

**THE EFFECTS OF FARMERS GROUP PERFORMANCE ON HOUSEHOLD
FOOD SECURITY IN WESTERN KENYA**

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DECLARATION

Declaration by the Candidate

This thesis is my original work and has never been presented for the award of an academic degree in any other university and should not be copied, or reproduced in any format without written authority from the author and/or University of Eldoret.

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DEDICATION

I dedicate this academic work to my mother Georgiah O. Masinde for being a strong mum, and all my family members who have been supportive and mostly for their encouragement, love and respect.

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My heartfelt thanks and recognition go to my supervisors for their essential assistance, counsel, and support. They have made certain that the research thesis is prepared professionally, finished, and submitted on time for defense. I owe a debt of gratitude to my classmates for their academic assistance and words of encouragement throughout the course. I also want to thank the department of Agriculture Economics and Rural Development for their immense support and the input that they instilled into this research project. Lastly, and definitely not least, special thanks to God for the gift of life and strength to carry out this project.

ABSTRACT

Many developing countries have reintroduced farmer groups into their policy agenda due to their role in accelerating technical and economic change in rural areas. In Kenya, however, farmer groups remain inadequately structured and their performance in promoting food security is not well established. Farmers in western Kenya, particularly in Bungoma and Siaya counties, depend heavily on agriculture as their primary source of livelihood, yet food insecurity persists despite the presence of numerous farmer groups. Previous studies have largely focused on the typologies, structures, and developmental stages of farmer organizations but have paid limited attention to how their performance—under different organizational regimes such as farmer groups and associations—affects household food security. This study therefore investigated the influence of farmer group performance on household food security in western Kenya. The specific objectives of the study were to: examine the effect of farmer group dynamics on food security; establish the effect of farmer group output on food security; and determine the influence of gender relations on farmer group performance. A multistage sampling technique was used to select 587 farmers from 33 farmer groups across Bungoma and Siaya counties, while simple random sampling was employed to identify 371 respondent households. Quantitative data were collected through household surveys, while qualitative data were gathered through document reviews, Key Informant Interviews (KIIs), and Focus Group Discussions (FGDs). Quantitative data were analyzed using descriptive and inferential statistics with the aid of SPSS (IBM), while qualitative data were analyzed thematically. The results revealed a statistically significant relationship between farmer group performance and household food security ($F = 10.081$, $p < 0.001$). The R value of 0.228 indicated a positive influence of farmer group dynamics and output on food security. Farmer group output ($\beta_2 = 0.152$, $p = 0.004$) had a relatively higher effect than group dynamics ($\beta_1 = 0.13$, $p = 0.015$). The study also found that gender disparities persist, with women contributing the majority of farm labour yet being marginalized in decision-making processes. The study concludes that strengthening farmer group performance and promoting gender equality in agricultural decision-making are essential for enhancing household food security and improving rural livelihoods in western Kenya.

Key words: Farmer Groups, Farmer group outputs, Food Security, Gender Relations, Group dynamics, Kenya, small scale Farmers

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LIST OF ABBREVIATION AND ACRONYMS

ACF	Action Contre la Faim International
AFD	Agence Française de Développement
BSF	Bureau of Standards
BUSSFFO	Bungoma Small Scale Farmers Forum
CARP	Community Action Research Platforms
CBO	Community Based Organization
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FHHs	Female Headed Households
GAEC	Groupements Agricoles d'Exploitation en Commun
GDP	Gross Domestic Product
HHs	Households
HLPE	High Level Panel of Experts
IFAD	The International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
KESSFF	Kenya Small Scale Farmers Forum
KIs	Key Informants
MVIWATA	Mtandao wa Vikundi vya Wakulima Tanzania
NASEP	National Agricultural Sector Extension Policy
NGO	Non-Governmental Organization
NPO	Non-Profit Organization
OECD	The Organization for Economic Cooperation and Development
SDC	Swiss Agency for Development and Cooperation
SFOAP	Support to Farmers' Organization in Africa Programme

UniCARSSA	University-based Community Action Research for cereal-legume value chains in SSA
UNICEF	United Nations Children's Fund
USAID	The United States Agency for International Development
WHO	World Health Organization

OPERATIONAL DEFINITION OF TERMS

Food security: Refers to having, at all times, both physical and economic access to sufficient foods to meet dietary needs for productive and healthy life.

Group dynamics: this refers to the attitudinal and behavioral characteristics of a group. It is concerned of how the group forms, their structure process, and how they function.

Household: This is an independent social unit composed of male or female farmer and his/her dependents that must have lived together for a period not less than six months. The members are answerable to one person as the head and share the same eating arrangement

Income security: Assurance of minimum level of income to individuals, families and households, regardless of their participation in labor force.

Productivity: It is commonly defined as a ratio between the output volume and the volume of inputs.

Profitability: This is the degree to which a business or activity yields profit or financial gain

Socioeconomic characteristics: They include, social and economic standing, level of education, current profession, and ethnic background or heritage

Standard of living - This is the level of income, comforts, and services available to a society or location as a whole, rather than to an individual.

Sustainability: This refers to the practices that aid long-term economic growth without negatively impacting social, environmental, and cultural aspects of the community.

Traditional crops: These are indigenous species native to a specific region or one that was introduced a long time ago and, due to long use, has naturalized and become part of the culture of a community

CHAPTER ONE

INTRODUCTION

1.1 Background Information

Maintaining adequate food security remains a critical challenge for the majority of rural households throughout developing nations, particularly in Sub-Saharan Africa (Mutea, 2019). Farmer groups are increasingly becoming an important channel for rural poor households to increase their income and achieve food security by improving crop productivity. In most situations, interventions to enhance smallholder agricultural commercialization use the farmer group method as an effective collective action initiative for improving production and marketing performance (Ndoro, 2020). Farmer groups allow easier access to farm credit as well as input marketplaces (Abebaw and Haile, 2013; Ashby, 2009; Uaiene, 2011), speed up efficient information flow on the availability of better agronomic technologies (Shiferawet, 2011), provide less expensive networks to achieve successful agricultural technology dissemination and adoption (Bernard and Spielman, 2009), and reduce farmers' risk aversion toward technological advances and income shocks through group action (Hogeland, 2006; Menapace, 2013; Pingali, 2005), and to accelerate the transition from small holder farmers subsistence farming to commercial farming through collaborative marketing and quality enhancement (Fischer and Qaim, 2012; Okello, 2007). All of these services provided by farmer groups have been identified as key factors contributing to improvements in agricultural productivity in the empirical literature (Hazell and Wood, 2008), particularly in Sub-Saharan African countries. Involvement in farmer groups has also been linked to higher average earnings (Fischer and Qaim, 2012) and better food security (Larsen and Liller, 2014; Theng, 2014).

Farmer groups are among the non-formal institutions that emerge and evolve within farming communities. Nuryanti and Swastika (2011) note that such groups are established to address challenges and barriers that individual farmers cannot overcome alone, whether operational, informational, or technical. Similarly, Sadjad (2021) emphasizes that the formation of farmer organizations stems from a collective drive to place agriculture on a more sustainable and productive path. By pooling resources, sharing knowledge, and coordinating efforts, farmer groups enable farming to become more efficient and effective, thereby improving both the quality of farmers and their agricultural outputs.

Recent empirical evidence reinforces this pivotal role of farmer groups and cooperatives in enhancing agricultural efficiency, resilience, and smallholder welfare. Collective action has been shown to bolster not only economic gains but also intangible assets and resilience (Tchale & Mapemba, 2025); in Malawi, cooperative membership significantly improved household income and dietary diversity even under extreme risk (Tchale & Mapemba, 2025). In China, the “cooperative + collective” model enhanced farmers’ access to productive services (Yu et al., 2024), while empowerment frameworks such as the Socio-Ecological System (SES) revealed how cooperatives can catalyze adoption of water-saving technologies (Zhang et al., 2024). Further, Ghanaian female-headed households in Farmer-Based Organizations (FBOs) achieved higher technical efficiency than their male counterparts (Abubakari & Donkor, 2023), and outgrower-based collective marketing schemes yielded improvement in farm performance and household welfare (Aidoo & Mensah, 2024). From a theoretical standpoint, collective action remains a strategic response to market access barriers

(Singerman, 2023), and Ostrom's design principles continue to guide robust cooperative governance (Grashuis, 2025).

Farmer formation of groups is an effective development strategy for encouraging collective action and strengthening market connections in agrifood chains (Bernard & Spielman, 2009). Such organizations help reduce transaction costs, enhance bargaining leverage for better output pricing and potentially lower input costs, mitigate risks, and scale operations (Francesconi & Wouterse, 2015). In China, the development of agricultural cooperatives significantly increased farmers' production revenue, mainly by improving land productivity—but also by facilitating capital investment, access to intermediate inputs at lower prices, and adoption of technologies (He, 2024). Cooperative membership in Spain was empirically shown to reduce opportunistic practices from both suppliers and buyers, helping sharpen market positioning and bargaining strength (Sánchez-Navarro et al., 2024). Moreover, cooperative interventions in global agrifood systems have been demonstrated to enhance farmers' collective bargaining power and improve profit distribution mechanisms in supply chains (Han, 2024).

The effects of farmer groups within countries that are developing have been strongly discussed in several strands of literature. According to certain studies, farmer organizations improve smallholders' agrifood value chain involvement and welfare. Fischer & Qaim (2012) discovered that membership in banana farmer associations led to price advantages and boosted household income in Kenya. According to a study conducted by Mojo et al. (2017), Ethiopian coffee farmers in particular showed favorable advances in household income and assets. According to Ito et al. (2012), being part of a farmer group greatly improves the economic standing of small-scale farmers in China. Mishra et al. (2018a) show that farmer belonging to a group improves

value chain involvement and food security in white onion contracted farming in India employing an endogenous switching logistic technique. A number of other studies have discovered that smallholder participation in agrifood value chains via farmer groups improves farm yields, household income, and net income from agriculture (such as Maertens & VandeVelde, 2017; Mishra, 2018b), costs acquired by members of the group, farm profit and gross income (e.g., Ma and Abdulai, 2017), and land and labor redistribution.

Other research, on the other hand, reveal that farmer groups performed poorly, leading to group dissolution in some situations (Markelova, 2009; Francesconi and Wouterse, 2015). For instance, Bernard et al. (2008) discovered that farmer organizations in Ethiopia didn't succeed to improve their degree of commercialization, whereas Nkhoma and Conforte (2011) discovered that farmer groups in Malawi were unable to improve their welfare, which they believed was due to ineffective group governance and management. Mwambi et al. (2016) discovered insufficient improvement in household, farm, and avocado income through smallholder involvement in Kenyan agri-food value chains. Even after accounting for input diversion, integrating farmers into groups for involvement in maize value chains had a detrimental effect on profitability in Ghana's upper west region (Ragasa et al., 2018).

These mixed findings suggest more research into the conditions that lead to successful farmer group operations, food security, agri-food value chain engagement, and mechanisms that provide large advantages to group members. In three ways, this research contributes to the expanding literature on the significance of farmer groups in farm performance. First, we investigate the group dynamic aspects that influence

farmers' retention and involvement in farmer groups in order to participate and contribute to farmer group performance. Second, we investigate the impact of farmer group output on farmer group performance. Third, we analyze the impact of group dynamics and farmer group output on food security at the family level.

Globally, farmer groups have been used as a part of the new “total approach” to rural development. After World War II, France was the first country to use farmer groups. The French government established legislation in 1962 to formalize Groupements Agricoles d'Exploitation en Commun (GAEC), or cooperative farming agricultural groups. It did so in reaction to rural discontent and the necessity for agricultural modernization. In India, cooperative farming is used to alleviate the resource restrictions that individual households confront, (Mishra et al. 2018a). Overall, farmer associations are essential resources for farmers seeking market and finance information, as well as other agricultural information such as new agricultural technology and they also serve as essential conduits for rallying farmers around a single goal, particularly in terms of service delivery and policy formation that promotes agricultural growth (Salifu, 2010).

In Africa, Farmers' and rural producers' groups have grown at an unprecedented rate during the last two decades. Today, there are tens of thousands of grass-roots farmers' organizations across Africa. At the national, regional, and worldwide levels, farmers' groups are gaining traction as advocates of the farming community (IFAD, 2018). IFAD and the European Union have been working together to help farmer organizations since 2008.

In east Africa, organizations are focusing on farmer groups as a tool for agriculture development. Despite the importance of farmer organizations on the policy agenda, little is known about their membership and the variables that influence farmers' decisions to join them. It is found out that national membership to organizations is minimal, at 9 and 16 percent among individual farmers and agricultural families, respectively, based on data from the Uganda Census of Agriculture 2008/9 (Adong, Mwaura, Okoboi, 2012). Farmer groups have become increasingly significant because of their importance in boosting agriculture commodity trading and value addition, especially in Uganda's policy agenda. In Tanzania, there is a network of farmer groups called MVIWAMBI that operates as a second-level farmer company. It provides its members with training and farm inputs, as well as collecting and marketing their coffee. Mviwambi is highly motivated and eager to advance (Agriterria, 2021). There is also Mtandao wa Vikundi vya Wakulima Tanzania (MVIWATA) which is a national farmers organization that brings together smallholder farmers from across Tanzania to form a united front to protect their economic, social, cultural, and political interests. MVIWATA was founded in 1993 whose goal was to empowering smallholder farmers economically and socially via capacity development, lobbying, and advocacy, particularly by developing their organizations and networks, enabling communication, and learning so that they can protect their own interests (FARMAF 2021).

In Kenya, there is a network of small-scale farmer organizations headquartered in communities across Kenya called Kenya Small Scale Farmers Forum (KESSFF). It has an average of 20 groups per Sub-County, and is present in 23 Kenyan counties. Each organization has an average of 100 farmers, bringing the total number of members to 82,000. Uasin Gishu, Vihiga, Makueni, Migori, Kiambu, Tana River, Kitui, Elgeyo Marakwet, West Pokot, Kilifi, Malindi, Kisumu, Marsabit, Taita Taveta, Kajiado, Trans

Nzoia, Kwale, Siaya, Machakos, Bungoma, Tana River, Kitui, Elgeyo Marakwet, West Pokot, Kilifi, Malindi, Kisumu, Marsabit, Taita Taveta, Kakamega and Homabay are among these counties. The main goal of KESSFF is to close the gender gap across all agricultural value chains while also reducing gender-based violence in the areas in which they serve. It also tends to encourage youth involvement in agriculture, which in turn benefits the agricultural sector by reducing hunger and poverty (KESSFF, 2021).

Bungoma County is one of the project sites for the World Agroforestry Centre's Strengthening Rural Institutions (SRI) project, which uses a participatory approach (groups) to enhance the capacity of smallholder farmer groups (World Agroforestry Centre, n.d.). Its main aim is to strengthen local organizations which in turn improves collective action among rural farmers to promote agricultural productivity and sustainability. Farmer groups in Bungoma County are approximately 310 which play a vital role in coordinating agricultural activities, facilitating access to inputs, and improving livelihoods (Lumwamu, 2019). There is also Bungoma Small-Scale Farmers Forum (BUSSFO), which is a community-based organization (CBO) that serves as an umbrella body for self-help groups. It has 24 groups and was established with a purpose to organize farmers and producers so as to strengthen their collective influence, improve agricultural productivity, and address rural challenges like food insecurity, unemployment, and low purchasing power (Soi et al., 2012). There are various stakeholders that collaborates with BUSSFO and they include government agencies, non-governmental organizations (NGOs), and faith-based institutions, to implement sustainable agricultural practices and enhance soil health. It does promoting of capacity building in agricultural technologies, facilitating access to affordable farm inputs, supporting market access, and advocating for policy and health-related interventions aimed at improving the welfare of smallholder farmers in Bungoma County (World

Agroforestry Centre, n.d.). These initiatives reflect Bungoma County's commitment to empowering farmer groups, strengthening rural institutions, and advancing sustainable agricultural practices for improved food security and livelihoods in Western Kenya.

Decreasing crop output in Siaya County, has led to food shortage (Odunga, 2019). There are more than 10,000 farmer groups in Siaya County, where the county government has collaborated with the Heifer International and the Agriculture Sector Development Support Programme (ASDSP II), and is working with over 10,000 individual farmer groups in Siaya to improve chicken value chain skills (County Government of Siaya, 2020).

1.2 Statement of The Problem

Collective action in the form of farmer organizations is increasingly recognized as a transformative pathway for improving farmers' livelihoods in Sub-Saharan Africa (Place et al., 2004; Tchale & Mapemba, 2025). However, group membership alone is insufficient to ensure sustainable development; these organizations must also possess the capacity to achieve their objectives and address the needs of their members (Abaru et al., 2006; Yu et al., 2024). Given that the majority of small-scale farmers in the region are affiliated with some form of farmer group, such organizations remain critical channels for reaching the most vulnerable rural populations (Bernard et al., 2008; Abubakari & Donkor, 2023). Farmer groups vary widely in size, structure, and function, serving different categories of members and stakeholders. This diversity has prompted researchers to classify them under multiple forms—including producer organizations, cooperatives, and common interest groups—based on their governance frameworks and operational capacities (World Bank, 2009; Han, 2024; Sánchez-Navarro et al., 2024).

Several scholars have performed research on the evolution of distinct farmer group typologies, levels of development, and issues groups face in the liberalized market. (Wennink, Nederlof & Heemskerk, 2007) argued that organizations should be classified based on their origin, legal existence, membership base, functions, purposes, scale and degree of functioning, organizational structure, governance, and management methods. Whereas Ha (2015) examined multiple cases, paying particular focus on the structure of farmer organizations, variation, functions played by farmer organizations, difficulties that these organizations face, support that these groups receive from various sources, and how those groups have evolved over time.

(Wanyama, Develtere & Pollet, 2009) investigated the transition of cooperatives from state-managed organizations specializing in one activity to private profit-oriented versatile organizations owned by farmers. The study specifically examined the influence of liberalization initiatives on the position of cooperatives across Africa.

Doward and Omamo (2009) examined the nature of organizations, the functions of various types of organizations in economic activity, and the process of organizational development in a study about institutions. Applying a maturity assessment methodology, the SRI project (2012) determined the degree of organizational maturity. The Agricultural Institutions Development Assessment Tool classified grassroots organizations into three maturity levels: beginner, middle, and mature. The criteria used to categorize groups included features of governance, management, leadership, resilience, and capacity development.

As a result, these farmer group studies have concentrated on identifying types, structures, functions, levels of development, problems, and growth over time. However, most studies on group development have concentrated on temporal changes rather than structural and functional changes. Also, there is a gap in literature on the performance

of farmer groups under different farmer organization regimes: farmer group under association and individual farmer groups. This study seeks to ascertain the effects of farmer groups' performance under the different regimes to enhance household food security for improved rural livelihoods in Western Kenya.

1.3 Overall objective

The overall objective of this study was to investigate the influence of farmer group performance on household food security in Western Kenya.

1.3.1. Specific objectives

To achieve this objective, the study was guided by the following specific objectives

- a) To examine the effect of farmer group dynamics on food security in western Kenya
- b) To establish the effect of farmer group output on food security in western Kenya
- c) To find out the influence of gender relations on farmer group performance in western Kenya.

1.4 Research questions

- a) What are the effects of farmer group dynamics on food security in western Kenya?
- b) What are the effects of farmer group output on food security in western Kenya?
- c) What is the of gender relations on farmer group performance in western Kenya?

1.5 Significance of the study

This study was significant in providing insights into how farmer group performance influenced household food security. The findings helped identify the most effective

types of farmer organization whether independent groups or those under association in improving productivity, profitability, and livelihoods. By examining group dynamics, the study enhanced understanding of how internal relationships and cooperation within farmer groups contributed to improved food security outcomes.

In addition, the study highlighted the role of gender relations in shaping the distribution of benefits within farmer groups, emphasizing the importance of gender equality in achieving sustainable agricultural production. The results inform policymakers, agricultural extension officers, and development partners on strategies to strengthen farmer groups for enhanced household and community food security.

1.6 Justification of the study

Agriculture is the backbone of the economy of Sub-Saharan Africa. It is the biggest provider of Economy in the African region, an important source of subsistence crops, and a source of income for a large number of people in a sizable part of the African population (UNEP 2003). The majority of people in Sub-Saharan Africa live in rural regions and rely on agriculture for a living (World Bank 2009, Salifu, 2010). As a result, agriculture is considered to be one of the most promising means for alleviating poverty as well as securing regional livelihoods (Ochola 2007, Salifu et al. 2010).

However, three out of every four poor people across the continent reside in rural areas, and the majority of them rely on agriculture for livelihood, either directly or indirectly (Dorward et al. 2009). As a result, it is clear that the majority of people in Sub-Saharan Africa rely on agricultural products for both sustenance and income. As a result, farmer groups are critical entrance sites for increasing agricultural production and revenue in these countries. Farmers' groups have since been utilized to connect farmers with the government, donors, and development partners involved in rural development in order

to boost agricultural production (Nyang et al. 2010, Bernard et al. 2008, Peters & Mcdonald 2010).

The majority of rural households are involved with farmer groups, which has enhanced the involvement of communities in their own prosperity and the growth of rural economies (Develtere et al. 2008). As a result, farmer groups affect and are affected by many rural households; thus, these groups are essential tools in improving the lives of rural individuals and hence worth investigating.

Farmer groups existing in different forms (groups under an umbrella association, and groups operating individually) has not been studied a lot by the past scholars. The small scale farmers were used as the key respondents as they largely contribute to agricultural production in the counties. Also, they solely depend on agriculture to improve their livelihood and as the project aims to boost productivity, it has also improved their livelihood. Methods that were used in this study were suitable to obtain the necessary information especially on groups under a farmer's association and individual groups.

Therefore, this study explains the group dynamics influence on both individual farmer groups and farmer groups under a farmer's association. It gives an insight on which type of farmer group approach between the two leads to higher food security and therefore it educates farmers at better group farming approach. Furthermore, the findings will inform policies and aid in the establishment of policy support, which is required to facilitate the effectiveness of group action. It will also allow the government as well as organizations which endorse groups to direct their aid in a way that allows these groups to remain effective. Finally, the material will be beneficial to the scientific community by providing information to scholars interested in researching farmer groups under different regimes.

1.7 Scope of the Study

The study was carried out in Bungoma and Siaya counties, western Kenya. 33 farmers groups were sampled from the study area. These involved 24 groups in Bungoma County and 9 groups in Siaya County. The study was mainly done to establish the impact of different types of farmer groups' impact on food security for the improvement of rural livelihood at household levels. Productivity and profitability of farmers groups was also studied. The influence of farmer groups on food security was studied to depict if it improves rural livelihood. Gender effect was also studied to understand its impact on farmer group performance. The scope of the study was bound by the number of sampled groups in each site and the structure of the groups.

1.8 Limitation of the Study

The study did not look into all groups in the two counties as it only focused on selected groups to get necessary information. Hence only 33 groups in the two counties were used. Out of these, 24 groups are organized in a farmer's association, while 9 groups are individual groups. Total groups under study in Bungoma County are 24 while total groups in Siaya are 9. This study also used traditional crops to evaluate profitability, productivity and food security at household level, despite the fact that farmers cultivate many types of crops. The study at some point relied on farmer's ability to recall past information in cases where there were no records kept to answer the questions accurately but this was overcome since farmers were probed further.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter focuses on the perspectives and studies related to the impact of group farming model on household food security to improve rural livelihoods in western Kenya. Section one outlines the research related to the current study. Section two examines research gaps to be addressed by this study. Therefore, literature substantially examines the state of research in relation to this study's variables to provide an adequate context in which this study's significance will be brought to light.

2.2 Theoretical framework

This study is grounded in Collective Action Theory, which explains how individuals form groups to address shared challenges that would be difficult to overcome individually. Such theory suggests that farmer groups can improve outcomes related to productivity, access to markets, and overall household welfare by pooling resources, cooperating in inputs acquisition, joint marketing, and engaging in governance structures that promote accountability and participation.

Recent empirical work in Kenya provides strong support for applying this theory in the agricultural sector. For example, Cheruiyot & Kibett (2024) evaluated social capital attributes—such as trust, norms, and networks—and found they significantly predict collective actions among smallholder farmers in Tinderet Sub-County, particularly in activities like input purchase, produce selling, negotiation of prices, and seeking market information. Similarly, Kemei (2024) studied passion fruit producer and marketing groups in Nandi County and demonstrated that collective action not only improved enterprise performance but also influenced choice of marketing channels and

commitment among farmers. Moreover, Otieno (2024) in his work with smallholder dairy farmers identified factors such as group governance, member participation, institutional support, and internal trust as essential for making collective action work effectively for improved productivity and market inclusion.

These findings align closely with this study's objectives: to examine how farmer group dynamics (which include internal governance, trust, and social capital), group outputs (such as production and marketing performance), and gender relations (which influence participation and benefit-sharing) affect household food security in Western Kenya. Collective Action Theory thus provides a conceptual lens to analyze not just existence of farmer groups, but their performance under varying conditions, enabling clearer understanding of how group performance translates into food security for households.

2.3 Food Security

Food security does have many dimensions and also some of the generally recognized definitions are: the availability of foods refers to adequate quantities supplied by domestic production and importation, food access referring to people's access to enough nutrient dietary rights, the use referred to. There will be access to food only if a household have the supplies and methods to obtain appropriate food to meet its members' nutritional needs (Neff, 2008).

Over the last 30 years, food security ideas have developed and mirrored changes in the thinking of government policy (Clay, 2002). The word came from the mid-1970, with food security being defined in terms of food supply by the World Food Conference in the year 1974. It guaranteed regional and global availability as well as stability of the pricing of essential food. In 1983, the FAO analysis focused on access to food and produced a concept based on the balance amongst demand but also food security

supply. In addition to regional and national aggregations in the examination of food security, the definition was later expanded to include household and individual level.

Safety of food involves three parts. These include sufficient and dependable supplies, access to supply and the capacity to use food supply. Various ideas are utilized and created from the understanding of food insecurity. There are seven hypotheses in existence, according to Scanlan (2003) as well as Nord (2014). The following are: The theory of Neo-Malthusian based on food insecurity analysis (Hopfenberg, 2001; Jenkins, 2001), a techno-ecology theory in which the inadequate use of technology and human naivety in order to solve food security concerns is regarded as a result of food insecurity inadequate.

Modernization theory states that the lack of the will to modernize the infrastructure of countries causes food insecurity, improves the food production system of countries, supports institutions, savings and restores governments, as well as the educational system that has changed in order to solve problems instead of studying the problem (Rostow, 1962) The world system theory states that food insecurity is the consequence of world trade imbalance, the politicization of food aid and how far development objectives are achieved theory of dependence and the (Petras, 1981; Tausch and Heshmati, 2010).

The theory of urban development states that the underlying cause of food insecurity is the scenario in which development between urban and rural regions is evenly distributed. According to Fox 2012 and Drebold, 2017, the opinion that rural development needs to increase at a higher rate than urban areas for food-security concerns the theory of social stratification which arise from the social stratification of

food insecurity and the imbalance that arises from that same (Pyakuryal 2001 and Safe 2018), and the theory of militarization which takes a view (Scanlan 2003).

2.4 Group Dynamics

The dynamics of a group refers to the collective attitude and behavior. According to Amir (2009), group dynamics are acts taken by group members. In both the official and unofficial groups of all kinds, group dynamics are crucial. Because they will create dynamic groups, group dynamics are vital to examine. Members have a close bond with one another and consider themselves to be a part of it (Jamil, 2020). External influences originate from outside the group, and internal variables come from within the group, resulting in contact among members, the exchange of ideas and experiences, and the subsequent development of knowledge for others. Groups are a common element in an organization, and group dynamics as well as organizational behavior must be studied.

2.4.1 Group atmosphere

Through sessions in each activity, the atmosphere can explain friendship with members of the group to other group members. This can be explained using the following categories: 1) Important but relaxed task (high familial/familial nature); 2) If a friend is having difficulty, they always help each other; 3) valued other group activities; and 4) prioritized personal interests over shared interests (Bakhtiar, 2020).

2.4.2. Group Structure

This is a framework of relations between members who unite the group and assist them achieve their objectives. Andarwati (2012) stated that group structure was an established pattern in the relationship between people and subsequently between groups that might explain the level/position and role of each member in the attempt to achieve the group's goals. In a number of ways, the structure may be described, group size,

group standards and cohesion are among the typical factors. Group members can have different states from each other in the group. Having different status among its members, means that the group has a hierarchical structure (Robbins & Judge, 2010)

2.4.3. Group size

The size of a group could vary from extremely tiny to very many. Small groups will always be more efficient as each individual has a chance to engage and be directly engaged in the group. Large groups can squander their time by agreeing on methods and determining who should be next. Group size not only impacts involvement, but also satisfaction. Members of huge groups have difficulty identifying and living with each other. According to (Bray, Kerr, and Atkins 1978) larger groups create more accurate answers to problems, and are highly expected to reserve important information (Horowitz and Borden's 2002) and generally have higher performance (Stewart 2006). However, according to (Mueller 2011), in larger groups, performance gained from more group members may be hampered because people's perspectives and emotional resources for forming personal relationships are quickly exhausted, which results to stress.

2.4.4. Group Norms

These are behavioral norms shared by a group of people. The social norms theory states that correcting misperceptions of perceived norms will most likely result in a decrease in the problem behavior or an increase in the desired behavior. There are several functions of group norms according to Black and Bright (2019) and these are: they facilitate group survival, they simplify expected behaviors, they help avoid embarrassing situations and they help identify the group and express its central values to others. Standards establish acceptable and undesirable conduct boundaries.

Typically, they're developed to help a group survive, make conduct more predictable, minimize embarrassment and convey collective ideals. Every group tends to set its own standards. Groups are pressuring members to comply with group standards or to shape them. Standards via the members indicate the group's degree of engagement, motivation and performance.

Performance standards dictate how quickly the members should work and how much they should have reached. They are designed to determine the effort of a person. Equality standards show that incentives are distributed according to the contribution of the member. Members who give more earn the most benefits in this respect. Members may participate in a variety of ways; effort, capacity or competence on the foundation of need, social responsibility norm awards. The biggest portion of reward goes to those with special needs.

Consequently, a majority of the populace must agree that standards are suitable to be recognized for conduct. The members need to bear in mind that the Group supports the standards established. Members are normally required to infringe on the standards sometimes. If most members breach the standards, they must be revised and no longer be used as a benchmark for assessing behavior. Group members who may not validate the standards shall be penalized or requested to quit the group.

2.4.5. Group Cohesiveness

It refers to the links between the team members and those who choose to stay in the group. A few things impact group cohesion. In general, it indicates that the grouping is more solid only when it is more difficult to gain membership of a group. Concurrence with the other groups can also assess cohesion. The much more powerful a group is, the more coherent it is. Also regarded to be cohesive are smaller groups that spend more

time with one other. Cohesion also has beneficial benefits in working groups, including worker satisfaction, minimal turnover, absence, as well as high productivity. Nonetheless, if the objectives are mismatched with organizational objectives, strong cohesion of an organization might be damaging to the success of a company. According to Evans and Dion (1991, 2012) in their meta-analytic studies postulated the cohesion-performance effect to be stronger and more positive in smaller groups than larger groups. This was confirmed by Mullen and Copper (1994) to be a positive relationship as well in their meta-analysis study.

2.4.6. Group Roles

Both formal and informal organizations, group roles are distinct. Formal organizations generally have specified responsibilities and members are assigned. Each role has a certain duty and task. There are positions, however, which organically arise and grow to fulfill the requirements of the groupings. Such roles typically replace the given ones when people become more aggressive and express themselves. Group roles can therefore be divided according to roles of labor, blocking roles or maintenance. Various teaching methods developed for cooperative learning, using roles to support group coordination and interaction. (Johnson, & Johnson-Holubec, 1992; Kagan, 1994). These roles are based on differences in personal experience or individual responsibilities in team coordination (Bielaczyc, 2001).

2.4.7. Interpersonal trust and norms

Interpersonal trust can be categorized into two sorts, such as faith in relatives and trust in neighbors, and it is based on family membership, blood links, neighborhood relations, etc. (Rus and Iglıc, 2005; Lewicki, Tomlinson, Gillespie, 2006). Researchers have made significant progress in recent years in their studies of farmer's interpersonal

trust (Kong, Dirks, Ferrin, 2014). Firstly, Feng, Vlachantoni, Liu & Jones (2016) claimed that collaboration and the reduction of transaction costs might be fostered through interpersonal trust. Rural society is characterized by highly geographically specific interpersonal relationships between farmers, and information is primarily transmitted through non-institutional channels like village meetings (Feng et al., 2016), neighborly communication (Hoell, 2004), and the media (Evans & Revelle, 2008). Interpersonal trust can improve communication and information exchange among the various social groups and encourage farmers to embrace e-commerce (Snderskov, 2011). Secondly, according to Wang, Li & Tu (2019), interpersonal trust has a favorable impact on farmers' decisions. As a result of their shared trust, farmers are more likely to communicate with one another, collaborate more effectively, and create a framework for benefit and risk sharing (Six, 2007).

2.5 Farmer group output

According to Place (2004), measuring group performance is difficult since groups engage in multiple tasks across time, making performance analysis and comparison difficult. As a result, measuring group performance would be best accomplished through the utilization of any outputs produced by group activity. As a result, the ability of organizations to efficiently generate achievements can be best judged by using direct outputs (Tallam, 2018). Sonam & Martwanna (2012) evaluated the accomplishments of small dairy farm organizations throughout Bhutan's east and center regions. The achievement of the groups was evaluated using tangible advantages from the dairy groups, such as an easy market for their milk, timely cash income, access to credit, production support, marketing support, efficiency in processing, members' representation, and opportunities for members' capacity development (Tallam, 2018).

According to access to credit, farmers' outcomes are influenced by access to credit in many different kinds of ways (Nyemeck et al., 2008). This means that access to credit can greatly improve the ability of farmers with limited or no savings to obtain agricultural inputs. Furthermore, easing potential capital constraints through credit lowers the cost of opportunity of capital-intensive assets compared to family labor, promoting the adoption of high-yielding technology like Integrated Crop and Pest Management (ICPM) and thus increasing land and labor productivity, which is a critical factor in encouraging development, particularly in many West African countries (Nyemeck et al., 2008). Credit constraints have been identified as an important element influencing farm performance and development. Liquidity constraints have been identified as an important factor limiting farm input use in both developing and developed economies (Lee and Chambers, 1986; Fare et al., 1990; Bhattacharyya and Kumbhakar, 1997; Heltberg, 1998; Katchova, 2005; Katchova and Barry, 2005; Blancard et al., 2006).

In terms of extension services, the quality of services is governed by two factors: (1) technical quality, which is judged subjectively by the customer, and (2) functionality, which is concerned with the customer's and seller's personal perceptions and attitudes (Lotfy & Adeeb, 2016). A high-quality agricultural-extension service is useful, well-managed, and accountable to farmers, and it meets farmers' needs in broad agroecological scenarios through frequent interactions between the farmers and extension workers (Mur, Oonk, & Bitzer, 2016; Ragasa, Tadesse, Berhane & Taffesse, 2013; Thuo, 2014). The worth in extension services is consistently evaluated using many criteria. Based on (OECD/DAC, 2010), the most widely used criteria in evaluating extension services are relevance, effectiveness, efficiency, and impact. Birner et al. (2009) and Mur et al. (a) identified three primary criteria for evaluating the quality of

extension services. Services must be (1) intelligible (concise and clear), and (2) relevant (3) dependable (constant, accurate, transparent, and locally validated) (timely, answering farmers' requirements, economical, applicable, adapted to farming and socioeconomic situations). Customer satisfaction is heavily influenced by the view of service quality (Grigoroudis and Siskos, 2010). Thus, Ihalainen (2011) defines customer satisfaction as a mental or as an emotional response to the standard of a product or service. In the context of agricultural extension, contentment is defined as meeting farmers' prior expectations about the standard of extension services (Elias, Nohmi, & Yasunobu, 2015). Measuring farmer satisfaction indicates the impact of extension services and the extent of the developed mental image, which influences future building of trust amongst farmers and extension providers (Kassem, Shabana, Ghoneim, & Alotaibi, 2020). As a result, pleased farmers are more likely to participate in extension services and inform others about the excellent service they received (Golrang et al., 2012). From the perspective of agricultural extension, assessing farmer satisfaction is critical for allocating resources, monitoring performance, rewarding personnel, and providing information to policymakers (Yazdanpanah & Feyzabad, 2017).

2.6 Gender relations in agriculture

There is a wide range of literature available on women's participation in agriculture. Authors all across the world have demonstrated that women in rural regions have played vital roles and made significant contributions to crop growing. Huyer (2016) revealed that agriculture employs 60% of women in Oceania, Southern Asia, and Sub-Saharan Africa. Despite this, women's agricultural activities are characterized by a global gender gap in vulnerabilities, productivity, and access to resources, decision making, gender norms, and division of labour. A study in India by (Agarwal et al. 2017; Geleta et al

2017b) revealed that women's contributions to the farm industry have been disregarded and underappreciated. Women in rural areas have been heavily involved in agriculture and related fields. They do a range of labour-intensive tasks like hoeing, planting, hand-harvesting and other post-harvest activities. Despite the fact that women perform the majority of agricultural activities, agriculture is regarded a man's domain; while women perform the labour, males control agricultural management and decision-making.

2.6.1 Gender division of labour

The involvement of women to labour in African agriculture is between 60 and 80% (FAO, 2019). Recent evidence from nationally representative household surveys across SSA nations using individual plot-level labour input data shows that the average female labour share in food production varied from over 50% in Malawi to less than 24% in Niger (Palacios-Lopez et al., 2017). A series of studies conducted in African villages revealed that more women than men worked in cultivator families and that women worked longer hours than men. Food production is primarily done by women in subsistence agriculture, particularly in Africa (Boserup 1970). That claim was reinforced by a later observation from the Jalu community in Kenya, when Pala (1976) discovered that the percentage of work done by women farmers greatly outweighed that of men. Similarly, in Ghana, smallholdings managed by women account for over 80% of total food production. In Tanzania, however, 87% of rural women do comparable duties, while Zambian women contribute up to 80% of their labour to household crops. Furthermore, female labour in production has been found to be less relevant in civilizations where intense agricultural systems predominate over extensive systems. Also, women's work in agriculture has frequently been misdocumented as marginal, and as a result, they have been viewed as consumers rather than producers. (Befikadu, 2016).

2.6.2. Gender access to resources and benefits

According to Oparok Stephen's (2015) research, male farmers outnumber female farmers in terms of agricultural productivity. This is because men have greater access to financial management and property ownership rights than women. As a result, there is this disparity. Inequitable access to resources limits women's ability to ensure agricultural productivity, livelihood security, and food security, and is increasingly linked to poverty, migration, urban development, and a higher risk of violence. There are frequently comparisons between men and women in agriculture. According to (USAID, 2010), only 15% of extension agents are women, women receive only 5% of extension services, women receive less than 10% of farm credit and they own only 2% of titled land worldwide. When access to inputs was equalized between men and women in Burkina Faso, women increased agricultural output by 10 to 20%. (IFPRI 2020) report showed that when women farmers in Kenya were given equal access to education and inputs, their yields increased by 22%.

Women bear the huge responsibility for food security in Africa, yet development organizations have spent insufficient resources and time researching the influence of agricultural policies and innovative techniques on the well-being of Africa's women farmers. Land is the most basic resource of agricultural production, whether inherited, granted, purchased, or seized. Women are currently the primary food producers in Africa. The relationship of women to land, as it is perceived in various countries, is a significant aspect in their ability to provide food for themselves and their family. Simultaneously, women have an increasing need to create income for commodities and services that they cannot supply. Women's agricultural labour at the compound household level is likely to be undercompensated or not paid at all in locations where a cash economy has taken root. However, women's attempts to gain access to and control

over land are hindered by social inequalities associated with customary and traditional tenure systems, which are amplified by a lack of enforcement and implementation of new land laws and policies promoting gender equality in land access and control.

Despite the important roles that rural women play in agriculture and food security, women and men have different levels of access to and benefit from productive resources (IFAD, 2016). Women frequently confront larger barriers to accessing and exercising control over productive resources (Asiedu, 2018; IFAD, 2019; Meinzen-Dick, 2014; Mikalitsa, 2010; Naadira, 2012).

2.6.3 Gender decision making

Female farmers in the country are among the voiceless, particularly when it comes to influencing agricultural policies. Such policies, which aim to increase food security and productivity, tend to undervalue or completely disregard women's roles in both production and the wider decision-making process inside the household. Men have traditionally dominated decision-making in Africa on both household matters and crop management, even in areas where women are the primary providers of farm labor (Enete & Amusa, 2010b). Farmers' socioeconomic characteristics, among other aspects, also influence their agricultural decision-making. Women's contributions to agricultural productivity have been differently described in the literature Rahman (2018), Damisa & Yohanna (2017) yet their involvement in agricultural decision-making has not been widely exploited or, at best, remains minimal. Franklin (2007) discovered that while women are present in increasing numbers in agricultural/rural groups, they make up a small part of the membership and are frequently under-represented at higher levels of leadership in the nine nations he studied, as well as throughout Africa in general. While women's involvement is frequently limited by their lack of legal land ownership, many rural groups do not adequately address the needs of rural women. Women's

participation in these organizations as office holders is even more limited. The most obvious example is in Zimbabwe, where, despite the fact that women make up 75% of Zimbabwe Farmers Union members, only 5% of the officials are female. Few women hold national policy-making roles in Africa, and those that do are concentrated in social ministries such as education, health, and women's affairs. Women are only rarely found in technical ministries such as agriculture, where their policies have far-reaching consequences. Overall, women hold a very low proportion of decision-making roles in agriculture and rural development ministries. It is apparent that the gender distribution of decision-making varies significantly from country to country and among different cultural and ethnic groups within the same country. While women's decision-making power tends to rise when the husband is absent in many nations, males may still be involved in many of the most significant decisions.

2.6.4 Gender Norms

There is a growing body of literature on gender norms—the unwritten, informal social conventions that dictate socially acceptable behaviour for men and women—and how they impact the possibilities for women's empowerment. Research on social norms is expanding beyond public health into other sectors, including agriculture, and there is rising interest in incorporating a social norms lens into policy models and tactics for women's empowerment (Hillenbrand & Miruka, 2018). Gender-based limitations are firmly embedded in the customary norms, beliefs, and values that define family and kin relationships (Kabeer, 2016). Benefit-sharing decisions and outcomes may be based on gendered intra-household and intra-community resource allocation and bargaining power (Berdegué, 2005; Quisumbing and Maluccio, 2003). Although laws are in place to change these male-favoring practices, norms tend to persist over time and are

sluggish to change (Deere and Doss, 2006), and norms that promote and support men's provider roles have remained stable (Petesch, 2018)

Agriculture extension systems, as well as numerous agricultural interventions organized by nongovernmental organizations (NGOs), aim to improve farmers' skills and capacities, as well as their adoption of technology and services. However, in many circumstances, women are regarded as "farmers' spouses," rather than farmers, and hence are not targeted for services, regardless of their actual contributions to production and marketing. Gender norms and gendered conceptions of what it means to be a farmer may restrict women's access to timely information and high-quality extension services.

2.7. Levels of Group Influence.

2.7.1. Individual groups

Understanding the farmer as an individual performer is a good first step, but many farm tasks are performed by groups or teams rather than individuals. The members must also strive to maintain positive relationships with one another not only when practicing group farming, but also before and after the tasks are completed, between growing seasons, and in social interactions (Maat, 2018). A farmer group that is well-functioning has basic capabilities and procedures for internal democratic management. These include developing a shared vision, defining common objectives, fostering mutual trust and responsibility, resolving conflict, and sustaining learning. The development of these skills results in strong groups.

2.7.2 Organization group membership

A farmers' association is an alliance of various farmer groups. It represents their concerns to the government and other organizations. It assists farmers in organizing themselves into viable agricultural value chains for optimal production and market

access. While the challenges that farmers continue to face become more complex, the umbrella organizations are ready to continue working with and for Kenyan farmers for the collective good and progressive socioeconomic transformation (KENAFF 2021).

as revenue increases.

2.8 Farmer group performance effect on Household Food Security

a) Farmer group performance and Household Food Security

According to a 2017 UN World Food Program report, 108 million people experienced severe food insecurity. There were also 815 million individuals who were hungry, despite the fact that enough food was produced to feed the whole world's population. Household food insecurity is more prevalent in Sub-Saharan African (SSA) countries such as Kenya. The dramatic change in global warming, the slow development of the global economy, and regional conflicts all play a significant role in SSA food insecurity. There is no doubt that the adoption of farmer groups will result in an increase in crop productivity, which will improve food security. Residents in the village help to generate interest and urgency among community residents, who then make requests to organizations and leaders of farmer groups and campaign workers for assistance. Crop production is a crucial aspect of every farmer's day, which affects their agricultural land's profitability. But then, the embracement of farmer groups has been seen to improve crop yields at household level, thanks to the intelligent planting practices (Farm GRO, 2021).

Farmer groups also aids in the development of forward and backward links for government access to and marketing of input services. In view of the importance of crops production, the concept of high-performance agriculture is central. How efficient you are as a group is essentially the amount you can produce on any given amount of

land. In today's economy it is as important as ever to be able to do things efficiently. You want your space and the land you have worked to cultivate to maximize. Returns on crops not only affect your efficiency, but also your bottom line. According to Oparok (2015), Members belonging to farmers' groups cultivate and harvest more food crops from their gardens that sustain them for a long period of time while those that do not belong to farmers' groups have the need to buy additional quantities to supplement on their own grown food crops. The variance arises from the fact that, members of the farmers' group receive advice as well as inputs for both food crops and cash crops and for that matter, they do not need to sell their food crops whereas the non-members of the farmers' groups cultivate their food crops which serves the both as food and sell off some due to lack of advice and inputs. Most members of the farmers' group have their food stock last up to 5 and a half months on average while non-members of the farmers' group have their household food stock last up to only 4 and a half months (Oparok, 2015).

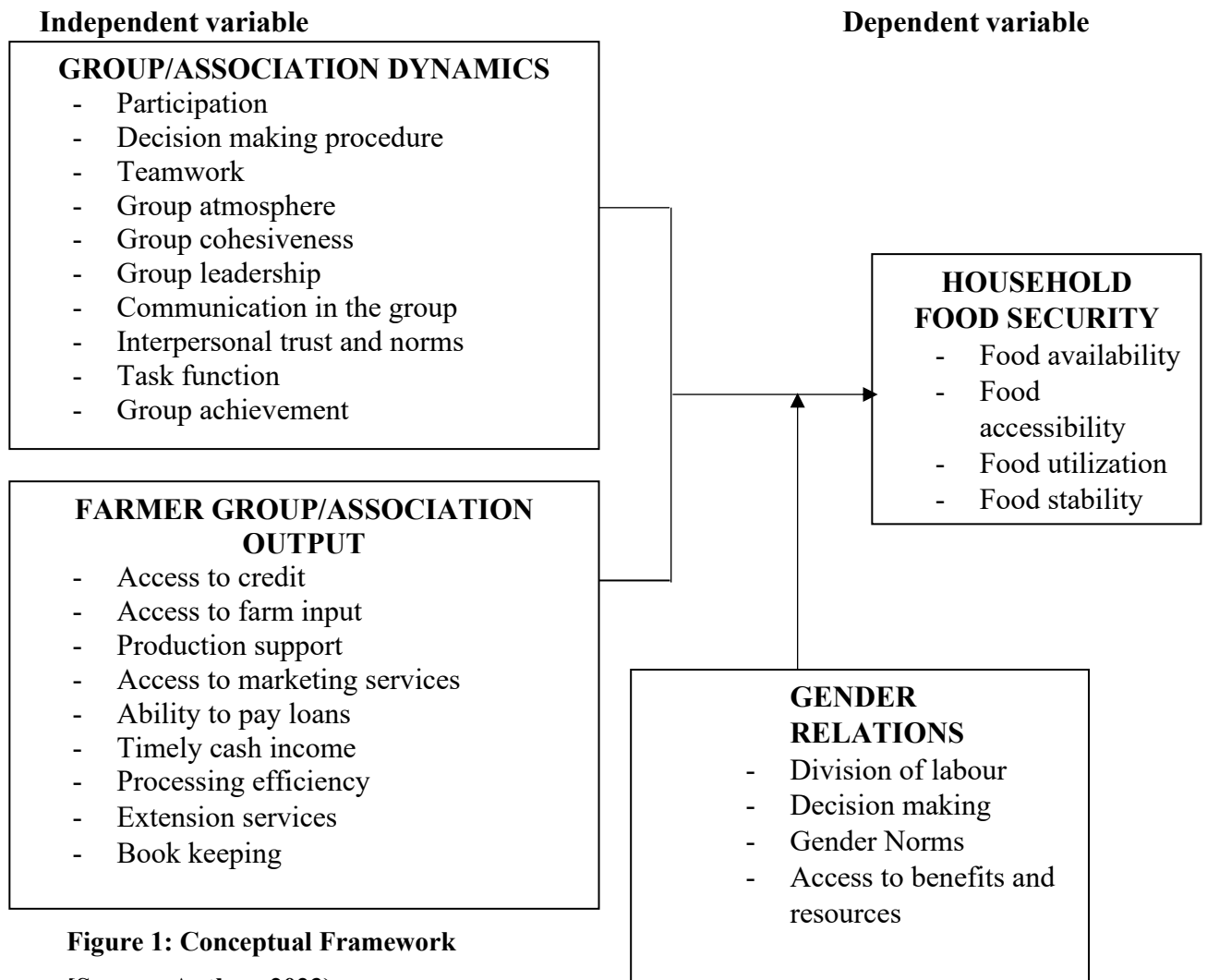
2.9 Research gap

The studies on farmer groups that have been evaluated do not provide a clear picture of its influence on food security. Furthermore, most studies on the viability of farmer groups' performance are scarce. Much emphasis is placed on global and national perspectives (FAO, 2014). Moreover, little attention is paid to the impact of group dynamics to farmer groups and further its impact at household food security. Most Kenyans live in the rural areas and depend mostly on their farms for their livelihood. In regard to this, farming is their main source of income which is both generated from subsistence and cash-crop production. Farmer groups have the capacity to significantly and effectively contribute to food security. It mostly relies on group members, whose abilities, opportunities, and issues are heavily influenced by age and gender.

These characteristics also determine each group member's tasks and responsibilities in their farming activities, as well as their productivity efficiency and decision-making power. The farmer group viability to production and profitability has been carried out in Kenya in the southern and central parts (FAO 2018). More and more farmers in these areas work their land and sell their produce as a group, based on the agreements they have with their buyers. It was also found out that it gave the farmers a bargaining power and helped them to plan on what and the quantity they grow. Since 2015, farmers in central and southern parts of Kenya some 15,000 farmers have joined to form groups and are practicing collective marketing where each group has a minimum of 15-30 members and some are registered with the county government (FAO 2018). However, it is not clear whether farmer groups organized in farmers' association has benefits over the individual groups or whether they have benefits to the individual farmers at household level and whether it impacts the food and income securities in western Kenya. Therefore, it is important for this study to be carried out in western Kenya and give an understanding of the effect of participating in farmer groups under an umbrella association to food security as compared to individual group farming while monitoring the group dynamics.

2.10 Conceptual framework

The conceptual framework combines two variables which describe how farmer groups through studying of the group dynamics, farmer group output and gender relations. The two variables are; the independent variables which are the group dynamics and farmer group outputs; the dependent variable which is food security; The conceptual framework is shown in figure



CHAPTER THREE

METHODOLOGY

3.1 Introduction

The methodology that was used in this study is described in this chapter. The description and method that was used to obtain data for the study is presented in it. It focused on description of the study area, research design, target population, sampling, data collection tools and procedures. The chapter discusses the establishment of validity and reliability. Finally, the analysis of data regarding research questions and operationalization of variables, which includes indicators and their measurement, methods of data collection, scale level and type of analysis, will be discussed.

3.2 Description of the Study Area

The study was conducted in Bungoma and Siaya counties, Western Kenya. The research locations were chosen consciously or purposefully, with the understanding that Bungoma and Siaya counties are a promising region for agricultural production operations due to their strategic natural factors.

3.2.1 Bungoma County

Bungoma County is located in Kenya's former Western Province, with its headquarters in Bungoma Town. The county has a population of 1,670,570 people, comprising 812,146 males and 858,389 females, according to the 2019 Kenya Population and Housing Census (Kenya National Bureau of Statistics [KNBS], 2019). It lies between latitudes 0°28' and 1°30' north of the equator and longitudes 34°20' east and 35°15' east

of the Greenwich Meridian. The county covers a total area of 3,032.4 km² (Bungoma County Government, 2023).

Bungoma County borders the Republic of Uganda to the northwest, Trans Nzoia County to the northeast, Kakamega County to the east and southeast, and Busia County to the west and southwest (Bungoma County Government, 2023). Its altitude ranges from about 1,200 metres above sea level to over 4,321 metres at the peak of Mount Elgon. Administratively, the county is divided into nine sub-counties, namely: Bumula, Sirisia, Kanduyi, Kabuchai, Tongaren, Kimilili, Webuye East, Webuye West, and Mount Elgon (Bungoma County Government, 2023).

The major physical features of the county include Mount Elgon, several hills such as Chetambe, Sang'alo, and Kabuchai, and rivers including Nzoia, Kuywa, Sosio, Kibisi, and Sio-Malaba/Malakisi. Notable waterfalls include Nabuyole and Teremi. Bungoma has one gazetted forest—the Mount Elgon Forest Reserve—covering about 618.2 km², and Mount Elgon National Park, which spans approximately 50.7 km² (Bungoma County Government, 2023).

The county experiences a bimodal rainfall pattern, with long rains from March to July and short rains from August to October. Annual rainfall ranges from 400 mm to 1,800 mm, while temperatures vary between 0°C and 32°C, depending on altitude. The average wind speed is about 6.1 km/h. In recent years, increasing variability in rainfall and temperature has altered the agricultural calendar and affected productivity (Bungoma County Government, 2023). Agriculture remains the backbone of Bungoma County's economy, with most households relying on crop and livestock production. The main crops grown include maize, beans, finger millet, sunflower, sugarcane, groundnuts, sweet potatoes, bananas, Irish potatoes, and vegetables (Bungoma County

Government, 2023). The county's environment supports complex interactions between plants, animals, and human activities, which shape its ecological balance. However, increased population pressure and intensified agricultural activities have led to reduced natural habitats and environmental degradation. The excessive use of chemical fertilizers has also affected soil fertility and biodiversity, altering natural processes such as nitrogen fixation and pollination. These dynamics continue to influence agricultural productivity and, consequently, household food security in the region (Bungoma County Government, 2023).

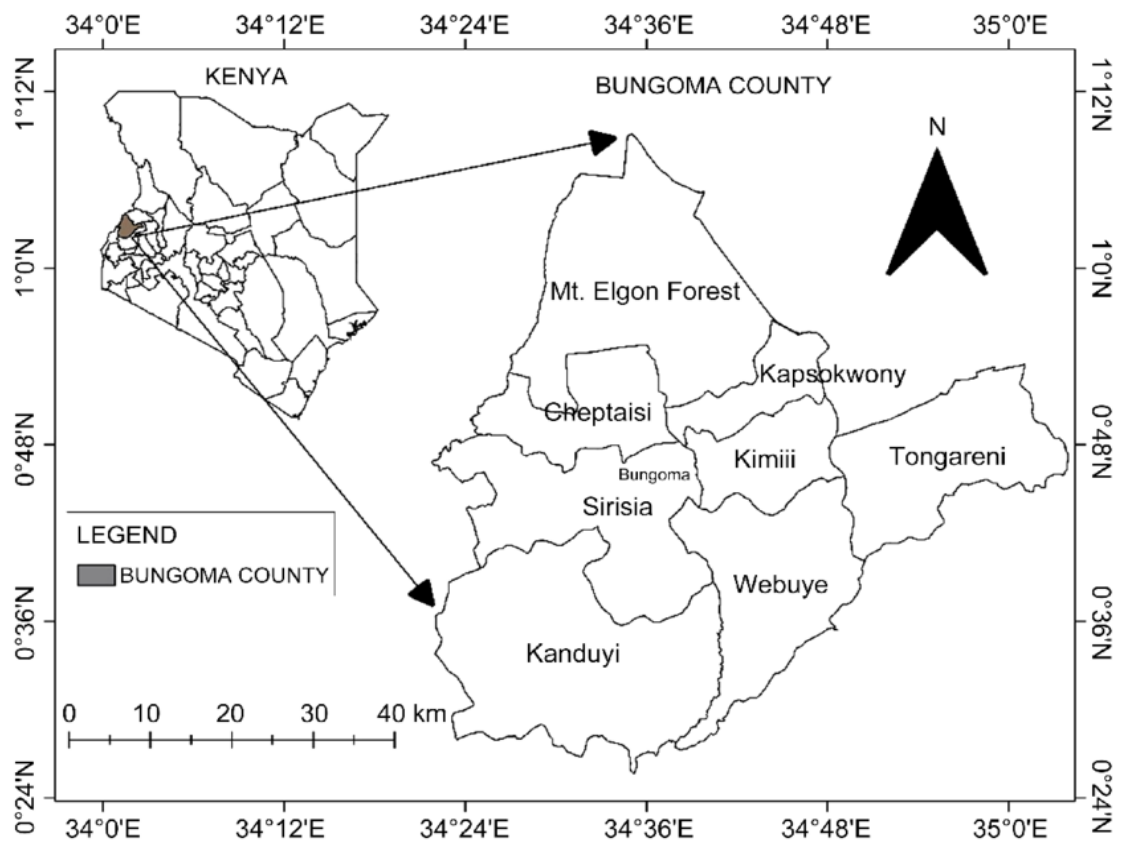


Figure 2: Map of Bungoma County

Source: (Open Institute, n.d.)

3.2.2 Siaya County

Siaya County is located in the former Nyanza Province, in the southwestern part of Kenya. Its administrative capital is Siaya Town, although Bondo is the largest urban centre. The county borders Busia County to the north, Kakamega and Vihiga Counties to the northeast, and Kisumu County to the southeast. It also shares a water boundary on Lake Victoria with Homa Bay County to the south (Siaya County Government, 2023). The county covers an area of approximately 2,496.1 km² and has a population of 842,325 people according to the 2019 Kenya Population and Housing Census (Kenya National Bureau of Statistics [KNBS], 2019). Geographically, it lies between latitudes 0°26' and 0°18' North and longitudes 33°18' East and 34°33' West, at an average altitude of about 1,318 metres above sea level (Siaya County Government, 2023).

Administratively, Siaya County is divided into six sub-counties, namely: Alego Usonga, Bondo, Ugenya, Gem, Ugunja, and Rarieda (Siaya County Government, 2023). The county experiences a tropical climate with significant rainfall throughout the year. The annual rainfall averages 2,155 mm, and the mean annual temperature is approximately 21.4°C (Siaya County Government, 2023).

Siaya County features three main geomorphological zones: dissected uplands, moderate lowlands, and the Yala Swamp. These zones differ in relief, soil types, and land use patterns. The altitude rises from about 1,140 metres along the shores of Lake Victoria to about 1,400 metres in the northern highlands. Major hills include Mbagha, Odiado, Akala, Regea, Nyambane, Usenge, Ramogi, Rambugu, Abiero, Sirafuongo, and Naya Hills, while Rivers Nzoia and Yala traverse the county and drain into Lake Victoria through the Yala Swamp (Siaya County Government, 2023).

The physical features and altitude variation influence the county's agricultural potential. The higher altitude areas such as Ugenya and Ugunja receive higher rainfall and are suitable for crop and livestock farming, while the lower areas of Boro, Uranga, Uyoma, and Wagai receive less rainfall and are more favorable for cotton production and drought-tolerant crops (Siaya County Government, 2023).



Figure 3: Map of Siaya County

Source: (Open Institute, n.d.-b)

3.3 Research design

A research design is a plan or strategy that is used to gather, analyze and interpret observed facts. Descriptive survey design will be adopted by the research. Descriptive research was conducted in order to study more than one variable where the researcher only measured the variables without manipulating or controlling them. This design consists of collecting data describing an event and organizing data in tabular, graphical or numerical images. In the course of the field survey, the study used questionnaires and interviews to ensure that all respondents answered all questions honestly and truly.

Questionnaires are commonly used, according to Mugenda (2003), to obtain significant information on the population. Each component in the survey is developed to address a particular purpose, research issue or study hypothesis. Therefore, it is important to know how to analyze the information collected from the questionnaires (Mugenda and Mugenda, 2003).

In this study, quant survey was used to collect mainly quantitative data, where both members of the household engaged in agriculture were spoke to. Structured questionnaires were also administered to selected farmers from different farmer groups and some key informants that gave mainly the qualitative data. Qual tools were also used and the FGD of men were separated from that of the women. KII interviews were also applied both for men and women to understand the gender perspective in the groups. Farmer group discussions were used to get the experiences of the farmers and the benefits they accrue from being in an individual farmer group or a group under an association.

3.4 Target Population

The respondents for this study came from Bungoma and Siaya counties. In Bungoma, 6 sub counties were under study. These are; Bumula, Bungoma South, Bungoma West, Bungoma Central, Kabuchai and North Bukusu sub counties. These sub counties were selected because farmer groups under the umbrella association (BUSSFFO) are located in these specific sub counties. In Siaya, the sub-counties under study included; Butula, Ugunja, Ugenya, Sigomre, East Ugenya, West Ugenya and Nambale. Butula and Nambale sub counties are located at the borders of Siaya and Busia but the farmer groups are registered in Siaya County. These sub counties were selected because there are several individual groups in these sub counties that are supported by the UNICARSSA project. Individual groups in this county acted as control because they are not formed under an umbrella association. The study target population is the small scale farmers who have organized themselves into individual groups and the farmer groups in an umbrella association in Bungoma and Siaya counties. These groups were selected so as to distinguish between the benefits of being in an individual group and benefits of being in a group under a farmer's association. The study also employed key informants (KIs): one (1) extension worker from each county, to understand their experience with the farmer groups in the two counties, three (3) group leaders from each county to understand better the management of the farmer groups, one (1) community leader from each county to understand farmer group performance at community level and one (1) official from the County government of each county to get the County's perspective on farmer groups.

3.5 Sample size and procedures of sampling

The study samples were in the Counties of Bungoma and Siaya as the field of study because farmers' groups are more organized in the two counties. As mentioned above, the study targeted farmers groups of the two counties. This formula was developed by (Daniel 1999) to achieve the size.

$$n = (N \times X / (X + N - 1)),$$

Whereby:

X is obtained through, $X = Z_{\alpha/2}^2 * p * (1-p) / MOE^2$,

$Z_{\alpha/2}^2$ on the other hand insinuates critical value for (the Normal distribution)

The level of confidence interval according to Mutai (2000) is taken as 95%, which enables an error tolerance margin of 0.05.

$$\text{So, } n = 371$$

In this study, every group had a chance of being sampled. In Bungoma County, sampling method was used to obtain the 218 samples from the total population. In Siaya County a census was carried out since the number of households is few and therefore to get the most appropriate results, all 153 households were used as samples. The population with the desired characteristics continued to be representative of this sample because it crosses the entire area of study.

3.6 Data Collection Method

In this study, quantitative and qualitative data were collected by means of a questionnaire and semi structured interviews respectively. Based on a cross-sectional research design, a mixed method approach was used to collect data according to the study objectives. While quantitative data was mainly be collected using household survey questionnaire, qualitative data was gathered through document review, Key

Informant Interviews, and Focused Group Discussions. The survey was developed with regard to independent and dependent variables. The questionnaires were administered using structured questions while KIIs and FGDs through structured interviews. The questionnaire included the choice of responses to ease the work of the respondent. In interviews, data was collected from key informant's face to face. The authority was sought from UoE and relevant government offices including the Ministry of Agriculture. Research permit was also sought from NACCOSTI.

3.7 Validity of the research Instrument

The questionnaire was tested and validated by the expert. Qual tools (FGD and KII) were also validated to ensure they are fit to get the information needed. It helped to conceptualize the technical accuracy and accuracy of the questionnaire; how large it is and how long it will take to reply to the questions. For research instruments, validity is an important element and Rodney (1998) says an instrument is valid if the concept that it is supposed to measure is measured.

3.8 Reliability of research Study instruments

This indicates the stability of the results obtained; the consistency of these values between one administration and another Fraenkel and Wallen (2008). Before the instruments are finished to the respondents, reliability is established by piloting the instrument (5 percent) on the sample. This is done to test whether items are difficult for the respondents to understand, lack of wording, identify items that are missing while the questionnaire was being constructed, and give an indication of the way the data collection instruments are performed in this field. Based on the findings of that pilot study, the elimination, alteration or advancement was done.

3.9 Data analysis techniques

After data collection, the first step involved examining the data for completeness, accuracy, and consistency to eliminate possible errors and omissions. The data were then coded, where responses to each question were categorized into meaningful groups to reveal essential patterns and trends.

Quantitative data were analyzed using descriptive and inferential statistics with the aid of the Statistical Package for the Social Sciences (SPSS-IBM). Descriptive statistics were employed to summarize the characteristics of respondents and study variables. These included measures of frequency, central tendency (mean, median, and mode), dispersion or variation, and measures of position.

Inferential statistics were applied to test relationships and determine the influence of independent variables on the dependent variable (household food security). Specifically, multiple regression analysis was used to analyze data for objectives two and three. The regression model adopted was as follows:

$$y_i = \beta_1 + \beta_2 X_2 + \beta_3 X_3 + \dots + \beta_K X_K + \epsilon$$

Where:

y_i the dependent or predicted variable

β_1 is the y-intercept, i.e., the value of y when both x_2 and x_3 are 0.

β_2 and β_3 are the regression coefficients representing the change in y relative to a one-unit change in x_2 and x_3 , respectively.

β_k is the slope coefficient for each independent variable

ϵ is the model's random error term.

This model helped to identify correlations and relative differences, particularly between socio-economic characteristics and farmer group characteristics.

Qualitative data from interviews and open-ended questions were analyzed using discourse and narrative analysis approaches. The qualitative responses were first organized according to research themes, then coded and categorized based on emerging patterns related to the study objectives. The identified themes were interpreted, summarized, and described narratively, providing deeper insights into farmer experiences and perceptions.

Data analysis was therefore conducted in line with the study's specific objectives, integrating both quantitative and qualitative findings to provide a comprehensive understanding of how farmer group performance influences household food security in Western Kenya.

CHAPTER FOUR

DATA PRESENTATION AND INTERPRETATION OF RESULTS

4.1 Introduction

This chapter presents the main findings of the study based on the analysed data from self-administered questionnaires using both descriptive and inferential statistical tests. The results are presented in the form of tables, figures and graphs.

4.2 Socio-demographic characteristics of the respondents

A total of 371 farmer respondents completed and returned the questionnaires. Out of this, 218 were farmers from Bungoma County while 153 were from Siaya County. Demographic information sought from the respondents included gender, age, level of education, marital status, main occupation, household head and seasonal income, and farm household size. In terms of gender, majority of the farmers were female (71.4%) while male was (28.6%). Majority of the respondents (55.0%) had attained primary level of education, followed by secondary level (27.5%), 11.6% had no formal education, 4.0% attained tertiary level of education while least number of respondents had attained graduate level (1.9%) (Figure 4.1).

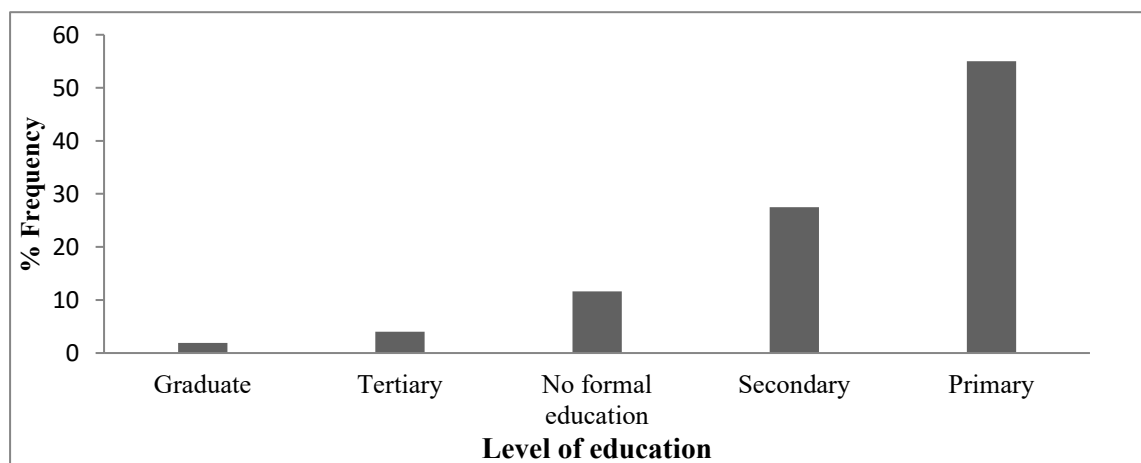


Figure 4.1: Level of education of the farmers

The average mean age of the respondents was 47 ± 14.93 . This was slightly higher in Siaya County at 49 ± 15.36 compared to Bungoma County (45 ± 14.50). In terms of marital status, majority (84.4%) of the respondents were married, followed by 12.1% who were widowed, 3.2% were single and only 0.3% were separated. Occupation wise, majority (94.6%) were farmers, followed by traders (3.2%). Those who engaged in formal employment were 1.9% while the rest (0.3%) had other occupations.

Concerning head of households, the male headed households were the majority (86.5%) while the female headed households were 13.5%. Furthermore, majority (84.4%) of the respondents were married, followed by 12.1% who were widowed, 3.2% were single while only 0.3% were separated (Figure 4.2).

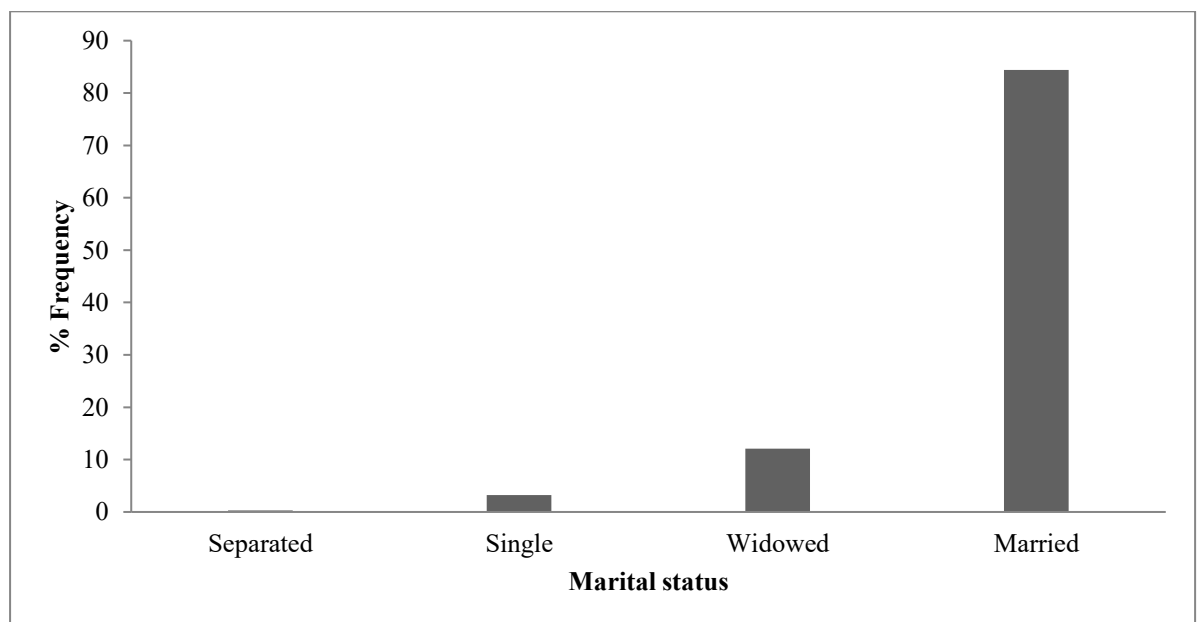


Figure 4.2: Marital status of the farmers

The average mean of household farm size was 2.07 ± 1.3 while household seasonal income was Kes. 50,475.10. Farmer seasonal household income was higher in Siaya County (Kes. 54,891.50) compared to Bungoma County (Kes. 39,699.30), with a significant difference between the two counties [$t(371)$, $p = 0.012$]. In terms of group membership fee, majority (81.9%) of the respondents were paying average membership

fee of Kes.168.5 to the groups in Siaya County while in Bungoma County, only 48.6% were paying average fee of Kes. 454.30 to the association. There was significant difference in membership fee contribution between the two counties [$t(371)$, $p < 0.001$].

The respondents also grew different crops. In overall, majority (96%) of the respondents grew maize, followed by beans (75.5%), Soybeans (45.6%), groundnuts (42.3%), millet (36.9%), and Sorghum (26.4%). Majority of the respondents in Bungoma County association planted beans and soybeans compared to groups in Siaya County while millet and sorghum were planted more in Siaya compared to Bungoma County (Table 4.1).

Table: 4.1: Responses of farmers regarding the types of crops they grow

Types of crops	% said yes		χ^2	Df	p
	Siaya	Bungoma			
Maize	42.1	57.9	2.91	1	0.88
Beans	37.1	62.9	7.907	1	0.005*
Soybeans	23.7	76.3	39.547	1	<0.001*
Groundnuts	42.7	57.3	0.231	1	0.631
Millet	54	46	16.446	1	<0.001*
Sorghum	66.3	33.7	34.588	1	<0.001*

Key: * Statistically Significant

In terms of gender, more female respondents (74.3%) planted beans compared to male respondents ($\chi^2=4.566$, $df=1$, $p = 0.033$). Furthermore, majority of the respondents with primary level of education planted groundnuts (61.8%), millet (57.7%), and beans (56.8%); this significantly differed between the respondents at ($\chi^2=9.294$, $df=4$, $p = 0.054$), ($\chi^2=17.128$, $df=4$, $p = 0.002$), and ($\chi^2=30.821$, $df=4$, $p < 0.001$) respectively. There was also significant relationship between marital status and type of crops where

majority of the married households grew soybean (89.3%) and groundnuts (89.2%) at ($\chi^2=7.869$, $df=3$, $p = 0.049$) and ($\chi^2=7.658$, $df=3$, $p = 0.054$) respectively. A summary of demographic characteristics of the respondents in both counties is shown in Table 4.2 below.

Table 4.2: Socio-demographic characteristics of farmers in Western Kenya

Variables		Frequency	Percentage
Gender	Female	265	71.4
	Male	106	28.6
	Total	371	100
Education	No formal	43	11.6
	education	204	55.0
	Primary	102	27.5
	Secondary	15	4.0
	Tertiary	7	1.9
	Graduate	371	100
Total			
Marital status	Married	313	84.4
	Widowed	45	12.1
	Single	12	3.2
	Separated	1	0.3
	Total	371	100
Head of household	Male headed	321	86.5
	Female headed	50	13.5
	Total	371	100

Main occupation	Farming	351	94.6
	Trade	12	3.2
	Formal	7	1.9
	employment	1	0.3
	Any other	371	100
Total			

4.3 Perceptions towards farmer groups and association dynamics in Western Kenya

This section analyzed the dimensions of farmer groups and association dynamics, which form the basis that influence food security. Ten dimensions of participation, decision-making procedure, teamwork, group atmosphere, group cohesiveness, group leadership, group communication, international trust and norms, task function, and group achievement were used as measures of group/association dynamics (Appendix A). A three-point Likert scale was used to measure the constructs, with 1 being disagree, 2 being undecided and 3 being agree. A reliability analysis of the scale measuring group/association dynamics indicated a Cronbach Alpha of 0.808, which indicates preferable internal consistency reliability (DeVellis 2012; Hair, Black, Babin, Anderson & Tatham, 2006).

Farmer group/association dimensions	Attributes	% distribution of responses			<i>M</i>	<i>SD</i>	<i>N</i>
		Disagree	Undecided	Agree			
Participation	Meeting involvement	3.5	20.5	75.9	2.72	0.52	371
	Meeting discussions	1.9	19.7	78.4	2.77	0.47	371
	Group activities	2.7	17.5	79.8	2.77	0.48	371
Decision making procedure	Decision making involvement	4.3	5.4	90.3	2.86	0.46	371
	Decision by consensus	2.7	4	93.3	2.91	0.37	371
Teamwork	Team effectiveness	1.9	2.4	95.7	2.94	0.31	371
	Team ability to reach consensus	4	1.9	94.1	2.90	0.41	371
	Effective team problem solving technique	15.1	5.4	79.5	2.64	0.73	371
Group atmosphere	Friendly well suited atmosphere	1.3	3.2	95.4	2.94	0.29	371
	Suppress conflict or unpleasant feelings	8.9	3.8	87.1	2.78	0.59	371
	Interest and satisfaction from work climate	1.9	4	94.1	2.92	0.33	371
Group cohesiveness	Degree of connection to the group	1.4	4.3	94.3	2.93	0.30	371
	Motivation to remain in the group	0.5	2.7	96.8	2.96	0.22	371
Group leadership	Leadership performance	3.2	2.2	94.6	2.91	0.38	371

	Competence and skills	13.2	7.8	79.0	2.66	0.70	371
	Leadership development programs	33.4	4	62.5	2.29	0.94	371
Communication in the group	Sharing of information	0.8	1.1	98.1	2.97	0.21	371
	Farmer to farmer dissemination	1.9	1.9	96.2	2.94	0.30	371
	Prompt dissemination	4.3	11.9	83.8	2.75	0.65	371
Interpersonal trust and norms	Trust other members	4	22.9	73.0	2.80	0.50	371
	Trust by other members	11.6	1.6	86.8	2.69	0.54	371
	Adhere to group rules and regulations	1.6	2.4	96.0	2.94	0.29	371
Task function	Provide problem solving suggestions to the group	7.8	7	85.2	2.77	0.58	371
	Provide or ask for facts or feedback	8.9	7.8	83.3	2.74	0.61	371
Group achievement	Performance of the farmer	1.3	2.7	96.0	2.95	0.28	371
	Performance of the group	2.7	9.7	87.6	2.85	0.43	371

Table 4.3: Response of farmers on group dynamic attributes in Western Kenya

Key: *M* = Mean; *SD* = Standard Deviation; *N* = Sample size

In terms of percentage responses, majority of respondents agreed that they were involved in meetings (75.9%), meeting discussions (78.4%), group/association activities (79.8%), decision-making (90.3%), and that decisions were mainly done by consensus (93.3%). Moreover, they agreed that there existed team effectiveness (95.7%), team consensus (94.1%), and effective team problem solving techniques (79.5%). Regarding group/association atmosphere, there existed friendly atmosphere (95.4%), suppression of conflict and unpleasant feelings (87.1%), and interest and satisfaction from work climate (94.1%).

Concerning group/association leadership, the respondents agreed that there was leadership performance (94.6%), competence and skills (79.0%), and leadership development programs (62.5%). In addition, there was sharing of communication (98.1%), farmer to farmer dissemination of information (96.2%) as well as prompt dissemination of information (83.8%). In terms of interpersonal norms and trust within the groups/association, members trusted other members (73.0%), they were also trusted by other members (86.8%) as well as adhered to group/association rules and regulations (96.0%). About task function, majority (85.2%) agreed that the group/association provided problem solving mechanisms as well as gave feedback (83.3%). As a final dimension, the respondents agreed that the group/association had achievement in terms of farmer performance (96.0%) as well as group/association performance (87.6%).

Based on mean rank of the variables, information sharing was ranked highest ($M=2.97$, $SD=0.21$), followed by motivation to remain in the group/association ($M=2.96$, $MD=0.22$), and farmer performance ($M=2.95$, $MD=0.28$). Adherence to group/association rules and regulations, friendly atmosphere, and team effectiveness had the same rank ($M=2.94$, $MD=0.30$, 0.29 , 0.29 , 0.31 respectively) (Table 4.3). In overall, majority (95.7%) said that the group/association dynamic was effective.

Table 4.4: Group dynamics attributes mean score comparison between farmer groups in Siaya County and farmer association in Bungoma County, Kenya

Farmer dimensions	group/association	Attributes	Siaya		Bungoma		<i>t</i>	<i>df</i>	<i>p</i>	Siaya	Bungoma
			<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>				<i>N</i>	<i>N</i>
Participation		Meeting involvement	2.75	0.49	2.71	0.54	0.847	369	0.40	153	218
		Meeting discussions	2.74	0.48	2.78	0.45	-0.931	369	0.35	153	218
		Group activities	2.8	0.49	2.75	0.48	1.109	369	0.27	153	218
Decision making procedure		Decision making involvement	2.8	0.55	2.90	0.37	-2.076	369	0.04*	153	218
		Decision by consensus	2.89	0.41	2.92	0.35	-0.724	369	0.47	153	218
Teamwork		Team effectiveness	2.93	0.31	2.95	0.31	-0.515	369	0.61	153	218
		Team ability to reach consensus	2.88	0.43	2.91	0.40	-0.698	369	0.49	153	218
		Effective team problem solving technique	2.74	0.59	2.58	0.81	2.209	369	0.03*	153	218
Group atmosphere		Friendly well-suited atmosphere	2.92	0.29	2.95	0.28	-1.066	369	0.29	153	218
		Suppress conflict or unpleasant feelings	2.56	0.79	2.95	0.30	-5.787	369	<0.001*	153	218
		Interest and satisfaction from work climate	2.89	0.39	2.95	0.28	-1.520	369	0.13	153	218
Group cohesiveness		Degree of connection to the group	2.88	0.4	2.96	0.21	-2.316	369	0.02*	153	218
		Motivation to remain in the group	2.98	0.14	2.95	0.26	1.476	369	0.14	153	218
Group leadership		Leadership performance	2.93	0.3	2.90	0.43	0.889	369	0.38	153	218

	Competence and skills	2.57	0.74	2.72	0.66	-2.022	369	0.04*	153	218
	Leadership development programs	2.32	0.94	2.27	0.94	0.502	369	0.62	153	218
	Sharing of information	2.98	0.18	2.97	0.22	0.567	369	0.57	152	218
Communication in the group	Farmer to farmer dissemination	2.91	0.39	2.97	0.22	-1.711	369	0.09	153	218
	Prompt dissemination	2.59	0.79	2.86	0.50	-3.705	369	<0.001*	153	218
	Trust other members	2.76	0.51	2.82	0.49	-0.983	369	0.33	153	218
Interpersonal trust and norms	Trust by other members	2.56	0.59	2.78	0.48	-3.932	369	<0.001*	153	218
	Adhere to group rules and regulations	2.94	0.29	2.95	0.30	-0.122	369	0.90	153	218
	Provide problem solving suggestions to the group	2.81	0.48	2.75	0.63	1.081	369	0.28	153	218
Task function	Provide or ask for facts or feedback	2.67	0.65	2.80	0.57	-2.016	369	0.05*	153	218
	Performance of the farmer	2.9	0.38	2.98	0.17	-2.617	369	0.01*	153	218
Group achievement	Performance of the group	2.71	0.53	2.95	0.30	-4.878	369	<0.001*	153	218

Key: *M* = Mean; *SD* = Standard Deviation; *t* = Independent samples t-test; *df* = Degree of freedom; *p* = Significant (2-tailed); *N* = Sample size; * Statistically Significant

Independent-samples t-test was further used to compare the mean scores of farmer groups in Siaya County and farmer association in Bungoma County based on the twenty six (26) group dynamic attributes mean scores. The results (Table 4.4) showed a significant difference in the scores on decision making involvement for Siaya ($M = 2.80, SD = 0.55$) and Bungoma [$M = 2.90, SD = 0.37; t(369) = -2.076, p = 0.04$, two-tailed]; effective team problem solving technique for Siaya ($M = 2.74, SD = 0.59$) and Bungoma [$M = 2.58, SD = 0.81; t(369) = 2.209, p = 0.03$, two-tailed]; suppress conflict or unpleasant feelings for Siaya ($M = 2.56, SD = 0.79$) and Bungoma [$M = 2.95, SD = 0.30; t(369) = -5.787, p = <0.001$, two-tailed]; degree of connection to the group for Siaya ($M = 2.88, SD = 0.40$) and Bungoma [$M = 2.96, SD = 0.21; t(369) = -2.316, p = 0.02$, two-tailed]; competence and skills for Siaya ($M = 2.57, SD = 0.74$) and Bungoma [$M = 2.72, SD = 0.66; t(369) = -2.022, p = 0.04$, two-tailed]; prompt dissemination of information for Siaya ($M = 2.59, SD = 0.79$) and Bungoma [$M = 2.86, SD = 0.50; t(369) = -3.705, p = 0.001$, two-tailed]; trust by other members for Siaya ($M = 2.56, SD = 0.59$) and Bungoma [$M = 2.78, SD = 0.48; t(369) = -3.932, p = <0.001$, two-tailed]; provide or ask for facts or feedback for Siaya ($M = 2.67, SD = 0.65$) and Bungoma [$M = 2.80, SD = 0.57; t(369) = -2.016, p = 0.05$, two-tailed]; farmer performance for Siaya ($M = 2.90, SD = 0.38$) and Bungoma [$M = 2.98, SD = 0.17; t(369) = -2.617, p = 0.01$, two-tailed]; and group performance for Siaya ($M = 2.71, SD = 0.53$) and Bungoma [$M = 2.95, SD = 0.30; t(369) = -4.878, p = <0.001$, two-tailed].

Based on the independent-samples t-test output, partial eta squared effect was calculated using Cohen's (1988) formulae below:

$$Eta\ squared = \frac{t^2}{t^2 + (N1 + N2 - 2)}$$

Where:

t = t-value

N_1 = Sample size of Siaya farmers

N_2 = Sample size of Bungoma farmers

0.01 indicates small effect; 0.06 medium effect; and 0.14 large effect.

Therefore, the magnitude of the difference in means show that only suppress conflict or unpleasant feelings ($\eta=0.08$) and performance of the group ($\eta=0.06$) variables had medium effect. The rest of the variables had small effect (Table 4.5).

Table 4.5: Group dynamic attributes magnitude difference in means between farmer groups in Siaya County and farmer association in Bungoma County, Kenya

Attributes	Siaya		Bungoma		<i>t</i>	<i>df</i>	<i>p</i>	η	Interpretation
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>					
Decision making involvement	2.8	0.55	2.90	0.37	-2.076	369	0.04*	0.01	Small effect
Effective team problem solving technique	2.74	0.59	2.58	0.81	2.209	369	0.03*	0.01	Small effect
Suppress conflict or unpleasant feelings	2.56	0.79	2.95	0.30	-5.787	369	<0.001*	0.08	Medium effect
Degree of connection to the group	2.88	0.4	2.96	0.21	-2.316	369	0.02*	0.01	Small effect
Competence and skills	2.57	0.74	2.72	0.66	-2.022	369	0.04*	0.01	Small effect
Prompt dissemination	2.59	0.79	2.86	0.50	-3.705	369	<0.001*	0.04	Small effect
Trust by other members	2.56	0.59	2.78	0.48	-3.932	369	<0.001*	0.04	Small effect
Provide or ask for facts or feedback	2.67	0.65	2.80	0.57	-2.016	369	0.05*	0.01	Small effect
Performance of the farmer	2.9	0.38	2.98	0.17	-2.617	369	0.01*	0.02	Small effect
Performance of the group	2.71	0.53	2.95	0.30	-4.878	369	<0.001*	0.06	Medium effect

Key: *M* = Mean; *SD* = Standard Deviation; *t* = Independent samples t-test; *df* = Degree of freedom; *p* = Significant (2-tailed); η = Partial eta squared value; * Statistically Significant.

4.4 Perceptions towards farmer group/association outputs in Western Kenya

Ten dimensions were used to establish the perception of the respondents towards farmer group/association outputs. A three-point Likert scale was used to measure the constructs. A reliability analysis of the scale measuring group/association outputs indicated a Cronbach's Alpha of 0.704, which was acceptable internal consistency reliability. According to the results, majority (58.2%) of the respondents were accessing credit, 83.6% received production support, 57.4% had ability to pay loans, 94.1% were doing processing efficiency, and 92.5% were accessing extension services (Table 4.6).

Table 4.6: Response of farmers on farmer group/association outputs in Western Kenya

Dimensions	% distribution of responses			<i>M</i>	<i>SD</i>	<i>N</i>
	No	No idea	Yes			
Access to credit	41.8	-	58.2	2.16	0.99	371
Access to farm input	62.0	1.3	36.7	1.75	0.96	371
Production Support	14.6	1.9	83.6	2.74	1.27	371
Access to marketing services	57.7	0.5	41.8	1.84	0.99	371
Ability to pay loans	41.8	0.8	57.4	2.16	0.98	371
Timely cash income	69.8	1.1	29.1	1.59	0.91	371
Processing efficiency	4.9	1.1	94.1	2.89	0.44	371
Extension services	5.7	1.9	92.5	2.87	0.48	371
Book keeping	68.6	1.1	30.3	1.62	0.92	371

In contrast, majority (62%) had no access to farm inputs, 57.7% had no access to marketing services, 69.8% could not acquire timely cash income while 68.6% could not do book keeping.

In terms of mean rank of the dimensions, processing efficiency was ranked highest ($M=2.89$, $SD=0.44$), followed by access to extension services ($M=2.87$, $SD=0.48$), and production support ($M=2.74$, $SD=1.27$) (Table 4.6). As illustrated in Table 4.7, independent-samples t-test was done to compare the mean scores of farmer groups in Siaya County and farmer association in Bungoma County based on the nine (9) farmer outputs dimensions mean scores. The results showed a significant difference in the scores on access to credit for Siaya ($M = 2.31$, $SD = 0.95$) and Bungoma [$M = 2.06$, $SD = 1.00$; $t(369) = -2.366$, $p = 0.02$, two-tailed]; access to farm input for Siaya ($M = 1.59$, $SD = 0.90$) and Bungoma [$M = 1.85$, $SD = 0.99$; $t(369) = -2.612$, $p = 0.01$, two-tailed]; production support for Siaya ($M = 2.38$, $SD = 0.92$) and Bungoma [$M = 2.91$, $SD = 0.40$; $t(369) = -6.706$, $p = <0.001$, two-tailed]; access to market services for Siaya ($M = 2.07$, $SD = 0.99$) and Bungoma [$M = 1.68$, $SD = 0.95$; $t(369) = 3.819$, $p = <0.001$, two-tailed]; timely cash income ($M = 1.47$, $SD = 0.84$) and Bungoma [$M = 1.68$, $SD = 0.94$; $t(369) = -2.228$, $p = 0.03$, two-tailed]; processing efficiency for Siaya ($M = 2.81$, $SD = 0.58$) and Bungoma [$M = 2.95$, $SD = 0.29$; $t(369) = -2.725$, $p = 0.01$, two-tailed]; and extension services for Siaya ($M = 2.80$, $SD = 0.57$) and Bungoma [$M = 2.91$, $SD = 0.39$; $t(369) = -2.037$, $p = 0.04$, two-tailed].

Table 4.7: Farmer outputs dimensions mean score comparison between farmer groups in Siaya County and farmer association in Bungoma County, Kenya

Dimensions	Siaya		Bungoma		<i>t</i>	<i>df</i>	<i>p</i>	η	Interpretation
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>					
Access to credit	2.31	0.95	2.06	1.00	2.366	369	0.02*	0.01	Small effect
Access to farm input	1.59	0.90	1.85	0.99	-2.612	369	0.01*	0.02	Small effect
Production Support	2.38	0.92	2.91	0.40	-6.706	369	<0.001*	0.12	Medium effect
Access to marketing services	2.07	0.99	1.68	0.95	3.819	369	<0.001*	0.04	Small effect
Ability to pay loans	2.24	0.97	2.10	0.99	1.300	369	0.20	0.004	Small effect
Timely cash income	1.47	0.84	1.68	0.94	-2.228	369	0.03*	0.01	Small effect
Processing efficiency	2.81	0.58	2.95	0.29	-2.725	369	0.01*	0.02	Small effect
Extension services	2.80	0.57	2.91	0.39	-2.037	369	0.04*	0.01	Small effect
Book keeping	1.68	0.94	1.57	0.90	1.074	369	0.28	0.003	Small effect

Key: *M* = Mean; *SD* = Standard Deviation; *t* = Independent samples t-test; *df* = Degree of freedom; *p* = Significant (2-tailed); η = Partial eta squared value; * Statistically Significant.

Further analysis in terms of farmer outputs dimensions was done. Regarding the respondents who accessed credit, 37.8% accessed credit through table banking, followed by 29% who accessed through groups, 27.6% through cooperative societies, 3.2% through associations and only 2.3% through commercial banks. Based on counties, majority (53.5%) from Siaya County accessed credit through table banking, 28.7% through groups and 17.8% through cooperatives. In Bungoma County, 36.2% accessed credit through cooperative societies, 29.3% through groups within the association, 24.1% through table banking, 6% through association, and 4.3% through commercial banks. No respondent from groups in Siaya County accessed credit through

commercial banks (Figure 4.3). The responses between the groups and association in relation to access to credit was statistically significant ($\chi^2 = 29.344$, $df = 4$, $p = <0.001$) with a large magnitude effect in the relationship ($\eta = 0.37$).

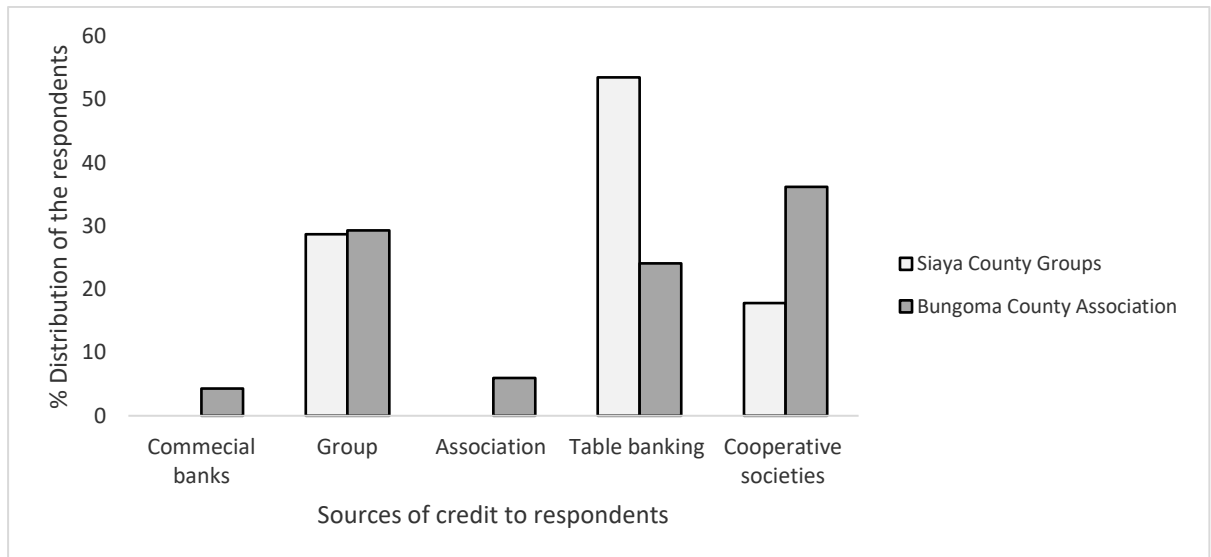


Figure 4.3: Sources of credit to farmer groups/association in Siaya and Bungoma Counties

In terms of credit period, majority (59.4%) secured credit with a duration of one month, 11.1% weekly, 13.8% for one year, 9.2% for half year, and 5.5% per season. The credit from commercial banks, groups, associations, table banking and cooperative societies were mainly granted for a period of one month. In average mean of credit amount was Ksh. 16,692 at an average mean interest rate of 10%. The credit was mainly used for farm production (71.9%), followed by household use (25.8%) and a few (1.8%) did credit refinancing.

Concerning access to farm input, majority (65%) of the respondents under association got free access to farm inputs while 27.5% did cash purchase from groups. The rest got access through credit purchase from groups (3%) and cash purchase from association (2.4%). The main type of farm inputs accessed were fertilizer (98.7%) and seed

(98.1%). The rest ranges from pesticides, labour, herbicide, tools and equipment, to land (Figure 4.4).

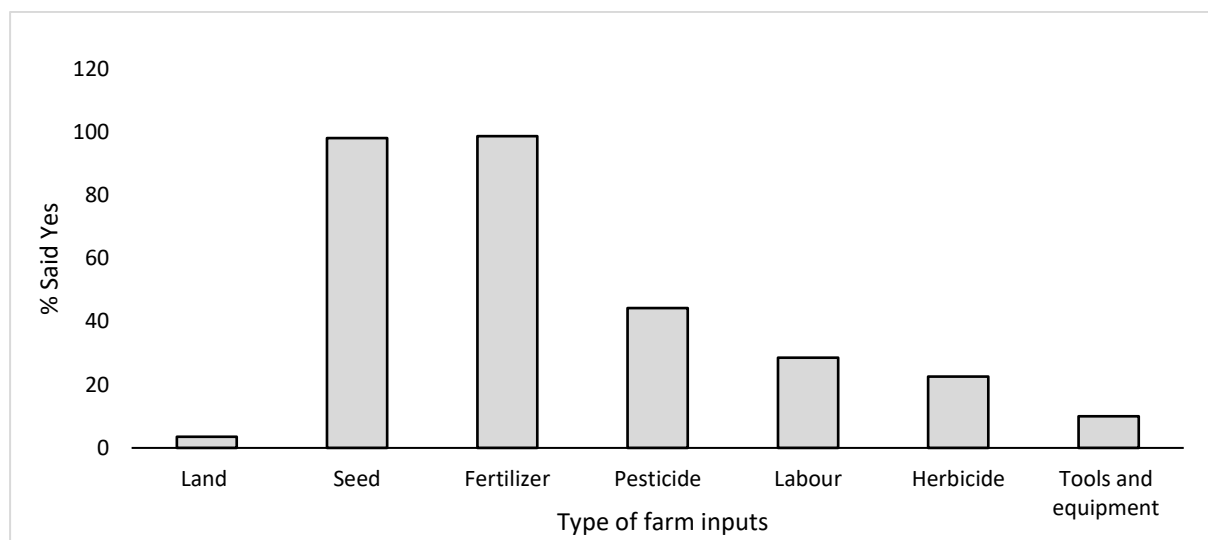


Figure 4.4: Types of farm inputs acquired from farmer groups/association in Siaya and Bungoma Counties

Further analysis was done between farmer groups in Siaya county and farmer association in Bungoma County who acquired farm inputs to establish the main types of farm inputs provided by the groups and association. Groups facilitated the acquisition of land (84.6%), pesticides (55%), labour (61.3%), and herbicide (54.8%). On other hand, the association mainly provided seed and fertilizer at 58.2% respectively, and tools and equipment (70.3%). As a result, the mean rank on seasonal cost of production was Ksh. 18,260±1,476 for farmer groups in Siaya County and Ksh. 12,974±879 for farmer association in Bungoma County with a significance difference in the scores [$t(369) = 2.478, p = 0.014$, two-tailed].

Regarding those who acquired production support, the sources of support were from groups (63.2%), association (33.8%), cooperative societies (32.7%), and farmer-to-

farmer (12.4%). Furthermore, the types of support included knowledge on farm inputs (72.7%), agronomy (48.6%), and farm market prices (23.2%). The association mainly provided knowledge on agronomy and market access while the cooperatives societies mainly provided knowledge on farm inputs (Figure 4.5). The average overall farm production was 1.57 ± 1.195 acres, which was slightly higher in Siaya County (1.65 ± 1.132) compared to Bungoma County (1.52 ± 1.237).

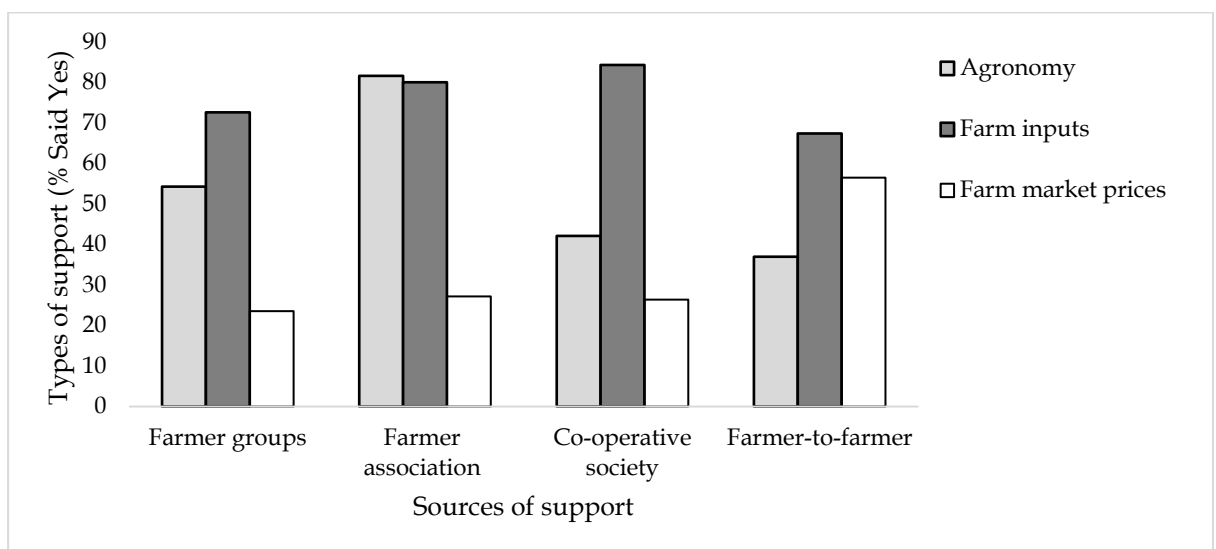


Figure 4.5: Types of production knowledge support from different sources to farmers

In terms of seasonal farm produce, in average maize produce ranked highly ($M = 1319.25$, $SD = 13319.25$) followed by sorghum ($M = 472.57$, $SD = 611.80$), miller ($M = 427.86$, $SD = 594.05$), beans ($M = 315.43$, $SD = 453.40$), and Soybeans ($M = 200.55$, $SD = 215.73$).

Table 4.8: Seasonal farm produce mean score comparison between farmer groups in Siaya County and farmer association in Bungoma County, Kenya

Seasonal farm produce (Kgs)	County	<i>M</i>	<i>SD</i>	<i>t</i>	<i>P</i>
Maize	Siaya	1442.87	1425.79	1.459	0.15
	Bungoma	1230.10	1265.80		
Sorghum	Siaya	588.58	641.44	2.981	0.01*
	Bungoma	247.38	483.03		
Soybeans	Siaya	395.00	253.78	5.262	<0.001*
	Bungoma	148.80	171.54		
Groundnuts	Siaya	388.28	330.49	-0.252	0.80
	Bungoma	414.56	906.60		
Beans	Siaya	428.11	533.30	2.895	0.01*
	Bungoma	252.13	389.14		
Millet	Siaya	620.56	724.42	4.742	<0.001*
	Bungoma	191.97	212.37		

Key: *M* = Mean; *SD* = Standard Deviation; *t* = Independent samples t-test; *p* = Significant (2-tailed); * Statistically Significant.

A comparison between farmer groups and association showed that mean seasonal produce of sorghum, soybeans, beans and millet were higher in Siaya County compared to Bungoma County (Table 4.8).

Furthermore, majority (70.6%) of the respondents directly accessed the market access for their firm produce, 26.8% through groups, 5.9% farmer to farmer while 2.4% was through association and cooperative societies respectively. In addition, market information sources varies from groups (37.5%), schools (31%), farmer to farmer (26.8%), association (2.7%) to co-operative societies (2.4%). The average household

cash farm income was Ksh. 17,661, which was slightly higher in Siaya County (Ksh. 21, 967) compared to Bungoma County (Ksh. 14,936).

Different post-harvest activities including drying (99.5%), cleaning (99.5%), storage (98.9%), sorting (42.9%) and grading (42.3%) were also undertaken by the respondents. Farmer groups in Siaya County did more sorting compared to farmer association in Bungoma County while grading was done more in farmer association compared to farmer groups. There was significant relationship between farmer groups in Siaya County and association in Bungoma County in terms of sorting and grading ($\chi^2 = 15.425$, $df = 1$, $p = <0.001$, $\eta = 0.204$) and ($\chi^2 = 8.004$, $df = 1$, $p < 0.006$, $\eta = 0.147$) with large effect size respectively.

In term of value addition, only 16% of the respondents did value addition. A paired-samples t-test was conducted to evaluate the impact of the value addition on selling price (Ksh). There was a statistically significant increase in selling price before value addition ($M = 215.9$, $SD = 32.9$) to selling price after value addition [$M = 725.8$, $SD = 110.6$, $t(42) = -3.464$, $p = 0.001$, two-tailed]. The mean increase in selling price was 509.9. The eta squared statistic (0.22) indicated a large effect size.

The respondents received extension services from different sources (Figure 4.6). The main source was from academic institutions (70.2%) and farmer groups (51.7%). The rest were from farmer association (44.9%), co-operative societies (24.4%), county governments (9.1%), private institutions (7.4%) and community *barazas* (1.7%). Training was the main (95.2%) type of extension services received by the respondents. Others (19.7%) also received farm demonstration services.

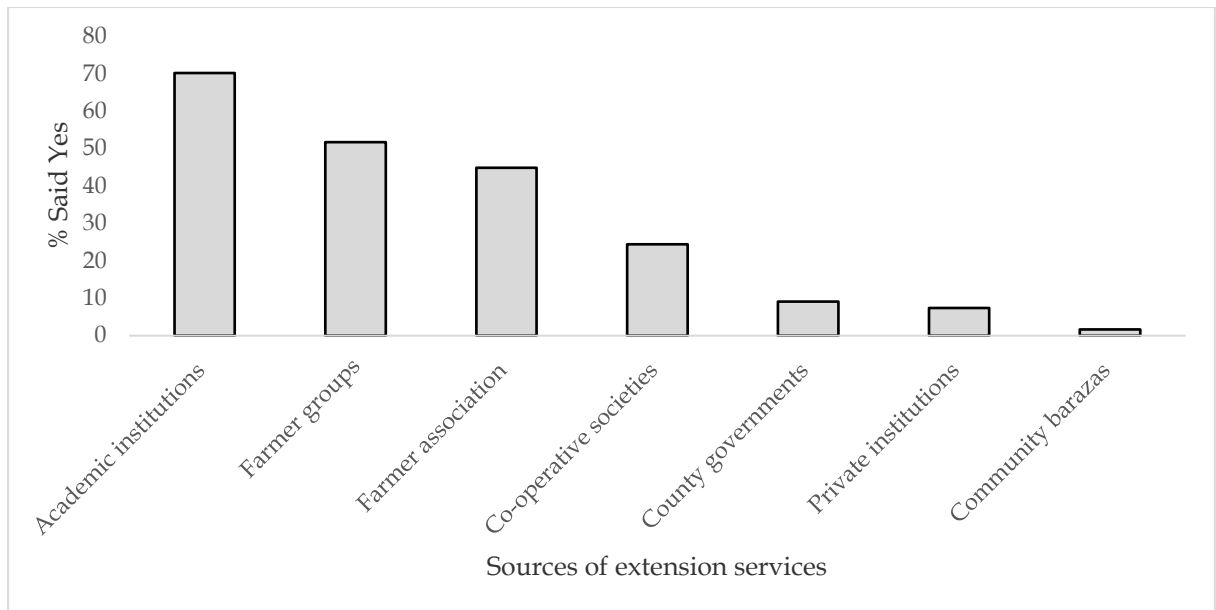


Figure 4.6: Responses of farmers on sources of extension services in Siaya and Bungoma Counties Kenya

Further information was also sought on the frequency, availability and accessibility of extension services amongst the respondents. In terms of availability, majority (79%) rarely received extensions services. 19.3% always received extension services while only 1.7% never received extension services. More respondents (62.6%) in farmer association rarely received extensions services. The services were offered on quarterly and during planting seasons at 41.3% respectively. Other respondents received the services on weekly (10.3%) and monthly (9.4%) basis. When available, majority (79.3%) could always access the services. 20.2% rarely accessed and very few (0.6%) could not access. More respondents (67%) in association accessed the extension services comparing to 66.2% who could not access in farmer groups. The most useful extension services were from academic institutions, farmer association and co-operative societies.

Concerning booking keeping, Majority (76.2%) reported to have knowledge in record keeping. Majority (56.2%) of farmers in association had knowledge on record keeping

compared to those in farmer groups (43.8%). The respondents kept records on farm inputs (94.4%), outputs (60%), and sales records (94.2%) but rarely kept expenditure records (only 7.8%) (Table 4.6). For those who did book keeping, 93.2% kept the records by themselves and they mainly did the records seasonally (68.3%). Others did on weekly (13.5%), monthly (9.6%), quarterly (2.9%), and yearly (5.8%) basis.

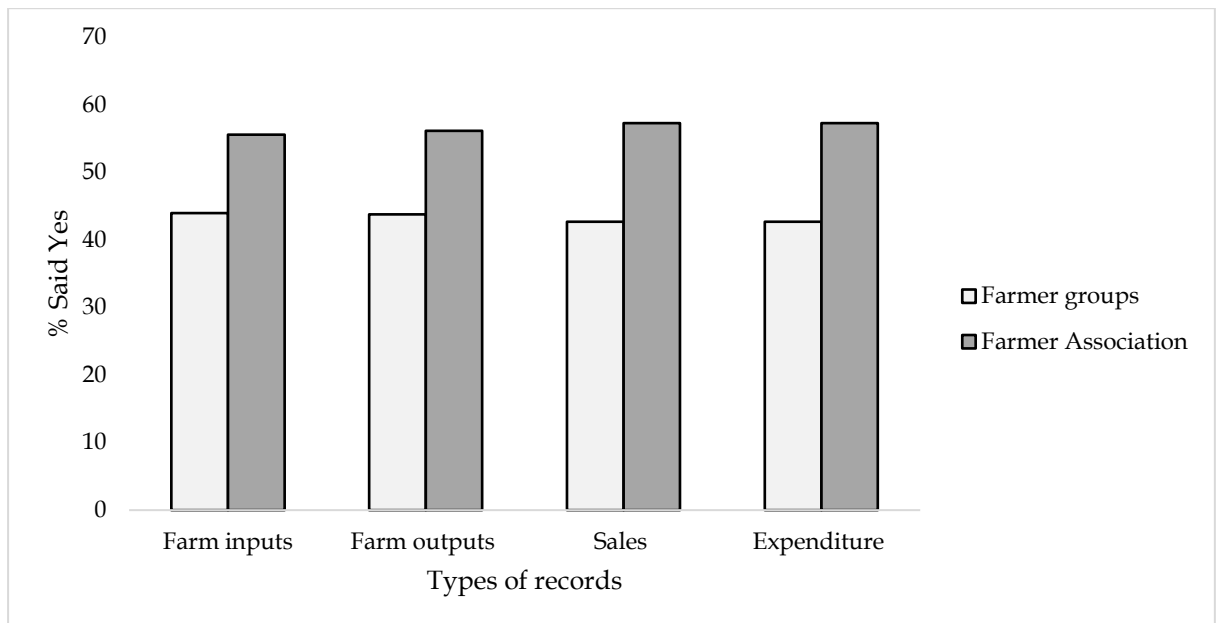


Figure 4.7: Responses of farmers on types of record keeping they undertake in Siaya and Bungoma Counties, Kenya

4.5 Perception of farmer groups and association towards food security in western Kenya

Food security was measured in terms of food availability, accessibility, utilization and stability as dimensions with twelve constructs. A three-point Likert scale of disagree, no idea and agree was used to measure the constructs. A reliability analysis of the scale measuring food security indicated a Cronbach's Alpha of 0.742, which was acceptable internal consistency reliability.

In terms of food availability, the respondents agreed that there was physical presence of sufficient food quantity (55.6), appropriate quality of food from their own production (64.5%) and availability of food diversity (65%). Furthermore, the respondents could also physically, economically and socially access food at 79%, 77.1%, and 76.8% respectively (Table 4.9%). Regarding food utilization, the perception of residents was that they utilized appropriate quantity of dietary intake (82.2%), quality of dietary intake (77.1%), active and healthy life (81.1%) and food preference at 66.8%. They also had food stability in terms of seasonality (83.3%) and vulnerability (63.1%).

Table 4.9: Perception of farmer groups/association towards food security in Western Kenya

Food security dimensions	Attributes	% distribution of responses			<i>M</i>	<i>SD</i>	<i>n</i>
		Disagree	No idea	Agree			
Food availability	Physical presence of sufficient quantity	44.1	0.3	55.6	2.12	0.99	371
	Appropriate quality of food from own production	28	7.5	64.5	2.36	0.89	371
	Food diversity	34	1	65	2.34	1.10	371
Food accessibility	Physical access	19.1	1.9	79	2.60	0.79	371
	Economic access	21.3	1.6	77.1	2.56	0.82	371
	Social access	21	2.2	76.8	2.56	0.82	371
Food utilization	Quantity of dietary intake	17.3	0.5	82.2	2.65	0.76	371
	Quality of dietary intake	17.3	5.6	77.1	2.60	0.77	371
	Active and healthy life	15.4	3.5	81.1	2.66	0.73	371
	Food preference	32.4	0.8	66.8	2.35	0.94	371
Food stability	Seasonality	16.4	0.3	83.3	2.67	0.74	371
	Vulnerability	35	1.9	63.1	2.28	0.95	371

Key: *M* = Mean; *SD* = Standard Deviation; *N* = Sample size

4.6 Perception towards food security percentage comparison between farmer groups in Siaya County and farmer association in Bungoma County, Kenya

A comparison was also done on the perceptions of food security dimensions between associations and individual groups, showing varying levels of agreement, disagreement, and uncertainty. For food availability, most associations (66.5%) and individuals (61.2%) agree there is a sufficient physical quantity of food, though disagreement is higher among associations. On food quality from own production, associations are split (52.8% agree vs. 46.8% disagree), while individuals are more positive (82.2% agree). Food diversity is rated highly by associations (85.3%) but less so by individuals (70.4%). In food accessibility, associations consistently show stronger agreement for physical (84.9%), economic (83%), and social access (87.2%) compared to individuals (66.4%, 68.4%, and 75% respectively), who also report more disagreement. For food utilization, associations have high agreement on dietary quantity and quality (both 82.6%), while individuals rate these slightly lower (69.1% and 78.9%), with more uncertainty in quantity. Both groups show similar agreement on leading an active and healthy life (about 67%), though individuals disagree more, and food preference is rated very high by associations (89.4%) compared to individuals (74.3%). On food stability, seasonality shows moderate agreement for associations (68.3%) but is lower among individuals (55.3%), with higher disagreement. Regarding vulnerability, agreement is relatively high for both groups (69.9% for associations and 73.6% for individuals), though individuals report slightly less disagreement.

	Food security Dimensions	Association			Individual groups		
		Agree (%)	No idea (%)	Disagree (%)	Agree (%)	No idea (%)	Disagree (%)
Food availability	Physical presence of sufficient quantity	66.5	-	33.5	61.2	18.4	20.4
	Appropriate quality of food from own production	52.8	-	46.8	82.2	2.0	15.8
	Food diversity	85.3	-	14.7	70.4	4.6	25.0
Food accessibility	Physical access	84.9	0.5	14.7	66.4	3.3	30.3
	Economic access	83.0	-	17.0	68.4	5.3	26.3
	social access	87.2	-	12.8	75.0	1.3	23.7
Food utilization	Quantity of dietary intake	82.6	-	17.4	69.1	13.8	17.1
	Quality of dietary intake	82.6	-	17.4	78.9	8.6	12.5
	Active and healthy life	66.5	-	33.5	67.1	2.0	30.9
	Food preference	89.4	0.5	10.1	74.3	-	25.7

Food stability	Seasonality	68.3	0.5	31.2	55.3	3.9	40.8
	Vulnerability	69.9	-	30.1	73.6	8.4	18.0

Table 4.10: Perception towards food security percentage comparison between farmer groups in Siaya County and farmer association in Bungoma County, Kenya

4.7 The perceived effects of farmer group performance on food security

In order to test the hypothesis, standard multiple regression analysis was used to explore the relationship between food security (one continuous dependent variable) and the two orthogonal dimensions of farmer group performance. The two dimensions (independent variables) of farmer group dimensions included farmer group dynamics and output while food security was measured in terms of food availability, accessibility, utilization and stability. The equation expressed as follows:

$$Y_s = \beta_0 + B_1X_1 + B_2X_2 + \varepsilon$$

Where,

Y_s = Food security

β_0 = Constant (coefficient of intercept)

X_1 = Farmer group dynamics

X_2 = Farmer group outputs

ε = error term

Data transformation was done to extract the two independent variables and one dependent variable. Standard multiple regression was used because it allows all independent variables (or predictors) to be factored into the equation simultaneously. The data met all the assumptions for multiple regression analysis, including sample size; multicollinearity; and outliers, normality, linearity, homoscedasticity, and independent of residuals (Tabachnick & Fidell, 2013).

This study had 431 respondents, which surpassed the recommended guidelines (Pallant, 2008; Stevens 1996; Tabachnick & Fidell, 2001); hence sample size assumption was not violated. In terms of multicollinearity, the collinearity diagnostics indicated tolerance value for each independent variable was 0.913 (Tolerance value of less than .10 indicates high multicollinearity) while VIF was at 1.096 (VIF value of above 1.0

indicates multicollinearity) hence the data did not violate the multicollinearity assumption (Table 4.13).

In terms of outliers, normality, linearity, homoscedasticity, and independent of residuals, the presence of outliers was checked from the scatterplot of the standardized residuals. The residuals were roughly rectangularly distributed, with most of the scores concentrated in the center (along the zero (0) point) with only few cases that had standardized residuals of more than 3.3 or less than -3.3 (Plate 4.1); hence outlier assumption was not violated.

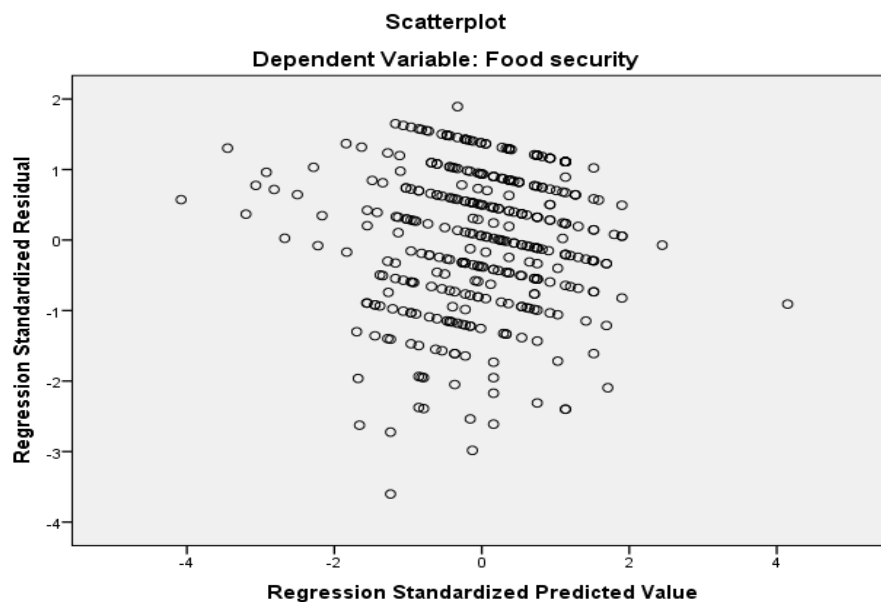


Figure 4.8: Standard regression analysis output for Scatterplot

Regarding normality, the normal probability plot (P-P) points lie in a reasonably straight diagonal line from bottom left to top right (Plate 4.2); an indication of linearity, suggesting no major deviations from normality.

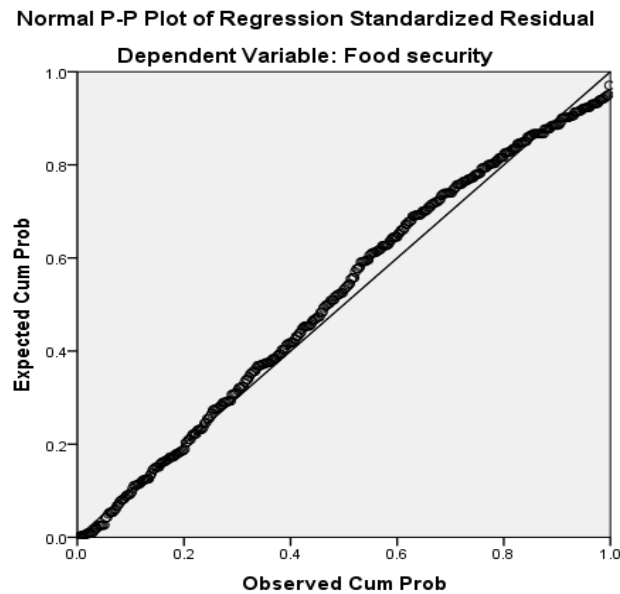


Figure 4.9: Standard regression analysis output for Normal Probability Plot (P-P)

Based on homoscedasticity assumption, the case wise diagnostic output table had one case (case number 6) with residual values of -3.602 outside the recommended values of 3.0 and -3.0 (Table 4.10).

Table 4.11: Standard regression analysis output for case wise diagnostics

Case Number	Std. Residual	Food security	Predicted Value	Residual
6	-3.602	12	28.4108	-16.41075

Dependent Variable: Food security

In order to check if this prediction had any undue influence on the results, a further examination of Cook's distance was done. The Cook's distance was not more than 1 (Tabachnick and Fidell, 2013), as the maximum value for Cook's distance was 0.04 (Table 4.11); hence it never posed major problem on the regression results.

Table 4.12: Standard regression analysis output for residual statistics table

	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	25.3897	34.139	29.7278	1.06357	371
Std. Predicted Value	-4.079	4.148	0	1	371
Standard Error of Predicted Value	0.24	1.416	0.381	0.152	371
Adjusted Predicted Value	25.1405	34.5127	29.7254	1.07959	371
Residual	-16.41075	8.62262	0	4.54377	371
Std. Residual	-3.602	1.893	0	0.997	371
Stud. Residual	-3.616	1.897	0	1.001	371
Deleted Residual	-16.53614	8.66614	0.00232	4.5782	371
Stud. Deleted Residual	-3.677	1.904	-0.001	1.004	371
Mahal. Distance	0.032	34.758	1.995	3.602	371
Cook's Distance	0	0.04	0.003	0.005	371
Centered Leverage Value	0	0.094	0.005	0.01	371

a Dependent Variable: Food security

Tables 4.12-14 indicates the results of the standard multiple regression. To predict the goodness-of-fit of the regression model, multiple correlation coefficient (R), coefficient of determination (R^2), and F ratio were examined. The R predictors on the dependent variable was 0.228, which indicates a positive food security levels with the two predictors. Furthermore, the R^2 was 0.052 suggesting a 0.5% of the variation in food security was explained by farmer group/association dynamics and output (Table 4.12).

Table 4.13: Standard multiple regression analysis output for model summary

Model	R	R Square	Adjusted R Square
1	.228a	0.052	0.047

The F ratio has a value of 10.081 ($p < 0.001$) and was considered significant (Table 4.13). The regression model achieved a satisfactory level of goodness-of-fit in predicting the variance of food security in relation to the two dimensions of farmer group/association dynamics and outputs, as measured by R , R^2 , and the F ratio. Therefore, the dimensions were important in contributing to food security in western Kenya.

Table 4.14: Standard multiple regression analysis output for Analysis of Variance (ANOVA)

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	418.533	2	209.267	10.081	.000
	Residual	7638.971	368	20.758		
	Total	8057.504	370			

a Dependent Variable: Food security

b Predictors: (Constant), Farmer group/association output, Group/association dynamics

The beta coefficients were used to explain the relative importance of the two dimensions (predictors) in contributing to the variance in food security (dependent variable). Therefore, the beta values under standardized coefficient indicated the contribution of each predictor to the dependent variable (Table 4.14). In terms of the relative importance of the two dimensions, farmer group/association output ($\beta_2 = 0.152$, $p = 0.004$) carried the relatively higher weight for food security, followed by farmer

group/association dynamics ($\beta_1 = 0.13$, $p = 0.015$) at 95% confidence level (Table 4.14).

Table 4.15: Standard multiple regression analysis output for coefficient results

Model	Unstandardized		Standardized	t	Sig.	Part	Collinearity Statistics	
	Coefficients		Coefficients				Tolerance	VIF
	B	Std. Error	Beta					
1 (Constant)	17.525	3.227		5.43	0			
Group/association dynamics	0.112	0.046	0.13	2.456	0.015	0.125	0.913	1.096
Farmer group/association output	0.204	0.071	0.152	2.865	0.004	0.145	0.913	1.096

a Dependent Variable: Food security

In conclusion, the two dimensions were significant. Thus, the results of the multiple regression analysis reject hypotheses H1 and H2. Hence, there was a statistically significant relationship between farmer group performance and food security in western Kenya.

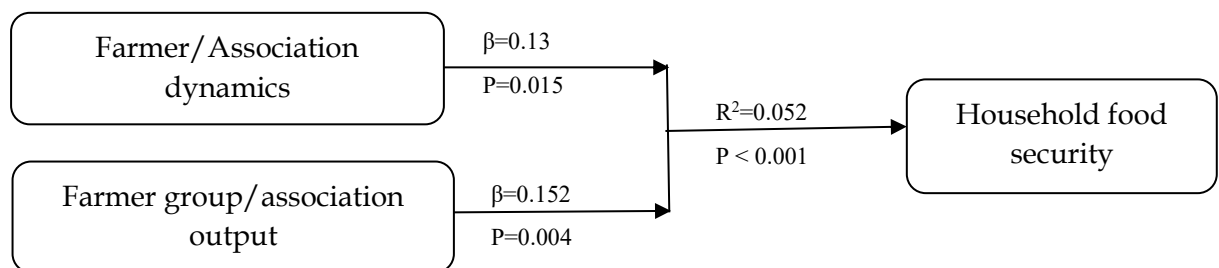


Figure 4.8: Hypothesized conceptual model on

Figure 4.8: The perceived farmer group performance and food security in western Kenya

4.8 Gender relations in western Kenya

Regarding division of labour, it was found out that of women are exploited with relative ease by male household head in western Kenya. This is extended to the household chores duties where women do most of the household chores which includes, cooking, cleaning, and taking care of the children and elderly in their households among other chores. Too much household chores have contributed to women lacking enough time to do proper farm work as they end up tired. However, younger men in the region agreed to sharing the labour amongst both genders because they believe in equality. In Bungoma county, division of labour was unequal and mostly women did almost all the work except doing the sales where the men came in. In Siaya county, women are the majority farmers while men prefer partaking other jobs which does not involve farming.

In terms of decision making, it was found out that the husband make most decisions regarding various agricultural activities on very occasions the decisions could be made jointly by the husband and wife. Women making decisions in the houses was also possible but it is rare. Also, the study revealed that women have been regarded as inferior when it comes to decision making at both farm and household level. They mostly leave this task to men with fear of domestic violence.

Concerning access to resources and benefits, men more than women in western Kenya have access and authority over resources as well as benefits. In both counties, women have little access to land and the availability of this land is critical to their ability to farm properly. The study showed that the educated farmers could let their wives have equal access to resources. But this came out different in terms of access and control over the benefits where, men and women have different control over benefits. It was depicted that male power is reinforced in rural households through male control and women have accepted this disparity even when they have achieved resources and assets via their own labour, as evidenced by their household experiences.

In terms of norms, the study showed that there are no specific norms that restrict the farmers from performing any agricultural activity. The study also found out that, there are certain norms in western Kenya that impose certain duties to men make it hard for men and women to work together for the betterment of agriculture. This includes the belief that women cannot carry out commercial agriculture and therefore should stick to subsistence farming. The study also brought out the fact that women cannot fully contribute to food security to full potential because they have been deprived their potential to grow cash crops and provide food and income at ago. Women who were

widowed however, did well in commercial farming because they had all access to resources and they made all their decisions.

CHAPTER FIVE

DISCUSSION

5.1. Socio-demographic characteristics of the farmers

In terms of age of the farmer, the mean age was 47 ± 14.93 , which is considered to be the prime age for productivity. The mean age for household heads in Siaya County was 49 and Bungoma 45 years. This implied that the farmers in Bungoma County are younger than farmers in Siaya County. Younger people tend to adjust to new technologies faster and better than the elderly, who are more conservative. (Ongusuni, 2007) discovered a positive relationship between age and technology adoption while working with peasant farmers in South-Western Nigeria. The age of the farmer predisposes one to better farming techniques and management skills through "learning by doing" (Khai et al 2008). Age is assumed to increase the likelihood of adoption, but at a decreasing rate as one gets older. Concerning gender of the household head, the Male-headed households (86.5%) outnumbered the female-headed households (13.5%) in Western Kenya. This reflects the situation in the study area, where the majority of households are headed by men and fewer by women. The household head is mainly responsible for the economic well-being of the household. This is also according to (Ogunmefun, 2018) who stated that household heads take the decision including formal insurance decisions that affect the farm output and revenues as well as standards of living at household level. The household head is primarily responsible for the household's financial well-being. Gender has been shown to influence agricultural production through issues and concerns about access to and control over production

resources. Men have greater access to land, credit, and extension services as household heads (GoK, 2004). According to the World Bank, delegate heads are women whose husbands are frequently absent and who thus have substantial but not total responsibility for the household. Female household heads have less access to protective social networks (Flato, Muttarak, & Pelsler (2017), education attainment (FAO 2014), and access to assets and services than male household heads (Kassie, Ndiritu & Stage, 2014). The gender of the household head influences how household resources are used and distributed within the household (Kamau, Kimani, & Wamae-Ngare 2014). In regards to education, more than half of the farmers 55.0% had completed primary school, which meant they could read, write, and understand many of the concepts central to this study. (27.5%) of the farmers had completed secondary education, (11.6%) of the farmers had no formal education, (4.0%) had attained tertiary education and only (1.9%) of the farmers were graduates. The education level is an important factor in this study because farmer literacy and participation in farmer groups require some level of understanding. decisions. Farmers with a higher level of education are more efficient in their production.

Better performance by more educated farmers, as noted by (Nyagaka, Obare, and Nguyo, 2010) may be attributed to the fact that education gives farmers the ability to perceive, interpret, and respond to new information and improved technology such as fertilizers, pesticides, and planting materials much faster than their counterparts. Regarding marital status, majority of farmers (84.4%) were married in western Kenya, 12.1% were widows, and 3.2% were single and 0.3% were separated. This is consistent with (Greiner C, Bollig M & McCabe JT, 2011) who stated that males, not females, are the designated holders of farms. Most likely, youth who could devote the majority of their energy to farmer group activities are denied the opportunity to do so because it is

assumed they cannot be responsible because they are not married. This forces the elderly to delegate serious activities among themselves, leaving the youth out of the groups.

In Siaya County, the widowed farmers 32.8% were more compared to widowed farmers in Bungoma county 7.9%. This means that in Siaya County, there is more innovation, development and access when it comes to farming as widows have the entire mandate when it comes to decision making and access to resources and benefits. This is in line with (Badstue, L., Petesch, P., Farnworth, C. R., Roeven, L., & Hailemariam, M. (2020), who depicted that innovation appears to be much more difficult in marriages where men dominate decision-making.

5.2 Farmer group/association dynamics

Ten components of group dynamics, including participation, decision-making processes, teamwork, group atmosphere, group cohesiveness, group leadership, interpersonal trust and norms, communication in the group, task function, and group achievement, was utilized to understand the dynamics of farmer groups.

In terms of participation, 75.9% of the farmers agreed to be involved in meetings, 78.4% agreed to be involved in meeting discussions and majority of the farmers 79.8% agreed to be involved in group activities. There was no significant effect on the independent t test of both counties. This implies that majority of the members in both counties are actively participating in groups. This is contrast with World Bank (2010), which stated with farmer groups and organizations generally struggle with low member participation. The amount of group activities in which each farmer participated was used to calculate participation. This is because farmers that join groups may not be able to participate in all events (Fisher and Qaim, 2014).

The classical group decision making process (Roubens, 1997) focuses on aggregating the opinions of decision makers according to their relative importance in order to select the best option from the aggregated opinions. However, in such a procedure, experts may disagree with a solution and reject it if they feel that their views have not been given sufficient consideration (Palomares et al., 2014). According to the results of this study, 90.3% of the farmers agreed to b This implicates that farmers are being included in decision making despite the fact that there can be different opinions to raise. Furthermore, more farmers support economic contributions.

In terms of team work, majority of the farmers 95.7% agreed to have team effectiveness, 94.1% of the farmers agreed that they have team ability to reach consensus and 79.5% of the farmers agreed to having effective problem solving techniques. The findings of this study show that the social context of a work team is vital for the dynamics of team effectiveness and conflict management in teams. The findings also lend support to the idea that conflict management styles can be assessed using a team-level study. Due, to the higher percentage of team effectiveness, it can only be depicted that the farmer groups perform their duties collectively. The problem solving techniques however, is slightly lower which means that some groups use competitive style of problem solving rather than using cooperative style of problem solving. First, the findings of this study are consistent with prior research of (Alper, Tjosvold & Law, 2000) and it highlights the advantage of cooperative conflict management over competitive conflict management in enhancing team performance. The findings imply that how team members resolve their conflicts can have an impact on the team's overall success (Tjosvold, Poon & Yu, 2005). Teams that use the cooperative approach see conflicts as a mutual problem which calls for common consideration and resolution in order for team members to complete their tasks efficiently. Teams with a competitive mindset

may see conflict an imbalance of interests, in which the achievement of one team member separates the others from achieving the goal. According to Alper et al. (2000), when conflict is managed constructively, team members feel sure that others are going to reciprocate and work toward mutually beneficial solutions. They recognize that they are able to pursue their particular interests while also seeking the interests of others. These expectations foster a genuine interchange of varied ideas and perspectives, which recombine into efficient and mutually beneficial solutions, hence enhancing team performance.

Group atmosphere was among the elements in group dynamics that had the role of making group members feel comfortable in doing duties in groups, but a negative group atmosphere could have an impact on group members' comfort. A positive group atmosphere will undoubtedly influence how the group handles pressure from inside as well as outside the group, in which the stronger the group atmosphere, the lighter the pressure by doing it sincerely but in a relaxed manner. The results of the study about group atmosphere, show that the majority of the farmers 95.7% agreed to have a friendly well-suited atmosphere, 87.1% suppress conflicts or unpleasant feelings and 94.1% get interest and satisfaction from work climate. This implicated that the values of the groups in western Kenya was in a high category which means that they have a good atmosphere. According to (Bakhtiar et al., 2020), the atmosphere in farmer groups was highly valued, which has been reflected in groups which decided to make their members feel at ease and full of brotherhood. The study (Kelbulan, 2018) demonstrated a difference where atmosphere was not well formed and was not felt among participants, stress occurred because of events that can be assessed as internal pressure, such as during seed distribution where members with narrow land asked for an equal

share of large areas land. The group's atmosphere reflected the morality, attitudes, and emotions that were commonly found in groups (Sirojudin, 2017).

The cohesiveness aspect of a farmer group may be viewed as a unit based on the bond between group members that demonstrates the degree to which the group survives despite challenges from within and without the group. In this study, majority of the farmers 94.3% agreed to have a degree of connection to the group and 96.8% agreed to have a motivation to remain in the group and this being in the high category showed that the group had good cohesiveness. The findings of this study were comparable to those of (Daniel et al., 2021), who found moderate levels of cohesion in a sense of participation and interaction, which made it simpler to fulfill group goals. The difference can be seen in the results of cohesion in farmer groups in the high category that had very deep bonds and helped each other in a cohesive manner to reach common goals (Kelbulan, Tambas, & Parajouw, 2018).

Each farmer group's leadership style had a significant impact on how successful the group was. This was reflected on the results of the study which showed that, 94.6% of the farmers agreed to a good leadership performance, 79.0% agreed to leaders' competence and skills and 62.5% agreed to leaders having leadership development programs which were in a high category. This was in contrast to the study's findings (Bakhtiar et al., 2020), which showed that group development in horticulture farmer groups was significantly influenced by leadership. This outcome was similar to (Haq, Nurlina, & Alim, 2016) and (Amalia, 2019), which found that the group of people taking part could take on a leadership role which could lead to group development.

Overall, in terms of communication, 98.1% of the farmers agreed to the current way of sharing of information, 96.2% agreed that there is proper farmer to farmer

dissemination and 83.8% of the farmers agreed that prompt dissemination is done properly. This implies that the farmers were content with they received or passed information. In terms of independent-samples t-test, there was a significant difference in prompt dissemination of information for Siaya ($M = 2.59$, $SD = 0.79$) and Bungoma [$M = 2.86$, $SD = 0.50$), implying farmers in Bungoma county perform better prompt dissemination than farmers in Siaya county. In terms of accessibility, dependability, informativeness, and comprehensibility, local and mass media outlets were much more favourable. As a result, they were best suited for communicating and disseminating knowledge and information to and amongst the farmers (Adolwa et al., 2012). Communication also contributes to the technical efficiency of a working group. Farmer groups whose members communicate and share information are more likely to be effective. Farmers achieve interaction and efficient information transmission among farmers in groups by using a communication medium such as a WhatsApp group, direct phone conversations, and door-to-door visits. This engagement between members tends to build group cohesion and improve group functioning with effective collaboration (Bharamappanavara and Jose, 2015).

In this study, interpersonal trust served as an independent variable. This study chose three factors to evaluate interpersonal trust, the trust of other members, trusting other members, and following to group rules and regulations. These variables were based on the measurement of trust variables in the studies by Bitmi and Ergeneli (2013) and Asveld, Osseweijer & Ganzevles (2015). 73.0% of the farmers trust other members, 86.8% of the farmers feel like they are trusted by other members and 96.0% adhere to group rules and regulations. This study first investigated whether social trust, such as interpersonal trust, encouraged farmers' intentions to participate in groups. The outcome demonstrated the beneficial effects of interpersonal trust on the intention to

participate. This finding is in line with earlier studies by Snderskov (2011) and Wang et al. (2019). According to these findings, positive relationships between farmers and frequent encounters between rural neighbours boosted mutual sense of belonging and lowered the cost of seeking cooperative partners. Furthermore, governments gradually improved their policy communication and information services (Chen, Miranda, Parcell & Chen 2019), and some local governments hired college-graduate village officials to provide support. All of this increased farmers' confidence in group participation, and it can be discovered that the higher the amount of social trust, the stronger farmers' participation enthusiasm. As a result, in the minds of farmers, the role of institutional norms was considerably more crucial. Furthermore, according to Hofstede's national cultural dimension, China is a society with high collectivism and a large power distance (Gelfand et al., 2006).

Group task function was the responsibility of each member of the group to provide problem solving suggestion and also provide or ask for feedback from the group. In this research, 85.2% of the farmers agreed to providing problem solving suggestion to the group and 83.3% provide or ask for feedback from the group, which was at a high level which means that they perform group task function well. This was contrary to (Satria Putra Utama, Peni Siwi Utami n.d.), who stated that farmer groups' functions and duties fell into the low category because they were not properly carried out. The relationship between a group's role in carrying out its obligations had an impact on group empowerment. This is according to (Romadhan & Saleh, 2019) who showed how the involvement of members in carrying out the tasks and responsibilities of the group has an impact on the development of farmer groups.

Group achievement was an element in group dynamics which defined success in carrying out their responsibilities correctly and providing satisfaction for participants in order to fulfill their aims of having joined a farmer group. In this study, group achievement 96.0% of the farmer agreed that they have a good performance and 87.6% of the farmer agreed that their group is performing well which was also on a higher category. A lack of unity regarding making efforts in leading the farming group can result in inadequate group effectiveness. According to (Rangga, Effendi, Listiana, & Pranata, 2019), the moderate level can be impacted by the low element of leadership. Effectiveness has a strong positive relationship with group leadership, and good group leadership will be followed by group effectiveness. The findings of this study agreed with those of (Daniel et al., 2021), who obtained results of moderate efficacy with the attainment of agricultural business levels that weren't yet most effective, owing to the rare participation of members in meetings unless when there was financial help

5.3 Farmer group/association output

In terms of credit access, farmers in Siaya had a slightly lower credit access from their groups (28.7%) while (29.3%) credit access through groups within the association in Bungoma County. The results also showed a significant difference in the overall scores on access to credit for Siaya ($M = 2.31$, $SD = 0.95$) and Bungoma [$M = 2.06$, $SD = 1.00$]. Which showed that farmers in Siaya County had an overall access to credit than those under an association. This is explained by a greater access to credit by table banking (53.5%) in Siaya County than (24.1%) in Bungoma County.

The results showed that, majority (62%) farmers in western Kenya had no access to farm inputs. This implies that farmers being in groups does not guarantee them access to farm inputs. This is in contrast with (Ortmann & King, 2007) study which stated that

one of the primary reasons for the development of organizations is greater access to agricultural inputs. These findings also contradict the findings of Manda et al. (2020), who discovered that cooperative membership enhanced the likelihood of adopting modern agricultural inputs. In terms of mean scores of both counties, access to farm input for Siaya ($M = 1.59$, $SD = 0.90$) and Bungoma [$M = 1.85$, $SD = 0.99$] which shows that access of farm inputs is slightly higher in groups under a farmer association, and this implies that being in an association is better than being in an individual farmer group.

The results of the study showed that 83.6% received production support and in terms of mean rank of both counties, production support for Siaya ($M = 2.38$, $SD = 0.92$) and Bungoma [$M = 2.91$, $SD = 0.40$]. This showed that groups in an association have more chances of receiving production support, probably from the association, than individual farmer groups.

According to the results of the study, shown in table 4.6, 57.7% of the farmer had no access to marketing services. This implicates that most of the farmers have no improved market access and therefore end up selling their produce at losses in the local markets. The mean rank of both counties showed that access to market services for Siaya was ($M = 2.07$, $SD = 0.99$) and Bungoma [$M = 1.68$, $SD = 0.95$] This concludes that the farmer organizations have not been of much help to the farmers in terms of access to market since its mean is lower than that of Siaya. This is in contrast Hellin et al., (2007) who did a study that showed that farmer organization has been acknowledged as a critical aspect in improving farmers' market access.

Our study showed that majority of the farmers, 57.4% were able to pay loans as shown in table 4.6. This implies that farmers in western region are able to acquire loans to

assist them with their farming as well as household activities. This was in contrast with a study carried out by Elahi et al. (2018) in Punjab, India that showed that participants were reluctant to be asked for a loan because; 1) do not require; 2) entails paying bribe; 3) insufficient security; 4) are unwilling to pay interest, 5) time-consuming procedures; 6) lenders who are faraway; and) costly procedures. The interest rate was the most critical factor in the farmers' decision to take up the loan. This means, in Western Kenya, the interest rate is quite friendly because majority of the farmers are willing to take up loans and are also able to pay them on time.

Mean ranking of both counties' timely cash income was ($M = 1.47$, $SD = 0.84$) in Siaya and ($M = 1.68$, $SD = 0.94$) in Bungoma. This implies that farmers in Bungoma County have more timely cash off-farm income compared to farmers in Siaya County. Timely cash income significantly contributes to food security as well as a farm activity. This is in contrast with a study by (Pfeiffer, Lopez-Feldman & Taylor, 2009; Huang, Wu & Rozelle, 2009), who stated that there may be additional indirect consequences when off-farm activities influence farm income via connections in factor use. When labor is scarce, off-farm activities limit the amount of labor required in farming. Off-farm income, on the contrary, could contribute to increased agricultural input utilization by relieving liquidity restrictions when capital is scarce. The outcome is also influenced by prospects for growth and family strategies in a given situation. (Kilic, Carletto, Muluka & Savastano, 2009) discovered that rural households in Albania use their off-farm income to leave agriculture, while Oseni and Winters (2009) discovered that off-farm activities support households improve their agricultural output through more input use, including more fertilizer.

According to the results, 94.1% were doing processing efficiency. This is a high percentage which showed that farmers had a vast knowledge when it comes to value addition. This is because value-addition aims to boost commodity availability, create off-farm employment possibilities, improve capacity building, expand trade, and give a road out of poverty. This is consistent with the findings of a study by (Al Hinai, Jayasuriya, Pathare, & Al Shukaili, 2022), which found that adding quality to agricultural products can improve the quality and quantity of the end product as well as packaging and branding. Furthermore, adding quality is the key to increasing the income of many farms and increasing the country's visibility in various global markets, which would have a good impact on the economy of Oman and GDP. In terms of mean rank of the dimensions, processing efficiency was ranked highest ($M=2.89$, $SD=0.44$). The mean rank for both counties showed that processing efficiency for Siaya was ($M = 2.81$, $SD = 0.58$) and Bungoma ($M = 2.95$, $SD = 0.29$). This showed that farmers in groups under an association have a better knowledge in value addition than farmers in individual farmer groups which clearly shows it is better to be in a group under an association.

According to the study, 94.1% of the farmers agree to receiving extension services. The respondents received extension services from different sources (as shown in Figure 4.6). The main source was from academic institutions (70.2%) and farmer groups (51.7%). The rest were from farmer association (44.9%), co-operative societies (24.4%), county governments (9.1%), private institutions (7.4%) and community barazas (1.7%). Training was the main (95.2%) type of extension services received by the respondents. Others (19.7%) also received farm demonstration services. The percentage of the availability of extension services from the study shows a moderate level of availability from the farmers' perspective. The farmers rated the academic

institutions extension agents as having had the highest level of availability (70.2%). This ranking of importance was followed by the extension agents from farmer groups (51.7%) which is at moderate level. As a result, the availability is in line with the findings from Buadi et al. (2013), who discovered that farmers were somewhat pleased with the availability, agricultural knowledge and input supplies. However, the mean rank of both counties showed a slight difference in terms of access to extension services where extension services for Siaya was ($M = 2.80$, $SD = 0.57$) and Bungoma ($M = 2.91$, $SD = 0.39$). This showed that farmers in an umbrella organization tend to have higher access to extension services compared to individual farmer groups.

According to our results, table 4.6 shows that 68.6% could not do book keeping. This largest category, which includes more than half of all farmers, may be a reflection on the farmers' educational attainment. As shown in table 4.2, 66.6% of the farmers attained the primary level and below. This value is attained by adding the number the percentages of farmers who only attained the primary level (55.0%) and farmers who have had no formal education (11.6%). This statistic is consistent with Olufokumbi's 1984 study, which found that 67 percent of the farmers he investigated had never completed formal education. This finding was additionally consistent with a prior study conducted by Udo in 1975, which discovered that a majority (71 percent) of the migrant farmers he investigated were illiterate. There is also a link between book keeping and the type of farming. This study only focused on farmers who carried out crop production and therefore book keeping in this type of farming has always proven to be difficult. This is similar with a research study carried out by (Dudafa, 2013), who found that poultry/livestock keeping records is less difficult and complicated than crop farm book keeping. In terms of mean difference between the two counties, Siaya had ($M=1.68$, $SD=0.94$) and Bungoma had ($M=1.57$, $SD=0.90$) which showed that farmers

in individual groups had slightly higher knowledge of book keeping than farmers in groups under an association.

5.4 Food security

The following four dimensions of food security were assessed:

Food availability as a component in food security was evaluated using indicators like as physical presence of sufficient quantity, appropriate quality of food from own production/stock and food diversity. As for the food accessibility dimension, we used physical access (ability to physically acquire food), economic access (Ability to buy food) and social access (ability to acquire food through social capital) to evaluate. For the food utilization aspect of food security, the dimensions used were; the quantity of dietary intake, the quality of dietary intake, active and healthy life and food preference. And finally, dimensions used for food stability were; Seasonality and vulnerability.

From the results, respondents gave detailed information of how they perceived their own household food security, showing contrasts between the association members and those that are in individual groups.

On food availability, many association members had a lot of greater confidence stating that their households had enough food throughout the year, with 66.5% indicating they perceived sufficient physical quantities compared to 61.2% of individual households. Farmers that were in groups under the associations often linked this perception to purchasing collectively, planning their production jointly, and mutual support during times when they faced shortages. In contrast, individual households emphasized more on the quality of food they produced themselves, with 82.2% strongly believing that it was of appropriate quality, compared to 52.8% among association members. This shows that individuals for the individual group place higher value on familiarity and

control over their food sources, even if they had a narrower. Range of foods. These perceptions are similar to the findings from Zemba et al. (2025), where cooperative members associated food sufficiency with the security of group-based production systems.

Perceptions of access also differed markedly. Association members frequently described feeling more able to reach markets, afford food, and rely on social networks in times of need. This was reflected in higher reported levels of physical access (84.9% vs 66.4%), economic access (83.0% vs 68.4%), and social access (87.2% vs 75.0%). Respondents attributed these perceptions to the reduced costs and increased market connections made possible through group membership. Similar sentiments are documented in Custodio et al. (2025), where cooperative participation was perceived as opening both economic and social pathways to better diets.

On utilization, association members often spoke of having “enough to eat and in the right variety,” with 82.6% perceiving adequacy in both the quantity and quality of their diets. Individual households also expressed satisfaction with dietary quality (78.9%), though their narratives suggested more reliance on staple-heavy meals. Respondents linked better diets to stronger peer support, knowledge-sharing on nutrition, and easier access to diverse food items—views that align with the dietary diversity framework of Hoddinott and Yohannes (2002).

Regarding stability, association members were more likely to feel prepared to manage seasonal shortages (68.3% vs 55.3%), often citing the group’s ability to mobilize resources, share stored food, or coordinate labor during difficult months. Nevertheless,

a substantial proportion in both groups admitted that certain months were still “hard to get through,” reflecting the ongoing lean-season challenges highlighted by FAO’s *Cadre Harmonisé (2025)* projections.

In terms of vulnerability, perceptions followed a similar pattern. While association members felt somewhat less exposed to shocks (69.9% vs 73.6%), respondents across both groups described weather extremes, rising prices, and health-related disruptions as persistent threats. Association members tended to view their group as a buffer, but not a guarantee, against hardship—a perception echoed in the FAO’s *International Year of Cooperatives 2025* position, which emphasizes that cooperative benefits must be paired with broader resilience measures.

Overall, the perceptions captured in this study reveal that association membership is seen by respondents as improving the consistency, diversity, and accessibility of their food supply, as well as offering a measure of protection against seasonal and market-related shocks. However, both groups still perceive themselves as vulnerable to broader structural and environmental risks, underscoring the need for integrated approaches that combine collective action with systemic interventions such as climate-smart agriculture, infrastructure development, and financial safety nets.

5.5 Gender relations

Gender relations significantly influenced participation in farmer organizations in Western Kenya. The study revealed that men and women experienced unequal levels of access, control, and participation within farmer groups, primarily shaped by cultural norms and household gender roles. Women were found to contribute the most labour

in agricultural production, yet their participation in decision-making, control over productive resources such as land, and involvement in commercial agriculture remained limited. Men's dominance in leadership and resource control often restricted women's active participation in farmer organizations and reduced their potential contribution to household food security.

Women's play a very critical role in farming and food provision and still, gender norms continued to define their responsibilities as caregivers and domestic workers, which in turn leaves them overburdened and with less time for farm activities. The same goes for men and their traditional identity as household heads and economic providers which led them to dominate commercial farming decisions and membership leadership in farmer associations. These dynamics has continuously reinforced gender inequalities in agricultural participation and outcomes.

However, the study also found emerging cases of change, particularly among younger or more progressive male farmers, who encouraged joint decision-making and recognized the benefits of including women more equitably in farm management and organizational participation. This gradual shift indicates a growing awareness of the value of gender collaboration in enhancing productivity and food security.

The results and discussions that follow are based on four main aspects of gender relations as experienced by men and women in farmer groups and associations: division of labour, household and farm decision-making, access to and control over resources, and social norms governing agricultural participation. Men and women narrated their experiences regarding household chores, farm labour activities, and how these gendered dynamics influenced their contribution to food security.

Both men and women in farmer group association narrated their experiences of how the division of labour at household level affects their contribution to food security. Bikketi (2016) conducted a study in Kakamega central, Western Kenya, and found out that women perform most agricultural activities. These are: land preparation, planting, weeding, watering crops (vegetables), harvesting, livestock feeding, particularly poultry feeding, and animal milking. However, according to the same study men also assisted in land preparation, planting, harvesting, pesticide and herbicide application, and farm produce marketing. In this study male household heads often exploit the labour of women with relative ease in western Kenya. However, as a result of men's economic disengagement, the issue of labour exploitation, hidden labour, and feminization of obligations must be studied further (Chant 2008).

Men and women gave their sentiments regarding how they share the labour at household level as well as at farm level. Maxwell, (A man in Bungoma County in a group under a farmer association; not his real name) narrated his experience;

“It is mainly the duty of the men to carry out land preparation, although in some households you may see the women helping out, weeding is done mostly by both husband and wife and harvesting is mostly done by women and children. About selling, very few men involve their wives but majority of us just do it alone, because we are the head of the houses you know (chuckles).”

Rhoda, (A woman in Bungoma County, in a farmer group under an association) also narrated her experience;

“During land preparation, my husband and I do hand ploughing together, we then do the harrowing together, we plant with the children and leave the crops to allow germination to happen. I do weeding all by myself. Harvesting is done by the both of us but the post-harvest activities are done by me and the children. However, (giggles)

when it comes to selling, my husband does not involve me mostly and I find that not pleasing but I'd rather not speak to preserve my peace (sighs)."

From an individual group, Mercy (not her real name) gave her own experience;

"I'll start by saying, men in this County don't like farming and it is left to women, most of the farm work here is left to women and others can attest to this (other women nod in agreement). Personally, I do most of the farm work and sadly I am not recognized at community level, but I have to do the farming to ensure I have food from season to season. I plough, plant, weed, harvest, and do the post-harvest activities all by myself because my husband is a drunkard, all he does is wake up and leave to go and have more drinks and so I have to work all alone most of the time and he only comes in when we want to sell. Well, he helps me sometimes but at a very minimal rate."

A man from an individual group, Arnold (not his real name) also gave his sentiments while conducting a men's farmer group discussion,

"Well, truth be told, most of the farmers in this county, are women and everyone knows that. It can even be seen with the number of female farmer groups that are available in this county. Surprisingly, some of the men even join the female groups! (Laughs). Men, only come in mostly when it's time to sell but aiding in labour, very few men do help. It is not quite appropriate and men should really wake up and take farming seriously"

According to the women, they do most of the household chores which includes, cooking, cleaning, and taking care of the children and elderly in their households among other chores. Considering Agnes (A woman in Bungoma County in a farmer group under an association) sentiment on this issue;

"We as women here in western Kenya have been brought up believing that household chores belong to a woman. We therefore wake up, skip our husbands (laughs), and start the day even before the breaking of dawn. First, we start with cleaning the house and

then milk the cows, feed the animals, before we prepare our children to go to school. All this time, the husbands are still sleeping (everyone laughs). They only get to wake up after children are gone to school and tea is ready. Most of us do the house chores and still go to the farm.”

Women in developing countries devote a significant percentage of their time to household activities such as obtaining water from sources outside the home, cooking meals, shopping, washing clothes, cleaning the house, child rising, and so on, Agesa & Agesa (2019). This is because this everyday house activity is deemed feminine, whereas those considered male or neutral (paying bills, car maintenance, or home upkeep) and do not require daily attention Cerrato & Cifre (2018). According to some cultural interpretations, women are more involved in doing house chores and do not want to fully share because they believe it is central to their gender identity and a source of power in the family, whereas husbands, whose gender identity has traditionally been marked by paid work, would not object to doing fewer house chores than their wives (Martnez and Paterna, 2009). In this study, this has contributed to women lacking enough time to do proper farm work as they end up exhausted from numerous household chores. Rose (not her real name, a woman from Siaya County from an individual group) also gave her narrative;

“I go with my husband to the farm, we work together almost half day in the hot rays of the sun, but when we come home, he sits under a shade and I have to go cook for him because that’s what women should do. He will then shower and leave for I don’t where while I wash the utensils and start preparing dinner. For us women, its work, work, work and more work (sighs). We can’t do anything about it because any minute of rebellion can be your last day in that house.”

This explains why most women cannot contribute to food security at large scale as they are occupied with a lot of house chores which depletes their energy to work on farms.

Damisa and Yohanna [2009] assessed the amount of engagement of rural women in decision-making in several areas of agriculture in Zaria, Kaduna State, Nigeria, and studied factors impacting their participation in the decision-making process in farm management. They discovered that women's participation in decision-making was quite low. A study by Chayal (2013), found out that farm women are actively involved in agricultural operations, but female participation in agricultural decision making is very low. The key restrictions observed by farm women in the decision-making process were low self-confidence, a lack of expertise, the idea that women are subordinate to male counterparts, illiteracy, and a lack of access to farm information. Age, family income, land ownership, and education were also identified as key determinants influencing farm women's participation in agricultural decision-making. Levels of decision-making participation can vary from no involvement to sole decision-making, with varied levels of input in between. For example, Nosheen (2008) examine men and women's participation levels in various agricultural techniques using three categories of involvement: never, sometimes, and often. In this study most decisions regarding various agricultural activities were made either by the husband or jointly by the husband and wife. It was also possible for the woman to make decisions, but it was less usual. Equally, women have been regarded inferior when it comes to decision making at farm and household level. They mainly leave this task to the men. Supporting this argument, consider Vivian's (a woman in Siaya County) experience;

“We as farmers depend on farming for food and income altogether, because it’s all we have. In my house I can say I have a mandate to make very few decisions where most of them are not important or impactful towards agriculture. That makes it difficult for me to carry out serious agriculture because each time I have to go as per my husband’s decisions. There are things that I might have knowledge on but he is the head of the house, (looks down in shame)”

In contrast, another woman in the same focus group discussion gives her sentiments:

“I sometimes make joint decisions with my husband regarding issues at household level. This means we have to discuss before we come up with what we want to do exactly. These decisions include; how to use agricultural benefits and resources, what to plant when planting season arrives, how to distribute funds among our agricultural enterprises and as much it’s not enough, it is something. At least he involves me (giggles).”

From these narrations it is evident that women are still looked down upon in terms of decision making especially in agricultural sector. Men prefer to be the sole decision makers, and women agree to that for the fear of cause domestic violence. Men also gave their sentiments regarding decision making, which only supported what the women said. Consider Samuel, a farmer from a group under an association,

“I will start by saying, decision making here in western Kenya is undebatable. Women are helpers but we men as the heads of the houses have to be in the front line to lead our families, and that’s why we make sole decisions for the good of our families.”

Women in Bungoma County in groups under an association, also gave their sentiments regarding how they carry out their decision making. Consider, Seline, a woman from a group in an association experience,

“Generally, in western Kenya, Men are the heads of the households. The fact that they own inherited land makes us women inferior and we have to answer to them. The same

goes for making decisions. In my house, for instance, my husband literally makes all the decisions as I follow. I came here from my father's home with nothing and so I don't have entitlement to anything. My husband makes all the agricultural decisions. I just support him."

Consider another woman in Bungoma County, Cecilia,

"Women in Bungoma County love farming. We are not fully recognized though at community level as we deserve. This makes it difficult even for our own husbands to take us serious. In my case, I only make decisions on subsistence production. Commercial decisions, my husband does that. It's sad because I also want to be involved (sighs). I think its high time women to be given a chance to also participate actively on commercial agriculture"

However, a younger man from Siaya County, in an individual group, Eric, not his real name, gave quite a different sentiment regarding the same,

"Honestly, decision making has always been left for the men, but this is wrong as women can also contribute to agricultural ideas. In my house I involve my wife in making decisions because at the end of the day it benefits both of us. For me, team work is the best as it brings peace in even in my house."

Bikketi (2016) study showed that cultural behavioural standards govern access to and control over land. Women in Kakamega, western Kenya primarily obtain land through marriage. This way of access is one of the 'systemic components' that is hard to alter. According to the same study, women in the Western region in overall have access to resources, but control over those resources remains a challenge, not only because women continue to have less agency, but also because even when women purchase assets, the man is still considered as the owner of those assets and resources, and can control their use and sale. Since in both Bungoma and Siaya women in groups have

little access to land, the availability of such land is critical to their ability to farm. To build on this theory consider Margaret's (a woman in Bungoma County) sentiments;

“In terms of access of land, women here live under the ‘authority’ of the husband. If you dare ask about land issues you’ll be asked [did you come with land from your home?]. We therefore prefer to remain silent regarding issues of land. The only time I can get to use the land freely is when am with my husband, or when I ask for permission from him of which he refuses to grant me sometimes not knowing maybe I would have grown something profitable (exhales). I really wish I could have my own land, I would really produce a lot.”

Julius, a man in a group under a farmer organization had the following to say on this as well,

“Well, here is Western Kenya we men have a say in almost everything because we literally own everything. Some men give freedom to their women to use resources and others simply don’t. This can be attributed to how we were raised and how we saw our parents do things. It’s for the best anyway because we only want what is good for our families (chuckles).”

Another man from an individual group, Steve also shared his sentiments,

“People tell me am different from others because I do allow my wife to have access to resources and I think this is because am not a full-time farmer. She does farming a lot and I let her use anything she wants for the good of our household. Still, very few men do this. How I wish men could do this more often, because you never know tomorrow.”

While men and women have equal access to benefits, men and women have different control over benefits. This is supported by Rachel’s opinion;

“In my marriage, I do not own anything, and any possessions I acquire belong to my spouse. When it comes to asset ownership, there is no equality. Except for the money

I may receive from my sales and a group investment that I do not tell to him, my husband owns all I have purchased. However, I have little access over other farm inputs.”

As a result, men continue to have main authority and control over the majority of resources and benefits, while women are confined to subordinate production. Male power is reinforced in rural households through male control. Women appear to accept this disparity even when they have achieved resources and assets via their own labour, as evidenced by their household experiences. The social consequences of nonconformity are severe, and a wife who 'overrules' her husband's authority conveys that she is in charge of the household's livelihood strategy, decision making, and resources. Most researchers have found out that in certain regions where women appear to control their own labour and have access to fertilizer, pesticides, and herbicides, men have assigned women extra tasks of producing revenue to satisfy household costs.

As shown in the study, there are no specific norms that restricting the farmers from performing any agricultural activity. However, there are norms that promote and support men's provider duties as head of the house, making agriculture a challenging journey for women to embark on. Many policymakers and rural advisory services classify their target populations based on characteristics such as "head of household" or "cash crop versus subsistence crop farmer," while women are viewed as subsistence producers (Manfre 2013; Farnworth & Colverson 2015). In this study, it was found out that certain norms that impose certain duties to men make it hard for men and women to work together for the betterment of agriculture. Consider Caroline's (a woman in Siaya County) experience;

“It is hard for me to carry out commercial agriculture because the norms people have on women as subsistence farmers makes it hard for my husband to support me even

though I think I have the capability to work up to that capacity. It has reduced the value of women farmers who have resolved to focus on subsistence farmers as they want us to be. This does not make subsistence farming exciting anymore because we want to do more”

A woman in Bungoma County also gave her experience on the same. Nancy (not her real name) had this to say,

“Women in this county are potential in farming, both for subsistence and commercial purposes. We have the potential and skills; thanks to what we have learnt. As we speak, I grow most cash crops but in small scale because I don’t have full support from my husband, and this is because of what people believe in western Kenya, that women have no capability to grow crops at cash crop level. Truthfully, am stuck and am just forced to help my husband grow maize.”

Another woman from the same group also contributed her experience. Hellen (a widow) gave her sentiments,

“Well, I’ll share my story on this, in terms of my own personal experience. My husband died 3 years ago. We did farm activities together but then I had not joined this group or any group for that matter. After he passed on, I did everything alone and even joined this farmer group because now I made all the decisions. From what I learnt from the group, I implemented easily and that was mainly the part where I could grow cash crops. Yes, people have a belief, saying that women can’t be commercial growers but as you can see am doing really well and I supply tomatoes everywhere in this community, same goes for peanut butter that I make from the groundnuts I grow. Honestly, these beliefs only bring women down and if this can be dealt with, we will see women flourishing and even support their own families”

From this narration, it shows that women cannot fully contribute to food security to full potential because they have been deprived their potential to grow cash crops and provide food and income at ago.

To support this, a man from a group under an association (Bungoma County) gave his perspective on the same;

“Women in western Kenya are so good when it comes to carrying out household duties, that is why it is even easier for us men to give them mandate to carry out subsistence farming. However, as it is known, men are the providers of the households and since most of us are farmers only, we are then the ones who can carry out commercial agriculture so as to provide for our families. That’s just how it is supposed to be.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

In summarizing these data, it was vital to notice that group dynamics elements had a significant impact on farmer group performance. Good leadership, effective communication among members, and a high level of group cohesion resulted in improved technical effectiveness of working units. Teamwork has the potential to improve information sharing in the farmer groups. The study also showed that farmer group output like has an effect on farmer group performance. However, this finding must be confirmed by more study on a bigger sample size.

The study clearly showed how members of a farmer group's participation, decision-making processes, task functions, level of cohesiveness, group climate, group norms, interpersonal trust, and group success were all influenced by the network of group dynamics.

The study's conclusions can be used as a practical guide for setting up and overseeing farmer groups for coordinated action and involvement over the long term. In related fields of study, a scale of the group's efficiency index can be applied. The correlations between the variables that have been identified can serve as catalysts for encouraging action and group empowerment, which may provide helpful insights into whether it is

feasible to use the group dynamic network to find signs of how to improve the functioning of the groups.

It was evident that the two dimensions were significant. Thus, the results of the multiple regression analysis reject hypotheses H1 and H2. Hence, there was a statistically significant relationship between farmer group performance and food security in western Kenya.

In terms of gender this study examined the gendered division of labour, gender norms, gendered decision-making, and access to and control of resources and benefits, and explores how these four aspects affect women in western Kenya's agricultural sector. It uses the case of women farmers in groups in western Kenya to understand how they are affected by gender relations in their toil to contribute to food security. Key findings show that cultural norms through patriarchal structures are still key institutions that determine gender roles. These in turn shape access to and control of resources and benefits. Findings also show that women are exploited when it comes to decision making at farm level despite them being major laborers on the farm.

Thus, understanding the gendered nature of asset, resource, and benefit distribution, as well as how it affects smallholder livelihoods, is critical for developing successful development policies and interventions. Despite the prominent role women play in the sector, the contribution of rural women to agricultural productivity and rural development in Western Kenya is grossly undervalued. It would be an understatement to say that women outperform their male counterparts in terms of agricultural participation, contribution to household economy, and food security.

6.2 Recommendations

1. Strengthen Capacity Building and Leadership Training

County governments, in collaboration with the Ministry of Agriculture and NGOs, should implement regular training and mentorship programs for farmer groups. These should focus on record keeping, group management, conflict resolution, and leadership development to enhance internal cohesion and performance.

2. Promote Gender-Responsive Agricultural Policies

Policies should be designed to ensure equitable access to agricultural inputs, land, credit, and decision-making opportunities for both men and women. Women's participation in leadership positions within farmer organizations should be incentivized through gender quotas or leadership mentorship programs.

3. Enhance Access to Agricultural Inputs and Markets

The government should facilitate partnerships between farmer groups and agro-input suppliers to provide affordable, high-quality seeds, fertilizers, and tools. Establishing farmer cooperatives for collective marketing can also improve farmers' bargaining power and income, thereby enhancing food security.

4. Institutionalize Monitoring and Evaluation (M&E) of Farmer Group Performance

The Ministry of Agriculture should establish a structured M&E framework to periodically assess the performance of farmer groups. This will help identify best practices, monitor progress, and address gaps in productivity, inclusivity, and sustainability.

5. Support Group Dynamics and Collective Action Mechanisms

Development partners and agricultural extension officers should promote positive group dynamics—such as trust, communication, and inclusiveness—since they are strongly associated with better performance and improved food security outcomes.

6. Integrate Nutrition and Value Addition in Agricultural Programs

County governments should encourage farmer groups to engage in value addition and diversification of food crops to improve nutrition and generate additional household income. Extension services should emphasize the link between agricultural production and dietary diversity.

7. Longitudinal Studies on Group Performance and Food Security

Conducting long-term studies would help track how changes in farmer group performance affect household food security over time.

8. Impact of Digital Technologies on Farmer Group Coordination

Future studies could investigate how mobile-based platforms and digital tools influence group communication, market access, and overall efficiency.

9. Comparative Studies Across Counties

Comparing farmer group dynamics and performance across different counties (e.g., Bungoma, Kakamega, Siaya) would provide a broader understanding of regional variations in food security outcomes.

10. Youth Participation in Farmer Groups

Research could examine the role of youth in farmer organizations, identifying barriers and strategies to increase their engagement in agriculture and agribusiness.

11. Gender Transformation Approaches

Further investigation is needed on interventions that effectively challenge traditional gender norms within farmer groups, promoting more equitable participation and benefit sharing.

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APPENDICES

APPENDIX I: HOUSEHOLD SURVEY QUESTIONNAIRE

Questionnaire	No:	Date:
.....		
Village/Location/Sub	county/County:	
.....		

SOCIO-DEMOGRAPHIC INFORMATION

1. Gender of the farmer: 1=Female () 2=Male ()
2. Age in years:
3. Level of education: 1=No formal education () 2= Primary () 3=Secondary () 4=Tertiary () 5=Graduate () 6= Post graduate ()
4. Marital status: 1= Married () 2= Single () 3= Widowed () 4=Separated ()
5. Main occupation: 1= Farming () 2= Trade () 3= Formal employment () 4= Any other ()
6. Head of the household: 1= Female headed () 2= Male headed () 3= Any other ()
7. Farm household size (acres):
8. Household seasonal income:
9. Do you pay membership fee to:

a. Group: 1=Yes () 2=No ()

b. Association: 1= Yes () 2=No ()

If yes, how much (Ksh)

a. Duration in the group/ association:

.....

10. Types of crops:

.....

GROUP/ASSOCIATION DYNAMICS

Dimensions				
1	<i>Participation</i>	1=Not involved	2=Less involved	3=Strongly involved
D1.	Meeting involvement			
D2	Meeting discussions			
D3	Group activities			
2	<i>Decision making procedure</i>	1= Disagree	2= Undecided	3=Agree
D4	Decision making involvement			
D5	Decision by consensus			
3	<i>Teamwork</i>	1= Disagree	2= Undecided	3=Agree
D6	Team effectiveness			

D7	Team ability to reach consensus			
D8	Effective team problem solving techniques			
4	<i>Group atmosphere</i>	1= Disagree	2= Undecided	3=Agree
D9	Friendly well-suited atmosphere			
D10	Suppress conflict or unpleasant feelings			
D11	Interest and satisfaction from work climate			
5	<i>Group cohesiveness</i>	1= Disagree	2= Undecided	3=Agree
D12	Degree of connection to the group			
D13	Motivation to remain in the group			
6	<i>Group leadership</i>	1= Disagree	2= Undecided	3=Agree
D14	Leadership performance			
D15	Competence and skills			
D16	Leadership development programme			
7	<i>Communication in the group</i>	1= Disagree	2= Undecided	3=Agree
D17	Sharing of information			
D18	Farmer to farmer dissemination			
D19	Prompt dissemination			
8	<i>Interpersonal trust and norms</i>	1= Disagree	2= Undecided	3=Agree
D20	Trust other members			
D21	Trust by other members			
D22	Adhere to group rules and regulations			

9	Task function	1= Disagree	2= Undecided	3=Agree
D23	Provide problem solving suggestions to the group			
D24	Provide or ask for facts and feedback			
10	Group achievement	1= Disagree	2= Undecided	3=Agree
D25	Performance of the farmer			
D26	Performance of the group			
11	Overall group dynamics effectiveness		1=Yes ()	2=No ()

FARMER GROUP/ASSOCIATION OUTPUTS

FARMER GROUP/ASSOCIATION OUTPUTS DIMENSION				
Dimensions		No	No idea	Yes
1	Access to credit			
2	Access to farm input			
3	Production support			
4	Access to marketing services			
5	Ability to pay loans			
6	Timely cash income			
8	Processing efficiency			
9	Extension services			
10	Book keeping			

3.1 Access to credit

If you have access credit:

- a. Type of credit: 1= Commercial banks () 2= Group () 3=Association () 4= Insurance company () 5= Table banking () 6= Group member () 7= Cooperative societies () 8= any other
- b. Credit period: 1= Weekly () 2= Monthly () 3= Quarterly () 4= Half year () 5= One year () 6= above one year () 7= Per season ()
- c. Credit amount:
.....
- d. Credit interest rate:
.....
- e. Purpose of credit: 1= Farm production () 2= Household use () 3= Credit re-financing () 4=any other (specify):

3.2 Access to farm input

If you have access to farm input:

- a. Mode of access: 1= Cash purchase from group () 2= Cash purchase from association () 3= Credit purchase from group () 4= Credit purchase from association () 4= Free access from group () 5= Free access from association () 6= any other (specify).....
- b. Types of farm inputs: 1= Land () 2= Seed () 3= Fertilizer () 4= Pesticides () 5= Labour () 6= Herbicides () 7= Tools and equipment ()
- c. Seasonal average cost of production (Kshs)
.....

3.3 Production support

If you acquire production support:

- a. Source of support: 1=Group () 2= Association () 3= Cooperative () 4= Farmer to farmer () 5= any other (specify)
- b. Type of support: 1= Knowledge on agronomy () 2= Knowledge on farm inputs () 3=Knowledge on farm market prices () 4= Knowledge on storage facility () 5= any other (specify).....
- c. Farm production (acres)
- d. Seasonal farm produce (Kgs)

3.4 Access to marketing services

If you have access to market:

- a. Market access through: 1=Group () 2=Association () 3= Cooperative () 4= Farmer to farmer () 5=Direct access ()
- b. Market information: 1= Group () 2=Association () 2= Farmer to farmer () 3= Cooperatives () 4= Social media () 5= any other agricultural institutions (specify).....
- c. Seasonal average sales (Kshs)

3.5 Timely cash farm income

If you acquire timely cash income,

- a. Source of income: 1= Farm produce () 2= Off-farm household business ()
 3= Formal employment () 4= any other (specify).

.....

- b. Seasonal average household income
 (Kshs).....

3.6 Processing efficiency

If you do processing efficiency,

- a. Post-harvest processing activities

POST-HARVEST PROCESSING ACTIVITIES		
Activities	No	Yes
1	Drying	
2	Cleaning	
3	Sorting	
4	Grading	
5	Storage	

- b. Value addition

- i. Do you do value addition: 1= Yes () 2= No ()

If yes, what kind of value addition

- ii. Selling price of farm produce before value addition (Ksh/Kg)

- iii. Selling price of farm produce after value addition
 (Ksh/Kg).....

3.7 Extension services

If you acquire extension services,

- a. Source of extension service: 1=Group () 2= Association () 3=Academic institution () 4= Cooperatives () 5= County government () 6=Community *Barazas* () 7= Private institutions () 8= any other (specify)
 - b. Type of extension services: 1=Training () 2=Farm demonstrations () 3=Role playing () 4= any other (specify).....
 - i. If trained, list three most common training services
 -
 -
 -
 - ii. If farm demonstrations, list three most common farm demonstrations
 -
 -
 -
- c. Frequency of extension services 1= Weekly () 2= Monthly () 3= Quarterly () 4= Planting seasons () 5= any other (specify)
 - d. Availability of extension services: 1= Never () 2=Rarely () 3=Always ()
 - e. Accessibility of extension services: 1= Never () 2=Rarely () 3= Always ()
 - f. List three most common source of extension services you receive:

-

-

-

g. List three most useful source of extension services you receive

-

-

-

h. List any extension services information gaps

-

-

-

3.8 Bookkeeping

If you do book keeping,

a) List the type of records

-

-

-

b) Who does the record keeping 1= Self () 2= Any other (specify).....

c) Knowledge on record keeping 1= Yes () 2= No ()

d) Frequency of record keeping 1= Weekly () 2= Monthly () 3= Quarterly ()
4= Yearly() 5=Seasonal ()

e) Purpose of book keeping:
.....

FOOD SECURITY

FOOD SECURITY				
Dimensions		1=Disagree	2=No idea	3=Agree
1	Food availability			
a.	Physical presence of sufficient quantity			
b.	Appropriate quality of food from own production/stock			
c.	Food diversity			
2	Food accessibility	1=Disagree	2=No idea	3=Agree
d.	Physical access (ability to physically acquire food)			
e.	Economic access (Ability to buy food)			
f.	Social access (ability to acquire food through social capital)			
3	Food utilization	1=Disagree	2=No idea	3=Agree
g.	Quantity of dietary intake			
h.	quality of dietary intake			
i.	Active and healthy life			

j.	Food preference			
4	Food stability	1=Disagree	2=No idea	3=Agree
k.	Seasonality			
l.	Vulnerability			

APPENDIX II: INTERVIEW QUESTIONS FOR THE KEY INFORMANTS IN BUNGOMA AND SIAYA COUNTIES

Introductory remarks about:

- Personal introduction
- The objective of the interview session and about what the information is for
- Permission to record (emphasizing that their views are confidential)

To the County Officials

1. What are the main **economic activities** of people in the county?
2. What is the **role of agriculture** in the wellbeing of people in the county?
3. Describe what you think about the **current agricultural market** for the crops produced in the county.
4. What are that main **difficulties / constraints / worries** that farmers face in relation to their crops? If possible, ask the person to specify for each crop.
5. Do you think that men and women have **different difficulties**, constraints or worries in relation to their crops?
6. What is the situation of women in relation to farming? Do you feel that women are **recognized as ‘farmers’** in the community? Are they benefiting from farming activities?

7. Do **women** have **access to services** from the county government? What services?
8. Does the county government have **policies or initiatives** to tackle some of the inequalities women face? What is your perception of those policies or the lack of them?
9. From your perspective, how do women and men **contribute to food and income** security at the household level?
10. Describe your view about **women** being given a chance to participate in agricultural **decision making** in contribution to food and income of the households.
11. Are there farmer groups in this county? How many do you know?
12. What is your general view about farmer groups? Are they bringing benefits to farmers? Which benefits are you aware of?
13. Do you think that farmer groups increase food security?
14. Does the county government have **plans or policies** that are meant to support farmer groups?
15. Do farmer groups seek any kind of **help from the county government**?
16. What do you think about the **future trend of farming** in groups in this area?
17. Is there something that I have not addressed that you would like to add?

To the extension workers

1. What are the main **economic activities** of people in the county?
2. Describe what you think about the **current agricultural market** for the crops produced in the county.
3. How would you describe agricultural extension services in your county?

4. Do you think that families in this county have **enough food and income** to cover their monthly needs? Please explain your answer.
5. What are that main **difficulties / constraints / worries** that farmers face in relation to their crops? If possible, ask the person to specify for each crop.
6. Do you think that men and women have **different difficulties**, constraints or worries in relation to their crops?
7. Describe your view about **women** being given a chance to participate in agricultural **decision making** in contribution to food and income of the households.
8. From your perspective, are farming groups addressing the needs of women in farming? Are **women accessing trainings**?
9. Are there farmer groups in this county? How many do you know?
10. What is your general view about farmer groups? Are they bringing benefits to farmers? Which benefits are you aware of?
11. Do you think there should be more farmer groups in this area? Why?
12. What needs to be done to improve and **strengthen the farmer groups**?
13. Do you think that farmer groups increase food security?
14. Do you think offering extension services to farmer groups have improved food and income security?
15. How do the farmers in this county receive **new technology or ideas** of farming?
16. What do you think about the **future trend** of farming in groups in this area?
17. Is there something that I have not addressed that you would like to add?

To the opinion/community leaders

1. Describe what you think about the **current agricultural market** for the crops produced in the county.
2. What are that main **difficulties / constraints / worries** that farmers face in relation to their crops? If possible, ask the person to specify for each crop.
3. Do you think that men and women have **different difficulties, constraints or worries** in relation to their crops?
4. What is the situation of women in relation to farming? Do you feel that **women are recognized as 'farmers'** in the community? Are they benefiting from farming activities?
5. Do **women own land and/or other resources**? Do they have **access to services** from the county government or community organizations? What services?
6. Do you think that families in this county have **enough food and income** to cover their monthly needs? Please explain your answer. If not, how do they cope with food or income shortages?
7. Describe your view **about women** being given a chance to participate in agricultural **decision making** in contribution to food and income of the households.
8. Are there farmer groups in this county? How many do you know?
9. What is your **general view about farmer groups**? Are they bringing benefits to farmers? Which benefits are you aware of?
10. Have you worked with farmer groups in your area at some point? If no, why not? If yes, how was the experience?
11. Do you think there should be more farmer groups in this area? Why?
12. Do you think that **farmer groups increase food security**?

13. From your perspective, are farming groups addressing the needs of women in farming? Are **women accessing trainings**? Do they have **access to decision making** processes? Which ones?
14. What do you think about the **future trend of farming** in groups in this area?
15. Is there something that I have not addressed that you would like to add?

To the farmer group leaders

Context

1. What is the **role of agriculture** in the wellbeing of people in the farmer group you lead?
2. Describe what you think about the **current agricultural market** for the crops produced in the farmer group you lead.
3. From your perspective, what are the **benefits of growing** [the focus crops] in terms of income, food, other benefits (school fees, trainings, and health and soil fertility)?
4. What are that main **difficulties / constraints / worries** that farmers in your group face in relation to their crops?
5. What is the situation of **women in relation to farming**? Do you feel that women are recognized as ‘farmers’ in your group, in their families, and in the community? Are they **benefiting** from farming activities?
6. Do the **women** in your group **own property**? Do you think it’s appropriate for women to have access to resources and benefits? Please explain your answer.

Farmer Groups

Motivations and perceived benefits

1. What are the **services** you get as an FA versus a farmers group? How are **benefits different for farmers group versus farmers association**? Are there more benefits that come with farmer association?
2. Are these **benefits the same for ‘all members’** or do certain individuals benefit more than others?
 - i. Are there any **differences** for women versus men farmers?
 - ii. Are there other types of differences that influence access to the group/FA services?
 - iii. How would you explain **the differences in benefits** (in case there are)?
3. Has being part of the group/FA affected your food and/or income security? How and why? Is this the case for all members of your group?

Group management and functioning

4. How would you **describe your leadership and the management** of the group?
5. How is **information shared** in the group? (mechanism/frequency).
 - i. How does **information flows** from FA to the farmer group?
 - ii. From farmer group to individual?
 - iii. What are the **advantages/disadvantages** of these ways of sharing?
What works well/less well?
 - iv. Are there differences between women and men access to information?
6. Describe the **decision mechanisms** of your group and explain if it suits all the members of your group.
 - i. What types of decisions are discussed?
 - ii. Who decides?
 - iii. What works well/less well?

- iv. As women, how much are your concerns represented? Are your concerns addressed in the group?
 - v. What happens if someone does not agree with some decisions?
7. Do you think that women, men, youth, elderly, etc. have different **interests in the group?**
 8. Are the interests of all members of the group well represented or are some interests given priority? Do you feel able to speak up about your challenges? Do the rest feel the same?
 9. From your perspective what aspects could work better in terms of information sharing, decision making, leadership, services offered, etc.?

The future

16. What do you think about the **future trend of farming** in groups in this area?
17. What needs to be done to **improve and strengthen** farmer groups?
18. Is there something that I have not addressed that you would like to add?

APPENDIX III: GUIDING QUESTIONS TO BE USED FOR FOCUS GROUP DISCUSSIONS IN BUNGOMA AND SIAYA COUNTIES

Introductory remark about:

- Personal introduction of participants and facilitators
- The objective of the focus group interview and about what we will do
- The composition of the group and why they were specifically selected
- Confidentiality of views.

Module 1: Socio economic characteristics

1. Describe what you think about being in a farmers group? Describe what you think about being in a farmers group under an association? (FA)
2. Describe the benefits that you have accrued from being in a farmers group?
3. Describe what you think about the current agricultural market for your produce?
4. Describe what economically motivates you to engage in farming?
5. Do you think age is a factor in terms of good productivity?

Module 2: Socio economic characteristics effect on farmer group performance

1. **Perception of quality:** What are the services that you get as a member in an FA or as a member in an individual group? How would you describe the service quality? How does being part of this group help you address your main challenges? What about as a woman farmer?
2. **Perceived benefits** Describe the benefits that you have accrued from being in a farmers group? What are the services you get as an FA versus an individual farmers group? As individual how do you benefit? As women farmers what are the benefits?
3. Describe the decision mechanism of your group and explain if it suits all the members of your group.
4. How would you describe the management of your group?
5. What would comment about the extension services offered at group level? Is it beneficial to you as an individual?
6. Has being in a group developed your capacity? If yes, how? (Mention some of the ways) specific to you as 'women' or 'men' farmers?
7. Do you as a member of a group feel like you are well presented? If yes, explain how you feel the group has represented you?

Module 3: household food and income security

1. Do you as a farmer feel like you are food and income secure? Please explain your answer.
2. How do you cope up with food shortage? Does your frequency change?
Comment about you food purchasing power

Module 4: Gender relations

Section A: Gender relations for the women discussion

1. What do you think about how labour is being divided among men and women in carrying out agricultural activities like in production (ploughing, planting, weeding, harvesting), post-harvesting activities and marketing?
2. Do you think it's appropriate for the women to have access to resources and benefits? Why?
3. Describe your view about women being given a chance to participate in agricultural decision making in contribution to food and income of the households.
4. What are some of the beliefs about what women cannot do in agriculture that hinders participation? What do you think about this?
5. What criteria do you use to select people to attend trainings in your group?
6. When you look the farm activities that you carry out, who is the 'farmer'? Who is 'recognised' as the farmer? Do you feel recognized as farmers in your household community? Based on this, who do you think is the best person to receive training?
7. Discuss what are that main difficulties / constraints / worries in [4 focus crops] for you as women?

8. Discuss the main differences in women and men's needs and interests in [focus crop] production. Are you able to raise your concerns about these differences? If yes, how? Which forum?
9. Within the households who attends trainings? How do they share information?
10. As a woman, how do you benefit from growing the focus crops in terms of income, food, other benefits (school fees, trainings, and health and soil fertility)?
11. Who decides about the benefits accrued from growing the focus crops?

Section B: Gender relations for the men discussion

1. Do you think it's appropriate for the men to have all the access to resources and benefits? Why?
2. Describe your view about men being given a chance to participate in agricultural decision making in contribution to food and income of the households
3. What are some of the beliefs about what men can and cannot do in agriculture that hinders participation? What do you think about this?
4. What do you think about how labour is being divided among men and women in agricultural activities like in production (ploughing, planting, weeding, harvesting), post-harvesting activities and marketing?
5. What criteria do you use to select people to attend trainings in your group?
6. When you look the farm activities that you carry out, who is the 'farmer'? Who is 'recognised' as the farmer? Do you feel recognized as farmers in your household community? Based on this, who do you think is the best person to receive training?
7. Discuss what are that main difficulties / constraints / worries in [4 focus crops] for you as men? Note for differences from each crop.

Finally, What do you think about the future trend of farming in groups in this area?

APPENDIX IV: SIMILARITY REPORT



University of Eldoret

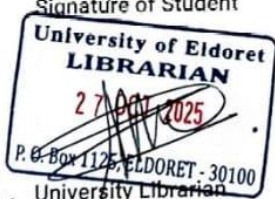
Certificate of Plagiarism Check for Thesis



Author Name	NASAMBU JOYCE MASINDE SAGR/AGE/ M/009/19
Course of Study	Type here...
Name of Guide	Type here...
Department	Type here...
Acceptable Maximum Limit	Type here...
Submitted By	titustoo@uoeld.ac.ke
Paper Title	THE EFFECTS OF FARMERS GROUP PERFORMANCE ON HOUSEHOLD FOOD SECURITY IN WESTERN KENYA
Similarity	7%
Paper ID	4569263
Total Pages	135
Submission Date	2025-10-23 19:24:25

Signature of Student

Signature of Guide



Head of the Department

Director of Post Graduate Studies