preserving pepper, and the essence of this according to farmers is to reduce post-harvest losses.

The results indicate that room cooling is the most preferred choice as majority (80.0%) of respondents employed this approach. About 8.0% of the farmers also use hydro-cooling whilst 4.0% and 2.0% used vacuum and evaporative cooling respectively. The low patronage of vacuum, hydro and evaporative cooling is due to the fact that these methods are very expensive and difficult to access (Osafo, 2013).



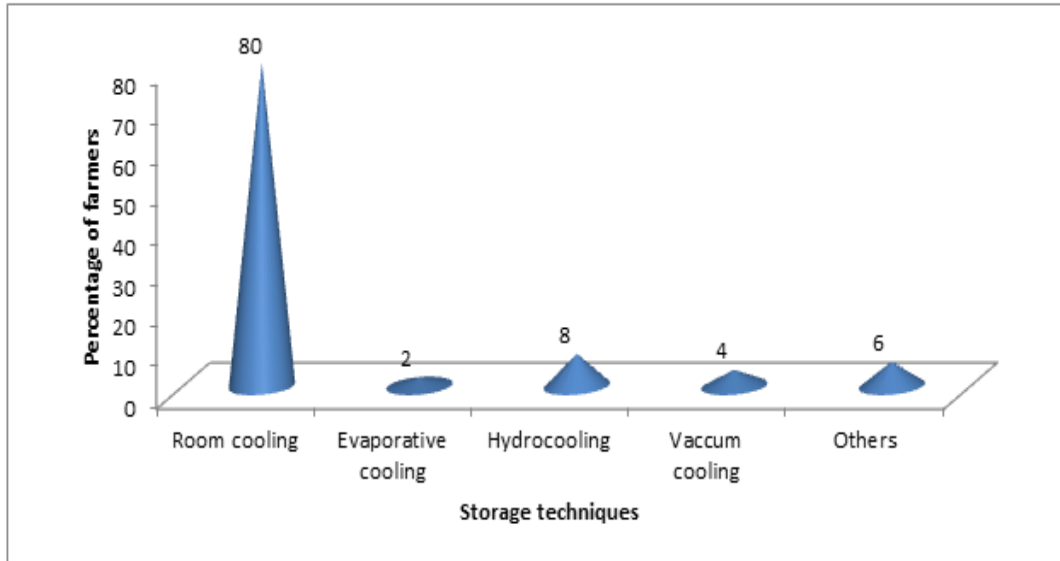


Figure 4. 3: Methods of Cooling Pepper

Source: Field Data, 2016

4.4.1 Post-harvest treatment of pepper

From fig.4.4 out of 50 pepper farmers, (30) farmers representing 60% employ curing as a post-harvest treatment, (5) farmers representing 10% employ dehydration as a method of post-harvest treatment while (15) farmers representing 30% employ drying as a post-harvest treatment against deterioration. This indicates that majority of pepper farmers in Asesewa preferred using curing in the treatment of post-harvest deterioration to other methods.

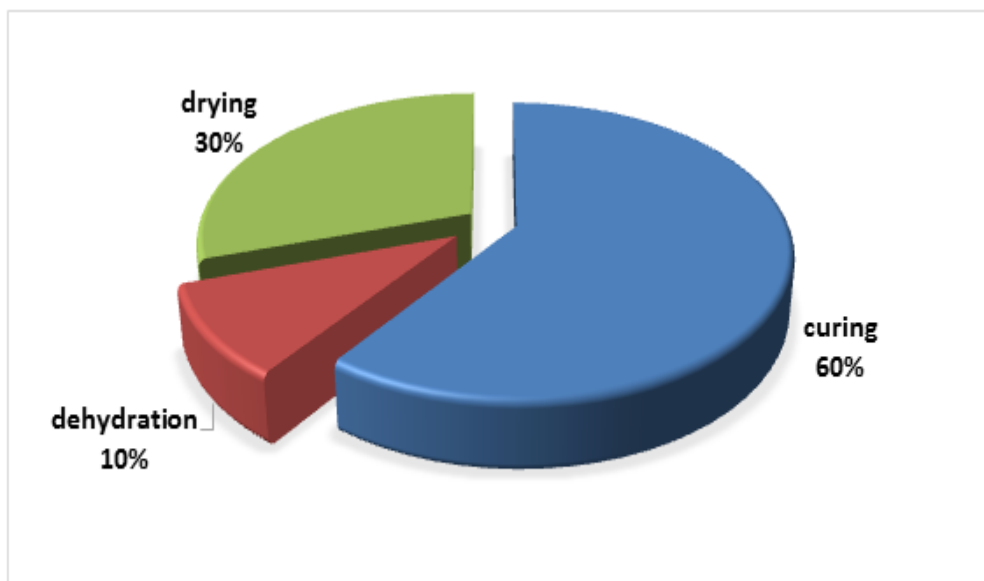


Figure 4. 4: Treatment of Post-harvest Deterioration



Source: Field Data, 2016

4.4.2 Post-harvest challenges

Figure 4.5 indicates that, (8) farmers representing 16% encounter bleaching injuries of their peppers, (37) farmers representing 74% encounter surface burning, while the remaining (5) famers representing 10% encounter desiccation. This results suggest that surface burning is the single most important challenge that confront the pepper farmers at the post-harvest stage of production. This presupposes that a lot more needs to be done to improve farmers' knowledge base, especially on postharvest handling so that such losses may be reduced or avoided altogether.

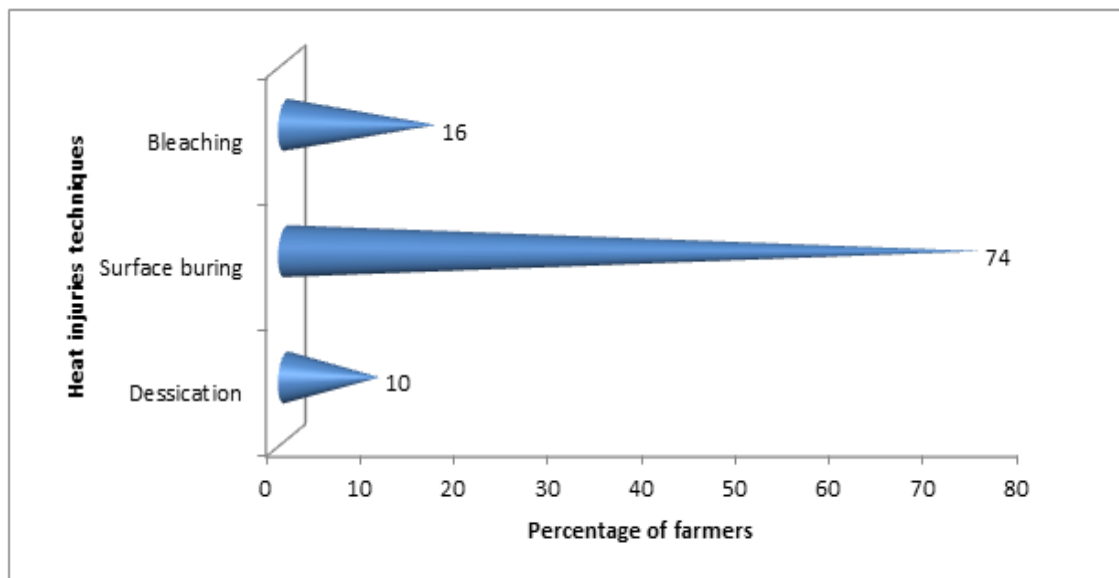


Figure 4. 5: Heat injuries encountered by farmers

Source: Field Data, 2016

4.5 Pepper Marketing in the study area

4.5.1 Marketing outlets

Figure 4.6 shows that there are five major marketing centers where pepper is sold; Asesewa, Agogo, Sekesua, Nkurakan and Akrusu/Akotoe. Out of these, 30% of chop bar operators buy from Asesewa market, 20% of chop bar operators buy from Agogo market, 40% buy from Sekesua market, 3.3% buy from Nkurakan market. The following requirements are expected from the exporter in order to meet international



standards for exporting vegetables. These are appearance quality (size, shape, colour, weight), flavour quality thus pungency and aroma, textural quality (smoothness, crispness, toughness, hardness), taste quality and prolonged shelf life. (CODEX STAN 2011). This result also confirms the report by (GSS, 2010) that the major marketing centres for Asesewa District is Asesewa, Sekesua and Akateng.

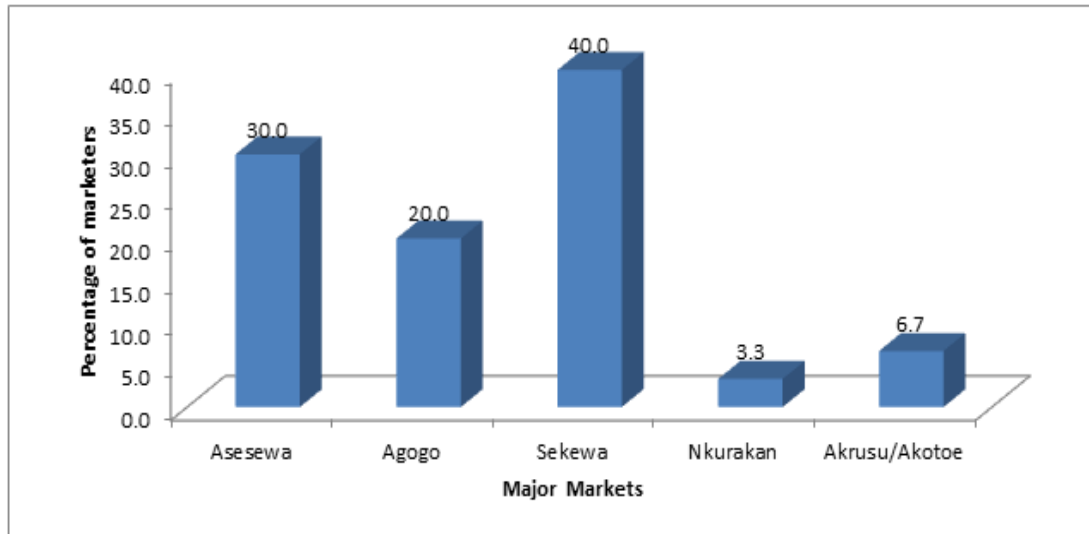


Figure 4. 6: Marketing outlets for pepper

Source: Field Data, 2016

4.5.2 Product price trend

The study obtained data on the prices of fresh and dried pepper for the various months. From the results, the prices of pepper are relatively higher in the period of January to March, but the prices favour fresh pepper. The highest price for fresh pepper was recorded in the month of February (GHs 273) while the highest price of dried pepper was GHs 200, and this occurred in the month of March. However, the prices of pepper are relatively lower than from the month of July to December.



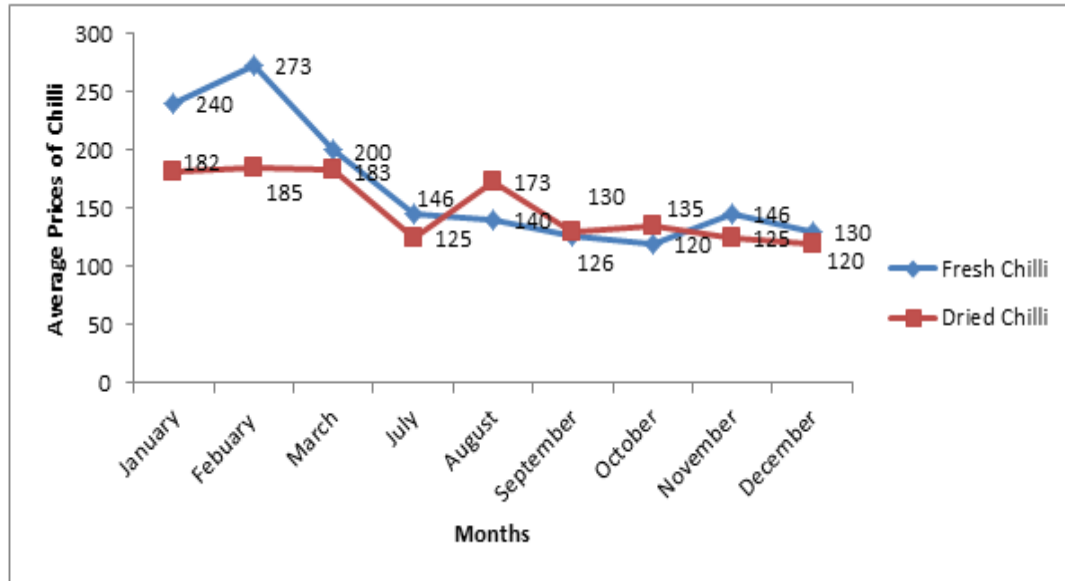


Figure 4. 7: Prices trends for pepper

Source: Field Data, 2016

Figure 4.7 compares the prices of fresh and dried Chilli pepper by the various varieties. The results shows that the price of *Kpakposhitor* (trini congo) was highest (GH¢ 254) when it was fresh followed by Sweet Chilli pepper (GH¢ 180). The variety of Chilli pepper which had the least price when sold in its fresh state was *Tongor* (seven pod) (GH¢ 125). Sweet Chilli pepper had the highest price when sold dried (GH¢ 250) followed by *Daliwa* (scotch bonnet) (GH¢ 165). Interestingly, *Kpakposhitor* (trini congo), which attracted the highest price when sold fresh had the least price when sold in the dried state (GH¢ 130).



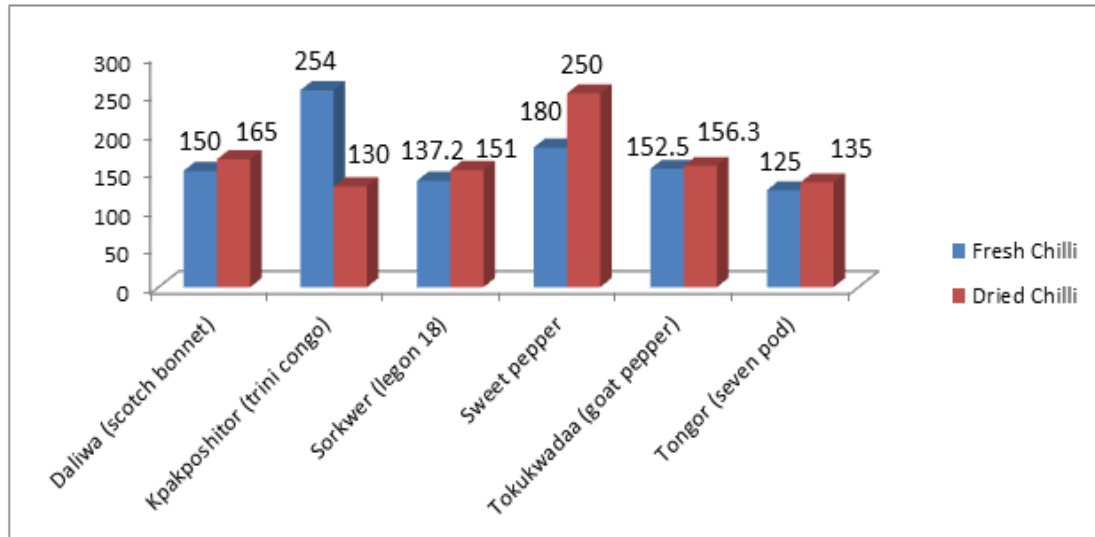


Figure 4.8 Chilli Prices and Varieties

Source: Field Data, 2016

4.5.3 Constraints faced by pepper marketers

Table 4.7 shows that seasonality or fluctuating supply is the most severe constraint of marketers in the study area. This result is in tandem with Mohammed *et al.* (2016), who reported that fluctuations in prices was the most severe constraint of Chilli pepper production and marketing in Nigeria. The literature indicates that speculative activities of marketing middlemen are responsible for price fluctuation by Chilli pepper producers (Suleiman and Isah, 2010). The results also show that low quality produce, low supply, low purchase price, poor transportation, high postharvest losses and poor export regulations. These results agree with Rutgers (2010), who revealed that pepper marketing in Ethiopia is characterized by insufficient output, low quality and a fluctuating supply. In addition, marketers often lack sufficient working capital to invest in chain upgrading.



Table 4. 7: Constraints of pepper marketing

Constraints	Mean score	Ranking
Low supply	2.13	3 rd
Low quality	1.79	2 nd
Seasonality	1.23	1 st
Poor export regulations	5.45	7 th
Low purchase price	2.41	4 th
High losses	4.27	6 th
Poor transportation	3.53	5 th

Source: Field Data, 2016

4.6 Analyzing profitability of pepper production

The study summarizes the amount of inputs used in the production of Chilli pepper in the study area. Table 4.10 shows that the average land rented to the chilli pepper farmers in the study area was 2.4 acres. This shows that pepper production in the area is small-scale since farmers operated on a farm size of 5.5 acres. The average seed sow per acre was 4.5. Also, 11 mandays of labour was employed on average. The average inorganic fertilizer use was 42.42 kg. Also, the average weedicide use was 4.9 litres. Table 4.10 shows that the average cost of rent per acre was GH¢ 102.0 while the mean cost of land preparation was GH¢ 150.25. The average cost of seed per acre was GH¢ 48.205. The mean market prices for fertilizer and weedicide per acre were GH¢ 212.50 and GH¢ 12.3 respectively. With regards to labour, GH¢ 96.30 was recorded as the average cost of labour (in mandays) per acre. On average, farmers were producing Chilli pepper at a cost of GH¢ 621.60.



Table 4.10: Cost Items (Means)

Activity	Unit	Means	Std. Dev.	Average COST (GH¢)
Farm size	Acre	5.51	2.32	
Land rent	GH cedi/Acre	2.4	1.74	102.05
Land preparation	GH cedi/Acre			150.25
Seeds	GH cedi/Kg	4.52	2.34	48.20
Labour	Mandays/Acre	10.76	8.89	96.30
Inorganic fertilizer	GH cedi/Kg	42.42	38.60	212.50
Weedicide/pesticid	GH cedi/Kg	4.88	2.34	
e				12.30
Total cost	GH cedi			621.60

Source: Field Data, 2016

Table 4.11 indicates that price per a kilogram of fresh and dried pepper was GH¢ 154.50 and GH¢ 154.18 respectively. The average output of Chilli pepper produced was 6.2 bags equivalent to 309 kilograms. The total revenue for fresh and dried Chilli pepper was estimated to be GH¢ 957.90 and GH¢ 955.92 (Table 4.11). Profit was calculated as the difference between the average revenue obtained from pepper production and the average total cost by the producer for the 2015/2016 cropping season. The results show that farmers made a gross profit of GH¢336.30 from fresh pepper and GH¢ 334.32 for dried pepper. These findings suggest that pepper production is profitable in the study area.



Table 4.11: Summary of Revenue Items

Production items	Means
Producer price (PP) of fresh pepper per bag (50kg) (GH¢)	154.50
Producer price (PP) of dried pepper per bag (50kg) (GH¢)	154.18
Pepper harvested (PH) (bags)	6.20
Farm size (FS) (acre)	5.51
Total revenue expected for fresh pepper	957.90
Total revenue expected for dried pepper	955.92

Source: Field Data, 2016

Table 4.12: Profit (Means)

Profitability Analysis	Means
Total profit expected for dried pepper	336.30
Total profit expected for dried pepper	334.32

Source: Field Data, 2016

4.7 Consumer preference for pepper quality

Consumer preference for food products depends on many attributes. Consumers choose a product attribute that satisfies their utility, below which the product is rejected. The study results reveal that most consumers (50.0%) prefer the sensory or search attributes, particularly taste of the pepper followed by appearance (33.3%) and flavour (16.7%). This is in line with Barrette *et al.* (2010) who revealed that textural attributes of are perceived using touch, or taste. It also confirms the work of Laurence and David (2002), who revealed that sensory perceptions (e.g. crispness) often correspond with consumer terms of purchasing vegetables. The only difference here is that buyers do not have standardized equipment to measure all these qualities;



therefore, they depend on visual sensory score. These assessments by buyers also conform to Ghana Export Promotion Authority standards for exporting vegetables.

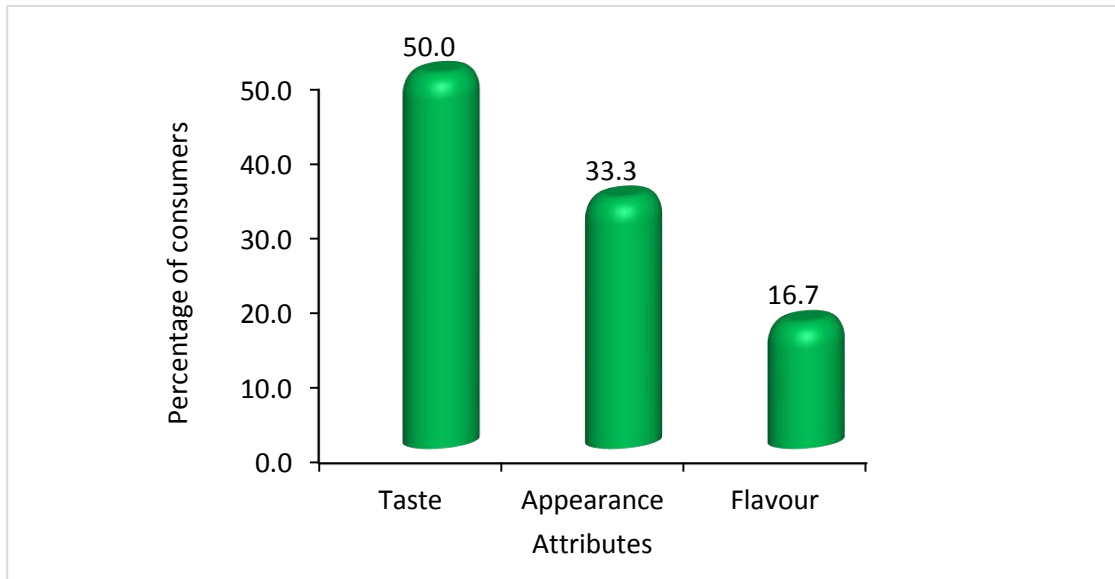


Figure 4.9: Consumer Preference for Pepper Qualities

Source: Field Data, 2016



CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of key findings

This study examined the prospects and constraints of production and marketing of pepper. Pepper farmers and marketers were selected from two major production zones in the Upper Manya Districts. The results reveal that commerce is the prime objective that drives farmers into pepper cultivation. Meanwhile, efforts to produce for the export market are rather low (10%).

Results of the study revealed that pest and disease infestation were the highest constraint followed by poor transportation, lack of storage and cooling facilities. Lack of irrigation facilities, high post-harvest losses and price fluctuation also came up as major constraints as far as farmers are concerned. Other constraints include lack of credit for production, high cost of inputs, limited access to land and low use of improved technologies.

Regarding pepper marketing, marketers complained about seasonality or fluctuating supply followed by low quality produce, low supply, low purchase price, poor transportation, high postharvest losses and poor export regulations. The results show that farmers made a gross profit of GH¢336.30 from fresh pepper and GH¢ 334.32 for dried pepper.

5.2 Conclusion

Pepper farming is a major source of income for farmers in the study area. Although pepper farming in Aseewa District has a great potential for export, only 10% of the existing potential has so far been tapped, leaving 90% untapped. Farmers stand to gain even more if they expand their focus to also cover supplies to the outside world.



The findings suggest that pepper production is profitable in the study area. The highest price for fresh pepper was recorded in the month of February and March for both fresh pepper and dried pepper respectively. The study found that farmers face the challenge of pest and disease infestations. Regarding pepper marketing, marketers complained about seasonality or fluctuating supply followed by low quality produce, low supply, low price, poor transportation, high postharvest losses and or export regulations. Buyers preference for pepper quality are taste, appearance and flavour respectively but all these measurements are based on sensory scoring instead of using standardized equipment.

5.3 Recommendations

- From the various findings of this study, it is recommended that:
- MOFA should provide pepper farmers with standardized equipment for measuring pepper quality before sending their produce to the market as this will also foster compliance to international market requirements for exporting peppers.
- Further research should be conducted to investigate the pepper farmers' constraints of pest and diseases in the study area.
- Ministry of Food and agriculture should provide adequate education on post-harvest handling of pepper in the study area.
- District Assemblies should expand their feeder road infrastructural projects to pepper farming communities in the study area to forestall transportation problems.
- MOFA should lobby NGOs and Banks whose interest is in Agriculture to give credit facilities to pepper farmers to expand their farms in the study area.



- Farmers should patronize certified improved as well as high yielding seeds in order to curb low quality produce in the study area.



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Appendix

UNIVERSITY FOR DEVELOPMENT STUDIES FACULTY OF AGRICULTURE
DEPARTMENT OF HORTICULTURE

QUESTIONNAIRE FOR PEPPER FARMERS

Introduction

This is a study being undertaken by an MSc. Horticulture student of the University for Development Studies, Tamale – Faculty of Agriculture on the topic “Prospects and constraints of pepper production and marketing in Asesewa Farming communities, Upper Manya Krobo District of the Eastern Region of Ghana. You are assured of confidentiality as far as the information you will provide is concerned.

Please tick (✓) the appropriate box and fill in the blank spaces where applicable in the questions below:

Section A

BIO DATA OF RESPONDENTS

Community.....

1. Gender a. Male [] b. Female []
2. Age a. Below 20 [] b. 21-30 years [] c. 31- 40 years [] d. 41-50 years []
e. 51-60 years [] f. 61 and above years []
3. Marital status a. Married [] b. Single [] c. Separated [] d. Divorced [] e.
Widow [] f. Widower [] g. Loose Union []
4. Family size a.1- 2 [] b. 3-5 [] c. 6-10 [] d. 11 and above []
5. Type of education received a. Formal [] b. Informal [] c. Non – formal []
6. Level of education (formal) a. Basic [] b. secondary [] c. tertiary []



7. Did you have background education in Agric? A. Yes [] b No [].

11. Kindly provide information on the following table as applicable

A	B	C	D	E
Name of variety	Type (L/E)	Major reason for cultivation	Yield per hectare	Source of seed
Kpakposhito(trini congo)				
Kwadayowi(bird's eye)				
Tokukwadaa(goat pepper)				
Tongor(seven pod)				
Daliwaa(scotch bonnet)				
Sorkwer(legon 18)				
Others				

For "C": 1=Export, 2= Home consumption, 3- Sell to commercial farmers, 4- For seed,

For "D": 1= 0-5 crates, 2=10- 15 crate, 3=20-50 jute sacks, 4=1ton

12. What is the size of your pepper farm?

13. How do your fund your farming? A. Bank [] b. Saving [] c. FBO [] d. NGO [] e. Depends on friends [] g. Other (specify).....

14. What type of bed do you use in nursing your seed? a. flat [] b. raised [] c. sunken bed

[] d. box [] e. trays [] f. other

(specify).....

15. How do you nurse your seed? A. Drill [] b. Broadcast [] .

16. Do you erect shade on your seedlings just after germination? A. Yes [] b. No []

.



17. Do you do thinning out? A. Yes [] b. No []

18. How do you prepare the land for pepper cultivation? A. Flatbed [] b. Plough

Only []

c. Riding [] d. Open field [] f. Other

(specify).....

19. At what stage do you transplant your seedlings? A. 3rd. week [] b. 4th week []

c. 5th week [].

20. At what time of the day do you do transplanting? A. Morning [] b. Afternoon []

c. Evening [] d. Night [].

21. How do you control weeds in your farm? A. Weeding with cutlass [] b. Use of weedicides

[] c. Use of ground covers [] d. Other

(specify).....

22. Do you use pesticides? Yes [] No []

23. State the name of pesticides used below

Variety of pepper	Form Harvested		Form sold		If dried which month of the year		If fresh which month of the year		Reason
	G	R	D	F	Jan-Dec	Price GHC	Jan-Dec	Price GHC	
Kpakoshitor (Trini congo)									
Kwadayowi (Bird's eye)									
Tokukwadaa (goat pepper)									



Tongor(seven pod)									
Daliwaa Scotch bonnet									
Sorkwer (Legon 18)									
Others									

24. If no. State the reason(s) why you do not use pesticide

24. Kindly provide information on the following table below as applicable as possible

Green=G R=Ripe D=Dried F=Fresh



25. What do you think about the prices you obtain for the varieties of the pepper you produced?.....

..

26. Do you know of any Ghana Export promotion Authority? Yes [] No []

27. How do you fund your farming activities a. Self [] b. Bank Credit [] c. FBO []

d. other (specify).....

28. Kindly provide information on the following table about your constraints for pepper production

Constraints of pepper production	Rank constraints in order of severity
1.	
2.	
3.	
4.	

29. When is the peak season for pepper?

30. LABOUR ACTIVITIES IN PRODUCTION (FOR PEPPER FARMERS ONLY)

Please provide information on labour use during the last cropping season

	2015									
	Hired labour				Family labour					
	No. of days	No. of persons		Wage/day	Cost of food(if any)	No. of days	No. of persons		Wage/day	Cost of food (if any)
	M	F				M	F			
Land clearing										
Tillage										
Planting										
First wedding										



Second weeding										
Organic fertilizer Application										
Inorganic fertilizer application										
Agro chemical Application										
Harvesting										
Transportation										

M= Male

F=Female

31. Kindly indicate whether you agree or disagree with me on the following statements;

Statement	Agree	Disagree
Pepper production in this district is not profitable.		
I will readily shift into production of another crop.		



UNIVERSITY FOR DEVELOPMENT STUDIES FACULTY OF AGRICULTURE
DEPARTMENT OF HORTICULTURE

QUESTIONNAIRE FOR CHOP BAR OPERATORS

Introduction

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Please tick (✓) the appropriate box and fill in the blank spaces where applicable in the questions below:

Section A

BIO DATA OF RESPONDENTS

Community.....

1. Gender a. Male [] b. Female []
2. Age(yrs) a. Below 20 [] b. 21-30 [] c. 31-40 [] d. 41-50 [] e. 51-60 [] f. above 60
3. Marital status a. Married [] b. Single [] c. Separated [] d. Divorced [] e. Widow []
f. Widower [] g. Loose Union []
4. Family size a.1- 2 [] b. 3-5 [] c. 6-10 [] d. 11 and above []
5. Type of education received a. Formal [] b. Informal [] c. Non – formal []
6. Level of education (formal) a. Basic [] b. secondary [] c. tertiary []
7. Did you have background education in Agric? A. Yes [] b No []



8. If yes, at what level a. primary [] b JHS/JSS [] c. Secondary/SHS [] d. tertiary; diploma [] degree [] master [].

9. Occupation a. civil servant [] b. fish farming [] c. trading [] d. pepper farmer []

e. food vendor [] d. artisan [] g. others (specify)

.....

A	B	C		D			E	F
Variety Purchased	Source	Cost		Preferred form			Ranking	Reason for preference
		Fresh	Dried	FG	FR	D		
Kpakposhitor (Trini congo)								
Kwadayowi (Bird's eye)								
Tokukwada(goat pepper)								
Tongor(seven pod)								
Daliwa(scotch bonnet)								
Sorkwer(legon 18)								
Other								

Column D: FG= Fresh green FR=Fresh ripe D=Dried

Column F: X= Flavor Y= Appearance Z= Taste



UNIVERSITY FOR DEVELOPMENT STUDIES FACULTY OF AGRICULTURE,
DEPARTMENT OF HORTICULTURE

Introduction

This is a study being undertaken by an MSc. Horticulture student of the University for Development Studies, Tamale – Faculty of Agriculture on the topic “ Prospects and constraints of pepper production and marketing in Asesewa Farming communities” of the Upper Manya Krobo District of the Eastern Region of Ghana. You are assured of confidentiality as far as the information you will provide is concerned.

Please tick (√) the appropriate box and fill in the blank spaces where applicable in the questions below:

Section A

BIO DATA OF RESPONDENTS

Community.....

1. Gender a. Male [] b. Female []
2. Age a. Below 20 [] b. 21-30 years [] c. 31- 40 years [] d. 41-50 years []
e. 51-60 years [] f. 61 and above years [].
3. Marital status a. Married [] b. Single [] c. Separated [] d. Divorced [] e.
Widow []
f. Widower [] g. Loose Union [].
4. Family size a.1- 2 [] b. 3-5 [] c. 6-10 [] d. 11 and above [].
5. Type of education received a. Formal [] b. Informal [] c. Non – formal [].
6. Level of education (formal) a. Basic [] b. secondary [] c. tertiary [].



7. Did you have background education in Agric? A. Yes [] b No [].

8. If yes, at what level a. primary [] b JHS/JSS [] c. Secondary/SHS [] d. tertiary; diploma [] degree [] master [].

Provide information on fertilizer, pesticides and pepper seed sold in your shop in the ff. table.

Agro-inputs sold	Type	Price (GHC)	
		Per litre	Per kg



