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DETERMINANTS OF FARMERS' PARTICIPATION IN AGRICULTURAL PRODUCTION COOPERATIVES AND IMPACT OF COOPERATIVE MEMBERSHIP ON FARM INCOME IN LIBERIA

BY

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Declaration

I hereby declare that this work is my own towards the MPhil (Agricultural Economics) degree and that, it contains no material previously published by another person nor presented for the award of any other degree in this University and any other institution, except where duly acknowledged in the text.

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ABSTRACT

Since the end of the civil war in 2005, more emphasis has been placed on smallholder farmers, and agricultural cooperative have been targeted as means of reaching to rural farmers and to reduce poverty. The government and its partners continue to provide supports for farmers through cooperative societies to help them increase their farm productivity as well as overcome market challenges. In spite of these benefits derivable from cooperatives, low farmers' participation continues to be recorded in the country. This study was therefore meant to identify the determinants of farmers' participation in agricultural production cooperatives and the impact of cooperative membership on farm income in three cooperative concentrated counties of Liberia-Bong, Nimba and Lofa Counties. Cross-sectional data was collected from a sample of

400 farmers (250 cooperative members and 150 non-members) using a multistage sampling technique. Structured questionnaire was used to collect data and the endogenous switching regression model was implemented for analysis. The study identified training, opportunity to buy and sell to cooperatives, improved prices, collective bargaining power, and access to credit as the services farmers receive from cooperative societies in the study area. Using Kendall's coefficient of concordance, use of primitive tools, pests and diseases, high post- harvest loses, unavailability of improved seeds, high costs of agrochemicals, and low yield are the major constraints faced by cooperative members. The study also identified human resources, inadequate equity capital, planning, inefficient use of resources, communicating cooperative values to the public and educating and recruiting youths as the key challenges confronting cooperative societies. The endogenous switching regression technique was employed to identify determinants of participation and evaluate the impact of cooperative membership on farm income. The study found gender, age, extension services, access to credit, farmers' perceptions that cooperatives are not managed efficiently and that cooperatives help members attain higher standard of living through higher profits as

the key factors that significantly influence farmers' decision to participate in agricultural production cooperatives. Cooperatives in the study area are positively impacting members' farm income. There was a significant difference between average farm incomes of cooperative members and non-members. Participation in cooperatives increased members' farm income by 55%. Increasing farmers understanding of cooperative principles and the benefits thereof as well as helping cooperative societies improve their management performance were recommended to ensure increased farmers' participation.

Dedication

This work is dedicated to my family, friends and all well-wishers.

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ACRONYMS

CBL- Central Bank of Liberia

CDA- Cooperative Development Agency

CFSNS- Comprehensive Food Security and Nutrition Survey

ESR- Endogenous Switching Regression

FAO- Food and Agriculture Organization of the United Nations

FBO- Farmer Based Organization

GDP- Gross Domestic Product

ICA- International Cooperative Alliance

IITA- International Institute of Tropical Agriculture

ILO- International Labour Organization

IMF- International Monetary Fund

LASIP- Liberia Agriculture Sector Investment Program

LISGIS- Liberia Institute of Statistics and Geo-Information Services

MOA- Ministry of Agriculture

MFDP- Ministry of Finance and Development Planning

MHSW- Ministry of Health and Social Welfare

NGO- Non Governmental Organization

PRS- Poverty Reduction Strategy

USADF- United States African Development Foundation

USAID- United States Agency for International Development

WAAPP- West Africa Agriculture Productivity Program

WFP- World Food Program

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Cooperative is a voluntary association of people who unite themselves for the improvement of economic welfare of members through the establishment of a business entity that is managed democratically. Farmers participate in agricultural cooperatives to overcome barriers such as poverty, markets failure, missing services in the production process, decreased income, increased transaction costs with trades and contribution to community development (Karli et al., 2006). Cooperatives play significant roles in economic development. With the aim of helping its members, cooperatives need to accelerate their performance. However, they are not only meant to improve members' well-being but also to eradicate poverty and act as tools for the distribution of national wealth (Mahazril *et al*., 2012). According to Karli *et al.* (2006), successfully managed agricultural cooperatives have great potential in agricultural and rural development in most developing countries. Delgalo (1999), stated that smallholder agriculture is too important to employment, human welfare and political stability in Sub-Sahara Africa to be ignored or treated as just another small sector of the market economy. Farmers pooled their limited resources together to improve agricultural output and enhance socio-economic activities through cooperatives in rural areas (Ebonyi and Jimoh, 2002). Agricultural cooperatives are useful in the dissemination of information about modern practices in agricultural production which contributes to farmers' agricultural output and increases overall farm income and improves welfare. Additionally, Ebonyi and Jimoh (2002) suggested that the analysis of the relationship between factors that influence farmers' participation in agricultural cooperatives reveals information that is crucial to increasing the participation of farmers in cooperative organizations, thus resulting to the increase in

agricultural output and the eradication of rural poverty. Participation of farmers in cooperatives has always been an important issue because cooperative societies are key to national development. Governments in most developing and developed countries use agricultural cooperatives as channels in reaching to rural farmers (Gou, 2006). Cooperative organizations reduce cost for government and support organizations in meeting farmers' needs. Scholars have renewed their interests in producer organizations such as cooperatives as an institutional tool to improve market participation of smallholder farmers, increase farmers' income, and reduce rural poverty (Bernard and Spielman, 2009). Participation in agricultural cooperatives is found to be closely linked to human and social capital (Hellin, 2009). Human development is expected to further improve the welfare of human life and self-empowerment on an ongoing basis. The manner in which cooperatives manage a variety of business activities that may result in benefits for the individual member makes cooperative to be classified as part of the running process of economic development. There is growing interest in supporting agricultural cooperatives, and cooperative union development as a platform for enabling vulnerable farmers to secure sustainable livelihoods. Global and national evidence clearly shows that rural farmers play critical roles in bringing about food and economic security for their households (FAO, 211). Due to this mounting evidence, greater attention is being paid to ensure that agricultural policies and programs address barriers to farmers' participation and benefits in rural producer groups such as cooperatives (FAO, 2012; IMF, 2009; and USAID, 2012).

Evidence shows that when farmers are more economically and socially empowered, there are direct and positive impacts on farmer households and community decision-making power and access to control productive assets. These changes lead to improved household nutrition, food and income security, broader development outcomes, and a more integrated production of both food and cash crops [International Cooperative Alliance (ICA), 2007).

The United Nations resolution numbers 54/123 and 56/114 emphasized that cooperatives have a role in poverty eradication, full employment and social integration and increased productivity. Hence, cooperative success is oriented towards the achievement of members' welfare.

It is argued that improving the productivity, profitability, and sustainability of smallholder agriculture is the main pathway out of rural poverty in developing countries. The collective action associated with cooperative positions it as a social capital; therefore, cooperatives need to be both inclusive (poor farmers need to participate) and effective (creating an impact on the income and well-being of participating farmers).

To ensure that cooperatives are achieving their purpose of establishment, it is important to analyze farmers' participation and identify factors that may be hindering their participation (Hanel, 1985). Therefore, this research was meant to examine the factors affecting farmers' participation in agricultural cooperatives and the impact of cooperative membership on farm income in Liberia.

In Liberia, 70% of the population (3.5 million) depends on agriculture for livelihoods [Liberia Institute of Statistics and Geo-information Services (LISGIS), 2009). Most of these farmers are smallholders who lack access to modern technologies, markets and credits [Ministry of Agriculture (MOA), 2012).

As a measure to address food security and reduce poverty in Liberia, the government has placed serious emphasis on agricultural cooperatives and farmers participation in these cooperatives. Government has emphasized that agricultural cooperatives hold much potential to empowering these economically weak farmers by enhancing their collective bargaining power in the market, thereby reducing the risks that they face in markets and enabling them to leverage enhanced market opportunities, and by building individual capacities thus improving members' income, leadership skills, and overall socio-economic status [International Monetary Fund (IMF), 2013). The

agricultural sector is considered as one of the most significant and sustained sectors in national development programs. Both the Poverty Reduction Strategy (PRS) and the Agenda for Transformation considered agriculture as major component of the Economic Revitalization Pillar in achieving these development goals.

As the result of these national strategies, government and development partners are striving to ensure increase in the number of cooperatives in the country. Agricultural cooperatives in the country are mainly located in rural communities and yet there is high incidence of poverty in rural areas. Liberia poverty headcount ratio at US$1.25 a day in 2007 was 83.8% of its 3.5 million people (IMF, 2007).

The agricultural sector is a key engine for economic development and poverty reduction, contributing about 35.3% to GDP in 2013, and approximately 70% to employment (IMF, 2013). Liberia's agricultural policies and strategies focus on intensification and increased production and market orientation of the smallholder agricultural sub-sector, and cooperatives are seen as an important institutions in achieving this (MOA, 2013). Cooperatives are prevalent in cassava production and processing, rice production, cocoa, coffee, and oil palm. This study therefore focuses on agricultural production cooperatives in the study area.

According to the Cooperative Act of Liberia, upon registration, each member buys a minimum share and the cooperative uses the shares as capital base for its business transactions. The returns from these transactions are kept within the cooperatives as savings which portion is reinvested in the cooperative and portion distributed as dividends to members at the end of the operational year based on use. However, the main objective of cooperative societies is not profit making but to provide members' production and marketing needs. Currently, there are 108 active agricultural production cooperatives societies out of 224 registered cooperatives in the country with a total

membership of 10, 722 [Cooperative Development Agency (CDA), 2011). CDA defines active society as having the following characteristics: warehouse, office, regular assembly and meetings, conducting business, and leadership structure and shareholders of more than 15.

The Cooperative Development Agency (CDA), alias Division of Cooperative and Marketing, established in 1936, is the government cooperative regulatory arm responsible for the registration of cooperatives in the country. The CDA gained autonomous status in 1981. It monitors the activities of all cooperatives including agricultural production cooperatives and ensures they follow the guidelines of the Cooperative Act of Liberia and the international cooperative principles, provides trainings to cooperative societies, audits the society book and settle disputes. The cooperative sector of Liberia adopts the following seven cooperative principles outlined by the International Cooperative Alliance (ICA):

1. Voluntary and open membership
2. Democratic member control
3. Member economic participation
4. Autonomy and independence
5. Education, training and dissemination of information among members
6. Cooperation among cooperatives
7. Concern for community development

1.2 PROBLEM STATEMENT

Since the end of the civil war in 2005, more emphasis has been placed on smallholder rural farmers, and agricultural cooperatives have been used as means of reducing rural poverty. According to the

National Population and Housing Census reports (LISGIS, 2009), the nation's population is estimated at 3.5 million with majority (about 70%) engaged in agriculture as the main stay of livelihood. Farmers, since 2006 receive supports from government, national and international nongovernmental organizations (NGOs). For these rural farmers to benefit from these aids, they have to be organized in farming groups especially cooperatives. Grants are awarded to cooperatives to improve their business activities and to build up their capacities in meeting market challenges as well as improving members' socio-economic welfare. Other organizations such as the United States Agency for International Development (USAID) provide modern farm equipment, such as power tiller to cooperatives to shift from their traditional production process to mechanized farming; while government and partners provide extension services to farmers and farming groups including cooperatives to enhance their productivity through best agronomic practices. According to the United States African Development Foundation (USADF) annual report (2014), it has awarded grants to cooperatives across the country with majority in Bong and Nimba counties in the central province.

Financial aids awarded to cooperatives are intended for institutional development. For instance, USADF grants are directed towards cooperative education (where members are trained on the principles of cooperatives), cooperative governance training, financial management training, entrepreneurship training, the construction of basic infrastructures, and the procurement of equipment. Additionally, revolving funds are given to these cooperatives to purchase raw materials from both members and non-members with priorities given to member-farmers. These raw materials are then processed and marketed. Government on the other hand, ensures that farmers receive extension services in the areas of crop production and marketing.

In spite of these benefits derivable from cooperative societies in the country, there is low farmers' participation in agricultural cooperatives. The total membership of cooperatives in the country currently stands at 10,722 which is far below the prewar status of over 75,000.

The factors contributing to the low participation of farmers in agricultural cooperatives and the impact of cooperative membership on farm-income in Liberia have not yet been investigated.

Therefore, the purpose of this research was to evaluate the factors affecting farmers' decision to participate in agricultural cooperatives and examine the impact of cooperative membership on farm-income.

1.3 RESEARCH QUESTIONS

1. How do farmers perceive agricultural cooperatives and what constraints do they face in the study area?
2. What services are received by cooperative members and what are the key challenges facing agricultural production cooperatives in the study area?
3. What are the determinants of farmers' participation in agricultural cooperatives and to what extent do they affect participation?
4. What is the impact of cooperative membership on farm-income?

1.4 OBJECTIVES OF THE STUDY

The main objective was to examine the factors affecting farmers' participation in agricultural cooperatives and the impact of cooperative membership on farm-income.

The specific objectives were:

1. To examine farmers' perceptions of agricultural cooperatives and prioritize the constraints facing farmers in the study area.

2. To identify the services farmers derived from agricultural cooperatives and prioritize the major challenges confronting cooperative societies in the study area.
3. To determine the key factors that affect farmers participation in agricultural cooperatives and the extent of their influence
4. To examine the impact of cooperative membership on farm-income in the study area.

1.5 HYPOTHESES OF THE STUDY

- Farmers' years of education is a significant determinant that positively affect the likelihood of participation in agricultural cooperatives (Ogunleye *et al*., 2015 and Zheng *et al*., 2012).
- Farmers' perceptions of agricultural production cooperatives are significant factors that influence their decision to participate (Chen, 2007).
- Cooperative membership is significant and positively influences farm income in the study area.

1.6 SIGNIFICANCE OF THE STUDY

There is limited if any information on the factors affecting farmers' participation in agricultural cooperatives and the impact of cooperative membership on farm income in Liberia. The study was therefore meant to lay the basis for empirical study in the cooperative sub-sector of the country. It has generated useful information for cooperative management bodies, national and international non-governmental organizations that work with cooperatives and policy makers. The study has also informed other cooperatives operating under similar conditions about the factors that influence farmers' participation in agricultural cooperatives and the impact of cooperative membership on farm income. Additionally, the study will assist in the improvement of agricultural cooperatives since it has identified and prioritized the challenges facing agricultural cooperatives in Liberia. Suitable and significant measures has been recommended that will increase farmers'

participation which will result to increase production and improve farmer's welfare through increased farm income.

The findings will help in establishing and supporting cooperatives by making them more effective in serving farmers; thus contributing towards achieving the national poverty reduction strategy, the agenda for transformation, vision 2030 (Liberia becoming a middle income state by 2030). The findings are useful to international development partners in directing cooperative development projects in the country and elsewhere. Other researchers will use the information that has been generated as a stepping stone for further studies on the problems facing agricultural cooperatives in developing countries. And significantly, the findings has contributed to the knowledge in the subject area.

1.7 ORGANIZATION OF THE STUDY

The study is organized into five chapters. Chapter one gives the introduction, problem statement, research questions, and significance of the study. Chapter two provides an overview of relevant literature. Chapter three outlines the methodology employed to achieve the study objectives. Particularly, it discusses the study area, describes the theoretical frame work and the sampling techniques adopted for data collection. Chapter four presents and discusses descriptive and empirical results while chapter five provides the conclusions and policy recommendations from the study.

CHAPTER TWO

2.0 REVIEW OF LITERATURE

2.1 INTRODUCTION

This chapter outlines some of the main themes in cooperative literature. It begins with the definition of cooperative and their reasons for formation. The chapter further cites from the literature, the factors that are considered to influence farmers' participation in agricultural cooperatives.

2.2 THE PRINCIPLE OF COOPERATION AND DEFINITION

The concept of people working together is the basis of the cooperative model. It dates back to the nineteenth century, where the first cooperative members of the Rohdale Society launched the cooperative movement (Zeuli, 2004). The idea was meant to bring people together, with the objective of addressing common issues, for the betterment of the members. The model has since evolved, thus reflecting changes in society more especially the interest of members. According to the International Cooperative Alliance (1995), cooperative is defined as an autonomous association of people united voluntarily to meet their common economic, social and cultural needs and aspirations through joint and democratically managed enterprise. United Nations (2009) report states that cooperatives are intended to be enterprises, which are highly democratic and selfgoverning and rely on self-help and responsibility to meet goals that include economic as well as social, cultural and environmental. Cooperatives are meant to encourage social integration and reduce poverty.

According to the International Cooperative Alliance (ICA) commission on cooperative principles (1966), the principles that are considered fundamental to legitimate and effective cooperative practice include:

1. Open membership: Membership of cooperatives should be voluntary and available to all persons, who can make use of the services without restriction.
2. Democratic organization: The final power of the cooperative should be retained by the members. Cooperative members should enjoy equal rights of voting and participation in decisions, regardless of the size of their shareholding or volume of trade with the cooperative.
3. Savings or surpluses arising from the operations of the society belong to the members according to transactions. The main objective of the cooperative is to provide services not to make profit; however, being a business enterprise, it may have excess income which should be returned to members as dividends.
4. The cooperative societies should make provision for the education of its members.
5. There should be co-operation among cooperatives.
6. The cooperative organization should be autonomous and independent
7. Cooperative institutions should show concern for community development.

2.3 AGRICULTURAL COOPERATIVES

Agricultural cooperatives pool production resources of farmers and rural entrepreneurs in order to maximize the benefits of its members (ILO, 2002). Agricultural cooperatives have been known to benefit members in agriculture, especially in cases of imperfect situations. For instance, in North America, cooperatives were organized to move products to markets and influence price and terms of trade, consistence with market supply and demand conditions, while providing fair treatment, other services and more protection from exploitative opportunism (Torgerson *et al.,* 1998). A south Dakota Soybean Farmers' Cooperative opened a processing plant to add value to their products and meet market demand. A Missouri corn growers' cooperative was able to enter the ethanol business; and an Iowa farmers' cooperative

improved their methods of pork production to become financially profitable. Cooperatives, as members owned businesses, help to aggregate the market power of people, who on their own could achieve little or nothing (Valentinou, 2007).

Agricultural Cooperatives play an essential role in the development of the rural sector and in promoting food security. In Brazil, 37% of agricultural GDP is produced through cooperative societies. In Egypt, 4 million farmers earn their income through cooperative membership; and in Ethiopia, the equivalent figure is 900,000 (FAO, 2013).

2.3.1 Types of agricultural cooperatives

Agricultural cooperatives are classified into two major types; production and service cooperatives (Lerman, 2013). Production cooperatives are cooperatives where farmers jointly operate owned agricultural plots (Chambo, 2009). Production cooperatives organize land acquisition, cultivation of crops, and marketing of produce jointly. The cooperative land is cultivated collectively through communal labor, and all produce from this land is sold through the cooperative. Members produce individually and sell to the cooperative as well. Agricultural production cooperatives provide input supply services to members, extension services, credit, and market opportunities.

Service cooperatives are the more common agricultural cooperatives. According to this arrangement, members carry out their activities independently, and the cooperative provides a range of services, including machinery, processing, transportation, packaging, distribution, marketing and information dissemination (Lerman, 2013). For example, the Dutch cooperative Agrifirm includes more than 17,000 farmers who combine their purchasing power for agricultural products and equipment (FAO, 2013).

2.3.2 Reasons for cooperative formation

Studies continue to record factors that justify the formation of cooperatives. Farmers participate in agricultural cooperatives to overcome barriers such as poverty, market failure, missing services in the production process, decreased income, reduce transaction costs with traders and contribution to the development of the cooperative communities (Msimango and Oladele, 2013). Market failure is one of the factors which have been noted as a major justification for the establishment of cooperatives (Valentinou, 2007). Market failure is the possible instances in which the ideal conditions for a market success do not hold (Harris and Carman, 1983). Harris and Carman (1983) describes these types of market failure as imperfect competition, which is a result of fewer buyers or sellers of the products; anti-competitive conduct, such as collusion and predation and asymmetric information. According to Centner (1988), the significant types of market failures are oligopsony, information and restricted bargaining with a hold-up problem. Oligopsony is defined as a situation where there are many sellers and few buyers, the identical situation that exist in agriculture. This leads to market power imbalance and results in farmers generally being price takers (Hansmenn, 1999). Asymmetric information is seen in two forms as a market failure, the lemon problem and moral hazards. The first is a time when a buyer is not able to differentiate between quality and nonquality products. This results in the seller not having the incentive to provide quality products. The later applies to when there are opportunities for one person to break a promise on the quality, but the costs are borne by another (Centner, 1988). Restricted bargaining is the third type of market failure. Under this condition, buyers take advantage of the production period in agriculture and may hold-up producers, by offering lower prices or even threatening to stop buying their products. Cooperatives provide a guaranteed market and some balance of market power (Centner 1988; Torgerson *et al*., 1998).

In most developing countries, lack of infrastructure and geographical isolation, due to poor roads or communication systems also lead to high transaction costs; and there is usually a tendency for collusion and price fixing in most traditional rural markets due to few buyers at each level of the chain. Smallholder farmers are the worse victims because of asymmetric information (Tollens, 2006).

Another reason for the formation of agricultural cooperatives is that farmers need an institutional mechanism in order to bring economic balance under their control. Agricultural cooperatives enhance the bargaining strength of farmers (Borgen, 2003). For instance, the most common and widely accepted rationale for farmer cooperatives in the United States is the competitive yard stick school of thought developed by Professor Nourse (Christy, 1987). Cook (1995) states that cooperatives help to provide a checkpoint on other businesses and forcing them to be more competitive. Furthermore, cooperatives have mainly been to bye- pass the investor-owned firms by enhancing prices and in general pursuing the goals of increasing margins and avoiding market power (Szabo, 2006).

Self-help organization is the third ideology within cooperative formation. This ideology places a greater emphasis on the social aspect of development (human and community). Considering the importance of agriculture to rural communities, which are largely poor, majority of the emerging agricultural cooperatives in developing countries have been formed for this reason (Christy, 1987).

There are three ways in which cooperatives differ from other business models:

1. Labor is the major resource each member contributes;
2. Agricultural cooperative membership consists largely of low income and limited resource farmers;
3. Even though the cooperative is organized for economic goals, the majority tend to also have social goals.

Cooperative formation in developing countries is a strategic intervention by governments in order to promote farmers' participation in the supply chain (Onumah *et al*., 2007).

2.3.3 Role of Cooperatives in the World Economy

A cooperative is a community based entity that is dominant with important governance structure within the global agricultural sector. According to Skurnik (n.d), the cooperative sector globally encompassed approximately 800 million members in over 100 countries and it is estimated to account for more than one hundred million jobs worldwide; the sector is 20% more than multinational enterprises. In particular, agricultural cooperatives account for 75 to 99% of milk production in Norway, Newzeland and the United States. 7% of the fishery productions in the Republic of Korea; and 40% of the agricultural production of Brazil are produced by agricultural cooperatives (ICA, 2007).

Galdeano *et al.* (2005), states that cooperatives are important structures in many agricultural markets. In the EU community, for instance, agricultural cooperative firms account for over 60% of the harvest, handling and marketing of agricultural products, with a market turnover of approximately 210,000 million Euros. Besides, over 50% of agricultural output worldwide is transacted through cooperative societies (Bibby and Shaw, 2005). Clegg (2006), states that there is a great potential in cooperative organization in terms of improving the living conditions of the poor- if they are able to gain power in the market for their produce.

Farmers receive several benefits from being members of a cooperative society:

2.3.3.1 Access to market

Hovhannisyan *et al*., (2012) identified that cooperative organizations are supportive in overcoming barriers that impede farmers' access to assets, information, services and input and output markets. For example, farmers in milk marketing cooperatives in the United States were able to pool products of a specified grade and quality and therefore they were able to market to commercial buyers. Agricultural cooperatives play an essential role in helping smallholder farmers cope with competitive and instable markets and increased costs of transaction and to succeed in economies of scale, through bulk selling (Clegg, 2006).

Farmers are easily linked with traders through agricultural cooperatives; which help to reduce cost of market search (Delgado, 1999). Cooperatives are helpful in terms of farmers overcoming access barriers to the marketing of large quantities. Most businesses prefer buying from large-scale farmers, rather than small-scale farmers because small-scale farmers are not consistent in terms of quantity availability. This gives farmers in cooperatives better opportunities to participate in the supply chain and to compete with large-scale producers in accessing market opportunities.

2.3.3.2 Strategy for Poverty Reduction

Agricultural cooperatives are used by most governments as poverty reduction strategy in reaching to the poor. Cooperative societies suggest an essential model for addressing the problem of the social exclusion of the poor and disadvantaged who lack access to opportunities in a liberalized market economy (Ministry of Finance and Development Planning (MFDP), 2006). In the UN guidelines relating to cooperatives in social development, cooperative societies promote local participation and inclusion which is central to poverty reduction (Bibby and Shaw, 2005). Cooperatives provide a powerful development strategy, which can enhance the competitiveness of smallholder farmers and also address market failure. Cook (1995) agreed with Abrahamsen's

prediction that cooperatives would become the farmers integrating agency, as the industrialization of agriculture continues to evolve; when he observed that farmer-cooperatives in the United States aggregate market shares had been increasing steadily.

2.3.3.3 Bargaining power

Another benefit farmers derived from agricultural cooperative societies is bargaining power. Agricultural cooperatives are assisting farmers to gain comparative advantage; thus increasing their opportunities to participate in the market. Farmers in cooperatives speak with one voice; hence, increasing the bargaining power (Onumah, 2007). It is an incentive for farmers to become part of cooperative societies because of economies of scale and other factors that limit competition. Cooperatives, in such cases, help to increase market margins and provide market assurance (Cook, 1995). All these measures help to increase farmers' income, which lead to welfare improvement. For instance, Kodama (2007), found that the existence of cooperatives in the coffee market led to improvement in the price offered by traders, when he analyzed coffee cooperatives activities in Ethiopia.

2.4 Agricultural Cooperatives in Developing Countries

Cooperatives have been received with mix reactions in developing countries as compared to the developed world, where cooperatives receive a great deal of support from government and community people. Cooperatives were regarded in different ways, from country to country during the post-colonial era. In some nations, the support for cooperatives increased and they were given a high profile within the planning of the economy; while in others, they were perceived as a political threat to the government. As a result, agricultural cooperatives were closed and replaced by government palatals. The cooperative model was adjusted to suit government priorities.

Cooperatives were no longer autonomous entities rather, they were integrated into structures and ideologies which had not been developed to meet the interest of the members but to serve the political and economic imperatives of the states (Develtere, 1993).

After structural reforms, cooperatives were once again considered as being organizations that could build on conventional forms but as an alternative to capitalism due to their compatibility with local traditional values and social habits (Brichall, 2003). This led to the emergence of the "new cooperative movement" especially in Africa, which has seen changes in government cooperative policies, to ensure that they operate as real cooperatives based on cooperative principles (Ortmann and King, 2007). For example, the establishment of the cooperative Act of 2005 in South Africa and the Cooperative Societies Regulations of 2002 in Malawi. Hence, the focus on the factors influencing farmers' participation in agricultural cooperatives, in this study was therefore based on the new cooperative movement, which is based on cooperative principles.

2.5 **Determinants of farmers' participation in agricultural cooperatives**

To better understand the role of cooperatives in the agricultural sector, it is important to accurately identify the factors influencing farmers' behavior and willingness to participate in local agricultural cooperatives. Factors that are responsible for the improvement of participation are important because cooperatives develop rural areas by reducing poverty (Mismango and Oladele, 2013). Multiple variables have been identified to have significant influence on farmers' participation in agricultural cooperatives. The findings of previous research suggest that the following factors have significant effects on farmers' participation in agricultural cooperatives: age, land size, access to extension services, household size, and household labour availability (Karli *et al*., 2006; Ogunleye *et al*., 2015).

In recent years, findings and conclusions of several studies on the role of cooperatives in China identified farmers' age, marital status, household size, on-farm income, farm size and performance of existing cooperatives as the key determinants of farmers' participation in agricultural cooperatives (Zhang *et al*., 2008; Gou, 2006; and Chen, 2007).

A study conducted by Chen (2007) suggested that farmers' perception on the management of cooperative is a significant factor that influences farmers' participation in agricultural cooperatives. The finding further indicated that agricultural producers perceive cooperatives as a positive means of improving their economic welfare. Farmers participate in cooperatives because they view it as an institution that can help them to reduce production and marketing risks and ultimately enhance their chances of expanding their business operations and increase their income level (Dikotter, 2010). Studies have suggested that participation in agricultural cooperatives is found to be closely linked to human and social capital (Hellin, 2009). Bernard and Spielman (2009) verified that farmers' access to extension, age, access to credit, and access to networks, and information have a positive effect on the likelihood of cooperative membership. Verhofstandt and Maertens (2014) found that households with a more land size and those with more agricultural labour force have a high probability of being members of cooperatives. The marginal effects showed that an additional agricultural labourer in the household increases the likelihood of cooperative membership by 7.2. The study further suggested that variables such as the education and farm experience and number of children in the household do not have significant effect on the likelihood of cooperative membership.

Even though these are important investigations, most of them are based on limited data samples and simple descriptive statistics. This study employed a unique and comprehensive dataset to conduct a rigorous empirical analysis of agricultural cooperatives in the study area.

2.6 Impact of Cooperative Membership on Farm-income

Several studies have suggested that cooperative membership has significant impact on farm income. Findings of empirical studies in China indicated that cooperatives help improve farm income; well-functioning cooperatives can make small-scale agricultural producers more competitive on the global market; cooperatives exert scale effects and lower an individual household's risk and transaction costs in market competition; and agricultural cooperatives foster a local agricultural economy with direct regional characteristics (Lu, 2008; Zhang, 2007; and Gou 2006). There is growing body of evidence that cooperative membership positively impact farmers' revenues and net income. Abebaw and Haile (2013) indicated positive impact of cooperative membership on producers' prices and market participation. Additionally, membership of agricultural cooperative was found to increase the likelihood of adopting improved technologies such as the use of mineral fertilizers which significantly increase their farm-income (Shiferaw *et al*., 2009). Other studies point to positive farm income and profits (Fischer and Qaim, 2012). Several farmers in Ethiopia who are members of agricultural cooperatives were investigated to have higher degree of commercialization. Fischer and Qaim (2012) found that the impact of participating in banana cooperatives was high on farmers' income in Kenya. Verhofstandt and Maertens (2014) found that the effect of cooperative membership on farmers' income is significantly positive and high in magnitude. The finding concluded that cooperative membership increases annual farm income by 40 to 46%. Maharjan and Fradejas (2006) showed that farmers participating in agricultural production cooperatives gained more production income than noncooperative participants. Sun (2007) indicated that cooperative member farmers in Jiangsu Province Poultry Industry earned more income than farmers who were not members of agricultural cooperatives. According to the findings of a work done by Li (2008), through the provision of various services in technology and marketing, cooperative membership raised bayberry farmers'

income in Zhejiang Province, China. Other studies also reveal and support the claim that cooperative membership has positive impact on farmers' income (Ma, 2006; Hou, 2003; and Yu, 2003). According to Ma (2006), average farm income of cooperative members increased by 22.2%.

CHAPTER THREE

3.0 METHODOLOGY

3.1 Theoretical Framework

The general goal of any cooperative society including agricultural production cooperative is to improve the welfare of its members. It is therefore relevant to measure the extent to which agricultural production cooperative has impacted members farm income which is assume to contribute to welfare of members. The endogenous switching model is employed to simultaneously estimate separate income functions for members and non-members of agricultural production cooperatives as well as determining farmer's decision to participate in agricultural cooperatives. The impact of cooperative membership on farm income is analyzed using significance of indicators of the endogenous switching regression. The switching regression enables us to determine the magnitude of the impact of farmer's participation in agricultural cooperatives. The procedures are detailed as follows.

3.1.1 Endogenous Switching Model

The instrumental variables approach of endogenous switching model is an estimation procedure that simultaneously fit binary and continuous parts of the regression models. Models with endogenous switching can be fitted in one equation at a time by either two-step least squares or maximum likelihood (ML) estimation; but both of these estimation methods are inefficient and need cumbersome adjustments to derive consistent standard errors. However, the movestay command implements the full-information maximum likelihood method (FIML) to simultaneously fit binary and continuous parts of the model in order to yield consistent standard errors. The approach relies on joint normality of the error terms in the binary and continuous equations. The behavior of an agent with a criterion function and two regression equations can be described as in (1) – (3):

AC_i □ □ 10,if ,if □ □□ □ZZ_{ii}□ □□ □$_{ii}$ 00

(1)

Y_{i1} □□ □X_i □ $_{1i}$, if AC_i □1 (2)

Y_{i0} □□ □X_i □ $_{i2}$,if AC_i □ 0 (3)

Where AC_i determines which regime (participation in agricultural production cooperatives) the agent faces. Y_{i1} *and* Y_{i0} denote the dependent variables for the continuous regression. Z_i, X_i denotes vectors of explanatory variables. □□□, , are parameters to be estimated. □□$_i$, $_{i1}$ and □$_{i1}$ denote the error terms that are assumed to follow a trivariate normal distribution with mean zero and variance σ^2. The parameters in the models are jointly estimated using the full-information maximum likelihood method (FIML).

3.2 Study Area

The study on the determinants of farmers' participation in agricultural cooperatives and the impact of cooperative membership on farm income in post war Liberia was carried out in three cooperative concentrated counties of Liberia-Bong, Lofa and Nimba counties. Together, they contain about 60% of the active 108 registered agricultural cooperatives in the country (CDA, 2011). The study area is reviewed looking at the location, population, climate of the region, ethnic groups, and the main economic activities.

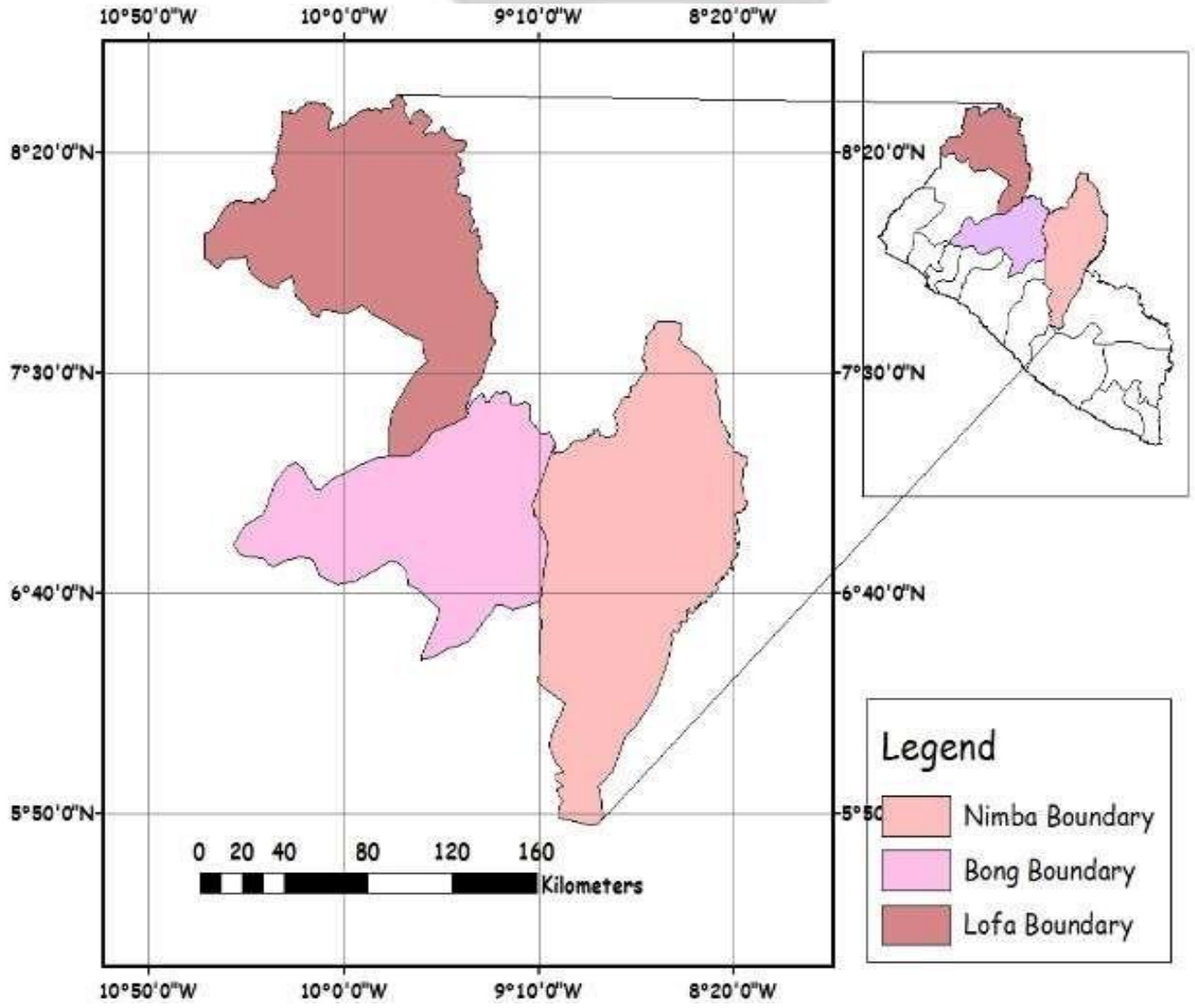

Figure 3.1. Map of the Republic of Liberia highlighting the study area

3.2.1 Location of the Study Area

Bong, Lofa, and Nimba counties are situated in the Central North part of the country, formerly referred to as the Central Province. Bong, Lofa and Nimba Counties have an area of 8,772 square kilometer, 9982 square kilometer and 11,551 square kilometer respectively. Together, they host about 30.8% of the country's 3.5 million people. According to the 2008 National Population and Housing Census report, Bong County has a population of 333,481 made up of 164,859 males and 168,622 females; the population of Nimba County is 462,026 made up of 230,113 males and 231,913 females, while the population of Lofa County is 276,863 of which there are 133,611 males and 143,252 females (LISGIS, 2009). The counties are surrounded by Ivory Coast on the East, Sierra Leone on the West, Guinea on the North and on the South by Gbarpolu, Margibi, and Grand Bassa counties.

3.2.2 The Climate of the Study Area

The climate is tropical and humid, with little change in temperature throughout the year in the three counties. There are two distinct seasons, wet and dry seasons. The wet season runs from late April to mild November; while the dry season starts from mild November and ends in April. Annual rainfall is as high as 510cm. Average humidity is 82% in the wet season and 78% in the dry season, but it may drop to 50% or below between December and March (en.wikipedia.org/wiki/climateofliberia). The soils are dominated with reddish brown, heavily leached, well-drained, acidic laterites (lotosols) soils. In lotosols soils, humus, nitrogen and phosphorus contents are low. This means that continuous farming on lotosols required the repeated application of fertilizers (www.fao.org/ag/AGP/doc/counprof/Liberia/liberia.htm).

3.2.3 Ethnic Groups

There are several ethnic groups across the three counties. In Bong the major ethnic groups are Kpelle which constitutes about 98%, Bassa and Mano constitute 2%. Lofa has Loma, Gbandi, Kissi and Mendi while Nimba has two major ethnic groups, Mano and Gio (www.fao.org/ag/AGP/doc/counporf/Liberia/liberia.htm).

3.2.4 Economic Activities

Agriculture, hunting, forestry and petty trade are the main economic activities across the three counties. The inhabitants depend on the sale of agricultural products as the main source of income. Most of the food crops produced in the country come from this region. Nonfarm opportunities are limited [Central Bank of Liberia (CBL), 2015). The agricultural output is derived from traditional farming system which involves the production of food (mainly rice and cassava) and tree crops (mainly coffee, cocoa, and rubber). Oil palm is produced both for home consumption and for the market. These three counties are considered as the food basket of the nation, and they support the densely populated capital (Monrovia) with most of its local food requirements.

3.3 Sampling Techniques and Sample Size

Multistage sampling techniques was employed by the study. In the first stage, the three counties were purposively selected because of the concentration of agricultural cooperatives and their increased agricultural activities. In stage two, the cooperative communities were stratified according to county and a total of 10 communities were selected 49 cooperative communities using proportional random sampling-two (2) from Bong, six (6) from Nimba and two (2) from Lofa. The

number of cooperative communities per county were divided by the total number of cooperative communities in the three counties and multiplied by the total number of communities sampled (ten). A total of 400 farm households including 250 cooperative members and 150 non-cooperative members were sampled for the study using Cochran equation.

3.4 Data Collection

This section takes an overview of the types and sources of data, the design of the questionnaire, pre-testing and the conduct of the survey.

3.4.1Types and Sources of Data

Primary data on farm household socio-economic characteristics were collected from sampled households through formal survey using structured interview questionnaire. Secondary data were drawn from annual reports and websites of cooperative support NGOs, Ministry of Agriculture local offices, and the Cooperative Development Agency (CDA). Oral interviews were conducted with government officials, cooperative support NGOs, and those with cooperative experience in the country.

3.4.2 Questionnaire Design and Pre-testing

The survey questionnaire was in five sections labeled A to E. Section A primarily consisted of questions on the socio-economic characteristics of respondents. Section B consisted of membership of cooperative societies. Section C considered access to extension services and capital. Section D focused on Farm Characteristics. Section E covered crops and livestock production and household food consumption. The last section labeled F covered constrains and perceptions of farmers and challenges facing agricultural cooperative societies. The enumerators were intensively trained for 3 days after which they pretested the questionnaire in Wumensay, a

suburb of Gbarnga, Bong County. Following the pre-testing three questions in section E were dropped due to ambiguity.

3.4.3 The Conduct of the Survey

Obtaining accurate data and gaining the farmers' confidence were key objectives for the fieldwork. To achieve these objectives, household heads (respondents) were assured of privacy and that the information gathered would be used for academic purposes. Interviews were held at the morning and evening hours of the day in the homes of the farmers. To ensure that information elicited from the respondents were not compromised in the shortcomings of translations, interviews were conducted in the local languages of the respondents.

3.5 Data Analysis

Descriptive statistics were used to explain the socio-economic characteristics of both cooperatives member and non-member respondents in the study area. Statistical tools such as averages, percentages, cluster analysis, and cross tabulations were applied. Others included Kendall's coefficient of concordance, perception index and endogenous switching regression. These were facilitated by SPSS version 21 and STATA 12 software packages.

3.5.1 Farmers' Perception of Agricultural Cooperatives

The evaluation of farmers' perception of agricultural cooperatives in the study was done by applying five-point Likert scale and perception index. The scale was defined as strongly agree, agree, neutral, disagree and strongly disagree. The perception index indicates the general agreement among respondents on their perceptions of agricultural cooperatives. The mean rank of individual perception statement is obtained by dividing the number of respondents who select a

particular scale by the total number of respondents multiplied by the scale. This is done for each scale for a statement and the values are summed up to get the mean rank.

The perception index (IP) is obtained by adding each mean rank of each perception statement and dividing it by the total number of perception statement. The PI falls between the scales and the scale value that the PI is closed or equaled to suggests the general agreement among respondents. For instance, using a scale that is defined as: 1, strongly agree; 0.5, agree; 0, neutral; -0.5, disagree; -1, strongly disagree, and if the calculated PI value is 0.4, then there is an agreement among the respondents because the PI value is closed to 0.5 which represents agreement in the scale. The formula for the perception index (PI) is given as:

$$PI = \sum_{i=1}^{n} Xi\ m/$$

Where;

PI = Perception index

X= mean rank of individual perception

statement m = number of perception statement n

= number of mean rank

3.5.2 Constrains faced by farmers and Challenges faced by Cooperatives

The constraints faced by farmers and the challenges confronting cooperatives in the study area were analyzed using Kendall's coefficient of concordance. Kendall's coefficient of concordance was used to measure the extent of agreement among cooperative members and non-members on the constraints faced by farmers and the key challenges faced by cooperative societies. The

Kendall's coefficient (W) is an index that measures the ratio of the observed variance of the sum of ranks to maximum possible variance of the sum of the rank. The concept is to find the sum of the rank for each constraint or challenge and then to examine the variability of this aggregate. Constraints or challenges are ranked from highest to least, and a maximum variability among these sum indicates a perfect agreement. The constraints or challenges with the least ranked scores are most pressing in computing the total rank score. To calculate the coefficient of concordance, the rank scores are used to obtain the extent of agreement in the rankings. The values ranges from zero (0) to one (1). A value of 1 means that the rank assigned by each farmer is exactly the same as those of other farmers and a value of 0 indicates maximum disagreement. To achieve this objective, constraints by cooperative members and non-members and challenges faced by agricultural production cooperatives were identified and farmers were asked to rank in order of importance.

The formula for the coefficient of concordance (Kendall's W) is given by:

$$w = \frac{12s}{m^2(n^3 - n)}$$

Where;

S = Sum of ranks for each constraint or challenge being ranked m

= number of rankings (cooperative members or non-members) n

= number of constraints or challenges

3.5.3 Determinants of Farmers' Participation and Impact on Farm-income

Regression analysis was employed to explain the factors affecting farmers' participation in agricultural cooperatives and the impact of cooperative membership on farm-income.

The endogenous switching model was used as specified below:

$$AC_i = \alpha X_i + \mu_i \qquad (13)$$

Where AC_i denotes membership of agricultural production cooperative (AC = 1 if a farmer is a member of agricultural cooperative and 0 otherwise).

$$Income_{iAC} = \beta X_i + \mu_i \quad (14)$$

$$Income_{iNAC} = \beta X_i + \mu_i \quad (15)$$

Where $Income_{iAC}$ and $Income_{iANC}$ denote income obtained by member of agricultural cooperative and that of non-member respectively and μ_i is a normal random disturbance term.

The explanatory variables X_i and their expected signs have been provided in Table 3.1. Table 3.1. Summary description of the Explanatory Variables

Variable	***Description***	***Expected signs***	
		AC equation	Income Equation
Gender	Gender of farmer (1=male, 0=female)	+/-	+/-
Age	Age of farmer (in years)	+	+
Education	Farmer's years of schooling	+	+
HHsize	Farm household size (number of persons in a household)	+/-	+
Farmsize	Farm size (in acres)	+	+
Extension	Extension services (1=if farmer receive extension services; 0=otherwise)	+	+
Farm_exp	Farming experience (years in farming)	+	+
Crop_type	Type of crop farmer cultivate (1, if farmer cultivate tree crop; 0, otherwise)	+/-	+
Acecredit	Access to credit (1, if farmer has access to credit; 0, otherwise	-	+
Nimba	Location of farmer (1, if farmer is in Nimba; 0, otherwise)	+/-	+/-
Lofa	Location of farmer (1, if farmer is in Lofa County; 0, otherwise)	+/-	+/-
Copnotm	Perception of farmer (1, if farmer perceive that cooperatives are not managed efficiently, 0, otherwise)	+/-	+/-
Coophelp	Perception of farmer (1, if farmer perceive that cooperatives help members attain higher standard of living; 0, otherwise)	+/-	+/-

CHAPTER FOUR

4.0 RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results and discussions from the study under the following headings: socio-economic characteristics of farmers, cooperative characteristics, farm characteristics, perception of farmers of agricultural cooperatives, and the services farmers derived from agricultural cooperatives in the study area, constrains confronting farmers, and the key challenges facing agricultural cooperatives in the study area. The rests are determinants of farmers' participation in agricultural cooperatives, and the impact of cooperative membership on farmincome.

4.2 Socio-economic Characteristics

Table 4.1 below represents the following socio-economic characteristics of both cooperativemember and Non-member farmers under the study: gender, age, marital status, and religion. The rests are level of education, years of schooling, household size, adult household size, and annual household income.

The results indicate that males constitute 67% of the total number of cooperative members compared to female (33%) cooperative member farmers. It also shows that 54% of noncooperative member farmers are male relative to 46% of females. The results revealed that there are more men participating in agricultural cooperatives in the study area. The reason may be due to more male

involvement in agricultural activities, and that males are the heads of the families. Majority of the respondents, both cooperative members and non-members (67% and 48% respectively) are between the ages of 36 to 50 with mean ages of 45 and 43 years. This means that majority of the farmers in the study area are in their active age; which is a boost to agricultural production.

It is also revealed in Table 2 that 86% of cooperative-member and 82% of non-cooperative member respondents are married. This supports the high participation of men in cooperative activities as males head the families and present the family in most of the off-home activities, while women stay at home to cater for children and family food preparation (MOA, 2008). Table 4.1 shows that 91% of cooperative members are Christians, 4% Muslims and 5% traditionalists. Likewise, 88% of non-cooperative member respondents are Christians compared to 9% Muslims and 3% traditionalists. This result is in agreement with the 2008 National Population and Housing Census results that majority of the citizens (95%) are Christian (LISGIS, 2009).

Results in Table 4.1 also show that 54% of the respondents who are members of agricultural cooperatives have no formal education, 16% have primary education, and 28.8% have secondary education. The rest 1.2% have above secondary education. Likewise, 52.7% of non-cooperative member respondents have no formal education, 15.3% have primary education, and the rest 32% have secondary education. This distribution showed that most of the respondents, both cooperative members and non-members have no formal education. The results confirm the 2008 Census results that the country is characterized by low human resource development with about 80% of the population being illiterate.

Table 4.1 also indicates that 68% of cooperative-member respondents have between 5 to 10 dependents, 17% have 11 to 15, 11% have below 5 dependents and 4% have above 15 with mean household size of 8.61. On the other hand, majority of non-cooperative member respondents (68%) have 5 to 10 household members, 16% have 11 to 15 dependents, 13% have below 5 members and

3% have above 15 members with mean household size of 7.77. The mean household sizes are above national average household size of 5.6. The difference may be because households in rural communities record high household sizes compared to those in urban communities (LISGIS, 2009) Results in Table 4.1 also suggest that 61% of households of cooperative-member respondents have less than 5 adult members, 38% have between 5 to 10, and 1% has above 10 with mean of 4.3. Similarly, majority of non-cooperative members (73%) have below 5 adult members per household, and 27% have 5 to 10 adult members with mean of 3.7. The results show that farm households in the study area have less numbers of adult members. The number of household dependents, especially adult dependents indicates available labor in the household. Households with larger household size have more labor for work on the farm (Msimango and Oladele, 2013). Results shown in Table 4.1 indicate also that 8% of cooperative participants earned annual income of less than 5,000.00 (Liberian Dollars, L$), 53% received between L$5,000.00 to L$20,000.00, 24% earned annual income ranging between L$20,001 to L$40,000.00 and 15% earned above L$40,000.00 with mean annual household income of L$23,180.00. Table 4.1 on the other hand, reveals that 24.7% non-cooperative members earned annual income of less than L$5,000.00, 62% received between L$5,000.00 to L$20,000.00, 6.7% earned between L$20,001 to L$40,000.00 and the rest 6.7% earned above L$40,000.00 with mean annual household income of L$12,245.60.

Table 4.1: Socioeconomic and Demographic Characteristics of Respondents

Variable	Cooperative Members						Non-cooperative members					
	Freq.	%	Min	Max.	Mean	Std.	Freq.	%	Min.	Max.	Mean	Std.
Gender												
Male	167	67					81	54				
Female	83	33					69	46				
Age												
Below 35	30	12	21	72	45	10.28	38	25	21	70	43	11.38
36-50	167	67					72	48				
Above 50	53	21					40	27				
Marital status												
Married	216	86					123	82				
Single	34	14					27	18				
Religion												
Christian	228	91					132	88				
Muslim	9	4					13	9				
Traditionalist	13	5					5	3				
Level of education												
No-formal	135	54					79	53				
Primary	40	16					23	15				
Secondary	72	28.8					48	32				
Above secondary	3	1.2										
Years in school												
Below 3	9	8	2	16	8	3.61	3	4	2	12	7.77	3.19
3-6	31	27					20	28				
7-9	27	24					26	37				

10-12	45	39					22	31				
Above 12	3	2										

Field survey (September/October 2015)

Table 4.1: Socioeconomic and Demographic Characteristics of Respondents Cont'd.

Variable	Cooperative members						Non-cooperative members					
	Freq.	%	Min.	Max.	Mean	Std.	Freq.	%	Min.	Max.	Mean	Std.
Household size												
Below 5	28	11	1	26	8.61	3.64	20	13	1	20	7.87	3.55
5-10	169	68					102	68				
11-15	43	17					23	16				
Above 15	10	4					5	3				
Adult household Size												
Below 5	152	61	1	15	4.31	2.3	109	73	1	10	3.65	2.3
5-10	95	38					41	27				
Above 10	3	1										
Household Income (L$)												
Below 5000	20	8	1500	125050	23180.36	23306	37	24.7	600	70800	12258.92	12415

5000-20000	133	53					93	62				
20001-40000	59	24					10	6.7				
Above 40000	38	15					10	6.7				

Field survey (September/October 2015) *1USD = L$88.00 (during survey period)*

4.3 Sources of Household Income

Table 4.2 below represents the sources and proportion of annual household income of respondents. The results show that 100% of cooperative members earn household income from farming, 14% receive income from off-farm activities and 2% earn household income from remittances. Table 4.2 also reveals that 100% of non-cooperative participants earn household income from farming, 27% receive annual income from off-farm activities and 2% earn their annual household income from remittances. This analysis indicates that farming is the main source of household income in the study area.

Table 4.2. Sources of annual household income

Cooperative members			Non-members	
Source	Frequency	Percent	Frequency	Percent
Farming	250	100	150	100
Off-farm	35	14	41	27
Remittances	5	2	3	2

Survey data (September/October 2015) *1USD = L$88.00*

4.4 Cooperative Characteristics

Table 4.3 below represents the following socio-economic characteristics of both cooperativemember and Non-member farmers under the study: years in cooperative, registration fees, minimum share and the dividend received in 2014.

The results show that 71% of cooperative-member respondents have spent less than ten years in their respective cooperative societies, 26% have spent between 10 to 20 years in their cooperatives, 2% have stayed for 21 to 30 years and 1% has spent over 30 years with mean year of 7. The results reflect the post war cooperative development of Liberia. Most of the prewar cooperatives began inactive with their facilities destroyed during the fourteen years of civil conflict. The reactivation of some of these cooperatives and the establishment of new ones started in 2006 following the inauguration of a democratically elected government in 2006 (CDA, 2011). The cooperative

subsector revitalization was part of the Poverty Reduction Strategy (PRS), a post war economic recovery agenda.

Table 4.3 also reveals that majority of the cooperative-member respondents (78%) paid between L$150.00 to L$250.00 to register with cooperatives, 20% of them registered with an amount below $150.00 and 2% registered with an amount above L$250 with mean registration fees of L$187.80, and a minimum and maximum registration fees of L$100.00 and L$500.00 with standard deviation of 68.7.

The results shown in Table 4.3 show that over half of the cooperative member farmers (56.4)% paid a minimum share valued between L$500.00 to L$1,000.00, 24.8% paid a minimum share value of L$1,001.00 to L$1,500.00, 16.4% purchased minimum share value below L$500.00, while 2.4% paid Above L$1,500.00. The mean minimum share value was $L760.00 with standard deviation of 426.9.

The results in Table 4.3 indicate that 37% of the cooperative-member respondents received below L$1,000.00, 8% received between L$1000.00 to L$5000.00, and 1% received above L$5000.00 with mean dividend of L$978.26.00 and standard deviation of 1673.5. Minimum and maximum dividends were L$250.00 and L$12000.00. The results further suggest that majority of cooperative-member respondents (54%) did not receive dividends in 2014. According to most of the cooperative staff interviewed during the survey, business transactions were negatively affected by the outbreak of the deadly Ebola virus disease which stroked the country in March 2014 and ravaged the economy. This led to low member involvement in cooperative activities which resulted in low dividends in 2014. Their views reflect the Central Bank of Liberia (2015) and the International Monetary Fund (2015) that the Ebola virus distorted economic activities and negatively affected key sectors of the economy including agriculture. Cooperative members benefit dividends based on their transactions with the cooperative organization (Msimango *and*

Oladele, 2013). In 2014, the Ebola virus stroked the country at the beginning of farming season in Liberia. It got worst in June to November, the period of major farming activities. During this period, traveling was restricted and most markets were closed including rural areas. Group meetings such as "kuu", an activity where in group of people during the farming season organized themselves in a working group on rotational basis with the aim of making a large farm that could not easily be done by one person were discouraged for fear of body contact which is one of the means by which the Ebola disease spreads from one person to another [Ministry of Health and Social Welfare (MOHSW), 2015).

Table 4.3: Cooperative Characteristics

Variable	Freq.	%	Min.	Max.	Mean	Std. Dev.
Years of membership						
Less than 10	177	71	1	40	7	6.3
10-20	66	26				
21-30	5	2				
Above 30	2	1				
Registration fees (L$)						
Less than 150.00	51	20	100.00	500.00	187.80	68.7
150.00-250.00	194	78				
Above 250.00	5	2				
Minimum Share (L$)						
Less than 500.00	41	16.4	200.00	2000.00	760.00	426.7
500.00- 1000.00	141	56.4				
1001.00- 1500.00	62	24.4				
Above 1500.00	6	2.4				
Dividend in 2014 (L$)						
Less than 1000.00	93	37	250.00	12000.00	978.26	1673.5
1000.00- 5000.00	19	8				
Above 5000.00	3	1				
Missing value	135	54				

Field survey (September/October 2015) *1USD = L$88.00*

4.5 Farm Characteristics

Table 4.4 below represents the farm characteristics of farmers under the study. It presents farm characteristics such as years in farming, farm size, land ownership, labor type, and sources of labor. Others are daily rate for man-day, rate for acre of machine work, and farm income.

The results show that 59% of cooperative members have between 5 and 10 acres, 31% cooperative participants have below 5 acres and 10% have above 10 acres with mean farm size of 6.3 acres. The results further show that 57% of non-cooperative participants have between 5 and 10 acres, 34% have below 5 acres while 3% have above 10 acres with mean farm size of 5.2 acres. Table 4.4 also indicates that majority of respondents, both cooperative members and non-members (98% and 99.3%) have squatter's right to land compared to 2% cooperative participants and 0.7% nonmembers who have legal title to land. The results reveal that most of the farmers in the study area do not have legal title to land. In the Liberian context, squatter's rights is where a citizen resides on a piece of land but does not have legal title to it. This means that such land belongs to government. Government has eminent domain over all land in the country. However, individual, a family or community is granted land use right by going through the legal process and purchasing a parcel of land from government (Land Rights Act). Table 4.4 also shows that 93% of cooperative members absolutely use human labour compared to 7% who use machine, specifically power tiller in some of their farming activities. On the other, 100% of non-members use human labour. This suggests that agriculture labor in the study area is dominantly human labor. The results confirms the Ministry of Agriculture (MOA) assessment report that the Liberian agriculture sector is characterized by low-level of technology use (MOA, 2013). Table 4.4 also reveals that 83% of

cooperative members use both family and hired labor combined, 10% practice self-labor (family labor) alone, while 7% use hired labor. It also shows that 78% of non-cooperative members use both family and hired labor while 22% practice self-labor.

Results in Table 4.4 further reveal that 72% of cooperative participants paid between L$125.00 and L$150.00 for a man-day, 6% paid above L$150.00 and 5% paid below L$125.00 with mean of L$150.36. Similarly, 72% of non-members paid between L$125.00 and L$150.00, 3.3% paid above L$150.00 while 2.7% paid below L$125.00 with mean daily rate of L$150.00.

Table 4.4 indicates that 4.8% of cooperative members paid between L$1400.00 and L$1500.00 for an acre of machine work, 2% paid above L$1500.00 while 0.4% paid below L$1400.00 with an average rate of L$1511.00. The type of machine referred to here is power tiller. The results show that non-cooperative member respondents in the study area do not use machine. Results shown in Table 4.4 also indicate that 13% of cooperative participants earned annual farm income less than L$5,000.00, 51% received between L$5,000.00 to L$20,000.00, 22% earned annual income ranging between L$20,001 to L$40,000.00 and 14.% earned above L$40,000.00 with mean annual farm income of L$21,359.43. Table 4.4 on the other hand, reveals that 34% non-cooperative members earned annual farm income less than L$5,000.00, 57% received between L$5,000.00 and L$20,000.00, 6% earned between L$20,001 to L$40,000.00 and 3% earned above L$40,000.00 with mean annual farm income of L$9671.59.

Table 4.4: Farm Characteristics of Cooperative members and non-members

Variable	Cooperative members						Non-cooperative members					
	Freq.	%	Min.	Max.	Mean	Std. Dev.	Freq.	%	Min.	Max.	Mean	Std. Dev.
Yrs. of farming												
Below 10	84	34	2	47	14	8.9	53	35	1	50	14	10.7
10-20	121	48					61	41				
21-35	38	15					29	19				
Above 35	7	3					7	5				
Farm size (acre)												
Below 5	78	31	1	15	6.3	2.6	69	46	1	15.7	5.2	2.2
5-10	148	59					77	51				
Above 10	24	10					4	3				
Land ownership												
Private	6	2					149	99.3				
Squatters	244	98					1	0.7				
Labour type												
Human	232	93					150	100				
Machine	18	7					0	0				
Labour source												
Family	25	10					33	22				
Hired	18	8					0	0				
Both	207	83					117	78				
Rate/man-day (L$)												
Below 125	12	5	100	200	150.36	18.8	4	2.7	100	200	150.00	13.1
125-150	179	72					108	72				
Above 150	16	6					5	3.3				
Missing	43	17					33	22				

Field survey (September/October 2015) *1USD = L$88.88*

Table 4.4: Farm Characteristics of Cooperative members and non-members cont'd.

Variable	Cooperative members						Non-cooperative members					
	Freq.	%	Min.	Max.	Mean	Std. Dev.	Freq.	%	Min.	Max.	Mean	Std. Dev.
Acre of machine work (L$)												
Below 1400	1	0.4	1200	1650	1511	110.6						
1400-1500	12	4.8										
Above 1500	5	2										
Missing value	232	92.8										
Farm income(L$)												
Below 5000	34	13	500	125050	21359.43	23104	50	34	500	105000	9671.59	16042
5000-20000	126	51					86	57				
20001-40000	54	22					9	6				
Above 40000	36	14					5	3				

Field survey (September/October 2015) *1USD = L$88.88*

4.6: Sources of Farm Income

Results shown in Table 4.5 below indicate that 66% of cooperative participants earned total annual farm income from food crops production, 53% receive annual farm income from plantation crops while 3% earned annual farm income from livestock production. Table 6 also reveals that 87% of non-cooperative members earned total annual farm income from food crops production, 21% earned annual farm income from plantation crops and 3% received farm income from animal production.

Table 4.5. Sources of annual farm income

Cooperative members			Non-cooperative members	
Sources	Frequency	Percent	Frequency	Percent
Food crops	164	66	131	87
Plantation crops	132	53	31	21
Farm animals	8	3	4	3

Field survey (September/October 2015) *1USD = L$88.00*

4.7 Access to Extension Services and Major Sources of Capital

This section discusses respondents' access to extension services and major sources of capital under the following headings: access to extension service, sources of extension services, major sources of capital and sources of borrowed funds.

4.7.1 Access to Extension Services

The results presented in Figure 4.1 below suggest that 80% of cooperative participants have access to extension services compared to 20% who do not access extension services. The results also show that 3% of non-cooperative participants receive extension services relative to 97% who do

not receive extension services. This implies that extension services are directed toward farmers who are members of agricultural cooperatives as it is easy to get to them. Membership of farmers' based organization such as cooperatives puts farmers in a better position to access extension services because group membership reduces the cost of providing extension services (Asogwa *et al*., 2014). Farmers who have access to extension services are exposed to adopting innovations which help in improving level of production by applying the skills and knowledge acquired through extension contact. Agricultural extension is the most essential source of information to farmers in most African countries and plays a substantial part in influencing farmers' adoption of modern technologies (Msimango and Oladele, 2013).

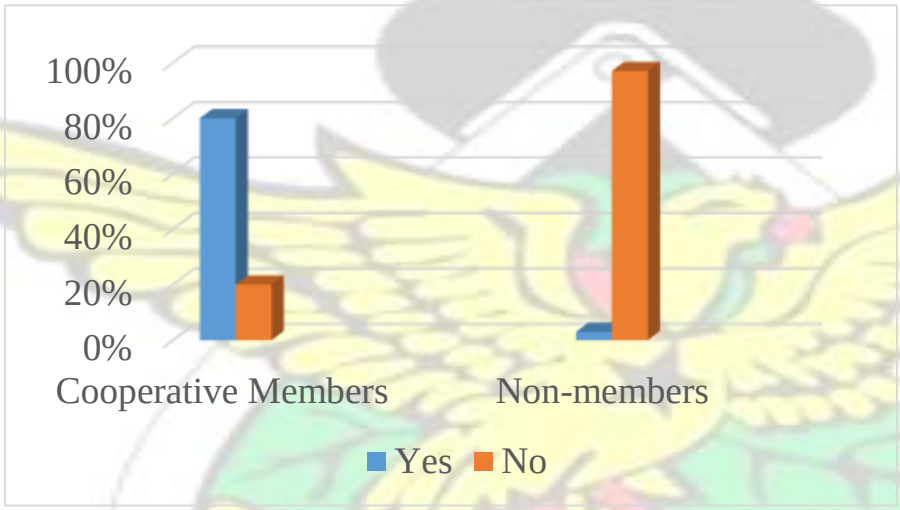

Figure 4.1. Access to Extension Services
Field survey (September/October 2015)

4.7.1 Sources of Extension Services

Results in Figure 4.2 below show that majority, 75% of the farmers accessed extension services from non-governmental organisations (NGOs) in 2014 and 15% received extension services from government while 10% received extension services from cooperative societies. The results reflect the current situation in the country where most of the agricultural funds come from donors. About

90% of the budgetary allocation for Agriculture in the 2014 national budget come from donor funding (MOFDP, 2014). Most of these funds are used on agricultural extension related activities while the rests are used on institutional and human resource development (MOA, 2014). Currently, there are several international non-governmental organizations, United States Agency for International Development (USAID), United States African Development Foundation (USADF), World Food Program (WFP), United Nations Food and Agricultural Organization (FAO) for example currently working with cooperatives and other farmer based organisations (FBO) across the country in different agricultural related programs (MOA, 2015).

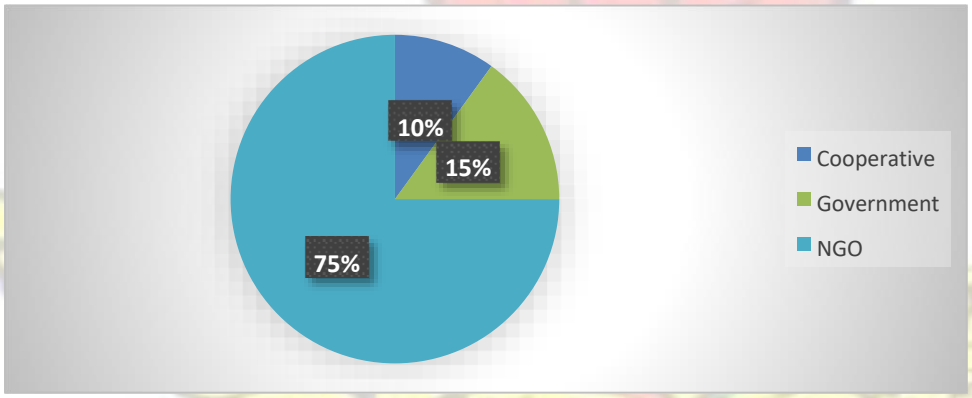

Figure 4.2. Sources of Extension Services
Field survey (September/October 2015)

4.7.2 Major Sources of Capital

The results in Figure 4.3 below indicate that 86% of cooperative members self- financed farming activities while 14% borrowed funds during 2014 farming season. Similarly, 86% of noncooperative members accessed capital through self-financing while 14% accessed funds through borrowed for 2014 cropping season. The results imply that farmers in the study area do not have access to credit. Access to credit plays a very important role in agricultural production; it enhances farmers' purchasing power to enable them acquire modern technologies (Baiyegunhi *et al.*, 2013).

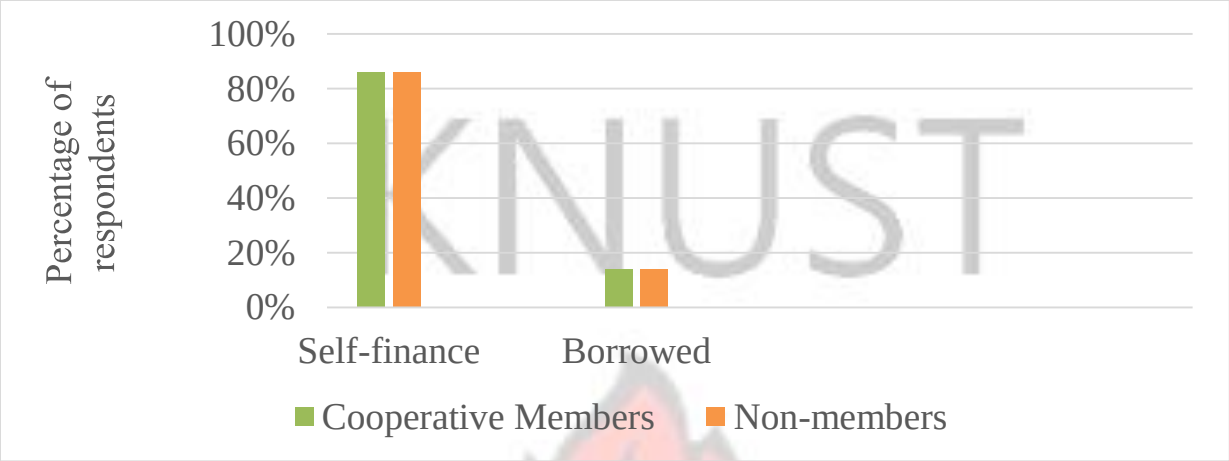

Figure 4.3. Sources of Capital
Field survey (September/October 2015)

4.7.2.1 Sources of Borrowed Funds

Results in Table 4.6 below indicate that 10.8% of cooperative members borrowed funds from cooperatives, 2% borrowed funds from family and 1.6% borrowed funds from friends. Table 7 also reveals that 7% of non-cooperative members borrowed funds from money lenders, 5% credited from friends while 2% borrowed from family members.

Table 4.6. Sources of Borrowed Funds

Variables	Cooperative members		Non-cooperative members	
	Frequency	Percentage	Frequency	Percentage
Family	5	2	3	2
Friend	4	1.6	8	5
Money lenders	0	0	10	7
Cooperative	27	10.8	0	0
Missing value	214	85.6	129	86

Field survey (September/October 2015)

4.8 Crops and Livestock Production

This section presents the results on crop and livestock production in the study area under the topics: major tree crops, major food crops, inputs use in major food crops production, and livestock production.

4.8.1 Crop Production

The statistics on major tree and food crops production in the study area is presented and discussed under this section.

4.8.1.1 Major Tree crops

Results in Figure 4.4 below show that 45.6% of cooperative members produce cocoa compared to 12% non-cooperative members. 8.4% of cooperative participants are engaged in coffee production relative to 1.3% of non-cooperative member farmers. Figure 4.4 also reveals that 7.6% of cooperative members are into rubber production while 2.7% of non-members are engaged in rubber production. 11.2% of cooperative-member respondents produce palm compared to 6.7% of non-members. The results reflect the Ministry of Agriculture report on tree crops production in the country. According to the Ministry, the tree crop sub-sector is underdeveloped due to the 14 years of civil conflict; tree crop farms were abandoned and most of them grew into hard bush (MOA, 2010).

Figure 4.4. Major Tree Crops grown by Respondents
Field survey (September/October 2015)

4.8.1.2 Major Food Crops

Rice and cassava are the two major food crops that are grown by respondents in the study area. Figure 4.5 below indicates that 90% of cooperative members and 95% of non-cooperative members produced rice in 2014. The results also show that 93% of cooperative participants and 91% of non-cooperative members produced cassava in 2014. The results conform to the major food crop production in the country. Rice is the first staple food follow by cassava. Rice and cassava form over 95% of the main diet of a typical Liberian household (MOA, 2008).

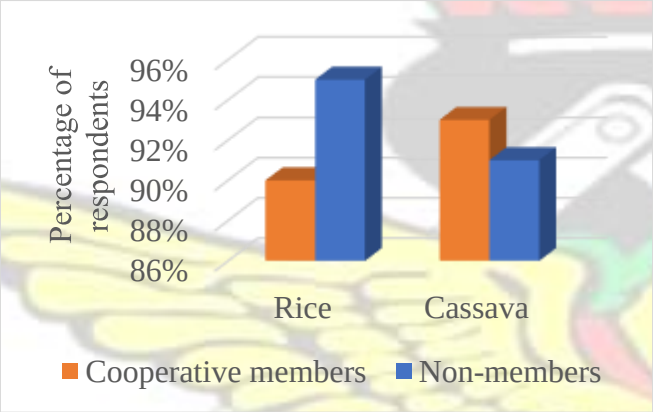

Figure 4.5. Major Food Crops
Field survey (September/October 2015)

4.8.1.2.1 Rice Production

The results shown in Table 4.7 below represents the quantities of rice harvested by respondents in 2014. The results show that 70% of cooperative participants harvested between 400 to 800 Kg of rice per acre, 26% got between 801 to 1500 Kg, 3% received below 400 Kg and 1% received above 1500 Kg of rice per acre with mean yield of 764.29 Kg. Table 4.7 reveals that 74% of noncooperative members produced between 400 to 500 Kg and 26% harvested below 400 Kg of rice per acre with mean yield of 420.34 Kg. This analysis shows that farmers who are members of agricultural cooperatives obtained higher yield compared to farmers who are not members of

cooperatives. This difference may be attributed to the fact that majority of the farmers who are members of cooperatives receive extension services (Figure 4.1) and it is assumed that they apply the skills and knowledge acquired from extension contacts. The results confirms the national rice yield per acre of local rice varieties. On the average, local rice varieties yield between 400 Kg to 800 Kg (1-2 ton/ha) per acre (MOA, 2015).

Table 4.7. Rice Yield per Acre

Variables	Cooperative members		Non-members	
Category of Yield (Kg) per acre	Frequency	Percentage	Frequency	Percentage
Below 400	7	3	36	26
400-800	157	70	105	74
801-1500	59	26	0	0
Above 1500	3	1	0	0
Total	226	100	141	100
Minimum	313		250	
Maximum	2025		625	
Mean	764.29		420.34	
Std. deviation	293.6		76.2	

Field survey (September/October 2015)

4.8.1.2.2 Cassava Production

The results shown in Table 4.8 indicate that 88% of cooperative participants harvested between 500 to 800 Kg of cassava tubers, 8% harvested above 800 Kg while 4% produced less than 500 Kg with an average yield of 525 Kg per acre. The results further show that 87% of non-cooperative participants produced between 500 and 800 Kg, 7% harvested above 800 Kg and 6% received less than 500 Kg of cassava tubers with a mean of 490 kg per acre. The mean yields per acre are less than the average national yield of 720 Kg per acre of local cassava varieties which are cultivated by most of the farmers in the study area (IITA, 2012).

Table 4.8: Cassava yield per acre

Variables	Cooperative members		Non-members	
Yield Category (Kg)	Frequency	Percentage	Frequency	Percentage
Below 500	10	4	9	6
500-800	216	88	126	87
Above 800	19	8	10	7
Total	245	100	145	100
Minimum	400		400	
Maximum	1250		1000	
Mean	525		490	
Standard deviation	119.1		117.1	

Field survey (September/October 2015)

4.8.1.3 Use of Improved Rice Varieties and Agro-chemicals

Figures 4.6a and 4.6b below represent use of improved crop variety and agrochemicals in rice production in the study area. Results in figure 4.6a show that 14% of cooperative participants use improved rice variety and agro-chemicals such as NPK fertilizers, urea, fungicides, insecticides, and herbicides in rice production. Figure 4.6b represents the types of chemicals. The results show that 61% of those who use modern variety and agrochemicals planted improved seeds, 17% applied fungicides, 22% used insecticides, and 22% applied herbicides. Figure 4.6b also reveals that 55% applied NPK fertilizers and 19% used urea in 2014 cropping season. The results indicate that the use of improved seeds and agrochemicals is limited among farmers in the study area. This confirms the Comprehensive Food Security and Nutrition Survey report that Liberia Agriculture sector is characterized by low productivity, inefficient management, and low-level technology (MOA, 2008).

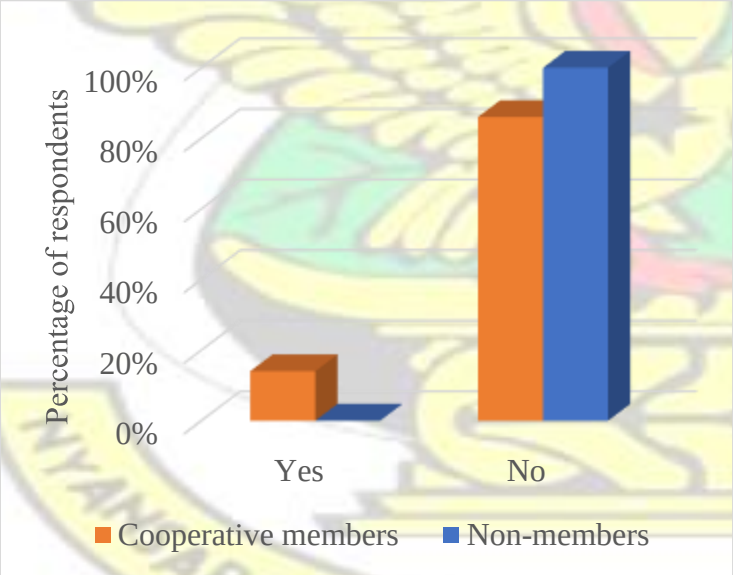

Figure 4.6a. Use of improved crop variety and agro-chemicals
Field survey (September/October 2015)

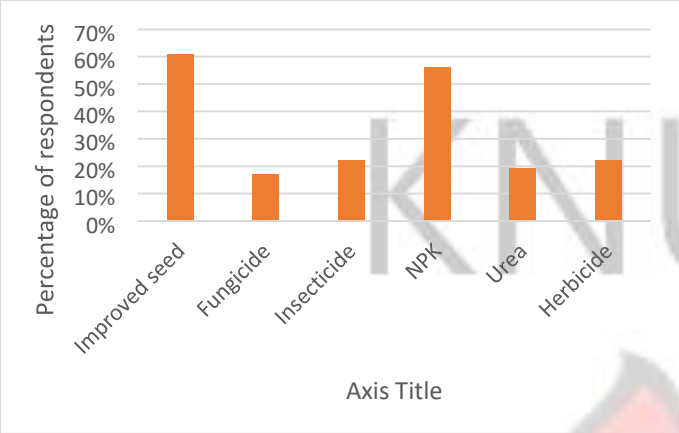

Figure 4.6b. Type of crop variety and agro-chemicals
Field survey (September/October 2015)

4.8.2 Livestock Production

The results in Figures 4.7a and 4.7b below represent the livestock wealth amongst respondents. The results in 4.7a show that 21% of cooperative participants rear livestock compared to 9% of non-cooperative participants. Results shown in Figure 4.7b reveals that 1% of cooperative members raise sheep relative to 0% of non-cooperative members, 8% of cooperative member rear goats compared to 0.6% of respondents who are not members of cooperatives, and 17% of cooperative members raise chickens relative to 9% non-cooperative members. However, during the survey, majority of the farmers reported high incident of chicken death due to disease attack. The results confirm the current state of the livestock sub-sector of the country. The livestock subsector plays a minimal role in the Liberian economy, accounting for about 14% of the agricultural GDP (Koikoi, 2011). Most of the animals are owned by traditional farmers who use local, less productive animal breeds and inappropriate techniques. Demand for livestock products greatly outstrips domestic supply; as a result, importation of livestock products and live animals are high (Koikoi, 2011). According to the Liberian Agriculture Sector Investment Program report (MOA,

2010), lack of improved breeding stock, lack of feed, diseases and unavailability of veterinary services, and inadequate transportation and bad roads are the challenges facing the livestock subsector.

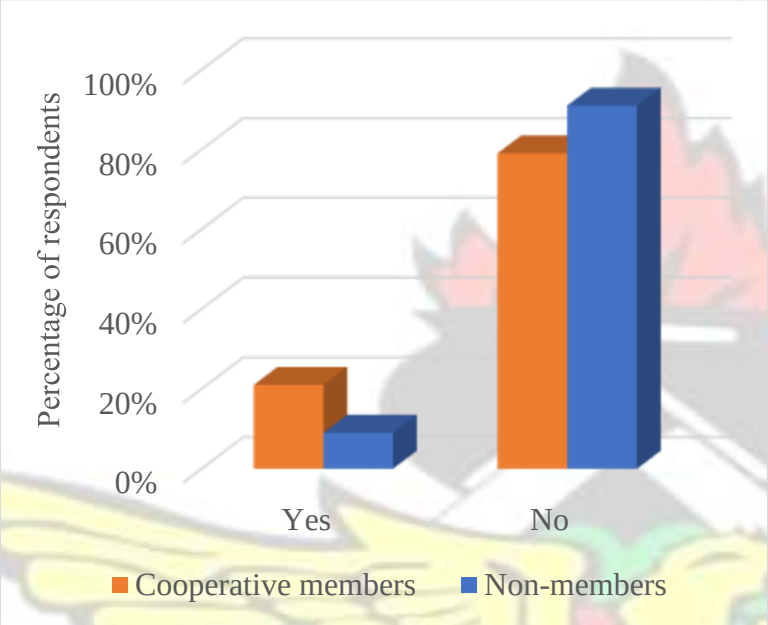

Figure 4.7a. Livestock Production
Field survey (September/October 2015)

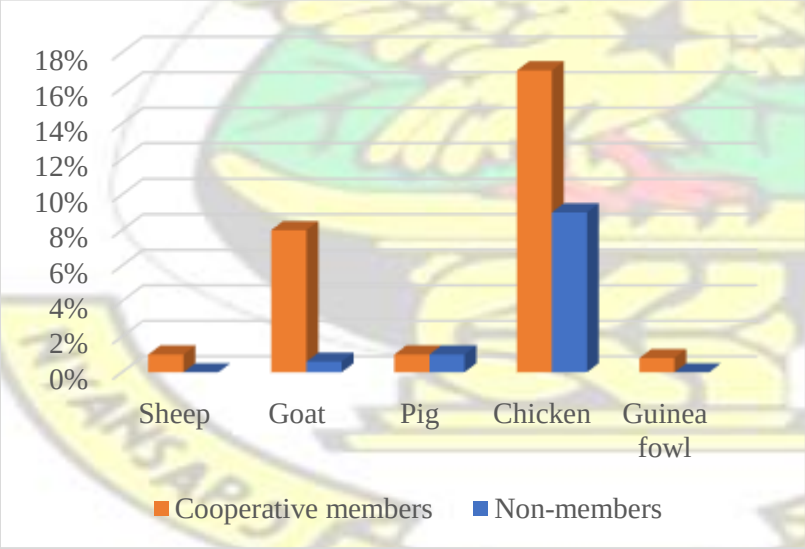

Figure 4.7b. Types Livestock
Field survey (September/October 2015)

4.9 Crop Productivity and Average Farm Income

Table 4.9a and 4.9b below represents crop productivity and average farm income of cooperative members and non-cooperative members respectively. The results in Table 4.9a indicate that the average cocoa yield per acre of cooperative participants is 51.58 Kg relative to 45 Kg in Table 9b for non-cooperative participants. The results also reveal that average coffee yield per acre for cooperative members is 42.57 (Table 4.9a) compare to 30 Kg (Table 4.9b) per acre for noncooperative members. The average rubber yield per acre for cooperative participants is 0.507 ton while that of non-cooperative members is 0.331 ton per acre. Palm oil production per acre for cooperative member respondents is 38.38 gallons (5-liter gallon) and for non-cooperative members is 22.59 gallons per acre of palm farm. The results shown in Tables 9a and 9b show that average rice yield per acre for cooperative members is 764.29 Kg compared to 420.34 Kg for noncooperative participants. The results further reveal that average cassava yield per acre for cooperative members is 10.5 bags (50-kg bag of cassava tubers) relative to 9.8 bags for noncooperative participants. Tables 9a and 9b also present average farm income derived from crop and livestock production of both cooperative members and non-members. The results suggest that average farm income for cooperative participants is L$21,359.43 compared to L$9,671.59 for noncooperative members. The results indicate that farmers who are members of agricultural cooperatives obtained higher crop yield of the various crops considered under the study relative to farmers who are not members of agricultural cooperatives in the study area. The results further show higher farm income for cooperative members compared to non-cooperative members. The difference in crop yield of cooperative participants and non-cooperative participants is because cooperative member farmers access extension services compared to non-cooperative member

farmers (figure 4.1) and that for farm income, it is due to the collective bargain power cooperative members enjoy.

Table 4.9a: Crop productivity and average farm income of cooperative members

Cooperative Members						
	Total Area (acres)	Total Yield	Ave. Yield	Quantity Sold	Unit Price (L$)	Total Income (L$)
Cocoa	283.1	14604.6 Kg	51.58 Kg	14604.6 Kg	152.14	2,221,943.84
Coffee	45.1	1920 Kg	42.57 Kg	1920 Kg	50.91	97,747.20
Rubber	20	10.13 ton	0.507 ton	10.13 ton	33,440	338,747.20
Palm oil	26	998.3gallons*	38.38 gallons	998.3gallon	270.56	270,100.00
Rice	940	718,428 Kg	764.29 Kg	34,957.57	34.42	1,203,239.56
Cassava	207.14	2175 bags*	10.5 bags	2131 bags	547.28	1,166,253.68
Sub-Total Income						5,298,031.48
Livestock Production						
Livestock	Quantity in Stock	Quantity Sold		Unit Price (L$)		Total Income (L$)
Goat	81	5		3,125.00		15,625.00
Pig	27	3		4,000.00		12,000.00
Chicken	484	23		400.00		9,200.00
Guinea fowl	11	4		1,250.00		5,000.00
Sub-Total Income						41,825.00
Total Income						5,339,856.48
Number of respondents						250
Average Income						21,359.43

Field survey (September/October 2015) *1USD = L$88.00*

* 1gallon = 5liters

* 1bag of cassava = 50 Kg of cassava tubers

Table 4.9b: Crop productivity and average farm income of non-cooperative members

Non- cooperative members						
Crop	Total Area (acres)	Total Yield	Ave. Yield	Quantity Sold	Unit Price (L$)	Total Income (L$)
Cocoa	62.17	2797.90 Kg	45 Kg	2797.90 Kg	135.00	377,716.50
Coffee	3	90 Kg	30 Kg	90 Kg	50.00	4,500.00
Rubber	7.5	2.484 ton	0.331 ton	2.484 ton	31,900.00	79,239.6
Palm oil	5.8	131 gallons	22.59 gallons	131gallons	240.00	31,440.00
Rice	524	220,256 Kg	420.34 Kg	6650 Kg	25.00	166,250.00
Cassava	204.4	2003 bags	9.8 bags	1740 bags	451.26	785,192.00
Sub-Total Income						1,444,338.10
Livestock Production						
Livestock	Quantity in Stock		Quantity Sold	Unit Price (L$)		Total Income (L$)
Goat	8		2	2500.00		5000.00
Pig	18		0	0		0
Chicken	110		4	350		1400.00
Sub-Total Income						6400.00
Total Income						1,450,738.10
Number of respondents						150

Average Income	9,671.59

Field survey (September/October 2015) *1USD = L$88.00*

* 1gallon = 5liters
* 1bag of cassava = 50 Kg of cassava tubers

4.10 Farmers' Perceptions of Agricultural Cooperative

This section discusses farmers' perceptions of agricultural cooperative under the headings, perceptions of cooperative participants and non-cooperative participants.

4.10.1 Ranking of Perceptions by Cooperative Members

Table 4.10 below represents the perceptions of cooperative members of agricultural cooperatives in the study area. The results indicate that cooperative members strongly agree to the following perception statements: cooperatives help members attain higher standard of living through higher profits, members benefit by receiving dividends, and that cooperatives are not managed efficiently. The results further show that cooperative participants agree that cooperatives are instrumental in introducing new products and technologies to local farmers; farmers would generally pay higher prices for supplies if it were not competition from cooperatives; cooperative members should patronize cooperatives and that cooperatives offer better prices than other competing businesses. The results in Table 10 also reveal that cooperative members disagree that cooperative leaders care more about cooperative survival than members' needs. They also disagree that cooperative members are not inform about the operation of their cooperative societies while they strongly disagree that there is no difference between cooperative and other businesses. The general

perception index (PI) of 0.31 means that there is an agreement among cooperative members of their perceptions of agricultural cooperatives in the study area.

Table 4.10. Ranking of perceptions by cooperative members

Statement	Ranks					Mean Rank
	1	0.5	0	-0.5	-1	
Cooperatives are instrumental in introducing new products and technology to local farmers	61	140	3	26	20	0.4
Cooperatives help members attain higher standard of living through higher profits	158	80	6	3	3	1
Members benefit by receiving dividends	162	79	5	4	0	1
Cooperatives are not managed efficiently	127	113	9	1	0	1
Farmers would generally pay higher prices for suppliers if it were not for competition from cooperatives	64	161	4	21	0	0.5
Cooperatives offer better prices than other competing business	35	119	8	84	4	0.2
Cooperative leaders are care more about cooperative survival than members' needs	5	49	5	176	15	-0.3
Members are not informed about the operation of their cooperatives	13	66	4	153	14	-0.2
Cooperative members should patronize cooperatives	45	185	2	13	5	0.5
No difference between cooperative and other businesses	0	3	2	81	162	-1
Perception Index (PI)						0.31

Field survey (September/October 2015)

**1=strongly agree, 0.5=Agree, 0= Neutral, -0.5= Disagree, -1= strongly disagree*

4.10.2 Ranking of Perceptions by Non-cooperative Members

Table 4.11 below represents the mean ranks of the perceptions of non-cooperative member respondents. The results indicate that non-cooperative members strongly agree that cooperative leaders are care more about cooperative survival than members' needs and that there is no difference between cooperative and other businesses. The results further show that noncooperative members agree that cooperative members are not informed about the operation of their cooperatives; cooperatives are not managed efficiently; cooperative members should patronize cooperative societies and that cooperatives are instrumental in introducing new products and technologies to local farmers. On the other hand, Table 4.11 reveals that non-cooperative members disagreed that cooperative members benefit by receiving dividends; that cooperatives help members attain higher standard of living through higher profits; and that cooperatives offer higher prices than other competing businesses. Results in Table 4.11 also indicate that noncooperative members disagreed that farmers would generally pay higher prices for supplies if it were not competition from cooperatives. The perception index of 0.20 indicates that there is a weak agreement among non-cooperative members of their perceptions of agricultural cooperatives in the study area. This suggests that non-cooperative members in the study area do not have sufficient knowledge about cooperatives and the principles of cooperatives.

Table 4.11: Ranking of perceptions by non-cooperative members

Statement	Ranks					Mean Rank
	1	0.5	0	-0.5	-1	
Cooperatives are instrumental in introducing new products and technology to local farmers	12	86	10	31	11	0.2
Cooperatives help members attain higher standard of living through higher profits	2	20	6	99	23	-0.4
Members benefit by receiving dividends	5	24	4	109	8	-0.3
Cooperatives are not managed efficiently	29	100	10	11	0	0.5

Farmers would generally pay higher prices for suppliers if it were not for competition from cooperatives	5	5	4	118	18	-0.5
Cooperatives offer better prices than other competing business	3	13	6	118	10	-0.4
Cooperative leaders are care more about cooperative survival than members' needs	100	20	4	16	10	1
Members are not informed about the operation of their cooperatives	25	112	6	4	3	0.5
Cooperative members should patronize cooperatives	28	100	4	14	4	0.4
No difference between cooperative and other businesses	52	93	2	3	0	1
Perception Index (PI)						0.20

Field survey (September/October 2015)

**1=strongly agree, 0.5=Agree, 0= Neutral, -0.5= Disagree, -1= strongly disagree*

4.11 Services Derivable from Cooperatives

Figure 4.8 below represents the services derivable from cooperatives in the study area. According to the results, 92% of cooperative participants indicated that they use their cooperative societies as market outlet. Farmers access markets through bulk selling (Hovhannisyan *et al* 2012). 89% received technical training and 69% received improved prices from cooperatives. Figure 4.8 also reveals that 89% enjoyed collective bargaining power while 68% access credit from cooperative societies. This distribution implies that members of agricultural cooperatives in the study area benefit from services provided by cooperative societies. This conforms to the purpose for which agricultural cooperatives are formed. Agricultural cooperatives are generally formed to address farm-level constraints faced by poor rural farmers as well as market failure. According to Clergy (2006), agricultural cooperative organizations are supportive in overcoming barriers that impede farmers' access to markets. Cooperatives help smallholder farmers cope with competitive and

unstable markets, increased transaction costs and to succeed in economies of scale through bulk selling. Cooperatives institutions enhance the bargaining power of farmers (Onumah, 2007).

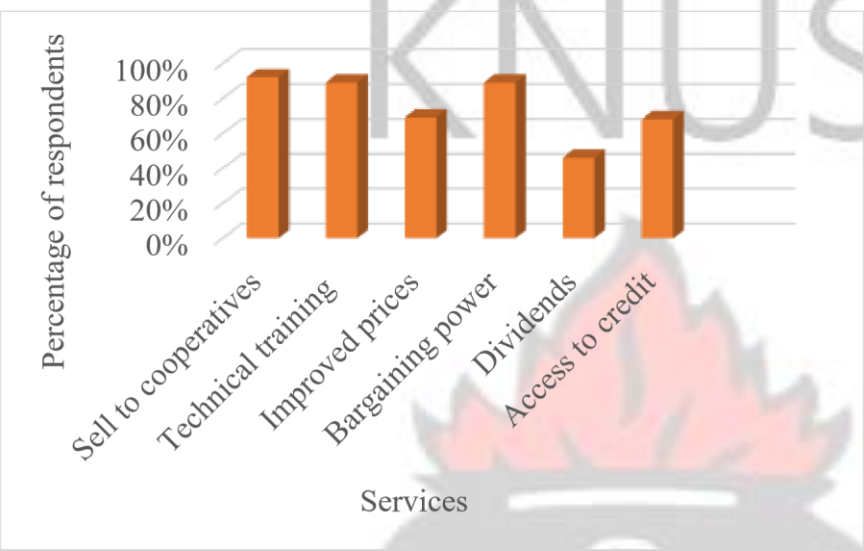

Figure 4.8: Services derivable from agricultural cooperatives
Field survey (September/October 2015)

4.12 Constraints faced by Farmers

This section discusses constraints faced by farmers in the study area under the following topics: constraints faced by cooperative members and non-members.

4.12.1 Constraints Faced by cooperative members

High returns from farm generally require farmers overcoming production and marketing constraints. Nonetheless, during agronomic and marketing stages, the farmers encounter some constraints. The cooperative-member farmers under the study were presented with some constraints to rank. In ranking, the constraints with the least overall rank assumes the highest important ones and constraints with the highest overall rank number implies the least important ones. Results shown in Table 4.12 below represents cooperative members' ranking of constraints. The results indicate that cooperative members under the study ranked use of primitive tools, pests

and diseases, high post-harvest loses, unavailability of improved seeds, high cost of chemicals and low yield as the topmost six constraints faced by farmers in the study area. Labour scarcity, lack of access to farm land, and lack of extension services were the least ranked constraints faced by cooperative-member farmers. The first most serious constraint that is faced by most cooperative members is use of primitive tools. This implies that agricultural production in the study area is characterized by the use of low-level technology. According to the IMF (2015), agriculture is the dominant contributor to export trade and earnings and a source of livelihood for a greater number of the active population (70%) than any other sector, but the sector is dominated by traditional subsistence farming.

The second major intractable constraint is the devastating effects of pests and diseases. According to Omofonmwan and Kadiri (2009), the effect of pests and diseases cause reduction in crop yield, and consequentially affect farm income.

In further analysis to test for the level of agreement among cooperative-member farmers' constraints rank, Kendall's Coefficient of concordance was employed. The estimated Kendall's coefficient (W) was 0.67 suggesting that there was 67% agreement among cooperative participants' constraints ranked. The F-statistic was employed in testing the level of significance of the estimated Kendall's Coefficient of concordance. The F-value obtained implies that, the constraints ranked were statistically significant at 1%. The results implies that there is agreement among cooperative members' rankings of constraints.

Table 4.12: Ranking of constraints by cooperative members

Statement	Ranks					Mean Rank	Overall Rank
	1	2	3	4	5		
Use of primitive too	248	1	1	0	0	1	1
Pests and diseases	115	132	0	2	1	1.5	2
High post-harvest loses	106	143	0	1	0	1.6	3
Unavailability of improved seeds	104	126	20	0	0	1.7	4

High cost of chemical	54	195	1	0	0	1.8	5
Low yield	55	194	1	0	0	1.8	6
High cost of seeds	45	175	30	0	0	1.9	7
Lack of access to credit	35	207	7	1	0	3.1	8
Labour scarcity	11	25	106	100	8	3.2	9
Lack of access to farm land	7	32	62	134	15	4	10
Lack of extension services	4	0	106	125	15	4	11
Number of observations	250						
Degree of freedom	10						
Kendall's W	0.67						
Asump. Sig.	0.000***						

Field survey (September/October 2015)
**1=Very high, 2=High, 3= Low, 4= Very low, 5= None*
******* *Significant at 1% level*

4.12.2 Constraints faced by Non-cooperative Members

The results shown in Table 4.13 below indicate that non-cooperative members ranked lack of access to credit, low yield, pests and diseases, high cost of chemicals, and high post-harvest loses as the topmost five constraints. The farmers also ranked unavailability of improved seeds, use of primitive tools, lack of extension services and high cost of seeds as high constraints. Labour scarcity and lack of access to farm land was ranked as the least constraints. The first most serious constraint ranked is lack of access to credit. Access to credit is a necessary ingredient in the various aspect of farming operations. It therefore plays a crucial role in the adoption of modern innovation and the purchase of production inputs. The estimated Kendall's Coefficient of concordance was 0.72 implying that, there was 72% agreement among non-cooperative members' constraints ranked. The F-value obtained implies that, the constraints ranked were statistically significant at 1%. This result shows that there is strong agreement among non-cooperative members' ranking of constraints.

Table 4.13: Ranking of constraints by non-cooperative members

Statement	Ranks					Mean Rank	Overall Rank
	1	2	3	4	5		
Lack of access to credit	138	12	0	0	0	1	1
Low yield	94	56	0	0	0	1.3	2
Pests and diseases	106	44	0	0	0	1.3	3
High cost of chemical	87	62	0	1	0	1.4	4
High post-harvest loses	54	96	0	0	0	1.6	5
Unavailability of improved seeds	70	72	3	5	0	1.6	6
Use of primitive tools	19	130	1	0	0	1.8	7
Lack of extension services	4	146	0	0	0	1.9	8
High cost of seeds	7	123	20	0	0	2.1	9
Labour scarcity	6	6	48	81	9	3.5	10
Lack of access to farm land	2	8	45	85	10	3.6	11
Number of observations	150						
Degree of freedom	10						
Kendall's W	0.72						
Asump. Sig.	0.000***						

Field survey (September/October 2015)

**1=Very high, 2=High, 3= Low, 4= Very low, 5= None*

*****Significant at 1% level*

4.13 Challenges confronting Agricultural Cooperatives

This section discusses the challenges faced by agricultural cooperatives in the study area under the topics: internal and financial challenges, and governance and communication challenges.

4.13.1 Internal and Financial Challenges

The results shown in Table 4.14 below indicate that decision making, inadequate equity capital, planning, human resources and efficient use of resources are the topmost five internal and financial

challenges faced by agricultural cooperatives in the study area. Aligning incentives and lack of access to credit were also ranked as high constraints while cooperation with cooperatives and high taxes were ranked as least constraints. The Kendall's Coefficient (W) was 0.66 implying that there was 66% agreement. The F-value was significant at 1%. This implies that there is agreement among cooperative members' ranking of internal and financial challenges.

Table 4.14: Ranking of internal and financial challenges facing cooperatives

Statement	Ranks					Mean Rank	Overall Rank
	1	2	3	4	5		
Decision making	138	111	1	0	0	1.5	1
Inadequate equity capital	121	129	0	0	0	1.5	2
Planning	87	163	0	0	0	1.6	3
Human resources	85	164	1	0	0	1.7	4
Efficient use of resources	26	223	1	0	0	1.9	5
Aligning incentives	38	207	4	1	0	1.9	6
Lack of access to credit	4	246	0	0	0	2	7
Cooperation with cooperatives	5	45	185	13	2	2.8	8
High taxes	0	0	0	178	75	4	9
Number of observations	250						
Degree of freedom 8 Kendall's W 0.66							
Asump. Sig.	0.000***						

Field survey (September/October 2015)

**1=Very high, 2=High, 3= Low, 4= Very low, 5= None*

*** Significant at 1% level*

4.13.2 Governance and Communication Challenges

The results shown in Table 4.15 below indicate that public understanding of cooperatives, educating and recruiting youth, board competency, members' involvement in cooperative activities and members' level of education are the topmost five governance and communication challenges faced by cooperatives in the study area. Balancing cooperative and members' needs, communicating cooperative values to members, board dedication, recruiting board members and board orientation were also ranked as high challenges. The Kendall's Coefficient (W) was 0.44

implying that there was 44% agreement among cooperative members on the governance and communication challenges. The F-value was significant at 1%. This implies that there is agreement among cooperative members' ranking of governance and communication challenges.

Table 4.15: Ranking of governance and communication challenges confronting cooperatives

Statement	Ranks					Mean Rank	Overall Rank
	1	2	3	4	5		
Public understanding of cooperative	215	35	0	0	0	1	1
Educating and recruiting youths	189	61	0	0	0	1.2	2
Board competency	169	74	7	0	0	1.4	3
Members involvement in activities	143	106	1	0	0	1.4	4
Members' level of education	131	115	4	0	0	1.5	5
Balancing cooperative and members' needs	80	142	28	0	0	1.8	6
Communicating cooperative values to members	53	177	15	5	0	1.9	7
Board dedication	0	231	15	4	0	2.1	8
Recruiting board members	1	215	33	1	0	2.1	9
Board orientation	3	153	94	0	0	2.4	10
Number of observations	250						
Degree of freedom	9						
Kendall's W	0.44						
Asump. Sig.	0.000***						

Field survey (September/October 2015)

**1=Very high, 2=High, 3= Low, 4= Very low, 5= None*

*** Significant at 1% level*

4.14 Determinants of Farmers' Participation in Cooperatives and Impact on Farm-income

This section discusses the determinants of farmers' participation in agricultural cooperative and the impact of cooperative membership on annual farm-income under the topics: mean differences in farm and household characteristics of cooperative members and non-members, and endogenous switching regression estimates.

4.14.1 Mean Differences in Farm and Household Characteristics

Table 4.16 presents differences in farm and household characteristics of cooperative members and non-members, with their mean differences using t-values to test for significant differences. The tvalues suggest that there are some differences between cooperative members and non-members, with respect to some farm-level and household characteristics. The results show that 67% of cooperative members are males relative to women whereas 54% of non-cooperative members are males compared to women, with significant mean difference of 0.13 at 5%. This implies that there are more men in cooperatives, and this suggests that women participation in cooperatives in the study area is very low. The average age of cooperative members is about 45 compared to about 43 years of age for non-cooperative members. The significant mean difference of 2.22 at 5% level indicates that members of cooperatives are older than non-cooperative members.

In terms of education, the results show that there are no significant differences between years of formal education for members and non-members of cooperatives. Both members and nonmembers have about 4 years of formal education. This further shows that both categories of respondents have low level of formal education. Similarly, cooperative members on the average have about 8 members in a household, compared to 7 members of household for non-cooperative members. The insignificant mean difference suggests that there are no significant differences between members and non-members of cooperatives in terms of household size. In terms of farm size, the results reveal that cooperative members have about 6.31 acreages compared to 5.18 acreages for non-cooperative members, with significant mean difference of 1.13 at 1% level. This means that cooperative members on the average have more farm lands relative to non-cooperative members. The results further show that about 80% of cooperative members have access to extension service

whereas only 3% of non-cooperative members have access to extension service. The highly significant mean difference of 0.77 suggests that non-cooperative members are disadvantaged in terms of access to extension services. The intuition drawn from this finding is that, if access to extension is to be improved in the study area, farmers should be encouraged to form cooperatives. Regarding farming experience, the results showed no significant difference between cooperative members and non-members, with an average farming experience of about 14 years. The results reveal significant differences in farm income between cooperative members and non-members. Averagely, cooperative members have about 21,359.43 (Liberian Dollars) whereas non-cooperative members earn about 9671.59 (Liberian Dollars). There is a significant mean difference of 11,687.84 (Liberian Dollars) at 1% level and this suggests that participating in cooperative plays significant role in improving farm income. About 96% of cooperative members agree that the current management of cooperatives are not efficiently done. Similarly, 86% of noncooperative members also agree to the statement that cooperatives are not well managed in the study area. This implies that respondents perceive management of cooperatives to be ineffective. On the other hand, 95% of cooperative members sampled in the study agreed to the statement that cooperatives help their members to attain better standard of living relative to only 17% of nonmembers who had similar perception. There exist a highly significant mean difference of 0.78 and this implies that perception on the benefits of cooperatives significantly varies among members and non-members. This means that individual perceptions about cooperatives should be given some attention since it has a bearing on participation. In terms of crop type, 90% of cooperative members grew rice in 2014 while 95% of non-cooperative members grew rice. The results further show that 14% of cooperative members access credit compared to 5% of non-cooperative members with a highly significant mean difference of 0.10 at 1%. This means that for farmers in the study area to access credit, they should be encourage to join agricultural cooperatives. According to Asogwa *et*

al. (2014), when farmers join social and economic association, the probability that they will access credit to support their farming activities is most likely to increase. Results shown in Table 4.2 also reveal that about 7% of cooperative members have access to machine (power tiller) relative to 0% of non-cooperative members with a highly significant mean difference of 0.068 at 1% level. The result implies that some farmers in the study area who are members of agricultural cooperatives have access to power tiller. This suggests that farmers in the study area should be encourage to joint agricultural cooperatives as it will increase the possibility of accessing some farm equipment especially power tiller which will improve their production methods thus increasing farm income.

Table 4.16. Mean Differences of Farm and Household Characteristics

Variable	Coop members (standard deviation)	Non-Coop Members (standard deviation)	Mean difference (t-values)
Gender	0.67(0.47)	0. .54(0.50)	0.13** (2.29)
Age	44.79(10.28)	42.57(11.38)	2.22** (2.013)
Education	3.87(4.88)	3.68(4.47)	0.19(0.0.43)
HHsize	8.61(3.64)	7.87(3.55)	0.74*(1.97)
Farm size	6.31(2.89)	5.18(2.24)	1.3***(4.36)
Extension	0.80(0.39)	0.03(0.18)	0.77***(3.43)
Farm experience	14.21(8.91)	14.47(10.65)	-0.26(0.99)
Farm income	21359.43 (23104.90)	9671.59(9951.77)	11687.84***(6.99)
Copnotm	0.96(0.19)	0.86(0.35)	0.10(1.09)
Coophelp	0.95(0.21)	0.17(0.47)	0.78***(4.21)
Croptype	0.90(0.30)	0.95(0.23)	-0.05*(1.630)
Acecredit	0.14(0.35)	0.05(0.21)	0.10***(3.46)
Ltype	0.07(.252)	0.00(.00)	0.07***(4.30)
Observations	250	150	

Source: Field survey (September/October) *1USD = L$88.00*

****, **, *, represent Significant at 1%, 5%, and 10% respectively*

The impact of farmers' participation in cooperative on farm income is presented in Tables 4.17. The estimates also show the determinants of farmers' participation. The endogenous switching regression model adopted in the study used the maximum likelihood approach to estimate both the participation and the outcome equations jointly. The selection equation represents determinants of cooperative participation in column 2. The coefficients are interpreted as normal probit

coefficients. Consistent with the mean differences, the results show that variables such as education, household and farm sizes, and farm experience have no significant influence on farmer's decision to join cooperative societies at the conventional levels, all things being equal. This implies that respondent's years of formal education, household and farm sizes as well as farming experience are not significant determinants of farmer's participation in cooperatives in the study area. However, the results reveal that gender has highly significant and positive influence on farmers' participation in cooperatives. The result implies that males are 0.6096 more likely to participate in cooperatives relative to females. Consistent with the mean differences, the results indicate that cooperatives in the study area are dominated by males. Age variable was statistically significant at 5% with negative coefficient of 0.0241; this suggests that an increase in farmer's age will reduce the likelihood of participating in cooperative by the estimated coefficient. This means that young farmers are more likely to participate in cooperatives in the study area. Consistent with the mean differences, the empirical estimates reveal that access to extension services have highly significant and positive influence on farmer's decision to participate in cooperatives. The significantly positive coefficient estimate of 2.3293 shows that farmers who have access to extension services are about 2.3293 more likely to participate in cooperatives relative to farmers who have no access to extension services ceteris paribus. Results shown in Table 4.17 also show that access to credit has a negative significant influence on participation in cooperative societies. The significantly negative coefficient estimate of 1.120166 indicates that farmers who access credit are less likely to participate in cooperatives. The results also indicate that farmers in Lofa County are more likely to participate in cooperative societies. This may be due to the International Fund for Agricultural Development project that is being implemented in the county. The project through cooperatives in the county provides assistance to farmers who are members of agricultural cooperatives (Field Survey). It is worth noting that farmers who perceive cooperatives to be poorly

managed have less likelihood of participating in cooperatives. This is indicated by the highly significant and negative coefficient estimate of 0.7621. Furthermore, the results show that farmers who agree that cooperatives help members to attain better standard of living are 0.5392 more likely to participate in cooperatives. This provides further support for the relevance of accounting for respondent's perceptions in empirical studies.

The results regarding the impact of farmers' participation in cooperatives on farm income are reported in the third and fourth columns of Tables 4.17, for cooperative participants and non-participants, respectively. It must be emphasized that, since perception on cooperatives does not directly influence farm income, the perception variables were not included in the income (outcome) equation. They were therefore used as the instrumental variables, since the endogenous switching regression approach requires that there be an instrumental variable (s) to indicate between the participation and outcome equations. A Wald test, indicating estimated coefficients as a group are different between cooperative member and non-member equations produced a chisquared value of 111.89 significant at 1% with 12 degree of freedom. This suggests that the coefficient estimates are statistically different. The significant likelihood ratio tests for joint independence of the three equations reveal that the equations are independent at 1% (Chi-square value was 19.60). The results show that the covariance term (r1) for the cooperative participants is statistically significant at 1% level, indicating that self-selection occurred in cooperative participation. Thus, participation in cooperative may not have the same effect on the noncooperative participants, if farmers choose to participate. Furthermore, the negative sign for the correlation coefficients (r1) indicates a positive selection bias, suggesting that farmers who participate in cooperative societies have higher farm income relative to farmers who are not members of agricultural cooperatives. Thus, membership of agricultural cooperatives has a significant impact on average farm income among those who participate in cooperative societies

in the study area. The insignificant correlation coefficients (r0) estimate for non-cooperative participants implies that in the absence of cooperative participation, there would be no significant difference in the average behavior of the two categories of farmers resulted by unobservable factors.

The results in Table 4.17 show gender has significantly positive influence on farm income of noncooperative members. The positive and significant estimate of 0.5515 implies that male farmers are more likely to have higher farm income even if they do not participate in cooperatives compared to female farmers. Age plays a significant role in explaining farm income among farmers who participate in cooperatives. The negative and significant estimate of 1.0503 shows that experienced farmers are less likely to have higher farm income from cooperative participation. This might be probably due to the fact that most of the participants are young farmers as indicated by the age variable in the selection equation. The results further indicate that education is an important factor in explaining higher farm income among cooperative participants. The significantly positive coefficient of the variable imply that good knowledge and firm understanding of cooperative principles may increase farmers' benefits in terms of farm income. The extension variable is significantly positive at 10% among cooperative participants. This means that access to extension services has the probability of increasing farmers' income. This emphasizes the significance of extension visits to farmers' production sites and farm output. Therefore, farmers should be encouraged to join cooperatives in order to access extension services while increasing their chances of improvement in farm income. Farm size has a significantly positive influence on farm income of cooperative participants at 5% level. This implies that an increase in farm size of cooperative participants will increase their farm income, all things being equal. The findings further revealed that household size has a significantly positive influence on the farm income of non-cooperative participants at 5% level. This implies that as the household

size of non-cooperative participants increase, their chances of increasing farm income also increases. This might be due to the fact that most of the household members engage in off-farm activities to generate income to support farming activities.

Table 4.17 ESR estimates for participation and income equations

Variable	Participation (selection)	Farm Income	
		Coop_members	Non-Coop Members
Constant	-0.9976472**(2.11)	9.535363***(21.88)	8.73671***(19.1)
Gender	0.6096***(2.66)	0.1574(0.60)	0.5515**(2.06)
Age	-0.0241**(-2.54)	-1.0503**(-2.17)	-0.4759(-0.93)
Education	0.0198971(1.35)	0.307446**(2.93)	0.0414175(1.43)
HHsize	-0.023714(1.19)	0.0080031(0.44)	0.0441245**(2.3)
Farm size	0.004801(0.17)	0.1777374***(7.28)	0.1952806***(7.3)
Farm_exp	0.0167598(1.36)	0.1686(1.08)	0.1619(0.92)
Extension	2.3293***(8.74)	1.0877*(1.66)	0.1229(0.46)
Crop_type	0.1352387(0.50)	0.5538268*** (4.23)	1.115229**(2.88)
Acecredit	-1.120166***(_4.69)	0.6687542***(3.28)	0.322446(1.15)
Nimba	0.132402(0.54)	0.1443417(0.98)	0.2648247(1.50)
Lofa	1.366402***(3.69)	0.1744377*(1.69)	0.2375362(1.15)
Copnotm	-0.7621***(-2.62)		
Coophelp	1.5392***(8.35)		
Lns0			9.6488***(211.21)
r0			-0.0379 (-0.24)
Lns1		10.0442***(228.28)	
r1		-0.7642***(3.23)	
Number of obs.	400		
Wald chi2(12)	111.89***		
Log likelihood	-711.73336		
LR test of independence	19.60***		

Source: Field survey (September/October 2015) *Values in parenthesis are t-values*
****Significant at 1%, ** Significant at 5% and * Significant at 10%*

CHAPTER FIVE

5.0 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY AND CONCLUSIONS

The findings of the study revealed that cooperative membership in the study area is dominated by male farmers, and that majority of cooperative members (54%) and non-members (52.7%) sampled for the study do not have formal education.

The perceptions of farmers in the study area play a major role in their participation in cooperative societies. Majority of cooperative-member farmers strongly agreed that cooperatives help members attain higher standard of living compared to 17% of non-cooperative members. The results further showed that 86% on non-cooperative members under the study perceive that cooperatives in the study area are not managed efficiently. This implies that perception that cooperatives are not properly managed is a hindrance to farmers' participation. Empirically, this variable is significant with negative estimate.

The study also identified technical training, opportunity to buy and sell to the cooperatives, improved prices, collective bargaining power, and access to credit as services farmers receive from cooperative societies. Agricultural production cooperatives are generally formed to address members' needs through the provision of services which aid members in their production process (Clegg, 2006).

The use of primitive tools, pest and disease infestation, high post-harvest loses, unavailability of improved seeds, high costs of agrochemicals, and low yield are the major constraints faced by cooperative members under the study. Findings also revealed the lack of access to credit, low yield, pests and diseases, high post-harvest loses, unavailability of improved seeds, use of primitive tools, and lack of extension services as the key constraints faced by non-cooperative participants.

The study also identified decision making, human resources, inadequate equity capital, planning, and inefficient use of resources as the key internal and financial challenges confronting agricultural cooperatives in the study area while understanding of cooperative values, educating and recruiting

youths, board competency, members involvement in cooperative activities, and members' level of education were also identified as governance and communication challenges facing cooperative societies in the study area.

The study found gender, age, access to extension services, access to credit, perceptions of farmers that cooperatives are not managed efficiently, and cooperatives help members attain higher standard of living through higher profits as factors that significantly influence farmers' decision to participate in agricultural cooperatives. Contrary from what is stated in study hypothesis one, empirical results showed that education, household size, farm size, and farm experience are not significant in explaining farmers' decision to participate in agricultural cooperatives in the study area.

However, education is a significant factor which positively affect cooperative-members' farm income. Age, even though it has an unexpected sign, is a significant determinant of cooperative participation, and member's farm income.

Farm size, extension contacts, and access to credit are significant determinants that positively influence cooperative member farm income. The study showed that farmers in Lofa County are more likely to participate in agricultural cooperatives and attain higher income. The study identified gender, household and farm sizes as significant factors that influence non-cooperative farm income.

The findings showed a significant difference in the mean farm incomes of cooperative members and non-members. Participation in agricultural production cooperatives increased members' farm income by 55%. This finding supports the widely held view that participation in agricultural cooperatives can improve farm productivity which translates into higher farm income (Minten and

Barrent, 2008; Verhofstadt and Maertens, 2014). Hence, cooperatives in the study area are positively impacting members' farm income.

5.2 POLICY RECOMMENDATIONS

One of the means of increasing participation in agricultural cooperatives among farmers can be achieved if farmers are well knowledgeable of the benefits associated with cooperative societies. This is possible through educating farmers on the cooperative principles and the benefits thereof. It is therefore recommended that policy makers design more programs that will help increase rural farmers' understanding of agricultural cooperatives, and farmers should be encouraged to join agricultural production cooperatives.

Farmers' perception on the management of cooperatives is a major factor that determines participation. This can be address through management performance. Hence, more assistance in terms of capacity building should be given to cooperative societies to improve their performance. Farmers' participation can also be achieved if farmers are convinced that production and marketing constraints can be addressed through cooperative societies. Therefore, it is important that in addition to extension services, government and development partners consider the reestablishment of the Agricultural Cooperative Development Bank to address farmers' needs through cooperative societies.

Age plays a significant role in cooperative participation and on farm income. The study therefore recommend that young farmers be targeted in policy formulation to ensure their participation in agricultural cooperatives.

It is also recommended that policies address hindrances to formal education among rural people and that people of formal education be encouraged to not just engage in farming but also to join

agricultural cooperatives since formal education significantly and positively influences the potential of cooperative members earning higher farm income.

5.3 LIMITATION OF THE STUDY

Most farmers and cooperative societies in the study area have poor or no record keeping systems. The lack of good record keeping system makes it difficult to obtain accurate production data as well as get information on cooperative activities.

Bad road, period of data collection, and limited resources were also some limitations as these factors prevented the study from covering many cooperative communities in the study area. The rainy season is at its peak between August and October in the study area. However, this was the only timely period for data collection, if this project was to be completed within its required schedule for the successful and timely completion of the academic program. Despite these limitations, useful data were collected from all sampled farmers. Hence, the initial sample size of four hundred (400) farmers were used in the analysis.

5.4 SUGGESTION FOR FURTHER RESEARCH

Based on the findings of the study, especially on the perception of farmers on the management of agriculture cooperatives in the study area, and this variable having turned out very significant in this study, a future research on the performance of cooperative societies in the country is suggested.

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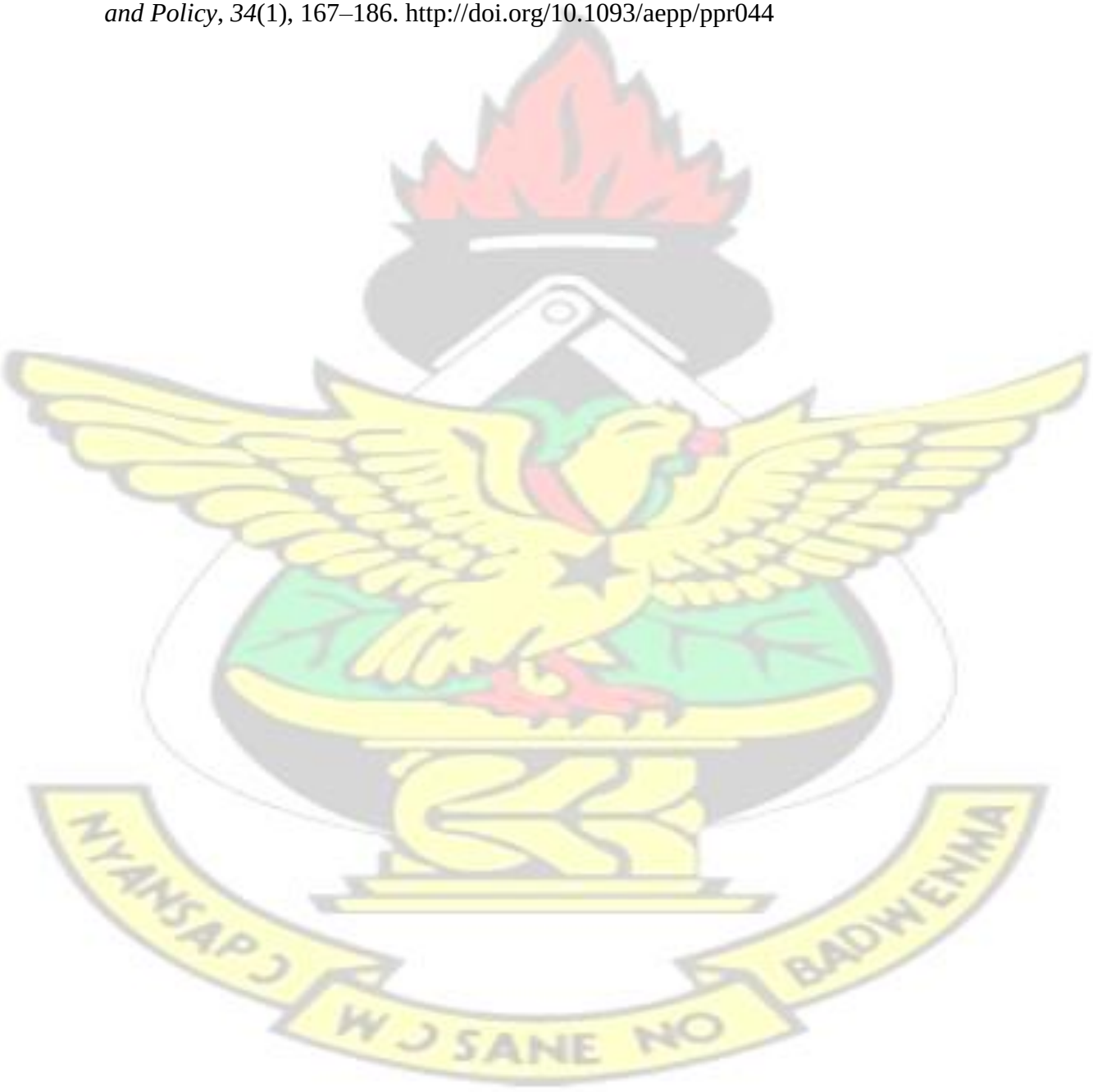

APPENDIX I

DETERMINANTS OF FARMERS' PARTICIPATION IN AGRICULTURAL COOPERATIVES AND IMPACT OF COOPERATIVE MEMBERSHIP ON FARM INCOME IN LIBERIA QUESTIONNAIRE FOR COOPERATIVE MEMBER AND NON-MEMBER FARMERS

Questionnaire number/ID: _____

Name of Community: _____Community Code/ID: -----

Date of Interview: / / / 2015

Time interview started: ---------- Time interview ended: ---------

Enumerator's Name: ---------- Enumerator's Code/ID [ ]

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS

1. Name: …….
2. Mobile phone number: ……..
3. Gender 1). Male [ ] 2). Female [ ]
4. Age: …….
5. Marital Status? 1). Single [ ] 2). Married [ ] 3). Divorced/Separated [ ] 4). Widowed [ ]
6. What is your level of education? 1). No formal education [ ] 2). Primary education [ ] 3). Junior secondary education [ ] 4. Senior secondary education [ ] 5. Tertiary education
7. Years in school: ……..
8. Household size: ……
9. Adult members in the household (>18years): …….
10. What is your religion? 1). Christian [ ] 2). Muslim [ ] 3). Traditionalist [ ]

11. Please provide information on your sources of household income for 2014:

Income source	Amount (L$)	Proportion of total income (%)
Farming Activities		
Off-farm Activitie		
Remittances		

SECTION B: COOPERATIVE CHARACTERISTICS

11 Are you a member of an agricultural cooperative? 1). Yes 2). No

12. If yes, what is the name of the cooperative?
……..

13. For how long (years) have you been a member of this cooperative? …….

14. Did you register with fees before becoming a member? 1). Yes 2). No

15. If yes, how much did you pay (***in (L$***): ……..

16. Did you buy share? 1). Yes 2). No

17. If yes, what is the value of one share (***in L$***)? ..……

18. What services do you receive from the cooperative? **1**). Technical training [ ] **2**). Access to credit [ ] **3**). Opportunity to buy from or sell to the cooperative (Market outlets) [ ] **4**). Improvement in the prices paid or received [ ] **5**). Improvement in market power (Bargaining power) [ ] **6**). Receive input supplies

19. Did you receive dividend at the end of 2014? 1). Yes [ ] 2). No. [ ]

20. If yes, how much did you receive (***in L$***)? …….

SECTION C: ACCESS TO EXTENSION SERVICES AND CAPITAL

21. Do you receive extension services? 1). Yes [ ] 2). No [ ]

22. If yes, from whom? 1). Cooperative [ ] 2). Government [ ] 3). Other (***specify***): ……

23. How many times did you receive extension services in 2014? …….

24. What was your main source of capital for 2014 cropping season? 1). Self-financed [ ] 2). Borrowed funds [ ] 3). Other (***specify***): ……

25. If borrowed, where did you borrow the funds? 1). Bank [ ] 2). Friend [ ] 3). Family [ ] 4). Money lender [ ] 5). Others (***specify***): ……

26. What was the amount borrowed (***in L$)?*** ……
27. What was the interest charged on the amount borrowed (***in L$***)? …….

SECTION D: FARM CHARACTERISTICS

1. How many long have you been in farming: ……..

2. What is your total farm size (***in acres***)? ……

3. What is the nature of ownership of your farm land? 1). Owned [] 2). Family [ ] 3). Communal [] 4). Others (***specify***): …….

5. What was your total farm income for 2014 (***In L$***)……

6. Please provide information on your sources of farm income for 2014:

Income source	**Amount (L$)**	**Proportion of total income (%)**
Food crop production		
Plantation crops		
Vegetables		
Farm animals		

7. Please provide information on your source(s) of labour:

Type of labour	Sources of labour (1=family, 2=Hired)	Unit of payment if hired (1=daily, 2=hourly, 3=acre, 4=hectare)	Amount charged per unit (***L$***)
Human			
Animal			
Machine			

SECTION E: Crop and Livestock Production and Household Food consumption 1).

Please provide information on your crop production:

a**).** Cash/Tree crop

Crop	**Quantity harvested in 2014 (Kg)**	**Amount Received**	**Proportion sold to Coop(%)**
Tree crops			
Cocoa			
Coffee			
Rubber			

Palm			

b). Other Crops

Crop	Grown 2014?	Area cultivated (Acres)	Qty. harv. (Kg)	consumption	Qty. sold (Kg)	Price/Kg	Qty saved	% to coop
Cereals								
Rice								
Maize								
Millet								
Sorghum								
Legumes								
Groundnut								
Cowpea								
Soybean								
Loma beans								
Root Tuber								
Cassava								
Yam								
Cocoyam Eddoe								
Potatoes								
Other Crops								

c). Inputs for the Rice Production

Input	Quantity used	Unit cost (L$)	Total cost
Seeds/kg			
Seedlings			
Fungicides (liters)			
Insecticides (liters)			
NPK (50kg bag)			
SOA (50kg bag)			
Urea (50kg bag)			
Manure (50kg bag)			
Others 1			
Others 2			

d). Inputs for the Cassava Production

Input	Quantity used	Unit cost (L$)	Total
Cuttings			
Fungicides (liters)			
Insecticides (liters)			
NPK (50kg bag)			
SOA (50kg bag)			
Urea (50kg bag)			
Manure (50kg bag)			
Others 1			
Others 2			
Others 3			
Others 4			

e). Constraints to crop production`

Please rank the extent of constraint by circling the number in the appropriate box

Statement	Very High	High	Low	Very Low	None
Input					
Unavailability of Improved seeds	1	2	3	4	5

High costs of seeds	**1**	**2**	**3**	**4**	**5**
High cost of chemicals	**1**	**2**	**3**	**4**	**5**
Labour scarcity	**1**	**2**	**3**	**4**	**5**
Use of primitive tools	**1**	**2**	**3**	**4**	**5**
Lack of access to farm land	**1**	**2**	**3**	**4**	**5**
Lack of access to credit	**1**	**2**	**3**	**4**	**5**
Production					
Low yield	**1**	**2**	**3**	**4**	**5**
High post harvest loses	**1**	**2**	**3**	**4**	**5**
Lack of extension services	**1**	**2**	**3**	**4**	**5**
Marketing					
Unable to meet quality requirements of buyers	**1**	**2**	**3**	**4**	**5**
Unpredictable prices	**1**	**2**	**3**	**4**	**5**
Lack of price information	**1**	**2**	**3**	**4**	**5**
High cost of transport to market	**1**	**2**	**3**	**4**	**5**
Low prices in accessible markets	**1**	**2**	**3**	**4**	**5**
High market fees/taxes	**1**	**2**	**3**	**4**	**5**
Poor transportation infrastructure	**1**	**2**	**3**	**4**	**5**
Difficult/ unable to find buyers	**1**	**2**	**3**	**4**	**5**
Late/ slow payment from buyers	**1**	**2**	**3**	**4**	**5**
FBOs (Cooperative) not effective at selling your commodities	**1**	**2**	**3**	**4**	**5**
Manipulation by market queens/middlemen	**1**	**2**	**3**	**4**	**5**
Environmental					
Irregular rainfall pattern	**1**	**2**	**3**	**4**	**5**
Pest and diseases	**1**	**2**		**4**	**5**
Social					
Theft of produce	**1**	**2**	**3**	**4**	**5**

f). Livestock wealth (2014)

Type of Livestock	**Quantity in Stock**	**Quantity sold**	**Quantity consumed**	**Unit price (L$)**
Cattle				
Sheep				
Goats				
Pigs				
Rabbits				
Chicken				

Guinea fowls				

2). Please provide information on household food consumption

Crop	Unit of measurement	Qty Consumed per month	Unit cost	Amount spend on qty per month
Cereals				
Rice				
Maize				
Millet				
Sorghum				
Legumes				
Groundnut				
Cowpea				
Soybean				
Loma beans				
Roots and Tuber				
Cassava				
Yam				
Cocoyam Eddoe				
Potatoes				
Vegetables				
Pepper				
Bitter-ball				
Others				

SECTION F: CHALLENGES OF COOPERATIVES AND FARMERS' PERCEPTIONS

1). Challenges of Agricultural Cooperatives

Please rank the extent of challenges faced by your cooperative by circling the number in the appropriate box

Statement	Very High	High	Low	Very Low	None
Internal					
Planning	1	2	3	4	5
Human resources	1	2	3	4	5
Aligning incentives	1	2	3	4	5
Cooperation with cooperative	1	2	3	4	5
Efficiency	1	2	3	4	5
Decision making	1	2	3	4	5
Financial					
Lack of adequate equity	1	2	3	4	5
Access to credit	1	2	3	4	5
High taxes	1	2	3	4	5
Governance					
Recruiting board members	1	2	3	4	5
Board orientation	1	2	3	4	5
Member involvement in coop activities	1	2	3	4	5
Board competency	1	2	3	4	5
Board dedication	1	2	3	4	5
Balancing coop and members' needs	1	2	3	4	5
Communication					
Communicating coop values to members	1	2	3	4	5
Members level of education	1	2	3	4	5
Educating youth	1	2	3	4	5
Public understanding of cooperative	1	2	3	4	5

2). FARMERS' PERCEPTIONs OF AGRICULTURAL COOPERATIVES

Please rank the extent of your understanding (perception) of agricultural cooperative by circling the number in the appropriate box

Statement	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
Cooperatives are instrumental in introducing new products and technology to local farmers	1	2	3	4	5
Cooperatives help their members attain a higher standard of living through increased profits	1	2	3	4	5
Members generally benefits by patronage refunds of cooperatives	1	2	3	4	5
Cooperatives generally are not managed efficiently	1	2	3	4	5
Farmers would generally pay higher prices for supplies if it were not for competition from cooperatives	1	2	3	4	5
Cooperatives offer better services than other competing businesses	1	2	3	4	5
Cooperative managers and board members care more about the cooperative's survival than member's need	1	2	3	4	5
Most cooperative members are not very informed about the operation of their cooperative	1	2	3		5
Generally, cooperative members should patronize their cooperative	1	2	3	4	5
There is no significant different between cooperative and other business entities	1	2	3	4	5

****** Is there anything you would like to tell us about your farming activities or on how agricultural cooperatives could serve you better?

……..

Your contribution to this effort is greatly appreciated.

APPENDIX II

Lists of Cooperative Communities per County

Bong County

Communities	Names of Cooperative s
1. Sanoyea Town (Sanoyea District)	Welekermai Rural Women Structure Cooperative
2. Botota (Kokoya Statutory District)	Kokoya Multipurpose Cooperative

Nimba County

Communities	Names s of Cooperatives
1. Douplay (Gbelay-geh District)	Warperley Multipurpose Cooperative
2. Karhnplay (Gbelay-geh District)	Gbelay-geh Farmers' Cooperative and Zoyeah Farmers' Cooperative
3. Gbedin Camp #3	Dokodan Farmers' Cooperative Society
4. Gbei-Vonwea Town (Gbelay-geh)	Sroh Kwado Multipurpose cooperative
5. Senlay Town, Whealay Clan	Bor-Dordelah Multipurpose Cooperative
6. Ganta Community	She-Leh-Tur Farmers' Cooperative

Lofa County

Communities	Names of Cooperatives
1. Salayea (Salayea District)	Quapatamai Farmers' Cooperative
2. Zorzor (Zorzor District)	Zorzor District Multipurpose Cooperative