



UNIVERSITY OF NAIROBI

**IMPACT OF HOUSEHOLD GOVERNANCE ON AGROFORESTRY AS A DRIVER OF
FOOD SECURITY IN SOUTHWESTERN UGANDA**

**A THESIS SUBMITTED TO THE UNIVERSITY OF NAIROBI IN PARTIAL
FULFILLMENT OF THE DOCTOR OF PHILOSOPHY DEGREE IN
ENVIRONMENTAL GOVERNANCE AND MANAGEMENT**

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DECLARATION

This thesis is my original work and has not been presented for a degree in any other University.



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Impact of Household Governance on Agroforestry as a Driver of Food Security in Isingiro District, Southwestern Uganda

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DEDICATION

This thesis is dedicated to my family and all those whose support in any form enabled me to complete it.

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I pray for divine blessings to be bestowed upon you.

Finally, I want to acknowledge the philosophical quotation of the wisdom of Lucius Annaeus Seneca, a Roman philosopher and statesman, about life, time, and the art of Stoicism. The extract

reminds the readers that humanity is intrinsically endowed with the potential and gifts to enable them to attain sufficient food and ecological integrity. However, because of deliberate blindness anchored in anthropocentric motives, they have often searched in vain and immaterially.

*“The greatest blessings of mankind are within us
And within our reach; but we shut our eyes, and
like people in the dark, we fall upon the very thing
we search for, without finding it”*

(The Philosopher, Seneca)

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ABBREVIATIONS AND ACRONYMS

ACIAR.....	Australian Centre for International Agricultural Research
BCE.....	Before the Christian Era/Before the Common Era
CARE.....	Cooperative for Assistance and Relief Everywhere
CE.....	Before Common Era/Current Era
D.R.C.....	Democratic Republic of Congo
EFPP.....	Expanded Forest Plantation Programmes
FDFA.....	Federal Department of Foreign Affairs
FGDs.....	Focus Group Discussion
GBM.....	Green Belt Movement
LGDP.....	Local Government Development Plan
MDGs.....	Millennium Development Goals
NAADS	National Agricultural Advisory Services
OAU.....	Organization of African Unity
PDM.....	Parish Development Model
Ph.D.....	Doctor of Philosophy
SDGs.....	Sustainable Development Goals
SPSS.....	Statistical Package for the Social Sciences
ToT.....	Theory of Change
UN.....	United Nations
UNEP.....	United Nations Environmental Programme
UNGA	United Nations General Assembly

Abstract

Food insecurity, based on a historical viewpoint, is a big challenge that has never met a sustainable solution. The research problem has its genesis in the observation phenomenon, which eventually arouses inquisitiveness that warrants it worth investigating. The observation triggers a shift in thinking to agroforestry-based food security as the way to go championed by governance and household decision-making. By its nature, the research problem focuses on the impact of governance on agroforestry as a driver of food security as well as agroforestry benefits in the study area. As a result of the dilemma associated with the attainment of food security, there have been several attempts to ensure that there is sufficient food for everyone all over the globe. However, there is no effort that has been successful in eradicating hunger and food security. These attempts have not given enough attention to governance as a prime influencer of agroforestry to ensure household food security. The unsuccessful attempts justify the fact that there is an urgent need for continuous research and action to find a remedy. Therefore, the study targets to address governance and social-ecological-related factors that affect food security in the Isingiro District. Embedded in this problem is the loose link between decision-making systems that cannot embrace good governance and propel agroforestry for food security. The loose connection between households, and the decision-making systems, and imbalances within households magnify the problem of food insecurity. This reality continues to affect households' ability to utilize the available resources innovatively as a pathway towards becoming food secure and meeting other essential needs beyond food security. This reality demonstrates the value and necessity of adequate food which constitutes four elements namely: availability, accessibility, affordability, and utilization. It has been claimed that there is enough food in the world that could feed everybody. However, millions of people are still experiencing acute food shortages. This concern raises a sensitive question of where the

problem lies. Agroforestry thus has been earmarked as a viable option and strategy that households could strategically embrace to become food secure. The adoption of this approach calls upon the influence of governance on agroforestry as a driving power for household food production. The study intended to analyze the impact of household governance on agroforestry as a driver of food security in Isingiro District, South-western Uganda. Specific objectives were: to determine household and farm-level governance factors affecting household transition to food security; to evaluate household decision-making for agroforestry-based food security; and to assess households' benefits of agroforestry beyond food security. The methodology for this study included a research design that used a cross-section survey, with mixed methods constituting qualitative and quantitative approaches. The investigation used systematic and purposive sampling for selecting participants. It further used a reconnaissance survey before actual data collection commenced. Key informant questionnaires, in-depth semi-structured questionnaires with open-ended and closed questions, and Focus Group Discussions (FGDs) guided the study in gathering data. Randomization was also utilized. The key findings showed that the majority of households had insufficient food which was due to multiple factors. These factors included decision-making, small landholdings, geographic conditions such as little precipitation, drought, poor soils, limited extension services; large families, and poor governance. The study recommends intensive studies on household attitudes and perceptions about agroforestry practice and other factors. The local government needs to review land policy. It also needs to strengthen its support to households in utilizing their resources productively through agroforestry to attain diversified benefits. This same study also recommends strengthening rural livelihoods and assets through structural transformation.

CHAPTER ONE

GENERAL INTRODUCTION

1.1 Background to the Study

The idea of lack of enough food emerged in the 1970s and this was after the world experienced food crisis (Clap & Moseley, 2020; Stefanis, 2014); and the global diet conference that occurred in Rome in 1996. The Global Food Meeting in 1974 at the time of 4 billion world population ruled that each person is entitled to be relieved from hunger. However, the goal of overcoming food shortage was not achieved (Nafees *et al.*, 2021). Since then feeding the current and anticipated future population while avoiding abuse of biodiversity is a global dilemma (Godfrey *et al.*, 2010; Tian & Yada, 2016). Kent (2019) holds that the rationale why there is hunger in the globe is a result of lack of considerable discussion on the core factor behind it. Kent highlights three underlying sources of world hunger as disjunction (that people holding the authority to overcome starvation do not feel affected by famine), sympathy (those with the power to help in addressing hunger appear not to have empathy for the incapable) and substantial interests (the dominant continually aim at serving interests of those influential and not the powerless).

One critical point drawn from Kent's argument is poor governance whose target does not open a clear pathway for households to adopt agroforestry to generate sufficient food (Bamwesigye *et al.*, 2022). According to this study, limited transparency and corruption are major factors responsible for deforestation in Uganda. As a pathway to food security for everyone in the world, governance and its interaction with agroforestry is essentially required to let transformative change essential for realizing universal sustainability goals occur (Visseren-Hamakers *et al.*, 2021).

From a scholarly viewpoint, documented evidence indicates that there is a linkage between governance, agroforestry, and food security (Mouratiadou *et al.*, 2024). The message related to this evidence is that the concepts of governance, and agroforestry are related, with the ability to lead to food security through dynamic interaction. The core focus and essence of governance is that it has the power to trigger transformational change in farming systems leading to sufficient food.

FAO *et al.* (2021) indicate that an estimate of over 650 million people were malnourished in 2019 and global hunger escalated in 2020 ranging from 750 to 811 million people. Further, according to Chichabelu *et al.* (2021), about 840 - 909 million people are experiencing chronic hunger globally and this is a risk to many countries. This earlier study indicates that to end hunger and elevate about 840 to 909 million people suffering from it, it would require up to US \$ 50 billion. FAO indicates that those people experiencing acute food shortages have habitually lost access to foodstuff, and in the gravest circumstances, spend one day or many days without ingesting (FAO *et al.*, 2020). Recent years witnessed undermined agricultural livelihoods, severe drought, and other climatic shocks (Gomez-Zavaglia *et al.*, 2020; Kiun & Jehazaib, 2020; Ochieng *et al.*, 2016). Later, this undermined foodstuff availability, for instance in Mozambique (Baez *et al.*, 2020), where cyclone contributed 54.8%, and drought 21% reduction in households' consumption level.

The global food systems have also been affected by the impacts of the aftermath of the COVID-19 pandemic and lockdowns. The situation is made complex by the distorted historical policies which have resulted in a loss of livelihoods and income and increased household vulnerability (Clap & Moseley, 2020). This fact is made sound by the global leader David Beasley, who alerts

the globe on starvation faced by millions of people and the impending effects of COVID-19 (Khorsandi, 2020).

At present, many families endeavor to feed their youngsters with nutritious meals, which are not accessible to everyone. Yet it has been claimed that the globe harvests enough foodstuffs that meet the social needs of all (Behera *et al.*, 2019). This study also indicates that 1 in 9 out of 821 million people, fail to get a meal daily. Such a situation essentially requires a solution to hitches of poverty and food security, and letting the rural households who regularly have no access to food find social justice. Further, this study demonstrates that families are in a situation where hunger is on the increase and where an increase in the sum of underfed individuals was 804 million in 2016; rising to almost 821 million in 2017. As part of the remedy, this same study recommends strengthening rural livelihoods and assets through structural transformation.

As a universal action towards creating a better world, in 2000 the global heads of state decided to reduce extreme poverty, and hunger and to enhance ecological sustainability in developing countries (Feeny, 2020). This decision became a portion of the development agenda for encountering the necessities of the poorest people (Weitz *et al.*, 2015). Although Millennium Development Goals (MDGs) gave hope for a better situation, they remained relatively distanced from national developments and decision-makers: and as a result, the target to eradicate poverty and hunger was not achieved (Ilora *et al.*, 2020). However, a study by Feeney (2020) shows disagreement between those who argue that MDGs were met and those opposed to their success.

Further, on 25th September 2015, the UN General Assembly embraced the post-2015 development agenda on workable objectives towards sustainable progress, emphasizing: Goal 1 eliminating poverty; Goal 2 ending hunger; 6 safe water for all, gender equality, environment, and global

warming, (Behera *et al.*, 2019; Ritchie *et al.*, 2018; Kolks, 2016). However, the world is not on track toward achieving food security (UN, 2019).

Africa is experiencing serious hunger, showing signs of worsening with natural and demographic changes, pests, and degraded soils (Sigh *et al.*, 2020). Otekurin *et al.*, (2020), show that many African countries have found it problematic to reduce hunger and malnourishment significantly since 1990. Further, many homes in Africa find it challenging to adjust to weather changes. This challenge is due to limited adaptive capacity, vulnerability, and being unable to adjust to farming practices and finding it expensive to spend on sustainable land practices like agroforestry (Bryan *et al.*, 2013). Relevant policies, stakeholder skill building, and adequate knowledge about sustainable land management like agroforestry adoption are thus required to address the issue (Khan *et al.*, 2014).

Further, in African countries like those in the Sahel, power over access to landholdings is lineage-centered and embodied in the male household heads or ancestry. Men inherit and have control over the land which deprives women of full land entitlements. This in some way alienates and excludes women from freely using household farms most productively. Nevertheless, an attempt to comprehend the governance of land and related resources is significant for the establishment of effective policies for managing natural resources (Binan *et al.*, 2017).

Many factors have been noted to affect tree adoption on farm holdings. Among these factors include gender power relationships whereby traditional patrilineal control over landholdings and their use limit women's capacity to decide on land accessibility and use it most productively. Females' survival privileges linked to acreage rest on the association with their counterparts (Feyertaag, 2021). The implication is that even men's dominance and control over farms do not

favor women to participate in tree adoption on farms to improve food production. Yet even some studies like the one in West Africa Sahel have recognized the link between food and the environment by demonstrating that the revival of on-farm trees under the active participation of farmers is significant since they provide ecological benefits like income, dietary food, as well as crops complements in arid areas (Binana *et al.*, 2017). The study in Ethiopia and Mali shows the significance of adopting on-farm trees mainly indigenous species such as *Faidherbia albida*, if food security which has persisted as a key problem is to be attained and to slow down ecological degradation (Mokgolodi *et al.*, 2011; Chawafambia *et al.*, 2020). The contribution of informal institutions along the formal ones in supporting farmers to develop friendly working relationships with the resident government; and to put in place effective strategies for effective care and safeguarding of natural resources (Binan *et al.*, 2017) is also highlighted.

More literature has shown that effective land management and soil conservation benefits farmers in diverse ways. For instance, in Kandoa degraded zone of Tanzania. As a result of proper soil management in this area, 68% of the study participants observed a reduction in soil erosion, increased firewood (98%), increased fodder (50%), high crop yields (56%), and food adequacy (68%). Such use of organic substances and tree adoption on farmlands lead to high food yields and other ecological services. However, the key challenge is how to sustain these land use practices due to lack of government support (Shrestha & Ligonja, 2015).

According to UBOS (2016), Uganda enjoys equally distributed rainfall except in the northeastern area. The amount of rainfall received lies between 1000-7500 mm of rain yearly and has two rainy seasons between March and November. People are motivated by the availability of rainwater to engage in food production though the mode of agricultural practice is mainly subsistence.

The 1995 Ugandan Constitution Article 1 gives people the power to be self-governing and determine their destiny. It also grants a constitutional mandate to the leaders to ensure effective conservation and management of the environment which is a core pillar of agriculture (The Republic of Uganda, 1995). Yet many constituencies are food insecure, and exposed to high risks of environmental changes such as prolonged drought (Kansiime & Mastenbroek, 2016). With national policies such as the National Agricultural Policy, 2013, and institutional arrangements, the household food crisis is still being experienced (Ampaire *et al.*, 2017).

Uganda introduced the procedure for formulating her National Land Policy in 1983, a development that witnessed the involvement of all citizens in its progression. The vision of this policy was: to lead Uganda's people to a flourishing and developed environment by using and governing land in the best way (Ministry of Lands, Housing and Urban Development, 2013). However, it has remained paradoxical that meaningful participation in the implementation of decisions on land access, and control remains challenged by the existing imbalances entrenched in patrilineal powers. The persistent traditional perception in western Uganda and elsewhere is that women have no land ownership, and are not decision-makers in matters of land (Rietveld *et al.*, 2016).

The male dominance in decision-making over land (Rugadya, 2020) even extends to farm produce for food security and sale. Literature reveals that household male heads control the market as well as sales although this does not rule out completely female heads of households (Larochelle *et al.*, 2018); and carry out much of substantial supervision activities. Men go ahead to regulate their wives' efforts. At the same time, men expect their spouses to offer labor on the banana estates before engaging in their other demands (Rietveld *et al.*, 2016). This overburdens women who do much of the work to produce food on the farm vis-à-vis domestic core responsibilities.

Although women's rights and participation may be granted by statute, their access to land is constrained by traditional norms (Mukasa *et al.*, 2020). Their rights over land remain insubstantial for defense, and implementation, and questionable as much control lies in the hands of male-household heads. Their being unconsidered in land inheritance traversing generations is influenced by the prerequisite to keep land within a household or clan parameters as predetermined by patrilineal dynamics (Rugadya, 2020). Literature also shows the effect of gender in terms of land security and asset privileges in Uganda. This is a similar situation in other countries. It explains why eliminating gender inequality that deprives women of the right to secure tenure over land and entitlements is a core element of Sustainable Development Goals (SDGs) that demands just access and use of assets (Feyertag *et al.*, 2021).

As a strategy to improve household livelihoods, gender equity in land access and ownership, equal participation in tree planting on farms, and external support can be effective in improving the involvement of sidelined groups in the restoration of degraded areas. For instance, the facilitation and support provided by the Adaptive Collaborative Management (ACM) group in dissimilar traditional situations has proved effective in enabling men to let their spouses grow trees on household farmlands and give them parts of the land to cultivate trees of their choice (Mukasa *et al.*, 2016). Despite weaknesses in Uganda's governance and institutional structures that have tolerated traditional customs, capacity deficiency, and unsatisfactory budgets to persist, literature presents significant development in the forestry sector. The Forestry Act, Forestry Sphere, and Forestry Plan have attempted to pay attention to communities' needs including those particular to women (Banana *et al.*, 2012 cited in Mukasa *et al.*, 2016).

It can be noted that poor governance: policies, poor decision-making, political meddling in the agricultural sector, abusive ways against proper utilization, and adoption of forestry resources affect food production (HLPE, 2023). Thus governance remains a critical factor as it determines certain conditions for promoting household food security through agroforestry practices.

Although agroforestry remains practiced in Uganda, the general lack of household education and knowledge about diagnosis, and management strategies for crop and tree species, diverse and multi-use of tree species poses a challenge (Ebifa-Ethieno, 2020). Indigenous knowledge also about tree species selection regarding a tree's ability to supplement nutrients to the soil, product diversification, and maximum shading is not wholly explored (Kalanzi & Nansereko, 2014). There has been planting of unsuitable tree species such as eucalyptus, pine, and *Maesopsis* on small-farm holdings by women in some districts of Uganda such as Rakai, Mpigi, Masaka, and Wakiso (Mukasa *et al.*, 2016) which does not support crop production as such.

The nation is still facing the challenge of woodland degradation like in the past (Majaliwa *et al.*, 2016), besides fixed-size arable landholdings. For instance, it is projected that by 2040, land under subsistence agriculture is plausible to rise by almost 1% whereas tropical high woodland on which farm animal undertakings are carried out is anticipated to decline by 0.2%, and unprotected woodland/forest by 0.07%. This is attributed to increasing to high population (UBO, 2021) and, the demand for agrarian and human habitation that has led to land usage systems inconsistency. As a result, further degradation of land, mudslides, floods, and prolonged dry seasons are predicted in the country, with the possibility of registering additional losses in terms of life and property. These occurrences are likely to happen if a mechanism for checking and regulating the speed at which land use systems is increasing is not put in place.

Although Uganda's fertility rate has been declining slowly, the projection is that the population will grow at the rate of 3 percent per annum, with 5.4 children per mother (State of Uganda Population Report, 2018). However, such population growth results in competition over scarce resources which are a threat to development where planned population and weak governance institutions for enforcing proper land use systems and protection of natural resources are lacking.

Further, literature shows that in Uganda, postharvest losses significantly threaten household farmers, leading to direct physical and economic losses. It has been revealed that 14.9% of all cooking bananas harvested in the country face a decline after the harvesting period, with 7.2% diminishing totally, whereas 7.7% decline moderately. Families headed by females encounter additional losses compared to those households headed by males. Some key factors responsible for the losses include selling immature bunches, poor harvesting treatment, and before the ripening stage. Much of the losses occur during the supply time. The strategies recommended for curbing postharvest losses include concentrating on the different phases immediately at the farm and becoming innovative in processing banana residuals into finished products (Kikuluwe *et al.*, 2018).

A study in Lake Victoria Semicircular, Kyoga grasslands, Upland arrays, and South-western Woodlands showed that farmers generally believe in using fertilizers though their preference over organic or inorganic fertilizers differ. Although 60% of respondents interviewed preferred inorganic fertilizers, 40% were for the organic type. The primary reasons why the farmers showed interest in inorganic fertilizers include functioning better, stress-free accessibility, non-smelling, easy preparation unlike organic fertilizers that are cheap, and long staying in soils according to those who are pro them. However, the decision regarding which kind of fertilizer to apply was determined by the production expectancy (Rware *et al.*, 2020).

Being one of the districts in south-western Uganda where exposed-grazing ground is dominant, Isingiro district faces drought which remains a threat to future cattle keeping, causing a decline in milk production (Ntakyo *et al.*, 2020). This projection is based on certain scenarios that have been happening. For example alterations in the land usage systems from 1990 to 2015, where subsistence agrarian land covered 98,073.36 area (km²) and 39.683% area (Km²) while in 2015, it covered 107,426.6 area (Km²), with 44.16% area Km² (Majaliwa *et al.*, 2018). As a new district, which came into force in 2006 (Reiveld *et al.*, 2016), it experiences mean yearly precipitation below 1000 mm. Its agricultural undertakings are constrained by water shortage. Bulky zones, nearly inappropriate for the growing of food crops, are spared for grazing livestock mostly Ankole longhorn cattle. However, the district is food insecure as a result of population pressure that influences the degradation of swamplands and topography, contributing to climate changeability, and unreliable and inconsistent precipitation patterns (Reiveld *et al.*, 2016).

Some studies in Nakivale wetland show that there has been an ongoing transition from land use for dominantly grazing livestock, especially cattle to crop agriculture, settlement of people, and urban development. This conversion dotted with poor land use practices has regressively affected natural resources through environmental degradation, overgrazing of steep slopes around the wetland, deforestation, and gradual diminishing of wildlife and essential swamp assets among them pasture for home faunae, and aquatic resource for home consumption (Bintooro, 2015; Kamukasa, 2013). There has been resistance by the communities neighboring the wetland to the effort of a foreigner to own the resource privately as the resource would cease to be a public good that supports people's livelihoods in the district. The study shows that participants (94.3%) rejected the idea of private ownership (Kamukasa, 2013).

A study in the zones of Uganda, Rwanda, and Tanzania within the Lake Victoria Basin shows a metamorphosis in land protection, and land usage, with variation in climate. An increasing population coupled with high demand for agricultural land and settlement, has reduced the rate of cattle ownership as a result of changes in climates that have lowered fodder. This situation is now a restraining factor to cattle keeping. The study reveals that high population growth affects resources mainly land for human habitation, and farming for food production (Kashaigili *et al.*, 2015).

Under decentralized governance, the water governance arrangement in Uganda functions at four strata: national, district, sub-county, and village, with each layer having a part to play toward aquatic delivery (Naiga *et al.*, 2020). The study in Isingiro District in the western region of the country, focusing entirely on five villages of Masha Sub-county reveals poor water governance and few aquatic fountains. This study also indicates that gender equity has been lacking as of the 22 members of the Water User Committee (WUC), only five have been females. Poor water governance in the district is anchored in unwritten informal by-laws, non-representation of WUCs at higher levels (national and district), and non-involvement of water users in decision-making. Consequently, due to water scarcity, people and animals strive for the same fountain of water while escalating the danger of water pollution and skirmishes between users. This alone affects food security and tree planting where water is needed for irrigation (Naiga, 2020).

1.2 Statement of the Problem

The area under investigation has transformed from being a historically known food basket and geographically green to one that is food insecure (Akwango *et al.*, 2016). This claim is based on identified interlinked issues affecting the study zone including drought, landscape degradation,

vagaries of weather, water scarcity, exponential population augmented by a high influx of refugees, and low per capita income (District Planning Unit, 2015).

There have been several unsuccessful attempts including ineffective governance institutions in Uganda and at the global level to eradicate hunger and resolve ecological abuse (Katongole & Ssali, 2020; World Agroforestry Center, 2008). However, those attempts have not yet yielded positive results by endeavoring to respond to the problem of the scarceness of foodstuff as well as an ecological catastrophe, especially in rural families. Utilizing the outcome of those unsuccessful attempts to find a sustainable remedy, searching for a workable solution is still in progress (Loring & Gerlach, 2015).

The magnitude of the problem under investigation is first of all an issue that is experienced at different levels of governance (Sidibé *et al.*, 2018). However, it affects more rural households who largely depend on subsistence farming. In circumstances where governance is not embraced, and agroforestry is not significantly practiced, food insecurity and lack of other agroforestry benefits have more impact on people's well-being. Thus, agroforestry-based food security becomes a critical issue.

The research problem has its genesis in the observation phenomenon, which eventually arouses inquisitiveness that warrants it worth investigating. The observation triggers a shift in thinking to agroforestry-based food security as the way to go championed by governance and household decision-making. By its nature, the research problem focuses on the impact of governance on agroforestry as a catalyst of food security as well as agroforestry benefits in the study area.

This study, therefore, targets to address governance practices and social-ecological-related factors that affect food security and agroforestry benefits in Isingiro District. At the heart of this investigation is the weak link between households and decision-making systems that have not yet embraced effective governance practices to propel agroforestry for food security. This weak connection makes households oblivious not to realize their power and potential to produce destiny via agroforestry, with the government's strategy not focusing critically on this essential reality.

Similarly, many key-related issues affect the transition to food security. These issues include land ownership, access, and use, traditional patrilineal control over landholding and its use, gender-based power relationships, intra-household decision-making, and control over household income, farm produce, and sale among others. The issues affecting the study zone include drought, climate change, landscape degradation, vagaries of weather, lack of irrigation water structures, water scarcity, and exponential population. These issues are augmented by a high influx of refugees, and low per capita income (District Planning Unit, 2015). A less innovative home that lacks effective governance practices, and passion for trees, even if its members plant one or two trees may make few farming practice changes (Kristjanson *et al.*, 2012).

Further, household food security is also often affected by little or no awareness of family decision-making structure and capacity to realize the potential for adequate feeding (Farnworth *et al.*, 2018). Linked to this is little knowledge on the agricultural benefits of strengthening the connection of household decision-making to local governance, and how this can eliminate imbalances within households themselves (Catacutan, 2015; Barnett *et al.*, 2015; Weitz *et al.*, 2015). All this has an impact on households' ability to make decisions towards utilization of available resources and

adoption of agroforestry. Yet this is a pathway towards becoming food secure as well as meeting other essential needs beyond food.

By addressing governance and ecological-related aspects influencing the production of food in Isingiro District, this inquiry is keenly interested in to what extent intra-household factors and external ones influence household food security. There is hope that by addressing the existing gaps, this study will add substantially to the production of adequate food through agroforestry practices. The study intends to enlighten households on how they can effectively embrace transformative governance for strategic use of resources within their means as a gateway to secure sufficient foodstuffs and enjoy other-related benefits.

1.3 General Objective

The main objective was:

To analyze the impact of household governance on agroforestry as a driver of food security in southern-western Uganda

1.3.1 Specific Objectives

Specific objectives included:

- 1) To determine household and farm-level governance factors affecting the transition to household food security.
- 2) To evaluate household decision-making for agroforestry-based food security.
- 3) To assess households' benefits of agroforestry beyond food security.

1.4 Research Questions

The research questions were:

- 1) What are the household and farm-level governance factors affecting the transition to household food security?
- 2) How does household decision-making affect agroforestry-based food security?
- 3) What are the households' benefits of agroforestry beyond food security?

1.4.1. Hypotheses

- 1) "There is a significant relationship between household and farm level-governance factors that affect the transition to household food security in the study sites."
- 2) "There is a significant relationship between socio-economic factors and household decision-making for agroforestry-based food security in the study sites."
- 3) "There is a significant relationship between socio-economic factors and household benefits of agroforestry in the study sites."

1.5 Justification of the Study

The entitlements to food are linked to agroforestry and this promotes food sustainability even for the yet-to-be-born generation. Agroforestry is pronounced in documented information as a viable strategy for enhancing a home's adequate food (Ofori *et al.*, 2014). Yet the world has persistently not become successful in overcoming hunger despite concerted efforts (Prosekov & Ivanova, 2018). This persistence of hunger is confirmed by FAO *et al.* (2020), which perceives the world

not to be on the right path to food security. This failure of not being on the right track makes many households vulnerable to acute hunger. Agroforestry propelled by governance, becomes a trajectory of hope to the attainment of food security and other benefits beyond adequate food. Hence the need for a change-oriented study.

As an agro-based country, Uganda's larger population (80%) depends on agriculture. Despite the country's food production programmes and policies aimed at doing away with food shortage according to Uganda Vision, 2040, this has not enabled households to become food secure. Therefore, this necessitates a change-oriented study on how households can dialogically embrace governance for enhancing the planting of diverse tree types for rich food harvests and other related benefits. Taking this direction is a better alternative to domesticating local agroforestry systems to enhance zero hunger, farmers' income, and resilience to climatic changes (Ofori *et al.*, 2014). The findings of this study will be beneficial to policymakers and planners in formulating sound policies that aim at enhancing food security, and add value to the existing body of knowledge. It is hoped that this study will generate vital information, culminating in good decisions for the institutionalization of the household framework for enabling families to be agro-ecological secure.

1.6 Scope of the Study

The research centers on how transformative governance and agroforestry influence rural households to become food secure. It takes into consideration household decision-making as a vital process for food sustenance. The study was conducted in Isingiro District, southwestern Uganda. Isingiro District was chosen to represent southwestern Uganda because of its unique history of food insecurity over decades and geographical conditions such as drought. The district lies in the cattle corridor with a documented record of climate variability, long drought seasons, and water

governance challenges. All these factors contributed to the choice of the district for the study. The district has also been portrayed on air and newsprint for encountering water scarcity, and extreme catastrophic conditions which affect food security over time.

As a result of Uganda being a signatory to the nineteen sixty-nine Organization of African Unity (OAU) Treaty administering dimensions about refugee challenges in Africa, and having the 2006 Refugee Act on the entitlements of refugees, the district hosts a huge number of refugees from different African countries, These countries include Somali, D.R.C, Rwanda, Burundi, Sudan and Eritrea, with the majority resettled in Nakivale Refugee Settlement and others within the communities. The presence of the refugees has put pressure on the natural resources in an attempt to meet food needs and other essentials (Mwangu, 2020). Their impact on food security, land, and environmental protection, causing degradation of natural resources and competition over land often sparks conflicts between them and the local people. The study covered the period from 2015 to 2021 because around this time especially in 2017, the area has been experiencing acute food shortage and ecological crisis.

1.7 Limitations of the Study

This inquiry anticipated delays in collecting data as well as analyzing it in time due to financial constraints. To overcome these shortcomings, the study developed and applied a workable budget to conduct the study within the available financial means as well as being time conscious. The researcher used frugal means, and attempted to make timely arrangements through the local council I and IIs prior to data collection. The study also anticipated facing a difficult task regarding gathering data emanating from the respondents' fatigue. Some studies had been conducted in the same area by some organizations which reportedly provided some token as an appreciation. Thus,

it was anticipated that respondents would demand some money. This was solved by using a friendly approach, being open, and showing the relevance of this research to them.

1.8 Definition of Key Terms

This study rationally considers defining key concepts as of great significance for the readers to comprehend how transformative governance and agroforestry influence household food security leading to diverse benefits. The definition of key terms is important because it helps readers capture the meaning and relevance of the entire study.

‘Entandikwa’: This is a programme/scheme initiated by the government of Uganda to target the poor and eliminate poverty.

The Parish Development Model (PDM) is an approach for establishing and bringing civic segment interventions aimed at creating wealth and employment at the parish level. In Uganda, the model is intended to liberate almost 39 percent of families from a small-scale economy to profitable production (Republic of Uganda, 2022).

Food security: According to the International Food Conference which took place in Rome in 1996, food security refers to the circumstances in which “all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and food preferences for an active and healthy life”(FAO, 2006).

Governance: By having eight qualities namely: participation, rule of law, transparency, accountability, responsiveness, consensus, orientation, equity, efficiency, and inclusiveness, many authors have defined it as the decision-making process by which decisions are implemented (or

not implemented) in society (Planas *et al.*, 2022; Ali, 2015 cited in Bachev, 2023; National Population Council, 2018).

Agroforestry: refers to the integration of food crops and trees on the same piece of land for various ecological services.

Agroforestry-based food security: This notion denotes a system where food adequacy, which is the condition of having dependable access to adequate, inexpensive, and nutritive food, is achieved, reinforced, or enhanced through agroforestry practices.

Food accessibility: As per the FAO (1966) definition, it is attainable if and only if ‘all people at all times have physical, social and economic access to sufficient, safe, and nutritious food that meets the dietary and food preferences for an active and healthy life’.

Household: A group of people, related or not, living together in the same dwelling, amenable to the same household head, and sharing food, food expenses, income, and other household assets (FAO, 2021).

A household head: This concept refers to a person who manages the income earned and the expenses incurred by the household (UBOS, 2016).

1.9 Thesis Organization

This thesis is organized based on a paper format.

Chapters One to Three: These chapters focus on the theoretical foundation and methodological approaches important to this research project.

Chapters Four, Five, and Six are based on specific objectives. Chapter seven presents a synopsis, wrap-up, and suggestions based on the key findings and deliberations of the chapters.

Chapter One: General Preamble: This section highlights the general introduction of the inquiry. It provides background as well as context on transformative governance, agroforestry, and food security. It widely sheds light on the global trends of food security and agroforestry adoption, and the relevance of this phenomenon. The chapter shares the study problem, aims, study questions, hypothesis, significance, justification, limitations, and thesis constitution.

Chapter Two: Literature Review: The second chapter is a theoretical review/analysis related to this study. It aims at conceptualizing concepts and theories by making them applicable to this entire inquiry. The section also displays theoretical background, including the discussion on governance, agroforestry, and food security at the household level.

Chapter Three: Study approach: This part provides the design used, data collection, and analysis. It describes the geographical location of the Isingiro District, its population, and the climatic conditions of the study locality. This chapter also provides a philosophical basis emphasizing a suitable approach to use.

Chapter Four: Determines household and farm-level governance factors affecting the transition to household food insecurity.

Chapter Five: Evaluates household decision-making for agroforestry-based food security.

Chapter Six: Assesses households' benefits of agroforestry beyond food security.

Chapter Seven: The focus of this chapter is on the conclusions and recommendations. It provides a summary of the key results and generalized broad-spectrum conclusions obtained from the findings in chapter four to chapter six.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature related to the study. Its purpose is to aid in establishing a clear understanding of the already existing and documented writings and trends related to the study. Ultimately, the use of a literature review is to convey to the readers the findings of other studies that closely link to this study. The review is also an attempt to identify gaps in the related literature. The chapter explains the main theory that underpins the study and constructs its content hinged on themes each generated from the corresponding study objective. It uses a theoretical framework that demonstrates variables most suitable for attaining sufficient food yields and other linked gains, with value addition. Before reviewing the literature related to each objective, the chapter commences by looking at the historical context of food security linked to various factors that have undermined sustainable food production in Uganda.

2.2 Historical Context of the Chronicle of Food Security and Land Degradation in Uganda

Scientific research based on evidence proposes that crops were first introduced in Uganda around 1000 BCE (Hamilton *et al.*, 2016). It was around this time that farming societies started to impact the arrangement of woodlands via slash and burn mode of crop production. This created an episode of woodland decline linked to socio-economic transformation.

Although the imperialism era witnessed novel notions of land ownership, and the creation of woodland reserves and agrarian locations, forest species and widespread banana varieties susceptible to pests and syndromes were at risk (Hamilton *et al.*, 2016). This reality is cemented

by the fact that as literature continues to reveal, most crops such as bananas in Africa including Uganda originated from outside (Andiku *et al.*, 2019). Much as these food crops originated from outside, colonialists promoted cash crops while showing less respect for the environment (Mwanika *et al.*, 2021).

While Uganda was considered a vital and potential food provider to its neighbors (Nabyonga *et al.*, 2022), the situation has changed. The country has been referred to as a food basket (Masereka *et al.*, 2020) because it has been endowed with richness in natural resources and a good climate that favors the growing of a range of crops. However, the achievement of food security depends on the strengthening of governance and well-managed natural resources (Martiniello, 2015).

The historical context further shows that food production in Uganda is traditionally associated with colonial rule (Mwanika *et al.*, 2021). Uganda succumbed to the capitalist-world economy whose main intention was to serve the interests of the Western powers to meet their needs through the introduction of commercial crops at the expense of sustenance crops. Thus establishment of money-making farming forced Ugandans to tolerate the fiscal expenses of imperialism and ended up compelling indigenous groups into vulnerable situations of poverty and precipitating food insecurity (Mwanika *et al.*, 2021).

Furthermore, literature reveals that food security in Uganda has been historically affected by imposed violent regimes and conflicts of the 1970s and 1980s, that is under Idi Amin from 1971-1979, and subsequently Milton Obote II from 1979. While the regime under Obote made efforts towards economic revival, those attempts became shortly demoralized by the political warfare that persisted till 1986 when the National Resistance Army (NRA) captured the government (Joughin *et al.*, 2010). The cooperatives that Uganda had established to help rural farmers improve their living

conditions were doing well. However, they could not survive longer due to political meddling. This scenario triggered food insecurity in the 1970s (Kyazze, 2010; Borda-Rodriguez, 2013). This historical background associated with the failure of the government to support farmers, and poor land has affected crop production (Nabyonga *et al.*, 2022).

Referring to Bugisu Cooperative Union and Gondo Cotton Cooperative Society, it is contended that the importance of cooperatives, their success or failure, depended on organizational dynamics, supported by the degree of collective managerial ethics and responsible leadership, communal wealth and contribution (Mbate, 2017). The establishment of cooperatives was an effort of the smallholder farmers as a reaction to the imposed terms of trade on them by the imperial administration and middlemen basically of Asian origin (Kwapog and Korugyendo, 2010 cited in Borda-Rodriguez, 2013).

As a part of the global sphere, Uganda agreed to establish a decentralized system for offering quality service delivery, including agriculture closer to the local people (Mushemeza, 2019). This source shows that the decentralization policy started well. However, it later slowed down due to many challenges such as keeping local governments subservient to the central government as well as abandoned and dysfunctional district departments. Although the theory of decentralization has been instituted to promote governance and accountability, on the other hand, this system can generate unintended costs and trigger once-experienced inequalities. It may also breed resident elite seizure and spark off conflicts as it reduces the quality of public policy (Mbate, 2017).

Further, Uganda in particular northern region suffered from another period of long civil war beginning in 1986 and this gravely affected food production and food safety. This situation created an agricultural vacuum whereby massive displacement of people into the camps and trading

centers for security purposes occurred. This brought to the surface a visible significant economic and agricultural crisis (Wairimu *et al.*, 2016). These challenges have been augmented by Uganda's fertility and dependency rate. The country's dependency rate is one of the highest worldwide with dependents (1.12) per employee. As a result, the population has been growing very rapidly, thus creating a huge number of people annually to feed (Jourhgin *et al.*,2010).

While aiming at restoring the economy, during the 1990s, the Government of Uganda encompassed a series of agricultural programmes. Those programmes were intended to lead to an impact of transformative governance and agroforestry on food security and to reduce poverty. These programmes include 'Entandikwa', Plan for Modernization of Agriculture (PMA) (Lukwago, 2010), National Agricultural Advisory Services (NAADS) (Lukwago, 2010), and Prosperity-for-All (PFA) (Makoba and Wakoko-Studstill, 2016). The objective of these programmes was agricultural recovery tailored towards the transformation of rural and peri-urban poor households. However, these models have met a lot of challenges regarding governance issues, the mode of application, the choice of beneficiaries, and the role of intermediate organizations which up to date have not been given attention (Mwesigwa 2016). However, as indicated by Rwamigisa *et al* (2017), the circumstances regarding the unsuccessfulness of these programmes especially NAADS which has remained a puzzle is demonstrated in the following figures (Fig 2.1 and 2.2).

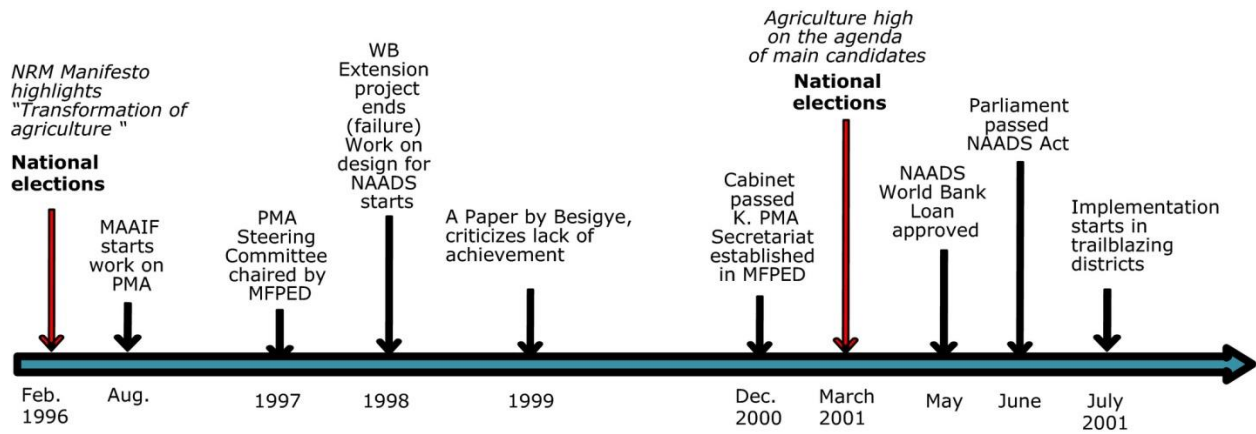


Figure 2.1: Key Events in the Reform Process Leading to Establishment of NAADS

Source: Derived from Rwamigisa et al., 2017)

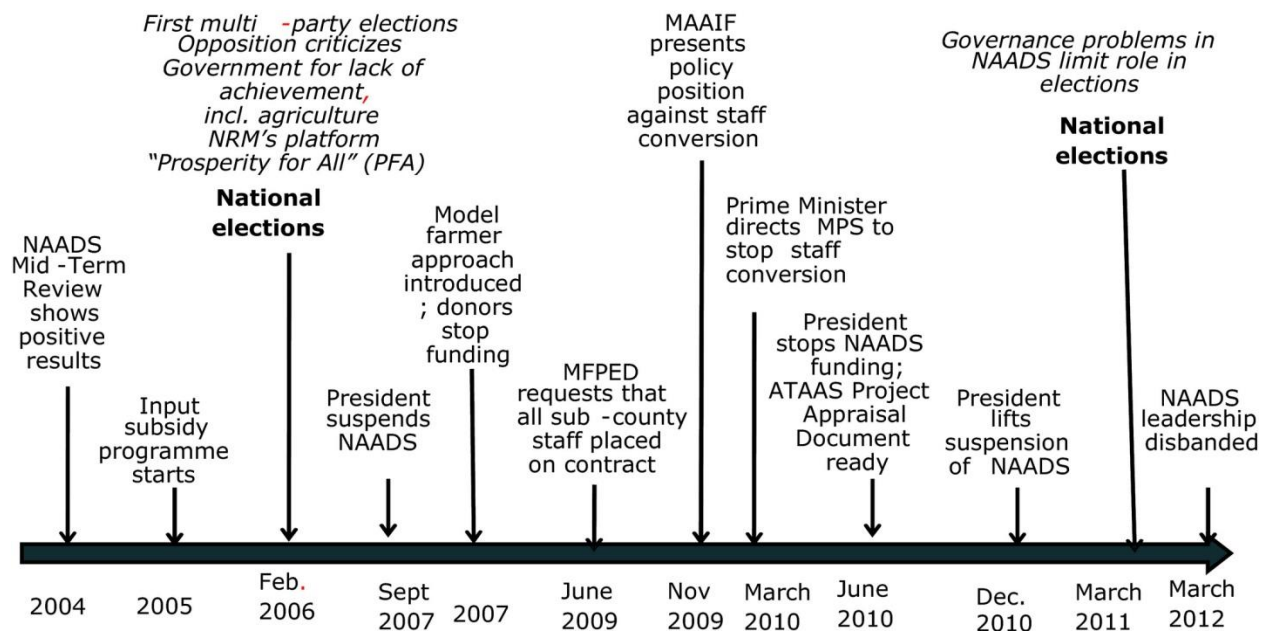


Figure 2.2: Key Events in the Reform Process Leading to Changes in the NAADS Programme

Source: Derived from Rwamigisa et al., 2017

The two figures above demonstrate clearly that firstly, the failure of NAADS was rooted in the segregation of the steady transformation alliance in the scheme; and secondly, the initial application of the programme escalated the susceptibility of the programme to partisan seizure and management hitches (Rwamigisa *et al.*, 2017). The previous literature shows the reasons why these noble programmes failed. The reasons include interest parties, patronage politicking, donor ideology, and elections seemingly being the primary aspect (Jourhgin *et al.*, 2010). The effect of failure to implement such programmes trickles down to rural households and creates food insecurity. The study identified factors responsible for the lack of strengthened governance and an effective grand plan of natural resource management.

As of 2021, the government of Uganda attempted to implement another agricultural programme known as the Parish Development Model (PDM) whose aim is to liberate almost 39 percent of families from a small-scale economy to profitable production (Republic of Uganda, 2022). The strength of this model lies in giving the power to decide on what they want to do, and in which place, and to ensure that the transformation program is determined at the village level. However, even if the center of development activities shifts from the sub-counties to the parishes, it is questionable as to whether this model will be exceptionally successful considering the level of corruption and lack of political will to bring rural people to the center of development. As a suggestion, for this model not to fall suit of the previous programmes that have failed to meet their intended objectives, this study alerts the government to first level the ground through rigorous scientific research on the elimination of corruption in the local government domain to zero degree and institutional cleansing.

2.3 Link between Governance and Agroforestry-based Food Security

The connection between governance, and agroforestry-based food security is evident. Governance, whereby there are strengthened institutional measures, improves food production by integrating food crops with trees. This requires responsible governance as a pathway to transforming farming and food systems (Wezel *et al.*, 2020). The literature further shows responsible governance as one of the elements of agroecology for supporting transitions toward sustainable farming. Thus, the transition to food security is driven by responsive governance, which embodies transparency, accountable and inclusive governance, and means that support agricultural producers (Edmundo *et al.*, 2020).

2.4 Household and Farm Factors for Determining the Transition to Food Security

According to Ntwenya *et al.* (2015), rural households have continued to experience persistent food crises in developing countries amidst several efforts to curb the problem. Contributory factors responsible for this scenario include agroecological zone, location and season, the involvement of family members in farming, diversified source of income, income per capita, and age.

According to Zakari *et al.* (2014), research done in southern Niger reveals that sustainability of enough food items at both household and national levels has remained a key challenge to many developing countries. The study reveals several factors which include drought, poverty, soil infertility, climate change, diseases, insect attack, costly food, flooding, access to the market, labor supply, and gender of the household head. Underlined also are low functioning of the agricultural sector, female-headed families, weak governance, and access to market and food aid as primary factors impacting the amount of domestic foodstuff produced (Kajombo *et al.*, 2014).

According to Fyles and Madramootoo (2016), the food crisis is affecting millions of people including Sub-Saharan Africa due to farming practices, consumption patterns, choices, and environmental treatment that are altering the agrarian land surface. This will affect future generations' desire to meet their own needs and sustain nature. Laboya *et al.* (2012) consider the question of food uncertainty by highlighting variables like bad governance. Lack of transformation in farming practices poses a great risk to the agricultural sector, besides the threat of natural factors (Baye, 2017; Parmar, 2017).

Due to population growth in the rural setting, with most people believing in inheriting large family sizes, habitable landscapes continue to shrink and affect sources of livelihood (Shore, 2013; Hag *et al.*, 2010). This also affects the status of soils. Such a scenario calls upon reconciling family planning services and environmental programmes (Hoke *et al.*, 2015). Agroforestry on agrarian landscapes, therefore, becomes a practical approach for skills to develop sustainable rural livelihood systems (Mahmud *et al.*, 2014).

2.5 Household Decision-making for Enhancing Agroforestry-based Food Security

Although households have the potential to influence decision-making systems for positive results in reversing trends of poor yields and environmental degradation, their capacity is limited. If they were optimally empowered, they would even bring some transformation without waiting for government or external interventions which may not manifest timely (Kajombo *et al.*, 2014). Many households have been slow to embrace new initiatives innovatively and efficiently. This has been due to insufficient knowledge and awareness (Mbwambo *et al.*, 2013).

The objective from which the above theme is derived recognizes the significance of households and local authorities engaged in a continuous mutual dialogical process for trust building. This depends on the service expectations for promoting ecological well-being by tapping the potential of agroforestry (Durá *et al.*, 2013). Families need to be informed of the value of trees as is the case around Mount Elgon bordering Kenya. Around this mountain, the rural people have demonstrated the willingness to plant trees to add nutrients to the soil and check soil degradation (Bartlett, 2014).

Freire (2000) besides advocating for the 'pedagogy of the oppressed highlights the possibility of creating a new situation involving the people themselves who are experiencing the existing problems. He holds that the masses possess the potential to change certain situations that threaten their lives only when they are aware of the inner power to act. Household inequalities with women's restriction to access household resources easily affect food production levels. While agriculture remains central to a family's sustenance and poverty reduction, realizing its potential calls for a swift change in food productivity, innovativeness, and inclusive decision-making (Conceição, 2016; Meijer *et al.*, 2015).

Further, household governance, faced with an imbalance in the household decision-making process is a significant factor, which affects agroforestry-based food security. Women's voice and visibility in the landscape governance process are still lacking due to women's lower educational levels, cultural factors, and taboos (Colfer *et al.*, 2015). These factors incapacitate home-based farmers who tend to be slow in innovative ways of incorporating shrubs and grasses on the farmstead. This reality remains overlooked in the African agricultural and forest policy domain (Meijer *et al.*, 2015).

2.6 Households' Benefits from Agroforestry beyond Food Security

Agroforestry is a means to realize various benefits of which the most basic ones include food and environmental wealth (Mbow *et al.*, 2014). This theme focuses on how agroforestry practices can benefit households multi-functionally beyond the food need. This requires rebuilding a healthy interaction between households and nature. It also calls upon consensus on the need for agroforestry as a factor with a significant role in enhancing social and ecological values towards addressing the effects of climate change and soil degradation. This factor acts as a pathway from poverty (Waldron *et al.*, 2017).

According to Vira (2015), trees contribute to diverse foodstuff, nutritional security, and fodder for domesticated animals in several dimensions. Agroforestry by its nature transcends its direct role of providing dietary needs for bodily security. It generates income, genetic resources, microclimatic regulations, and pollination. It controls soil erosion and provides medicine. Worku and Bantihun (2017) also show the worth of the indigenous knowledge of varied tree species in a family's agrarian landscape and traditional agroforestry systems. Nevertheless, there remains very little of this knowledge in the record. Awareness of agroforestry benefits is thus important (Gao *et al.*, 2014). This is reflected in the readiness of the rural poor to embrace agroforestry projects as they show knowledge of tree species for food security, rain, and other benefits, with support from ACIAR interested in transforming lives and landscapes (Barlette, 2014).

Pinho *et al.* (2012) further show the significance of agroforestry or trees on the farm. Diverse trees improve soil fertility besides acting as a vital provider of multiple gains for many households. They provide a measure of foodstuff sustenance and play a basic part in natural resource management. Some scholars suggest practical means of utilizing small plots of land to grow

nutrient-dense food (Hewitt & Hewitt, 2015). This is one reason why the Green Belt in Kenya, established under the distinguished leadership of the late Wangari Maathai has enabled families to be mindful of the value of local crops beyond having trees relative to family size, gender equity through community education and advocacy (Hoke *et al.*, 2015). This requires the practice of indigenous knowledge to include trees in homesteads (Mahmud *et al.*, 2014).

Multipurpose paybacks of trees can be tapped by rural households but this requires the adoption of agroforestry technological innovation. The slow-encompassing of agroforestry innovative strategies by rural households keeps them in poverty and unimproved socio-economic conditions (Mbwambo *et al.*, 2013).

Care for the soils is a mandatory prerequisite to high agricultural yields thus agroforestry benefits households through natural cover preservation (Udawatta *et al.*, 2017). This makes agroforestry a more effective management strategy for improving soil health to which household governance systems as well as legislatures ought to give attention (Dollinger & Jose, 2018).

2.7 Theoretical Framework

This survey is supported by the adopted CARE Pathways Theory of Change (Brown *et al.*, 2016). This theory has been initially used to enable females at the domestic level to address dietary and nutritional issues. The main aim of using the theory of change is to come up with a substantial contribution in terms of suggesting pragmatic and implementable recommendations. The recommendations are for improving household food security through enhancing forestry programmes. With a further understanding of the task of each household member in contributing to food security, this theory also recognizes the necessity of empowering men and

children as well. Hence, it stresses the avoidance of exclusion of any household member to make transformational change in the area of meeting the most basic need possible.

This theory is justifiably used to explain the situation of poor households regarding food security and as an attempt to bring about equity, empowerment productivity, and profitability of all members (Lynn *et al.*, 2017). Contrary to this theoretical view, women have been recognized as primary players and providers of farm labor in the agrarian sector, but culturally men dominate in decision-making on land use and resource ownership on the farm (Phiri *et al.*, 2022). However, from this theory, it can be noted that becoming food-secure and being able to enjoy other benefits related to on-farm tree practice, requires that all household members have to be empowered in agroforestry initiatives as a vehicle aimed at sufficient food without the domination of an individual over another in terms of household governance.

The theory further highlights five change levers that are essential for households to transition to a situation with enough food through the adoption of agroforestry. The levers include capacity (knowledge, skills); assets, inputs; productivity; household influence, and enabling environment, characterized by positive attitudes, behaviors, social norms, and positive institutions (Lynn *et al.*, 2017).

The theory has been applied by CARE, Save the Children, and World Vision as an attempt to get rid of insufficient foodstuff even in extremely deprived households in developing countries such as Ghana, Mali, India, Bangladesh, and Ethiopia where related projects have been carried out (*ibid*, 2017).

Being applied to create a change by getting rid of inadequate foodstuff and poverty faced by the deprived, it supports transformative governance and agroforestry practice aimed at creating a positive change in setting households free from food insecurity and enabling them to benefit beyond their food need.

CARE Pathways Theory of Change can be backed by the African Philosophy of Ubuntu which considers positively the welfare of all members of the planet. As a sense of collective solidarity, it can be used to instill in households a spirit of just treatment towards others, household teamwork, and showing care for non-human beings such as tree species in the cosmos (Museka & Munashe, 2012). It manifests in activities/attitudes such as caring, love, and accountability. This has a connotation of wholesome, and all-embracing.

In line with the pathway theory, this thesis emphasizes the concept of inclusion whereby human beings have to connect with nature. This connection means avoidance to exclude the other (humans and biodiversity). Individual and joint efforts in taking care of the surroundings, the self, and those entities that are not part of us in terms of being human sustain the spirit of the connectedness of human life and nature (Kleespies *et al.*, 2021).

Other competing theories relate to CARE Pathways Theory of Change in attempting to demonstrate gaps associated with ecological and food production as well as what is required for rural households to attain food security. Post-development Theory shows its dissatisfaction with the growth model whereby the matter of deprivation, starvation, and food security is incorrectly de-politicized by development practitioners. In a post-development context, theorists emphasize that food welfare and factors affecting agricultural practices: acreage portion, and farming practices should be dealt with within the civil domain on the principle of justice. Thus post-

development philosophers propose equitable distribution of land, local interventions, engaging indigenous people, and integrating indigenous knowledge within the farming domain. Further, their view is against local resource control by those in power. This fact has been verified in Swaziland (Karplus, 2014). However, the Post-development Theory fails to give more concrete alternatives to development that can enhance food security.

Various theories attempt to relate to various variables (factors) embedded and employed in this study: gender, age, marital status, family size, occupation, monthly income, size of the land, and acreage useful towards the realization of household adequate food.

The study adopted and modified the Theory of Change analysis (ToC) analytical framework (Fig. 2.3) as a supplementary explanation of the kind of transformation needed and how it can take place. The main reason why this theory was customized was to integrate new understanding, and insights, and to make it more user-friendly and implementable. This framework analyses the outcomes of the impact of household governance on agroforestry as a driver of household food security. It considers community-based governance intervention that would guarantee enough food to homes (Obodai *et al.*, 2017).

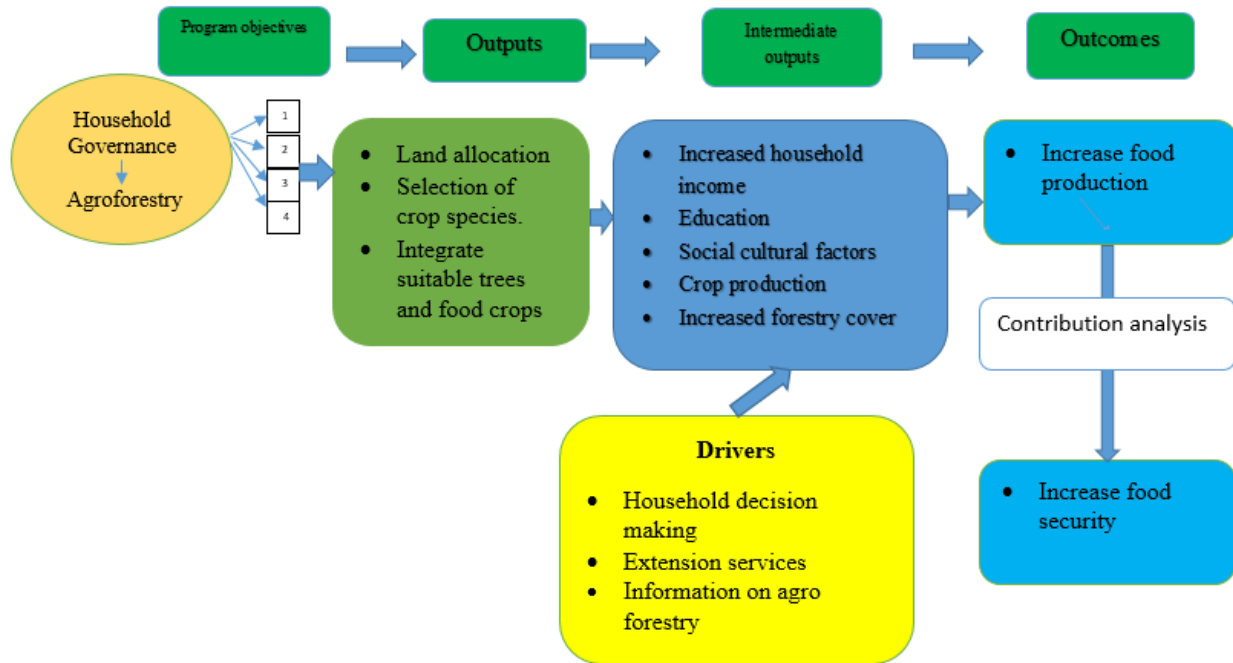


Figure 2.3: Theory of Change Analysis (ToC) Analytical Framework

Source: Adopted from Obodai *et al.*, 2017

The figure above illustrates that governance and agroforestry are significant factors in improving food crop production and food security through forest conservation in the household. This study adopts the ‘theory of change’ model from a previous study in Asante Akim South District, Ghana. This theory demonstrates the connections between activities, outcomes, policy settings, and their alignment with various sources under integrated farming. The study highlights the crucial role of governance in facilitating the availability of household food crops. For example, through the Expanded Forest Plantation Programmes (EFPP), 2763.1426 metric tons of food crops were produced from 444.4046 hectares of land in the Asante Akim South District, Ghana between 2011 and 2013 (Obodai *et al.*, 2017). The theory helps to understand that many causal factors and outputs are essential for promoting positive change in domestic food production.

Governance acts as a prime catalyst, influencing outcomes to enhance household crop production. Other factors such as household income, education, and socio-cultural elements play vital moderating roles in ensuring increased food production. Key factors for change include policy review, capital investment in tree adoption on farms, and education, along with accountable and responsible leadership. Consequently, effective decision-making, extension service delivery, and information availability result in the achievement of food security.

Drawing from the above-adopted theory, one can therefore contend, that via a Theory of Change (ToC) methodology, certain factors can be further incorporated in agrarian progress and in policy development for a change in food production. These factors can be effective communication, participant engagement, and linking science-based knowledge with pragmatic and policy. Noteworthy, the literature shows the significance of shifting to new policies unhurriedly, well-tracked through a bottom-up approach, and yielding outcomes. In the same vein, flexibility for management, budgeting and project plans are noteworthy aspects for stimulating transformation to the anticipated result and social impact (Rajala *et al.*, 2021). All these essentials coupled with good governance are key drivers of agricultural transformation that can uplift households to a level of food security and a stable natural environment.

2.8 Conceptual Framework

This conceptual framework (Fig. 2.4) offers promising aspects that affect food production as well as forest conservation. The creation of the conceptual framework espoused a broad review of concepts related to governance and agroforestry based on available studies on food security. Governance in this sense takes a central position in the entire process of change as a prime influencer of all the factors required for food production. This process embraces various types of

capital resources (ecological, human, time, social) that have to dynamically interact and shape each other in a non-linear mode entrenched in multifaceted systems of humans and the environment.

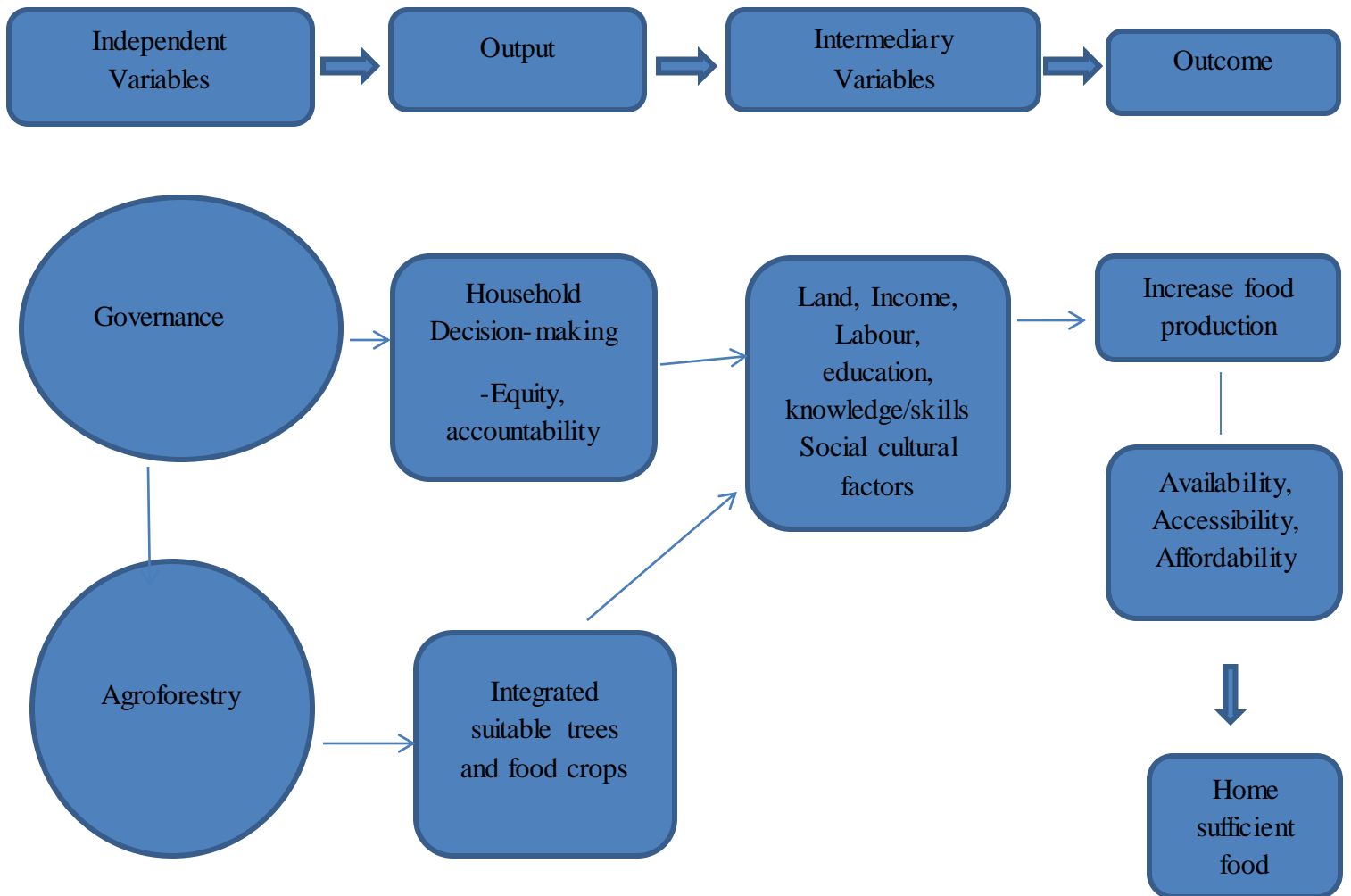


Figure 2.4: Conceptual Framework: Governance: Its Impact on Agroforestry as a Driver of Food Security in Isingiro District

Source: Author

This conceptual framework has been designed based on the cause-effect-outcome process. It considers the intervention role of independent variables, dependent and mediatory variables in the process of household food transition. According to Figure 2.4, households' inputs are spent on agroforestry initiatives. Governance as an engine will enrich food status and bring about more

benefits beyond food security such as income, climate change mitigation, fresh air, and value addition. Enough foodstuffs and their availability remain contingent upon agroforestry, household decision-making and agroforestry itself thrives on household inputs. Central to the expected change in social cultural factors namely attitudes, perceptions, beliefs, values, social norms, traditions, status, and behaviors, is governance. These factors influence how families manage resources and make decisions. Governance in this sense is viewed as an engine for enhancing fruit trees for adequate foodstuffs and enjoyment of other related benefits.

A review of the existing literature shows the role of governance in ensuring food-system transitions (Huttunen *et al.*, 2022). It also shows how effective governance is essential to transform food systems and achieve the United Nations (UN) Sustainable Development Goals 2030 (Kraak & Niewolny, 2024). This means that since households are living in a dynamic world that is probably metamorphosing rapidly, the anticipation of changes in societal welfare and how those changes are to be managed either by mitigation or adaptation to influence resilience is expected. Consequently, people are challenged with a choice of either remaining onlookers or endeavoring to manage alterations whereby the results have a greater likelihood of sustaining human and world well-being.

However, desired governance requires appropriate and well-crafted human agents, who are pro-ecological and agricultural sustainability. These agents should be dissociated from any process of change that abuses the environment and induces escalating degeneration in household food production. It is not any household or certain communities that may know how to go about food security and how to use the environment sustainably as a means to attain the ultimate end of agricultural engagement. Nevertheless, the study foresees a golden opportunity to invest

purposely in the formation of transformative leadership for inspiring households to become flexible in behavior and attitude toward resource use in food production.

The framework goes ahead to show that household decision-making with support from other levels of governance influences and determines how the available capital like land, income as well as labor are utilized. These resources also influence households to integrate trees with food crops. This influence results in improved food production, availability, accessibility, affordability, and utilization of food thus enabling households to achieve food security. This necessitates gender equity, accountability, inclusiveness, transparency, and participation of households under effective and pro-household leadership.

2.8 Study Gaps

Literature reveals the existence and persistence of household food insecurity (Ntwenya *et al.*, 2015). However, it does not suggest a unique and promising comprehensive sustainable measure to food insecurity, and a lasting solution; and there is no adequate explanation of why stakeholders in food production systems have not utilized their ingenuity to find a permanent solution to food shortage.

Literature provides enough evidence about governance issues and how they affect agricultural practices and benefits (Colfer *et al.*, 2015; Meijer *et al.*, 2015). However, there is a lack of a comprehensive study at the domestic level anchored on empirical analysis (Joshi and Joshi, 2017); and the limitation of policies, practices,, and discrepancies between various governance layers.

The study among other strategies focuses on agroforestry as a viable means of household food security and other diverse benefits (Vira, 2015). However, the significance of agroforestry and several dynamics involved in its implementation are not largely internalized.

While the importance of agroforestry has been recognised as a viable pathway to food security, the literature demonstrates that there has been a slow adoption of innovative approaches by rural families (Mbwambo *et al.*, 2013). However, household perceptions and attitudes have continued to limit the rate of agroforestry practices, which indicates that holistic investigation of these issues is still a major subject for further consideration.

CHAPTER THREE

GENERAL MATERIALS AND STUDY METHODS

3.1 Research Design

The inquiry utilized a cross-sectional survey. This survey necessitated the application of a qualitative and quantitative approach to data collection as well as analysis because this survey makes it possible to gather data on a particular period (Hipel *et al.*, 2015). The inquiry further used a mixed methods approach because it integrates components of quantifiable and qualitative methods, and the application of this direction of inquiry is premised on the supposition that such an integrated approach offers a supplementary whole understanding of a problem under investigation. A research design does not fall into the study like a drop of rain falling on the ground but is instead shaped by a certain philosophy.

Henceforth, the choice of using a combination of qualitative and quantitative approaches was molded by the pragmatic philosophical worldview, which is sequential, concurrent and transformative, problem-centered, and real-world practice-oriented; and it is also commonly used in areas of evaluation and programme intervention (Creswell, 2014; 2009). Pragmatist researchers in this sense believe that research happens in social, historical, and political among other contexts, and may consider the use of a theoretical mirror reflective of social justice and political ambitions (Creswell, 2014). Further, this is a philosophical or epistemological view that concerns itself with the study question and uses varied methods to get information concerning the problem. Hafsa, N (2019), Cherryhoymess (1992), Morgan (2007), and Maarouf (2019) viewed pragmatism as the philosophical basis for mixed research methods. This philosophical foundation believes in what works/the results. It does not concern itself with any particular

epistemology/ontology and encourages researchers to opt for mixed methods to go qualitatively and quantitatively to achieve their objectives.

The application of an integrated qualitative and quantitative approach was complemented by another worldview known as the Transformative Worldview which concerns itself with the needs of seemingly sidelined or excluded persons and groups (Creswell, 2014). This same worldview was preferred as an additional form of inquiry because of being political and power, fairness-oriented, cooperative and change-oriented. The study involves issues such as gender inequality, poor governance, control over household resources like land, and earnings from the sale of farm products, hence the significance of using this philosophical worldview to give full meaning and relevance to the research.

A reconnaissance survey aimed at familiarization through the research zone, prior testing of tools, and choosing study areas as well as parishes was conducted. The use of reconnaissance opened the way for acclimatization with the study area, the population under the study, and research dynamics that would have been unfamiliar during the actual data collection period. It also aimed at information gathering on food status, agroforestry aspects, data collection procedure, questionnaire validity and reliability, accessibility and sampling frame, an overview of households on food status and agroforestry pre-field study (Faircloth, 2017). The sampling units of analysis (households) whose selection was aided by a reconnaissance survey were randomly interviewed. Households were targeted because they are domains that provide space in which decisions concerning the essence and relevance of the study would occur.

3.2 Research Area

The survey was conducted in the Isingiro District of southwestern Uganda (Fig. 3.1), in the three parishes of Kabaare in Mashes Sub-county, Kikokwa, Birere Parish, and Kigyendwa, Nyamuyanja Sub-county. Isingiro District is about 2,610 sq. Km. The choice of this area depended on its people who are highly engaged in agriculture, its lengthy and historical account of low precipitation, and irregular rainfall patterns (Rietveld *et al.*, 2021). The district is located within southwestern Uganda, nearly two hundred seventy-nine km, and forty-seven after Kampala City, and Mbarara City. It shares the border alongside the United Republic of Tanzania, districts of Rakai, Ntugamo, Mbarara, and Kiruhura. The area has equatorial weather, precipitation (1200 mm) on average, 17 to 30 degrees centigrade, and two major rainy seasons. Soils include clay, laterite loam, and sandy. It bears an ecological system prone to chronic drought. The physical features are bare hills, rangelands, thorny bushes, trees, savanna grassland, scattered swamps, and valleys. It has sharp gradients, deep valleys, moderate slope hills, and low terrestrial levels (District Planning Unit, 2015).

The district has a population size of 486,360 composed of 236,619 males and 249,741 females, with 430,982 rural households (Uganda Bureaus of Statistics, 2016). The countrywide report shows a high growth rate of 3.0% per annum, and 5.4 children per woman in Uganda (National Population Council, 2021). Isingiro District LGDP II report indicates that women in the district had 6.7 children on average, the majority being the youth (approx. 30%). Population densities are affected by landholding systems, relocation, and land texture. Refugees' influx influences household population, agricultural production patterns, and physical endowments (District Planning Unit, 2015).

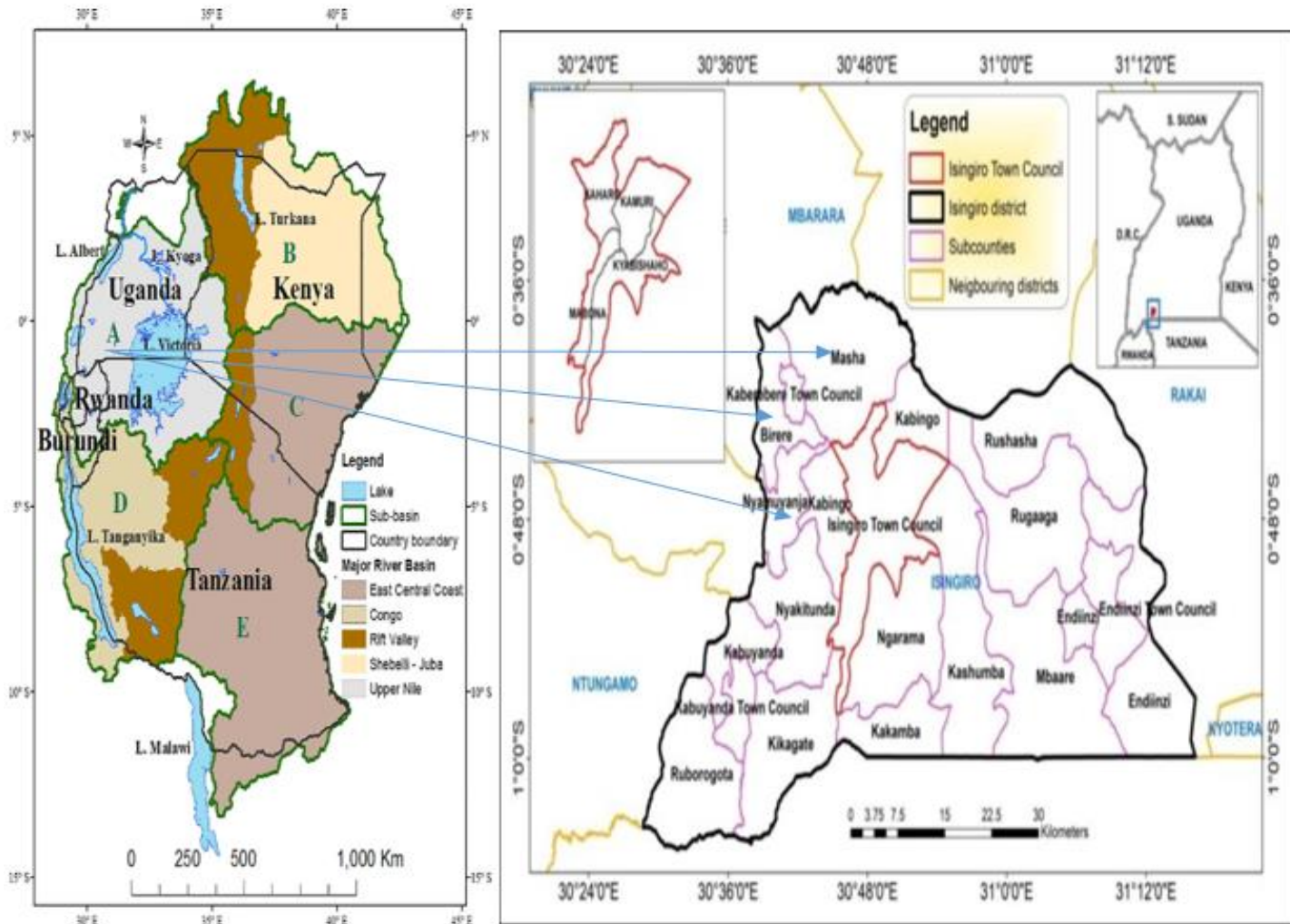


Figure 3.1: Location of the Study Area, Isingiro District

Source: (Bwengye et al., 2022; Nanteza, et al., 2016).

3.3 Target Population

The study aimed at family heads or their wives, single parents, the widowed, and the separated possessing historical experience of the study area. Data was collected in 3 parishes of Kabaare, Kikokwa, and Kigyendwa because of their proximity, geographical features, and history of food insecurity, targeting 400 respondents out of the district population of 486,360 (Uganda Bureaus of Statistics, 2016) as indicated in table 3.1 below. Out of this targeted population, the actual

frequency of respondents interviewed across parishes stood at 284. The targeted number of 400 participants. The distribution criterion followed the size, location, and geographical proximity of the study sites. The result was the fruitful achievement of a total return rate of 71%.

Table 3. 1: Category of Respondents per Parish

No. of targeted respondents	Category of primary respondents	Kabaare	Kikokwa	Kigyendwa
400 respondents in 3 parishes, and 5 villages per parish	Households heads/wives, windowed, single parents & the separated	150(37.5%)	130(32.5%)	120(30%)
Total:				400

3.4 Sampling Design

The sample unit of analysis was the household head. The study used purposive sampling for the parishes where the study was conducted. The use of this sampling was on the basis that the technique is judgmental, cost-effective, and time-effective, based on knowledge of the research problem upon agroforestry for informed key informants. Systematic sampling being an unbiased representation as put by (Creswell, 2003) was used for selecting village households from which households who practice agroforestry against non-practitioners were identified as a basis for determining which ones are food secure or insecure. This technique helps select a non-biased sample from the target population. Its use is justifiable because of its advantage of ensuring that participants get an equal chance and opportunity to contribute to the study.

In each of the five villages in the three parishes of the study, 26 households were systematically selected by dividing a village into four parts and later by skipping one household starting with

the first one from the center. The desired sample size was determined using Yamane 1967:886 (Kosgei & Loice, 2015) thus,

$n = \frac{N}{1 + N(e)^2}$ where n signifies sample size, marginal error (0.10, 0.05 or 0.01, and N the population under study/the study population. Therefore, n

3.5 Research Instruments

The study employed primary sources which included an in-depth semi-structured questionnaire, key informant questionnaire, and focus group discussions to gather data.

3.5.1 Primary Data Collection Instruments

The study also used an in-depth semi-structured questionnaire whose question design was mainly open-ended. This type of questionnaire was administered in a face-to-face interview as it saves time and allows clarification and detailed information to be captured. The justification for using an in-depth semi-structured questionnaire is that it helps capture original data and feedback directly and promptly from the interviewee. This type of questionnaire also saves time.

3.5.2 Focus Group Discussions

The survey used focus group discussions (FGDs) to capture details on variables, participants, crops, trees, and pastures. Focus Group Discussions (FGDs) were employed to capture data on the socio-demographic characteristics of participants and agroforestry systems on the farm. One FGD was conducted by selecting one participant to represent each village. The study selected practitioners who were experienced, and knowledgeable in practicing agroforestry from the household level. The selection was done purposively during household interviews. This

method is preferred based on its role in capturing data from purposely chosen groups of participants. It saves time, gives detailed information, and provides room for a researcher to seek clarification from the participants.

3.5.3 Key Informants

The study used key informants (KIIs) selected in each village. This category of informants constituted informed villagers,/farmers, Local Council 1, and 11 chiefs based on their knowledge, expertise, level of understanding, and ability to address technical questions about the study subject on transformative governance relative to food security and agroforestry. The study developed interest in the use of this technique because it is a one-to-one discussion and generates detailed information, with clarification of unclear areas.

3.5.4 Secondary Sources

The study employed ancillary resources that had relevant information about the topic under the study. These sources included peer-reviewed articles, books, part of media, reports, and published conference papers. The study further utilized internet to extract more information using the available recommended search engines.

3.5.5 Questionnaire Survey

The questionnaire was self-administered to the participants in a face-to-face interview using a variety of data collection methods that constituted multiple questions.

3.5.6 Randomization Approach

The study used randomization approach to arrive at a sample from the bigger population. The study arrived at the sampled population in each parish basing on particular characteristics such as being geographically distant from each other to avoid bias in the data collected. This process of selecting respondents by chance is preferred because it is a simple best way of getting rid of or putting unnecessary variables under control.

3.6 Data Analysis

The analysis employed Statistical Package for the Social Sciences (SPSS) in organizing and polishing captured particulars to get the necessary information. Data analysis was acted upon descriptively and by the usage of frequencies, percentages, and inferential statistics like Chi-square, graphs and charts. The study used frequency distribution to determine the sum, frequency of each value, and percentage. Data were treated in several different ways such as organizing it into rows and columns in a table format and looking for correlations. The study process considered data cleaning for error deterrence and correction.

As part of the study methodology, the study employed multiple linear regression analysis. It aimed to scrutinize the association between numerous independent variables and a singular dependent variable. The principal objective of this analysis was to explain the influence of the independent variables on the dependent variable while controlling for other variables in the model.

SPSS Statistical software to conduct the regression analysis. The use of SPSS enabled the accomplishment of various statistical methods, including data cleaning, manipulation, and regression analysis. The target was to derive meaningful insights from the gathered data.

The study also used the Multiple Linear Regression Model to predict the value of a dependent variable grounded on multiple independent variables. The model's use was also to comprehend the association and effect of every independent variable on the dependent variable. Before regression analysis was conducted, thorough data preparation methods were undertaken. These methods involved initial data screening to establish the appropriateness of the data set for analysis. Data screening involved checking for absent values, and normality assumptions, among other thoughts, to guarantee the truthfulness and validity of the data. The procedure also included confirming that regression assumptions were recognized, fitting the model with statistical software, and then assessing, interpreting, and reporting the results, focusing on the importance and influence of the independent variables.

The regression coefficients produced from the analysis offered insights into the strengths and course of the associations between the independent variables and the dependent variable. The regression models' general fit and predictive capability were assessed through numerous statistical indices, such as R-squared and Adjusted R-squared, to evaluate the model's explanatory power and generalizability.

3.7 Data Validity and Reliability

The study used multiple data methods to validate its findings by comparing qualitative insights with quantitative outcomes to confirm the consistency of findings. Further, the study combined qualitative and quantitative data during analysis to achieve a comprehensive understanding of the research questions. Triangulation followed using qualitative data to explain qualitative findings and vice versa. Regarding reliability, the study used consistent and standardized data collection techniques to ensure that both qualitative and quantitative data were collected systematically and

reliably. Data entry checks to reduce errors and ensure data currency and the use of transparent documentation were carried out.

3.8 Study Limitations

The study encountered limitations which included delays due to financial constraints and covering a wider area. However, the study overcame these shortcomings by developing a workable budget and working within the available financial means. The researcher aimed to be time-conscious for every single activity involved. Despite these limitations, the study had to continue because of its paramount significance, value, potential, and purpose of enabling rural households to transform into food-secure entities.

3.9 Ethical Considerations

The commencement of the inquiry followed ethical requirements. The research proposal was approved as per guidelines stipulated by the Graduate School of the University of Nairobi. The proposal was later sanctioned through the Research Ethics Committee of Mbarara University of Science and Technology, and finally by the National Council of Science and Technology. Further, the principal investigator obtained an acceptance letter from the Authority of Isingiro District allowing the research to start in the specified areas. The area local council leaders LC I and IIs who showed interest in the study were further used as an entry point. The principal aim of the study was clarified to household respondents who eventually signed an informed consent form before they engaged in the study based on assurance that their rights were going to be protected during the data collection period.

3.10 Study Output

This study resulted in the PhD thesis, peer-reviewed articles, the attraction of several views from readers of published articles, invitations to publish in certain journals and to make presentations at international conferences.

CHAPTER FOUR

DETERMINING HOUSEHOLD AND FARM LEVEL GOVERNANCE FACTORS AFFECTING THE TRANSITION TO HOUSEHOLD FOOD SECURITY IN ISINGIRO DISTRICT, SOUTH-WESTERN UGANDA

Abstract

Governance, in particular, decision-making plays a significant role in influencing the transition to households' food security. It helps in addressing causative factors responsible for undermining household sustainable food security. This study aimed to determine family and farm-level governance factors affecting the transition to household food security. Respondents who participated in the study were 284. The study employed a cross-sectional survey design to obtain qualitative and quantitative data on household food security. Household interviews, focus group discussions, key informants' interviews, and observations were employed to collect data. Qualitative data were analysed by categorizing them into themes to extract respondents' experiences and opinions. Quantitative data were coded, entered, cleaned, and summarized using descriptive statistics, frequencies, and chi-square. The study used the Multiple Linear Regression Model to establish the extent to which selected variables were responsible for the transition to household food security. Results on maize production showed that the association of occupation of coefficient (0.006) and income (-0.54) had a significant and positive value $P=0.000$ ($P<0.05$) and was related to food security, while the association between family size (0.006) and land size (0.055), marital status (0.092), and land acreage (-0.108) had no significant relationship. Concerning beans, results indicated that the relationship between occupation (coefficient -0.059) and income (0.059) had a significant value of $P= 0.000$, whereas the association between family

size (0.096) and land size (0.055, marital status (0.092) and land acreage (-0.108) had no significant association. In the case of bananas, the association of occupation (0.038) and income (0.142) had a significant value of $P=0.000$, while the relationship between family size (0.010) and land size (-0.026), marital status (0.014), and land acreage (0.184) had no significant relationship. The study recommends that heads of families embrace joint-making processes for improved farming practices. There is a need for land policy review by the government. It is also important to sensitize households on the possibility of utilizing their land innovatively.

The study also proposes that the government and related stakeholders invest in household capacity building for inclusive gender participation in decision-making regarding food security; establish resilient household food production, and increase support for strengthening it further.

Keywords: household, governance, transition, food security, participatory, sustainable, policy, livelihood

4.1 Introduction

Uganda is one of the countries implementing Goal 2 of the Sustainable Development Goals (SDGs) (Barbier *et al.*, 2021). Eighty percent of agricultural households participate in farming for their consumption, making agriculture the backbone of a large percentage of the populace (Uganda Bureau of Statistics, 2020).

However, food security remains persistent due to degradation and climatic conditions that affect soil quality (Call & Gray, 2020). The Uganda Fertilizer Policy indicates that the loss of soil nutrients is one of the uppermost challenges in the African continent, adding to the disparities in

land resource distribution, with 66.2% of the households relying on utilizing less than one hectare of agricultural land (Uganda Bureau of Statistics, 2020).

Further, the COVID-19 lockdown has affected Uganda's household food security, causing low farm income, low consumption (44.4%), fewer food varieties (34.3%), and missing meals (37.6%) (Agamile, 2022).

The rapidly growing population also contributes to food insecurity in the country. Around 2021, the population was estimated at 42.8 million, having grown from 5 million in 1948 (Uganda Bureau of Statistics, 2021), with 33% of the population (44 million) being poor (Mottaleb *et al.*, 2021).

Despite the government plans and the initiation of the National Development Plan III 2020/2021-2024-2025 for enhancing agricultural productivity, food insecurity remains unresolved (National Planning Authority, 2020). The earlier study by Mulinde *et al.* (2021) in Central and Eastern Uganda indicates that prolonged drought, unreliable rainfall, land scarcity, the decline in soil fertility, poor land use management, and crop loss have kept many households food insecure. Nevertheless, this situation has driven household farmers to adapt to the use of inorganic fertilizers and seek extension services on how to improve food production.

In Isingiro District, household food insecurity is a critical problem which resembles earlier results (Rietveld *et al.*, 2021). This study shows that the district has been experiencing an increased incidence of drought, crop failure, and less precipitation in the last decade: and this situation has been attributed to deforestation in the district.

This paper aimed to determine household and farm-level governance factors affecting the transition to household food security. The chapter generates essential information for the government and other stakeholders on the need to review agricultural policy and render support for strengthening household food production. The study rejects the hypothesis, that “there is a significant relationship between household and farm-level governance factors that affect the transition to household food security in the study sites.”

4.2 Materials and Methods

The study was conducted in the Isingiro district covering five villages in three civil parishes. The rationale for selecting this area was the highly agricultural nature of its population, long history of drought, and irregular rainfall patterns (Rietveld *et al.*, 2021). The district is in South-western Uganda, about 279 and 47 Kilometres from Kampala and Mbarara Cities. Isingiro district has a population of 486360, an annual rainfall of 1200 mm, loam, sand, and clay soils, with bananas, maize, and beans being predominantly grown (Taremwa *et al.*, 2017). The study used qualitative and quantitative approaches to get a clear picture of the study problem. The study targeted households (26) per village, selected using a systematic sampling technique. The sources from which data were obtained included primary and secondary sources. The study administered a semi-structured questionnaire to the primary respondents in a face-to-face interview. Fifteen key informants (KIIs): farmers and local leaders were selected purposively. The KIIs were selected based on their experience in household farming and knowledge of the study problem. The Focus group discussions (FGDs) constituting 15 participants were engaged using a structured questionnaire. The sample size of 400 respondents was determined using a formula by Yamane 1967

$n = \frac{N}{1 + N(e)^2}$ where n signifies sample size, e original error at 10% (0.05), and N the total population under study (1967). Therefore, $n = \frac{486360}{1 + 486360(0.05)^2} = 400$

The study used open-ended, closed-ended questions to collect qualitative data analyzed by grouping them into themes which included causes of food insecurity, crop quantity, and means of overcoming food insecurity. Quantitative data were coded, entered, cleaned, and summarized using descriptive statistics, frequencies, and chi-square. The study employed a checklist to confirm the steps followed. The study also used Multiple Linear Regression Mode statistics to analyze the association between a dependent variable and numerous independent variables. The purpose was also to envisage the value of a dependent variable using multiple independent variables. The dependent variables were maize, beans, and bananas and the independent variables included land size, land acreage, marital status, occupation, family size, and income.

4.3 Results and Discussion

Social-demographic characteristics

A summary of the social-demographic characteristics of primary respondents is in Table 4.1.

Table 4.1: Social Demographic Characteristics of Respondents

Name of Parish	Gender (%)		Age (%)	Marital Status (%)	Literacy Level	Family Size (%)	Main Occupation (%)	Land size (%)	Land Acreage (%)	Monthly Income (US \$)
	Male	Female								
			Less than 20	Married (%)	Non-formal Education (%)	0-5	Crop growers	< 1 acre	less an acre	Us \$ 28
Kabaare	7	27	67	36	71	33	31	42	41	34
Kikokwa	13	20	33	30	24	34	34	24	29	36
Kigyendwa	10	23		34	5	33	35	34	30	30
			20-29	Separated	Primary	6-10	Pastoralists	1 acre	1 acre	30.5-55.5
Kabaare			30	18	29	35	100	31	31	32 29 39
			30-39	Widowed	Secondary	11-15	Cropping & cattle keeping	2 acres	> 1 acre	58-83
Kabaare			36	35	41	37.5	61	22	29	50
Kikokwa			35	28	38	37.5	39	39	41	17
Kigyendwa			29	37	21	25		39	30	33
			40-49	Single	University	16-20	Civil servants	> 2 acres	2 acres	86-111
Kabaare			29	25	46	33.3	50	36		33.3
Kikokwa			27	50	8	33.3	17	42		33.3
Kigyendwa			44	25	46	33.3	33	22		33.3
			50-59		Others		Self-employed			114 & above
Kabaare			48		24		31			21
Kikokwa			26		36		8			21
Kigyendwa			26		40		61			58
			60-69				Non-occupation holders			
Kabaare			40				100			
Kikokwa			25							
Kigyendwa			35							
			70+							
Kabaare										
Kikokwa			57							
Kigyendwa			43							

Source: Field Data

The demographic characteristics of FGD and KII participants are in Table 4.2.

Table 4.2: Demographic Characteristics of FGD and KII Participants

Variable	FGD Participants		KII Participants	
	Frequency	Percentage	Frequency	Percentage
Gender				
Females	10	67	6	40
Males	5	33	9	60
Age				
20-39	1	7	1	7
40-59	9	60	5	33
60-70	5	33	9	60
Marital Status				
Married	11	73	13	86.6
Widowed	2	13	1	6.6
Separated	1	7	0	0
Single	1	7	1	6.6
Education				
Non-formal	0		0	0
Primary level	8	53	3	20
Secondary level	4	27	8	53
University /tertiary	3	20	4	27
Main Occupation				
Famer	10	67	12	80
Civil servant	5	33	3	20

Source: Field Data

The study indicated that male-headed families were more advantaged than female-headed ones regarding food production. In all the parishes, the study revealed that 65% of the married male-headed households as food secure compared to 35% of married female-headed households (Fig. 4.1). FGD (100%) and KIIs (80%) confirmed this finding in all the parishes. A participant in the FGD stated, ‘‘our household is large and food insecure because it lacks a male head.’’ One key informant also asserted, ‘‘*In our village, the majority of the female-headed households are food insecure.*’ (Female KII, KiIGR, 20 October 2019).

The higher percentage of food-secure male-headed households means that marriage is a significant factor in food production. This finding matches previous studies in Teleyayen Sub-watershed, Ethiopia, where male-headed households (22.09%) than female-headed ones (16.09%) were food secure (Agidew & Singh, 2018). The male-headed households tend to be more stable, use relatively large land acreage, with more access to resources than female-headed households. This finding reflects the previous results in South Africa (Tibesigwa & Visser, 2016) where more male-headed households than female-headed ones were food secure. The implication is that male-headed households have a comparative advantage and more chances of accessing enough food than female-headed ones.

One of the fundamental factors that make male-headed households take advantage of non-male-headed ones is the fact that men in rural areas have access to job opportunities, and easily access information that can help them improve their food status. Much as the male may not involve his household members in decision-making, his contribution can still add some value to food production depending on personality and attitude.

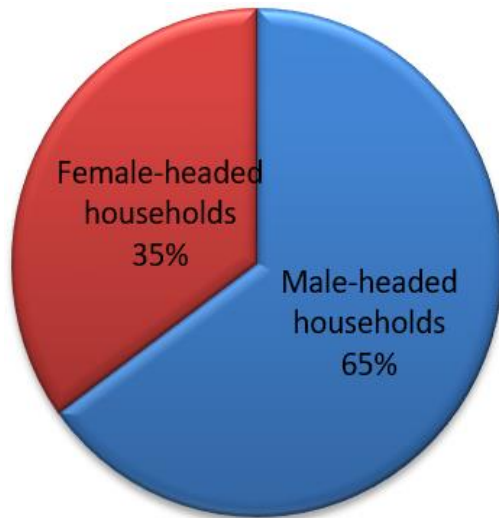


Figure 4.1: Proportion of Food Secure Households segregated by the Nature of Household Headship

More married people were food secure compared to other marital status categories through Chi-Square tests (Fig. 4.2). This finding matches a previous survey on features of families in the United States. The survey found single mothers and divorced people more susceptible to food insecurity (Men, 2017). This finding implies that married couples aim at more food production and fulfillment of the primary needs of their families.

In households where exposure to dialogue, joint decision-making, and planning materialize, there is a greater possibility of attaining food security. Households that do not solely depend on their heads' decisions open space for benefiting from governance and its qualities like inclusiveness, transparency, and participation to improve food production. This thought suggests that married persons who combine their ideas and inputs, generate openings for improved food efficiency in their families. Additionally, such families are more predisposed to embrace crop diversification, including mixing fruit farming as an additional source of sustenance.

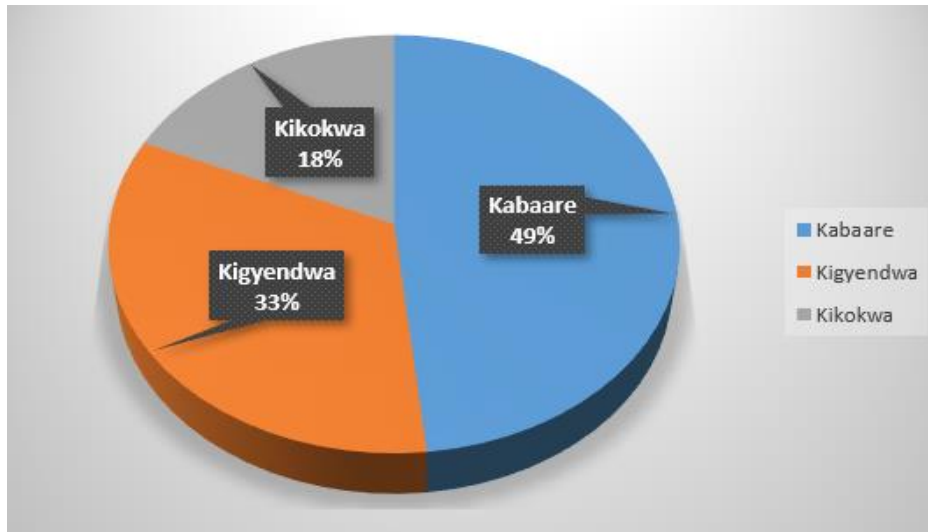


Figure 4.2: Food Status of each Category of Marital Status

Most households (5-6 members) had inadequate assets (Fig. 4.3). This finding on family size means that large households owning insufficient resources are food insecure. These results match previous findings in the Western Highlands of Guatemala, showing that for more than half of the homes (52%), food production did not meet domestic needs and needed other avenues of food (Lopez-Ridaura *et al.*, 2019). Resource-restrained families are often food insecure and affect other household essentials due to high consumption rates. The earlier study results by Ogunniyi *et al.* (2021) in Nigeria support this view, where families with ≥ 5 members had a 6.4% food insecurity incidence. By implication, larger families may continue to face hunger unless policy intervention for addressing the problem exists.

Further, large households may affect the land size used for crop production through land inheritance. It means dividing the land into small landholdings. However, this makes it hard to produce reasonable food for the family members, whose consumption may be high. Due to the lack of awareness, skills, and fear of crop competition, such families may resist the integration of

crops with fruit trees. Such a scenario indicates weak governance where the local government does not deliver required extension services to the families.

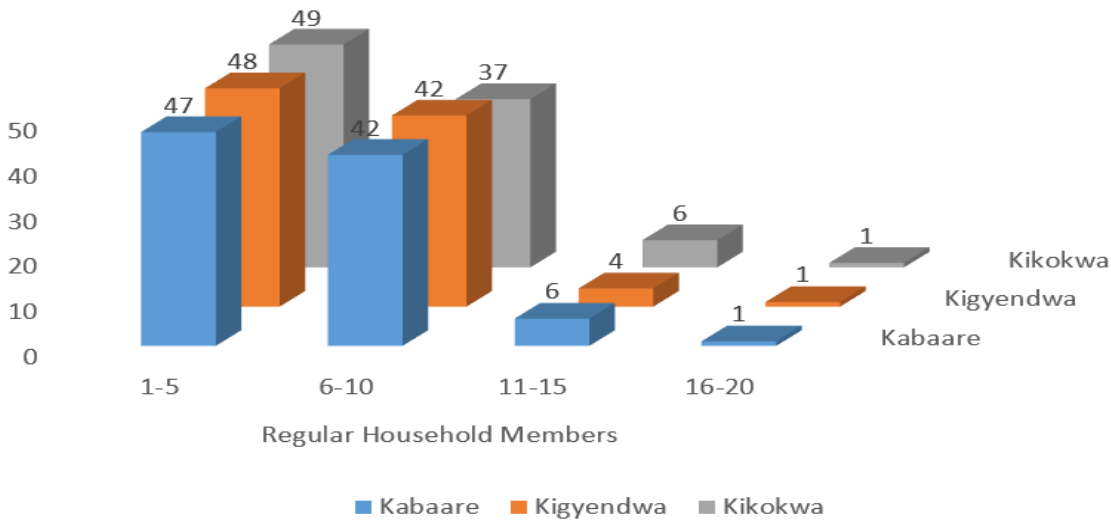


Figure 4.3: Family Size per Parish

4.3.1 Household Decision-making on Food Security

Household decision-making and the means for attaining food security (Fig. 4.4) are essential. Although there were variations in decision-making across the parishes, more household heads in Kabaare (43%) involved their members in decision-making than in Kikokwa (39%) and far less in Kigyendwa (18%). A previous study in rural Tanzania indicated differences in household decision-making authority on farms between husbands and wives (Silvestri *et al.*, 2015). Whereas household members desire to reach a consensus, men tend to exclude family members due to patriarchal and cultural norms. Pulling resources together becomes difficult, hence causing food insufficiency.

Men’s dominance in decision-making traditionally follows the patterns of the African family setting, which grants men more governance to control family affairs (Akinola, 2018). In this sense,

women's ideas remain untapped to enrich food production. The implication is that one person's decision-making is limited to generating adequate food for the household.

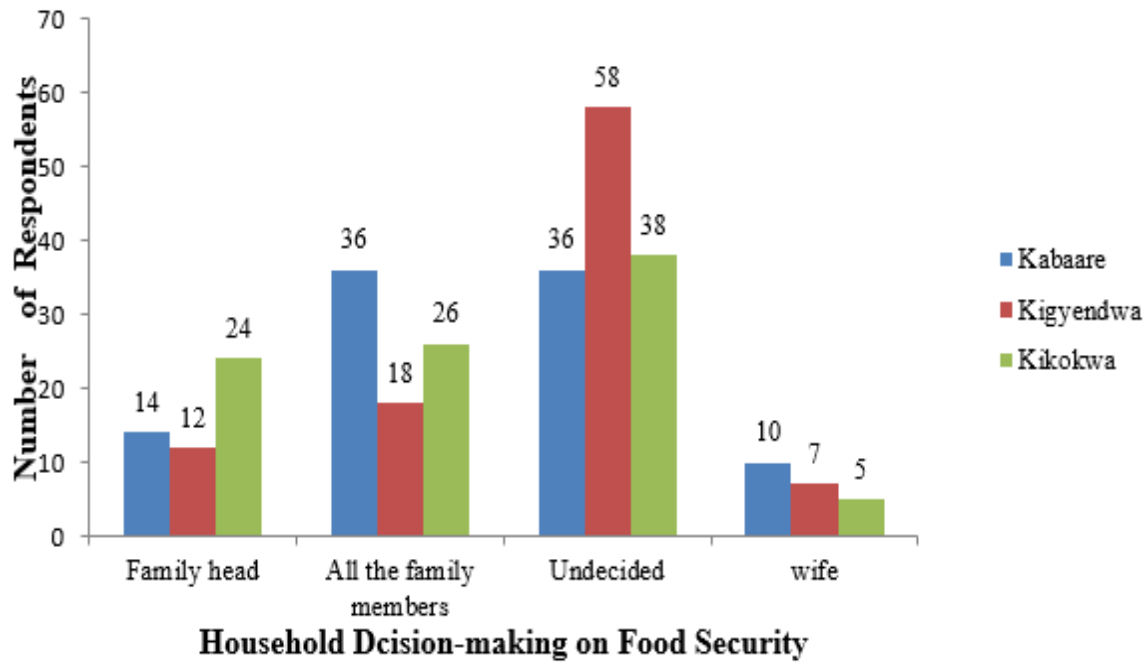


Figure 4.4: Household Participation in Decision-making per Parish

4.3.2 Relationship between Household-farm Factors and their Influence on Food Security

The Chi-Square analysis (Table 4.3) was employed to test the association between the variables: family size, land size, occupation, income, land acreage used for food production, and marital status.

Table 4.3: Association of Variables

	Pearson Chi-Square Tests		
	Value	Df	Asymp. Sig. (2-sided)
Family size and land size	10.825 ^a	9	0.288
Family size and land acreage	4.932 ^a	6	0.553
Marital status and land acreage	8.860 ^a	6	0.182
Main occupation and monthly income	67.458 ^a	20	0.000

The family size had an insignificant association with land size (statistical value of 10.825a at $p=0.288>0.05$). This finding matches earlier findings (Herrera *et al.*, 2021) in northern Madagascar, underlining the potential of larger households with lesser land resources to curtail food uncertainty through labor provision. While bigger household sizes often relate to limited land sizes, this mixture can still provide a calculated advantage. Households of this kind may take advantage of joint labour more efficiently. Subsequently, such effort may lead to increased yield per unit of plot. It is also possible for such large households to invest more in crop diversification and strengthen their methods to increase productivity and resilience against inadequate food issues. However, the present study shows that a further increase in the family size is likely to exert more pressure on the consumption needs rather than utilizing the available land productively. This finding echoes earlier study results in the Teleyayen sub-watershed, Ethiopia (Agidew & Singh, 2018), implying that an increase in family size without an increase in land size adversely affects food security.

Land is inelastic, and currently, nearly one billion people are starving, predominantly in Sub-Saharan Africa (239 million) and Asia (578 million). Consequently, land is subjected to pressure from an increasing populace (FAO, 2011). Unless a large family works harder, uses the land more productively, or secures extra work to save and purchase more land, the issue of food security remains inescapable. One can argue that minimizing food insecurity within the family depends on who makes decisions.

According to Chi-Square (X²) results, there was no significant relationship between marital status and land acreage utilized for food production (statistical value of 8.860a at $P=0.182 > 0.05$), which is greater than 0.05. This finding disagrees with the previous study results in Sinana District, Ethiopia, which indicate that households headed by married heads are likely to attain food security, attributed to land ownership size, mutual support, and income levels (Mengistu *et al.*, 2021). The married are likely to work harder to utilize the available landholding and secure more land for food production due to their responsibilities toward fulfilling children's needs.

Married couples, through cooperation, can work jointly to improve food production. However, attaining food security among married persons may not be guaranteed due to some factors. These factors include social-cultural norms and power relations. These factors may affect access to productive resources and openings, affecting married couples' ability to enhance food security.

The study findings revealed a positive and significant relationship between household occupation and income (statistical value of 67.458a at $p=0.000 < 0.05$). This finding concurs with the previous study findings in Ethiopia (Mohammed *et al.*, 2018) on the positive association between farm activities and income. Farm undertakings enable households to earn their living even if they may not generate enough income. An increase in farm earnings may lead to investments in other non-farm areas. The fact that households (68%) in the study area earn a higher income from crop growing manifests a positive association between occupation and income. This finding demonstrates that the higher the income level, the higher the degree of engagement in farming. This finding echoes earlier study results (Tesfaye *et al.*, 2016) in Arsi Zone, Ethiopia, where household average income increased to 50%, and the effect of adopting improved wheat varieties was $P < 0.05$. The implication is that households earning more income have the potential to

purchase more tools and extend their revenue base. Therefore, households may be encouraged to seek employment opportunities that earn them some income to invest in farming.

4.3.3 Quantity of Primary Crops Harvested, Consumed, and Sold

Results summarized in Table 4.4 indicate the primary crops and their quantity.

Table 4.4: Quantity of Primary Crops Harvested, Consumed and Sold

Name of Crop	Quantity harvested	Kabaare Parish	Kigyendwa Parish	Kikokwa Parish
Maize	50 Kgs or <	45%	23%	32%
	51-100 Kgs	71%	0%	29%
	101-150 Kgs	50%	25%	25%
	151+	14%	29%	57%
Beans	50 Kgs or <	20%	40%	40%
	51-100 Kgs	11%	22%	67%
	101-150 Kgs	50%	25%	25%
	151+Kgs	31.5%	37%	31.5%
Bananas	20 bunches	37%	33%	27%
	21-50 bunches	23%	18%	59%
	51-100 bunches	27%	50%	23%
	101-300+ bunches	19.20%	49.30%	31.30%
Maize, beans & bananas	Combined quantity consumed			
	50 Kgs or <	33%	37%	30%
	51-100 Kgs	26.7%	33.7%	39.5%
	101-150 Kgs	55%	9%	36%
	151 + Kgs	0%	0%	100%
Maize, beans & bananas	Combined quantity sold			
	50 Kgs or <	37%	28%	35%
	51-100 Kgs	3%	51%	26%
	101=150 Kgs	31%	46%	23%
	151+ Kgs	67%	0%	33%

Source: Field Data

Although all the crops were important, bananas doubling as a food and cash crop were the most significant for households' survival. These findings reflect the earlier study results in Rugaaga

Sub-county, Isingiro district, where FGD participants unanimously mentioned that since 1998, bananas have been relied on as their significant crop for cooking and commercial purposes (Rietveld *et al.*, 2021). Households that lack reasonable banana plantations are inclined to severe food insecurity. This crop’s significance echoes the earlier findings in the GanoFofa Zone, Ethiopia (Alemu, 2017). However, it is significant to note that vital household location (Table 4.5) and external factors (Fig. 4.5) significantly affect most crops, making households food insecure. This finding implies that location and external factors deny households the right to enjoy agricultural benefits while perpetuating food insecurity.

Table 4.5: Major Household Location Factors Influencing Food Security

	Frequency	Percentage
Geographical conditions		
Effects of climate change		
Kabaare	81	32
Kigyendwa	84	35
Kikokwa	85	33
Total	250	100
Environmental degradation		
Kabaare	56	30
Kigyendwa	64	35
Kikokwa	85	35
Total	185	100
Infertile soils/land shortage		
Kabaare	76	32
Kigyendwa	82	35
Kikokwa	79	33
Total	237	100

Source: Field Data

Analytically, the adverse effect of location and external factors on food production is noticeable.

Households residing in areas faced with poor road networks, lack of market for the

produce, limited feasible financial support, and inadequate extension services find it difficult to overcome or minimize food insecurity. For instance, Kigyendwa Parish, characterized by poor road networks and limited extension services, faces substantial challenges in guaranteeing food security. Responding to these location-specific and external challenges is critical for improving agricultural efficiency and improving food security in the study zone.

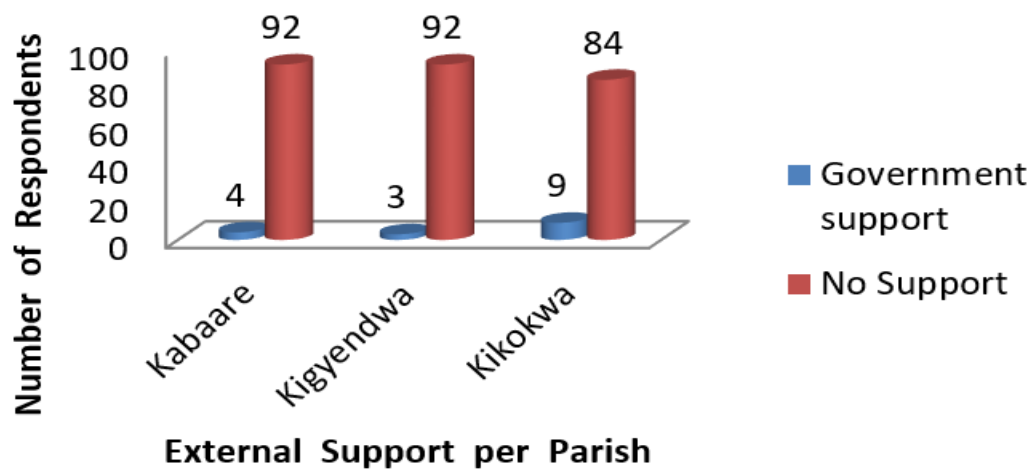


Figure 4.5: External Support towards Household Food Security

Based on multiple linear regression results and coefficient of determination value (Table 4.6), most variables like land size, family size, occupation, and marital status had a positive and insignificant effect on the production of the major food crops. This finding relates to the past study by Getaneh *et al.* (2022) in the Asayita district, Ethiopia, where household size, marital status, and land are related to food security in a way that they can positively influence it. Marital status and large household sizes alone are not an assurance to escape food insecurity (Mengistu *et al.*, 2021). A large household that focuses more on consumption than labor provision, increasing the available

land, or using it efficiently is prone to food insecurity. This finding implies that other factors influence food security as reflected in the model equation or equation model (Table 4.7), where e = error term (other factors not addressed in explanatory variables).

According to the multiple regression analysis results, some variables, such as acreage for food production and monthly income have negative coefficients. Other variables like the land size, number of household members, and monthly occupation are positive but insignificant. This finding disagrees with the earlier results in the north Wollo administrative zone, Ethiopia (Kassegn *et al.*, 2023). Thus, the variables do not contribute significantly to food security. With adjusted R-squares of -0.006, -0.004, and 0.042, the results indicate the existence of other factors influencing food production in the study sites beyond the ones studied. This finding shows that the independent variables in the regression model are not so effective at explaining the variability in the dependent variable.

Table 4.6: Multiple Linear Regression Results and Coefficients of Determination Value

Coefficients ^a						Adjusted R Square
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	
	B	Std. Error	Beta			
	(Constant)	3.794	.496	7.646	.000	-0.006
	Size of land in acres	.080	.190	.055	.418	
	Acreage for food production	-.206	.252	-.108	.817	
	Number of regular household members	.015	.153	.006	.096	
	Main occupation	.008	.091	.006	.092	
	Monthly income	-.076	.089	-.054	.856	
	Marital status of respondent	.241	.159	.092	1.518	
a. Dependent Variable: Maize harvested)						
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	-0.004
	B	Std. Error	Beta			
1	(Constant)	5.063	.228	22.156	.000	
	Size of land in acres	-9.521E-5	.088	.000	-.001	
	Land acreage for food production	-.055	.116	-.062	-.471	
	Number of regular household members	.020	.071	.017	.284	
	Main occupation	-.040	.042	-.059	-.956	
	Monthly income	.039	.041	.059	.940	
	Marital status of respondent	-.103	.073	-.085	-1.410	
a. Dependent Variable: Beans produced (Kgs)						
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	0.042
	B	Std. Error	Beta			
1	(Constant)	.637	.490	1.298	.195	
	Size of land in acres	-.039	.188	-.026	-.206	

Land acreage for food production	.356	.249	.184	1.431	.154
Number of regular household members	.026	.151	.010	.172	.864
Main occupation	.057	.090	.038	.633	.527
Monthly income	.204	.088	.142	2.305	.022
Marital status of respondent	.037	.157	.014	.235	.815
a. Dependent Variable: Banana bunches produced seasonally					

Source: Field Data

Table 4.7: Model Equation

Independent variables X_1 = Marital status X_2 = Occupation X_3 = Land size X_4 = Family size X_5 = Monthly income X_6 = Land acreage	
1. Model 1: Maize production	Terms
$f(x) = B_0 + B_1 X_1 + B_2 X_2 + B_3 X_3 + B_4 X_4 + B_5 X_5 + B_6 X_6 + e_m$	B_0 = constant e = error
2. Model 2: Beans production	
$g(x) = K_0 + K_1 X_1 + K_2 X_2 + K_3 X_3 + K_4 X_4 + K_5 X_5 + K_6 X_6 + e_b$	K_0 = constant e = error
3. Model 3: Banana Production	
$p(x) = a_0 + a_1 X_1 + a_2 X_2 + a_3 X_3 + a_4 X_4 + a_5 X_5 + a_6 X_6 + e_b$	a_0 = constant e = error

Source: Field Data

Therefore, the hypothesis, “there is a significant relationship between household and farm level-governance factors that affect the transition to household food security in the study sites” is rejected.

Consequently, less than 50% of households per parish accessed adequate food (Fig. 4.6). These findings reflect past study results in Masha Sub-county, Isingiro District (Muzira *et al.*, 2018), implying that no one cause for food insecurity in the study area. This scenario agrees with the analysis of the findings and observations, indicating that many factors are responsible for food

insecurity across the three parishes. Hence, the absence of good governance accelerates the impact of those factors on food production.

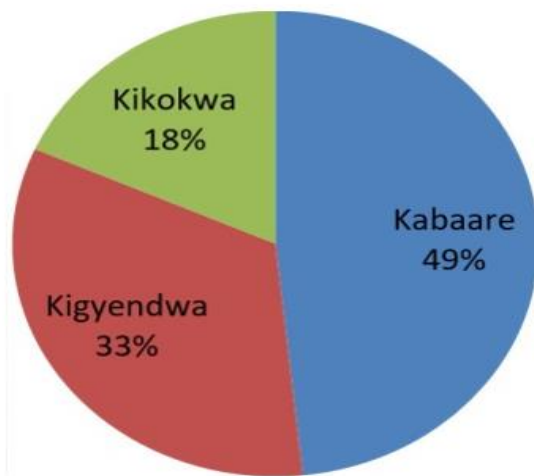


Figure 4.6: Household Access to Sufficient Food

Some households adopted strategies (Fig. 4.7) to address food insecurity. The findings match previous study results in Karenga and Kepchesombe Sub-counties, north-eastern and eastern Uganda. This earlier study showed that 84.1% of farmers planted diverse crops, and 52.1% diversified their crop production (Tiyo *et al.*, 2015). Adopting alternative farming strategies is a more effective strategy for improving household food security. The study highlights the implementation of such strategies that can result in the enrichment of household food status.

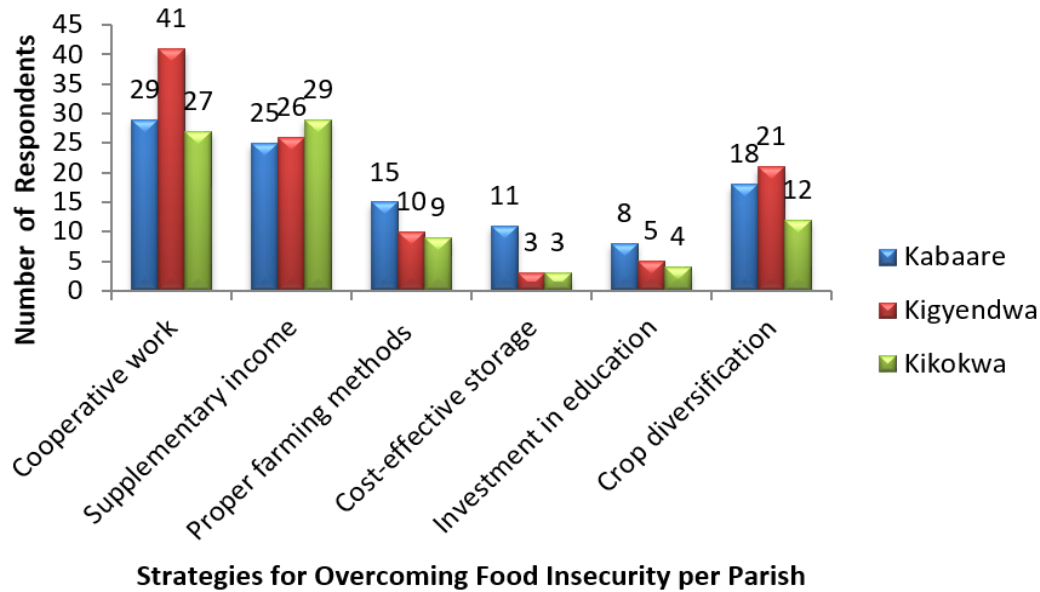


Figure 4.7: Strategies for Overcoming Food Insecurity per Parish

Although approaches such as supplementary income, investment in education, crop diversification, and proper farming techniques are essential, they may not alone be adequate to realize sufficient food. Thus, it is important to consider other strategies that may be responsible for overcoming food insecurity other than those mentioned in the study.

Findings in the study sites revealed the necessity of transition to food security. In line with the above strategies, how to transit to food security is a critical issue according to past results (Wezel *et al.*, 2020). The transition to food security comprises a multidimensional method that integrates governance reforms, agroforestry practices, and household joint decision-making. These components have to interact to enable the transition to food security. The shift includes numerous interrelated aspects for ensuring that everyone and families have access to sufficient, safe, and nutritious food to meet their dietary needs and preferences for an active and healthy.

The transition process should encompass all the aspects of food security: availability, accessibility, affordability, and utilization. Hence, a need for the impact of governance on agroforestry. This process requires policy support, stakeholder engagement, gender dynamics, capacity building, access to inputs, market linkages, social support; resource allocation, and household joint decision-making characterized by a shared vision. However, the shift is likely to meet challenges for instance sustainability of the transition.

The study acknowledges the limitation of not having measured food security. The reasons for the existence of this limitation are time, limited knowledge of the appropriate tool to use, and limitations in data availability, hence leaving it for future investigation.

4.4 Conclusion

Most households are food insecure due to many factors. The acreage of land, family size, primary occupation, monthly income, and marital status have a positive and insignificant effect on food production. The study rejects the null hypothesis; "there is a significant relationship between household and farm-level governance factors that affect the transition to household food security in the study sites." The involvement of household members in decision-making remains a primary driver toward food security. The shift to household food security is possible when family members agree to decide together through dialogue regarding how to enhance adequate food within their household.

Hence, the study recommends that heads of families discard patriarchal systems and embrace joint-making processes.

Responding to household governance and decision-making demands challenging and changing fundamentals and attitudes that affect food security. Thus household decision-making requires empowering and sensitizing men to develop a positive attitude towards involving their family members in deciding and improving food production within their families.

The issue of land in relation to household size remains crucial. Data analysis revealed land shortage that affects household food production. Addressing this issue requires a land policy review by the government and a critical study on household access to land for food production. It is also significant to sensitize households on the possible means of utilizing their landholdings most creatively.

The study further proposes that the government and related stakeholders invest in household capacity building for inclusive gender participation in decision-making regarding food security. It also proposes that they establish resilient agricultural systems for household food production, and increase support for further strengthening these efforts.

Additionally, there is a need for further studies on enhancing household capacity to address governance and decision-making related to factors such as land, income, and family size affecting food production.

CHAPTER FIVE

EVALUATING HOUSEHOLD DECISION-MAKING FOR AGROFORESTRY BASED- FOOD SECURITY IN ISINGIRO DISTRICT, SOUTH-WESTERN UGANDA

Abstract

Household decision-making is fundamentally a significant aspect that facilitates on-farm tree growing, and household-sufficient food. This study aimed to evaluate household decision-making for agroforestry-based food security. It also intended to comprehend how the decision-making process, power, and outcome affect household food security and agroforestry practices. A cross-sectional survey consisting of qualitative and quantitative approaches was employed to gather data. Primary techniques: personal interviews, focus group discussions, primary informants, and observations were employed to collect data. The study used a sample size of 400 households. The study analysed data using SPSS and Excel Software to produce descriptive statistics, percentages, and frequencies. The results indicated that gender has a positive and insignificant effect at a beta value of 0.067 at a significant worth of 0.269. However, age, size of the household, employment, as well as land size, have a negative and unimportant influence on household decision-making for agroforestry-based food security. The study recommends building and strengthening joint decision-making to become transformative and inclusive. In this way, household decision-making can be linked to the local government and gain momentum to address issues that affect household food security. This study will enable households to access extension services, training, and timely interventions toward realizing ecological and food-secure families.

Keywords: household, governance, agroforestry, food security

5.1 Introduction

A study in developing countries namely Cauca, Colombia, and Tuma-La Dalia, Nicaragua, shows that intra-household decision-making is characterized by gender inequality (Godek & Garcia, 2018). This inequality affects mostly rural women who find themselves in a fragile situation that reduces their decision-making power, especially in matters of food security. Although in some households decisions are taken jointly, in others there is no dialogue; one spouse decides without consulting or informing other family members. Taking a gender transformative approach tailored towards altering masculinity and femininity relations, confronting male-controlled rules, and supporting egalitarianism among men and women is one means of eliminating this challenge.

In sub-Saharan Africa, in particular, in Burundi and Rwanda, respondents (45%) showed that men dominated decision-making and 64% indicated that the same applied to labor allocation linked to varietal selection (Okonya *et al.*, 2019). In male-headed households (MHHs), women's primary activity was weeding as their contribution. However, their contribution remained insignificant. For instance, women (16%) contributed to decision-making and 14% to providing labor. This male dominance in decision-making reflects earlier study results in Nigeria. In this study, only 21 (10.5) females were consulted on land preparation, with 3 (1.5) having their opinion considered, and non 0 (0.0) in the final decision (Baba *et al.*, 2015). This gap is due to gender norms, opinions, and self-perceptions of women about their position and role in household food production especially where they have limited access to land. This implies that such limitations hinder women's potential to contribute significantly to food production yet a bulk of agricultural work is quite often placed on their shoulders.

Ugandan policies recognizing joint decision-making for empowering women were introduced impartially of late. This recognition is part of the Policy Action for Climate Change Adaptation (PACCA) II Project (Bamanyaki, 2019), National Development Plan (NDP) II 2015/16 - 2019/20, and the 1995 Constitution of the Republic of Uganda. All this documented evidence acknowledges poorer input. It also shows the impact of females in home decision-making, calling upon equal treatment for both men and women at all levels.

However, Uganda's national policies still have gaps as they have not openly promoted collective decision-making at the family level. This finding echoes the recent study in Nwoya District, Acholi sub-region of northern Uganda (Acosta *et al.*, 2020). This study indicates that contribution to the collective decision-making process is generally unequal. However, the absence of collective decision-making cannot lead to the transformation of agroforestry practices and household food production.

Further, the findings in the agricultural regions of Uganda (Shibata *et al.*, 2020) highlight that within wealthy families; men use their power to overlook their female counterparts, women, when it comes to making decisions within the households. This finding realized a larger ratio of well-to-do men who consider themselves innovative (69.7%), contrasted to that for conjugal females (50.7%). This study still shows that concerning making decisions within the family, married men alone were 69.7%, jointly (29.1%), and married women alone (34.2%). This is attributed to women's perception of men as their bosses, with power over family resources, and about themselves as subordinates. Women who greatly depend on their husbands' resource support for purchasing seeds, and materials and for paying casual labor often participate less or not in decision-making. Well-to-do men's perception is that they do not have to involve their counterparts in

making decisions because men view themselves as possessors of land. These views are supported by a case study in eastern Uganda, in Kapchorwa and Manafwa districts (Bomuhangi *et al.*, 2016) showing male dominance in household decision-making.

Despite individual preferences, disparity remains the norm in the relationship between asset ownership and decision-making by husbands versus wives. The mode of resource ownership is solely under men as women account for 48.32%, males 60%, sole male decision-making 67%, and joint decision-making 33%. This finding matches an earlier study in Benin (Atozou *et al.*, 2017) where the majority of the women lack knowledge of land management structure and are less concerned about most agricultural land since they do not possess the land.

Isingiro District recognizes the existence of inequality and marginalization between males and females (Okaka & Nagasha, 2018). The district faces inequality issues where men's position is more than that of women. For instance, a case study of Isingiro District indicates participants' view of man as the leader and family head who looks after and plans for the family. As for the woman, they explained that her role is digging and doing domestic work (Sjoberg & Osterlund, 2016)). However, as a step towards eliminating gender inequalities, the district is making some efforts to eliminate existing gaps (Okaka & Nagasha, 2018).

The study attempts to evaluate household decision-making for agroforestry-based food security in Isingiro District. It expects to enlighten households and other stakeholders in building, and strengthening household decision-making to become transformative and inclusive for agroforestry-based food security.

This inquiry used the hypothesis, “There is a significant relationship between socio-economic factors and household governance for agroforestry-based food security in the study sites.”

5.2 Materials and Methods

The study occurred in three political parishes within the Isingiro District, purposively selected because of their history of food insecurity, access, and agricultural-based historical background. The district is 0.84° South, and 30.80° East in south-western Uganda (Nakanwagi *et al.*, 2020). The inquiry employed a cross-sectional survey, qualitative and quantitative approach to gathering data using five years. The methods used to get data included personal interviews, Focus Group Discussions (FGDs), and key informants (KIIs). The three civil parishes where the researcher gathered data were Kabaare having a population of 4,810, Kikokwa 2,803, and Kigyendwa 2880 (District Planning Unit, 2015). The study systematically sampled twenty - six households per five villages in each parish. The selection of KIIs was effected using purposive sampling. Descriptive statistics, frequencies, and the chi-square method were employed to code, enter, clean, and analyze data. The study also used multiple linear regression procedures to establish the importance of socio-economic aspects in affecting home decision-making for agroforestry adoption and producing sufficient food.

5.3 Results

5.3.1 Social Demographic Characteristics

Gender

The study indicated that regarding gender, female and male respondents differed across the parishes. However, all three parishes had more females than males (Fig. 5.1). This finding entails

unequal representation of men and women since fewer men were at home compared to women during the interview.

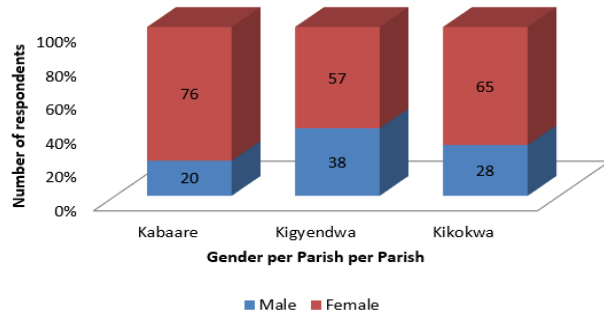


Figure 5.1: Respondents’ Gender for Each Parish

Age

Regarding age, majority of the respondents were between 30 to 59 years (Fig. 5.2). This means the productive age in all parishes was the highest. The implication of this finding is that those in the reproductive age may be able to engage in agricultural production because they are energetic, able to provide required labor and acquire more land.

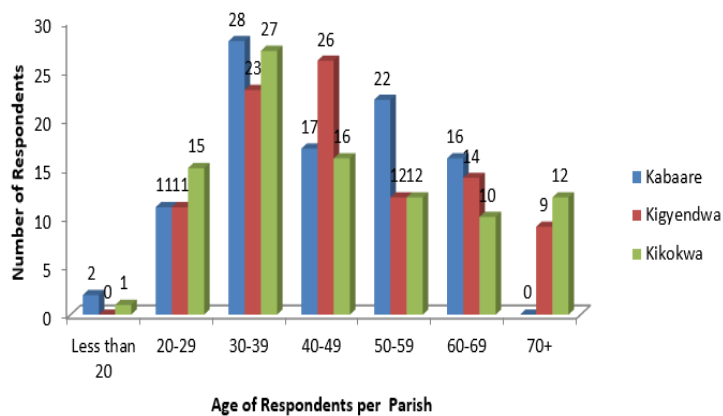


Figure 5.2: Age of Respondents per Parish

Marital status

In terms of marital status, most respondents in the three parishes were married. However, there was a visible variance amid the parishes, with Kabaare having more married respondents contrasted to Kigyendwa and Kikokwa (Fig. 5.3). This finding implies that marriage has a significant effect household agricultural production.

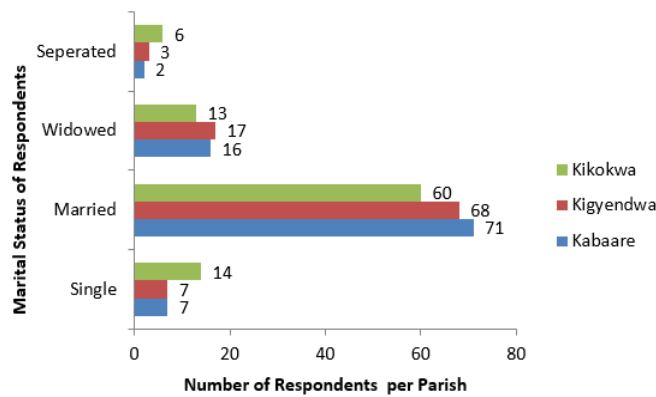


Figure 5.3: Marital Status of Respondents per Parish

Education

Most respondents practicing agroforestry had attained a primary education level. This finding implies that though many respondents could read and write, their education level was not suitable enough to provide them with enough knowledge and innovative skills in agroforestry practice hence the need for more support in refresher courses (Fig.5.4).

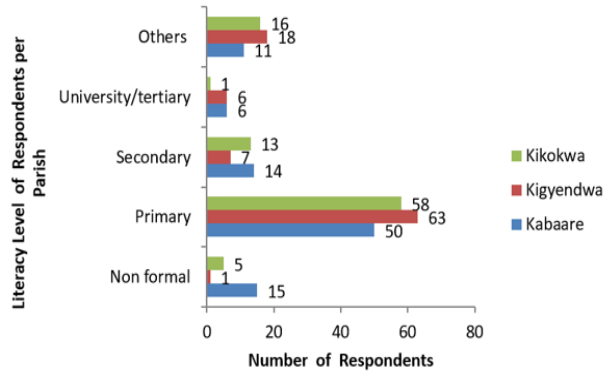


Figure 5.4: Literacy Level of Respondents per Parish

Household Size

Regarding regular household members, all the parishes had a large number of regular members though Kabaare constituted the highest number of respondents (Fig. 5.5). This finding implies the need for enough food for large households.

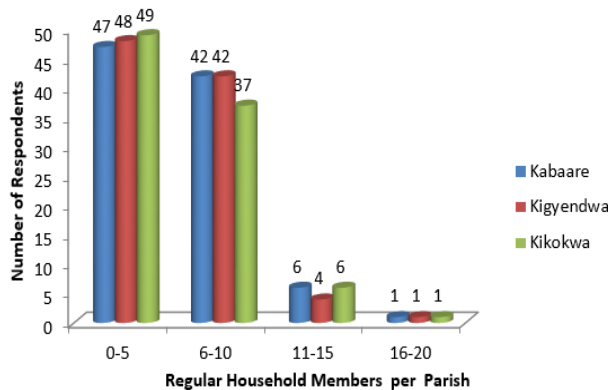


Figure 5.5: Regular Household Members (family size) per Parish

Main occupation

Regarding the main occupation, most respondents constituted household agriculturalists (Fig. 5.6). The study showed an insignificant disparity even if the number of agrarians was more in Kabaare

and Kikokwa than in Kigyendwa. This outcome implies that agriculture is the primary undertaking and basis of livelihoods.

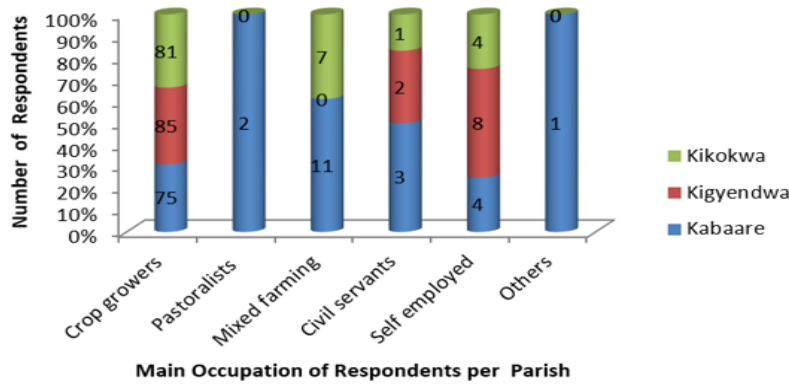


Figure 5.6: Respondents’ Main Occupation for Each Parish

Land size

Land size varied across the parishes, with most respondents living on less than an acre of land (Fig. 5.7). This finding demonstrates land scarcity that limits households’ benefits of agroforestry beyond food security.



Figure 5.7: Land Magnitude for Each Parish

Acreeage for food production

On land acres used for food production, households that had inadequate landholdings were the majority (Fig.5.8). FGDs (100%) and KIIs (100%) supported this finding by agreeing that most families possessed less than an acre and two acres, which may not be enough to support agricultural activities. However, some families utilized larger acreage for agroforestry practice, exceeding the size of land they owned. The implication is that households that used more acreage engage in land hiring from outsiders.

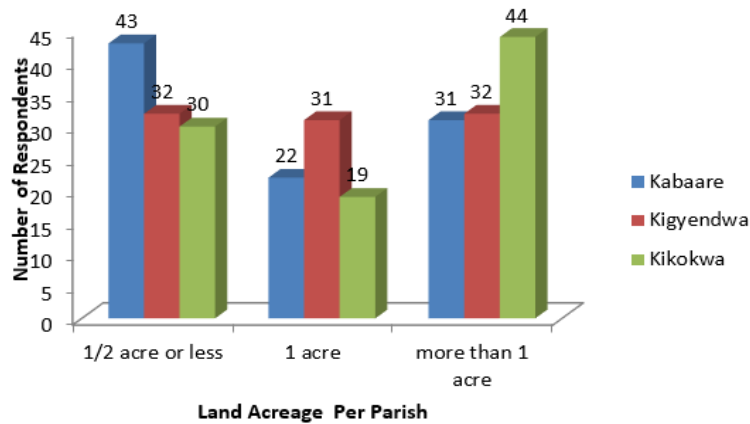


Figure 5.8: Land Acreeage for Food Production per Parish

Income

Most households in the study engaged in farming and received little revenue from their general livelihood sources. FGDs constituting 100% and KIIs 100% also indicated that limited income limits household benefits of agroforestry. This finding implies that households' effort to engage in on-farm tree adoption and its benefit beyond food is limited by less income earned (Fig. 5.9).

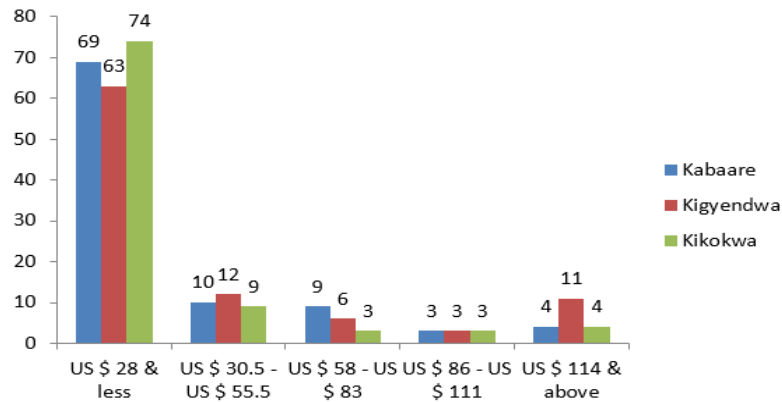


Figure 5.9: Household Monthly Income per Parish

5.3. 2 Governance Factors Influencing Household Agroforestry-based Food Security

5.3.2.1 Household Decision-making

Household decision-making and the process used in pursuing food security are essential factors. Even though there was a disparity in decision-making among the parishes, Kabaare had additional family members engaged in decision-making about agroforestry-based food security than Kikokwa and Kigyendwa (Fig. 5.10). The implication is that household engagement in creating decisions performs a vital task by affecting household food security and agroforestry practice.

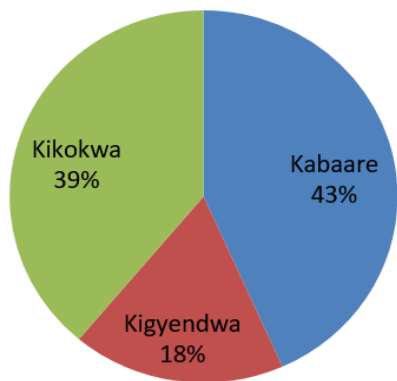


Figure 5.10: Household Heads Involving Family Members in Decision-making

The findings indicated that household members who made decisions through meeting, planning and agreeing together were below 50% in each parish, they were more in Kabaare than in Kigyendwa, and Kikokwa. Households that faced a one person’s decision accounted for were more in Kigyendwa than in Kabaare, and Kikokwa (Fig. 5.11).The implication is that isolating family members from participating in making decisions limits household efforts to boost food production.

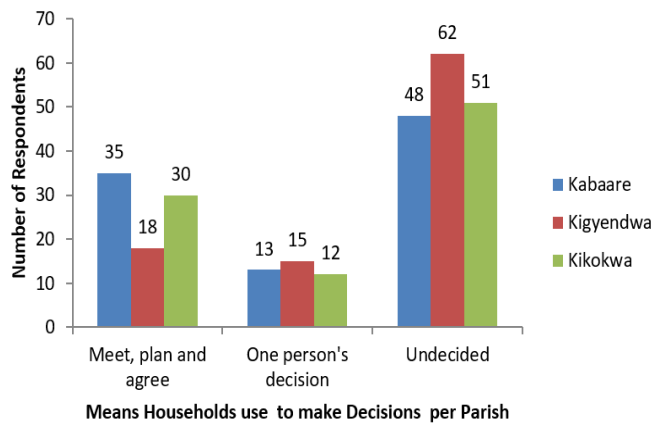


Figure 5.11: Means Households use to make Decisions per Parish

Kikokwa Parish registered more household heads involved in making decisions on agroforestry compared to Kabaare and Kigyendwa. Regarding having undecided members, Kigyendwa had

more household members than other parishes. For the households in which wives decided on family food production, Kabaare had the largest percentage (Fig. 5.12).

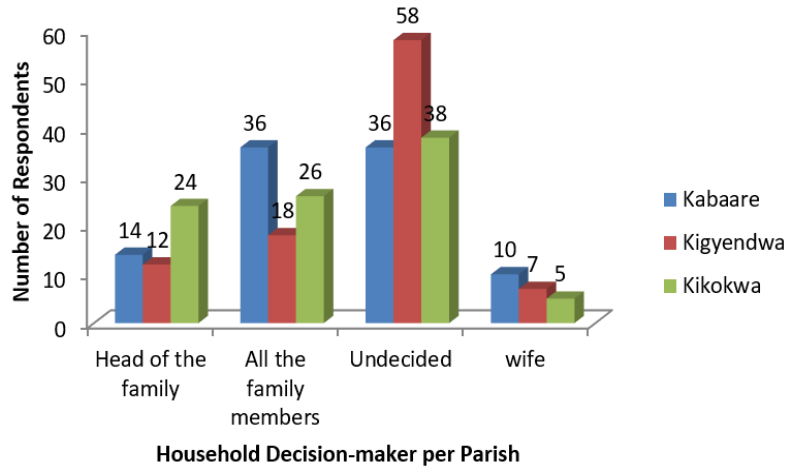


Figure 5.12: Household Decision-makers per Parish

The positive effect of the decisions made by the household members on the household potential for food security accounted for Kabaare (39.7%) which was more than in, Kigyendwa and Kikokwa. Kabaare had more negatively affected households than Kigyendwa and Kikokwa (Fig. 5.13). The implication of this finding is that the nature of household members’ decision determines the level of household food production and agroforestry practice.

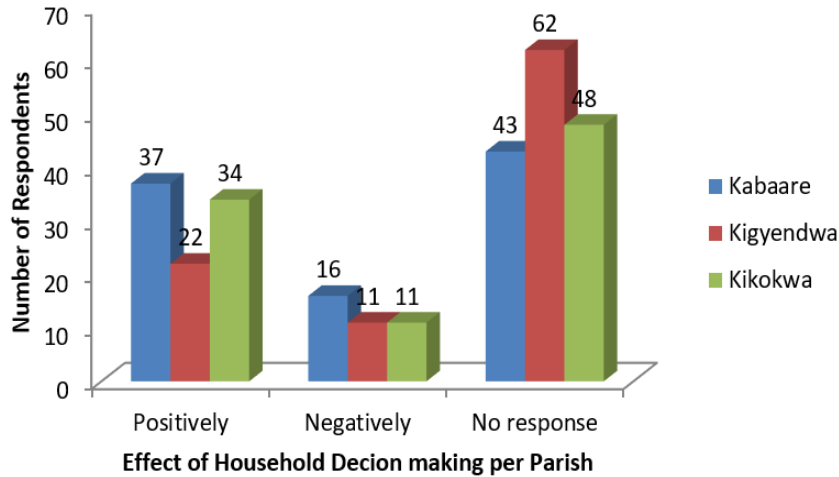


Figure 5.13: Effect of Household Decision-making per Parish

Findings from FGDs (100%) and KIIs (100%) showed little external support, and this agrees with the key results that put Kabaare above the other parishes at 39%. Regarding support from non-governmental organizations, the two parishes: Kabaare and Kikokwa, got extra support contrasted to Kigyendwa though some of these parishes accounted for 50% and above (Fig 5.14).

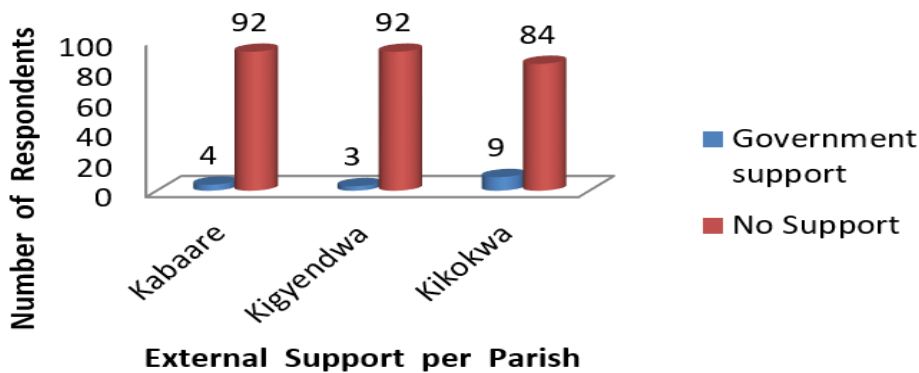


Figure 5.14: Exterior Aid to Family Foodstuff Safety

5.3.2.2 Association among Family Farm Governance Factors and their Impact on Agroforestry-based Food Security

The association of variables family size, land size, gender, and the main occupation was verified using Chi-Square analysis. Cross-tabulation was employed to establish the relationship among selected factors.

5.3.2.2.1 Cross-tabulation of Variables

Household size and land magnitude

The use of cross-tabulation revealed that most families with 1-5 regular members (61%) had less than an acre of land. The outcome shows that households are resource-constrained. The implication is that most families cannot adopt and practice agroforestry as a trajectory to produce sufficient food (Fig. 5.15).

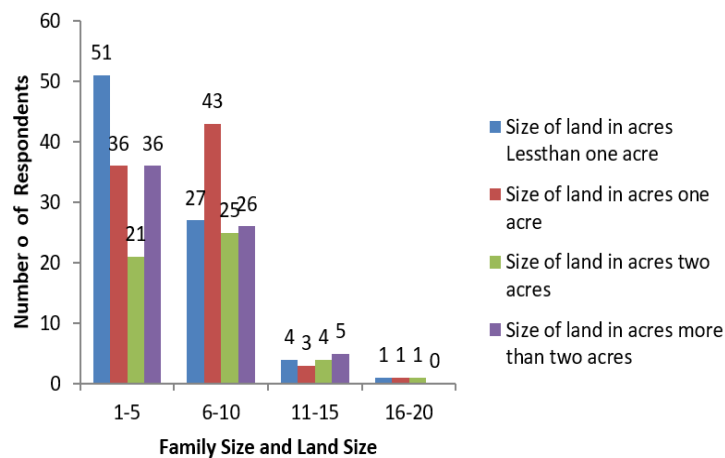


Figure 5.15: Cross-Tabulation of Household Size and Land Magnitude

Gender and main occupation

Regarding gender and the main task, females' percentage engaged in farming was much higher than that of males. Even in most other occupation domains, the study revealed that females were the majority. This outcome implies that females are the primary domestic core duty bearers. As a result of cultural and male-controlled roles that are often male-controlled, women engage more in farming than men (Fig. 5.16).



Figure 5.16: Cross-Tabulated Gender and Occupation

Age and land size

Land ownership based on age varied across the parishes. The majority of the productive age (30-59) respondents owned more land compared to those less than 30 years. This means that those in the productive age dominated ownership and land usage compared to the other categories (Fig. 5.17). This implies that energetic and productive people can acquire land on their own and inherit from their parents.

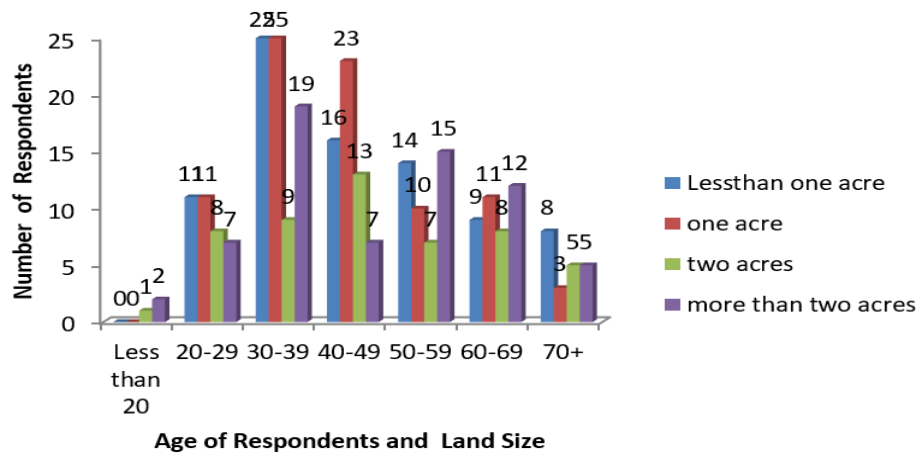


Figure 5.17: Cross-Tabulated Age and Land Size

5.3.2.2.2 Chi-Square Analysis

Table 5.1: Chi-Square of Family Size and Land size

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.825 ^a	9	.288
Likelihood Ratio	11.498	9	.243
Linear-by-Linear Association	.904	1	.342
N of Valid Cases	284		
a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .54.			

The Chi-Square (χ^2) confirmed a very weak positive and unimportant impact the family size has upon the available land meant for producing food at Phi Cramer' $V= .195$, $P=0.288 > 0.05$ in the above table (Table 5.1). The implication is that there is a need for more adequate land for feeding large household members. Inadequate land makes it harder for large households to produce enough food.

Table 5.2: Chi-Square of Gender and Main Occupation

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.034 ^a	5	.015
Likelihood Ratio	13.981	5	.016
Linear-by-Linear Association	6.541	1	.011
N of Valid Cases	284		
a. 7 cells (58.3%) have expected count less than 5. The minimum expected count is .30.			

The χ^2 indicated a positive and insignificant relationship between gender and household respondents' main occupation at Phi Cramer' V= 0.222, $p=0.015^a>0.05$ and df 5 in the above table (Table 5.2). The association of these variables has no statistically significant value and significant influence on domestic agroforestry-based food security. This finding implies that an insignificant though positive relationship between gender and main occupation has a significant effect on household food security.

Table 5.3: Chi-Square of Age and Land size

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	20.068 ^a	18	.329
Likelihood Ratio	21.977	18	.233
Linear-by-Linear Association	.527	1	.468
N of Valid Cases	284		
a. 6 cells (21.4%) have expected count less than 5. The minimum expected count is .54.			

The χ^2 also confirmed a positive and insignificant association between age and the size of land at $P=20.068^a >0.05$ and Phi Cramer' V = 0.266, $p=0.329 > 0.05$ in the above table (Table 5.3). However, the relationship is not statistically significant to make a big influence on domestic agroforestry-based foodstuff safety. As an implication of this finding, for age to have a strong positive impact on acreage, it also requires experience, skills and adequate knowledge.

Table 5.4: Model Summary^b

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.140 ^a	.020	.002	.869

a. Predictors: (Constant), Size of land in acres, age of the respondent, number of regular household members, gender, main occupation

b. Dependent Variable: Who makes decisions on agroforestry practices

Based on the multiple linear regression outcomes in the model summary above (Table 5.4) using size of the land, age, and family size, gender and main task reveals Adjusted R Square value of 0.002. This finding denotes 0.2% variation in household decision making which is predicted by land size, age, family size, gender as well as main occupation while the remaining 99.8% are due to other intervening factors.

Table 5.5: Multiple Linear Regression Results and Coefficients of Determination Value

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.669	.320		8.329	.000
	Gender	.126	.114	.067	1.108	.269
	Age of the respondent	-.047	.035	-.081	-1.358	.176
	Family size	-.072	.080	-.054	-.908	.365
	Main occupation	-.032	.047	-.042	-.685	.494
	Size of land in acres	-.037	.046	-.048	-.809	.419

a. Dependent Variable: Who makes decisions on agroforestry practices

In the regression coefficients in the above table (Table 5.5), gender reveals a numerical value of 0.067 by means of a significance level of 0.269, age -0.081 at 0.176, family size -0.054 at 0.365, main occupation 0-.042 at .494, size of land in acres -0.048 at 0.419. This finding means gender has a positive and insignificant effect while most factors: age, household size, main livelihood, and size of the land size bear a negative and insignificant impact on household agroforestry-based

food security. Therefore, this inquiry discards the null hypothesis which stated that “There is a significant relationship between socio-economic factors and household governance for agroforestry-based food security in the study sites.”

5.4 Discussion

5.4.1 Social Demographic Characteristics

The study findings revealed gender imbalance regarding the number of respondents in all the study sites. Female respondents were more than male respondents regardless of household means. This finding resembles the previous study results in Machakos County, Kenya (Kinyili *et al.*, 2020), where female respondents were 56.9% and non-adopters (59.1%); and male respondents (agroforestry adopters) were 43.1% and non-adopters (40.9 %). The findings in the study sites confirm this similarity. There was significant variation among the study sites whereby Kabaare Parish had the highest number of women and lowest number of men interviewed compared to other study sites. This variation is due to the cultural roles traditional society has assigned to women. Such roles restrict women’s movements. Females tend to engage more in domestic and farm activities like growing food crops, caring for the trees, and caring for the elderly and the sick than men. This finding may explain why more women than men were at home during the interview.

This view could raise an argument that one would expect to find more male respondents as household heads instead of the majority females. Finding more females at home is also attributed to many factors such as seeking formal and informal job opportunities by the men, norms, and alcohol consumption. This finding echoes past study findings in Nigeria (Baba *et al.*, 2015), where the rules and values govern gender division of labor, responsibilities, and power. Also, the consumption of alcohol by the household heads and youth fails the decision-making process on

food production and tree adoption. The implication is that this failure subsequently creates gaps in food production and affects households to unlock their potential for complementing food crops with tree products such as fruits and edible leaves.

Although men and women were engaged in domestic agriculture during data collection, males dominated household decision-making in every study site. This outcome matches past findings in Lubungo A and Maseyu villages of Morogoro rural district, Morogoro, Dar es Salaam (Uissoa *et al.*, 2016). This study shows that men dominate the power of making household decisions concerning crop growing and adopting trees on-farm. According to this study, respondents opined that there was male dominance in decision-making as male participants (73%), and 69% in Maseyu and Lubungo A villages were from male-headed homes. This present study concurs with these findings and argues that exclusive male decision-making may not open adequate space for women to unlock their potential for contributing significantly to the food production domain. It may also deprive them of opportunities to contribute substantially to food insecurity reduction. The implication is that such imbalances in decision-making influence on-farm tree adoption as well as food production within the family.

Argumentatively, male dominance in decision-making silences female voices and affects their developmental ideas in contributing to household food security. Such male dominance affects household assets for instance social by keeping them undeveloped. The effect of such dominance subsequently keeps food production at a low level. This dominance echoes earlier results in Enugu State, Nigeria (Ogonna & Anarah, 2017), where male involvement in decision-making is dominant. This result implies that holding much decision-making power by men who are irregular

at home may negatively affect household agroforestry-based food security. This means that resources such as land can not be put to use productively, and even if women suggest new and innovative initiatives, they may not be adopted.

Productive age remains an important aspect that influences decisions related to mixed farming-based food security. This finding, points out that heads of the families who constitute productive age may engage more in tree adoption for food security than all those outside the productive age. This present finding matches earlier results in Nyantonzi Parish, Masindi District, Uganda (Ahimbisibwe *et al.*, 2019), where a rise in the age of a family controller increases the likelihood to uptake on-farm trees. However, this reality applies only to the most active stage of growth. It can be argued that productive age accompanied by farm experience, exposure to extensive production technologies, more resources, established wide social networks, ownership of large-size landholdings, and better access to financial support can lead to more engagement in agricultural production. However, young adults are dependent and unable to engage more in agricultural production. It can also be noted that young adults may not value farming activities as much as older individuals, often leading to a tendency to overlook on-farm work.

Although the study considers marital status and its effect on food production, it is vital to observe that the association between marital status and family agricultural production is intricate. Additional investigation and deliberation of supplementary aspects are required to comprehend every likely effect of marital status on agrarian efficiency.

Household magnitude remains critical in crop production and agroforestry. Most households where children are on average 6 -7 per woman, find it hard to make decisions and provide labor collectively. This finding means that having a large family is not a guarantee for collective decision-making on food production. This finding does not reflect earlier results of the Kombolcha District of East Hararghe, Oromia, Ethiopia (Doti, 2017). This study indicates that the model output family size is similar to 0.13, statistically significant at a 5 percent probability level. This finding shows that one adult equivalent increase in family size results in a 0.023 ha increment of farmland. However, Kabaare, Kikokwa, and Kigyendwa Parishes show that large families, patriarchy, land shortage, poverty, outside opportunities negatively affect collective decisions on food production. The consequence leaves women and responsible men to engage in almost all the household activities. The implication is that large families that are not cooperative and relative to the available resources compromise household food production and agroforestry adoption.

On the other hand, one would argue that large families have an advantage of sufficient labour provision. However, it is not a gurantee since children together with the head of the family may leave the burden of gardening almost to their mother as a result of other factors.

Land size plays a significant role in decision-making on agroforestry adoption. The present study area has most families that thrive on one and fewer acres of land. The land shortage is a factor upon which non-agroforestry adopters base their decision not to use their small landholdings for agroforestry. The result of the present study does not agree with earlier findings obtained from Wedza, Mudzi, Guruve, and Goromonzi districts of Zimbabwe (Makate *et al.*, 2016). In these districts, land size influences the adoption of diversified crops. A one-acre increase (decrease) in

land size obtained by the family was associated with a 15.8% increase (decrease) in the likelihood of adopting crop diversification. Once acreage size increases or decreases, the owner is influenced to choose its use for some types of crops. Although some other factors such as experience, information, as well as agricultural inputs are significant, cultivable area takes precedence in influencing food-based agroforestry adoption. Therefore, farmers who possess moderately large landholdings are likely to practice agroforestry compared to their counterparts.

However, some households decide not to put their small landholdings to mixed cropping due to the perception that trees affect the growth of cereals and legumes. As households increase, there is searching for more land which decreases land for agricultural activities. This view matches earlier outcomes obtained from Rombo District, Tanzania (Mmbaga *et al.*, 2017), where 80% of the land for seasonal agriculture has been affected by settlements. The implication is that families with small landholdings may prefer to use them exclusively for cereals and legumes instead of agroforestry. The land issue alongside the type of crop to grow creates a research gap for further investigation in the study site.

5.4.2 Relationship between Household-farm Factors and their Influence on Agroforestry for Food Security

While the family size in all the study sites differs unimportantly, the land size varies significantly. The household size and land size are not comparable. This finding means that there is a positive but insignificant relationship between the two variables. This result differs from the earlier study findings in the highland districts of Northwestern Ethiopia (Alemu *et al.*, 2017), where the decline of farmland size due to subdivision has resulted in farmland holding. This decline in land size does

not support the average farm household for about 33% of the sample households. This reality is even made harder by land fragmentation which adversely affects farm productivity.

The χ^2 showed a positive but unimportant association among gender and respondents' main work. This result means that the association of these variables has no statistically significant value and significant effect on household agroforestry-based food security. This finding differs to some extent from earlier results in south West Nigeria (Adetomiwa *et al.*, 2020), where both gender and occupation were positive and important by $p < 0.10$, 1% level of probability. We agree with these results because a mismatch between gender and occupation inversely affects household food production and tree adoption. This finding shows that there is inequality in gender roles in decision-making power. Most women in the rural setting are farmers who earn less income, unlike men who seek opportunities and alternative sources of income from outside the household. This finding implies that the gender roles of women are mostly limited to farming which is not adequately supported, and this affects food production.

The study using χ^2 statistically established a positive and insignificant association between age and land size. This result is similar to the previous outcome in selected villages in Khargone District (Western Nimar region) of Madhya Pradesh, India (Patidar & Patidar, 2015). What this finding indicates is the important relationships ($p \leq 0.05$) among respondents' age, and farm size (18.21, $p = 0.029 < 0.05$). This outcome matches earlier results obtained from Nairobi, Kenya (Kaua, 2020), where older farmers could invest in agroforestry compared to young people. Due to customary land inheritance, older family heads divide their land among the children. However, older household heads tend to remain with more land giving part of it to their sons. In the end,

young people end up with inadequate and fragmented landholdings rendering it difficult to influence household decision-making. This view does not reflect earlier study findings in the Kombolcha District of East Hararghe, Ethiopia (Doti, 2017). Such a study shows a mismatch amid age and acreage size being important by a 10 percent probability level. The age of the farmer results in a decrease in the farmland by 0.063 hectares. The implication is that household size and land magnitude remains a crucial factor requiring the attention of transformative agricultural policy.

5.4.3 Multiple Linear Regression Results and Coefficients of Determination Value

From multiple regression findings as well as the coefficient of determination (Adjusted R square) value, gender had a positive and insignificant effect, with age, family size, and the major livelihood having a negative and insignificant influence on household decision-making for on-farm tree adoption and foodstuff production. As an outcome, it does not concur with the results in Rulindo District, Rwanda (Rwaburindi *et al.*, 2019), where gender had a negative insignificant effect. Land size and gender influence decision-making on agroforestry practices and food production.

Although all the respondents are engaged in farming, their age and resource ownership remain significant factors in decisions about food security. Older household heads in the study sites were more involved in agriculture than young people due to their experience and access to land. This finding reflects earlier findings gathered from the highland districts of Northwestern Ethiopia (Alemu *et al.*, 2017). Age differentiation and farm size also negatively influence households' choice not to adopt trees on the farm due to land inheritance. The young heads of families who are less educated and have no employment find it hard to adopt agroforestry for food production due

to having less land. This echoes earlier findings in Kaduna State, Nigeria (Issa, 2019), where age would determine the productiveness of the household since farming uses manual labor.

5.4.4 Household Decision-making and its Influence on Agroforestry-based Food Security

Governance, which means the decision-making process by which decisions are implemented or not implemented in society or in an organization (Ali, 2015; Planas *et al.*, 2022 cited in Bachev, 2023); or as the set of institutions and social relations related to decision-making processes, policy, and implementation (Larson *et al.*, 2021) has a significant effect on agroforestry-based food security. This means that governance plays a crucial role in agroforestry-based food security as a system where food adequacy is achieved, reinforced, or enhanced through agroforestry practices (Sahoo *et al.*, 2020). What occurs on and around farms hinges simply on the decisions of individual cultivators. Thus local household practices such as agroforestry for enhancing food security are significantly affected by governance procedures and establishments (Larson *et al.*, 2021). More particularly, governance issues play an essential role in determining the link between agroforestry and food security by influencing policy backing, community involvement, land tenure system, access to assets, and environmental upkeep.

Household decision-making for enhancing food security through agroforestry practices is essential (Kalanzi *et al.*, 2020). The study revealed significant variations of household heads who involve house members in decision-making among the study sites. Kabaare Parish had the highest percentage, and Kigyendwa had the lowest number of household heads who involved their members in agroforestry decision-making. However, all the study sites fall below the average level (50%) of involvement. This finding means that households that make joint decisions are few compared to those that depend on one person's decision-making or are undecided. This is a result

of perceiving the family head as a prime decision unit with elevated influence on decision-making. The implication of this is that most families lack dialogue and planning together over household food production. This outcome matches past findings gathered from northwest Vietnam (Catacutan & Naz, 2015), where the majority of the household heads dominated decision-making, with only 9% of women making decisions alone. The rationale behind household joint decision-making or failure to decide together depends on the awareness level of the household heads. It may also depend on the degree of influence by the household members.

According to this study, the most appropriate decision-making structure for achieving food security involves input from all household members. The structure encompasses the head of the household, the female counterpart, and adult children. Research has shown that in cases where decision-making is not inclusive within the family, agroforestry interventions are destined to fail (Kalanzi *et al.*, 2020). Including every household member in decision-making supports the philosophies of good governance, which are central to achieving agroforestry-based food security.

5.4.5 The Effect of Decision-making on Households' Agroforestry-based Food Security

The positive and inverse effects of the decisions made on household food security varied significantly among the study sites. Kabaare had the highest percentages of families affected positively and negatively while Kigyendwa and Kikokwa had the lowest number of households affected negatively, often causing conflicts. This result reflects the findings of earlier studies in Kisii County, Kenya (Bala *et al.*, 2020), where households have small size landholdings. In this county, land size holdings per household account for 0.75 acres per household, mean land for agricultural production (0.97 acres), woodlots (0.62 acres), fodder crop (0.41 acres), and fruit

orchards (0.40 acres). Families that meet and plan together can realize some positive changes in food production even if the landholding is small. However, in households where decision-making is strictly by the household heads, it results in family disagreements. The earlier study findings in Nwoya District, northern Uganda (Acosta *et al.*, 2020), and in Ecuador (Twyman *et al.*, 2015), back observation in showing that dialogue or disunity affects households in terms of land use for agriculture. Thus, the effect of decision-making is either positive or negative depending on the attitude, perception, and degree of influence of the head of the family and his or her family members. One of the respondents interviewed reported:

“Nobody in our family is satisfied, because as a mother and my children, we want to eliminate coffee since it destroys the banana plantation. However, my husband has resisted and is ready to deal with us if we tamper with his coffee. He brought coffee to the banana plantation without consulting us, and we do not want it. We will not rest until we have removed it”, (Female, FGDs, KleMsha, 7 July 2019).

A situation of this nature has a significant effect on household food production since it creates an environment that does not favor families to produce enough food. This environment implies that household heads’ monopoly over decision-making inversely affects household food status since the household functions in a conflict situation.

5.4.6 Institutional Factors and their Effect on Household Agroforestry-based Food

Security

Although the study revealed institutional support for the households, the support was not adequate. This finding relates to the past study results in Kaduna, Nigeria (Issa, 2019). In this study, females' participation and practices in adopting on-farm trees were affected in many ways by limited education and limited accessibility to financial support. Lack of such institutional services (training, agricultural inputs, skills, and awareness) limits the capacity of households to engage in productive agroforestry-based food production. According to the FGDs and KIIs, the inadequacy of such services and poverty limit household members from unlocking their potential to overcome food insecurity. The finding echoes the past study findings collected from the Eastern Free State of South Africa (Myeni *et al.*, 2019), where most farmers (99%) could not access extension services. Poor service delivery by the institutions is largely due to lack of resources, limited awareness, and poor leadership. Thus, inadequate institutional services adversely affect food security and agroforestry adoption.

In addition, some respondents reported their households as having lost hope for external support. During the interview, one of the respondents said,

“I don't see government leaders coming to support us apart from coming for our votes. They make promises which they do not fulfill”, (Male, FGDs, Klemsha, 15 May 2019). Another respondent stated, “Our chairman discriminates, distributes inputs selectively on political lines”, (Female, FGDs, Klemsha, 30 May 2019).

This finding reflects the previous study findings in many African nations. Those countries are Egypt, Ghana, Malawi, Rwanda, Zambia, Bangladesh, Nepal, and India (Álvarez-Mingote & McNamara, 2018). In these countries, extension services could not reach various farmers due to poor governance characterized by exclusiveness, lack of transparency, and accountability. Such a situation calls for transparent and pro-household leadership for leading households justly and implementing agricultural decisions effectively.

5.5 Conclusion and Recommendations

Household decision-making is a fundamental factor in household agroforestry adoption for food security. The fact that in some households, decision-making is multilateral, it is the household head (male or female) who is in control of others. Decision-making is also undecided in some cases. Men have continued to control the household process of making decisions. This control by men also extends to domains where females contribute more significantly. This kind of gender inequality is traditionally rooted in a patriarchy where men perceive themselves as having power over household capital resources. The explanatory variables, gender, age, occupation, family size, and land size, have no significant effect on household decision-making. The study recommends government intervention in revising gender and agricultural policy development. It re-emphasizes building and strengthening household joint decision-making processes to be transformational and inclusive. The household decision-making needs to link firmly to the local governance for adequate provision of services.

CHAPTER SIX

ASSESSING THE BENEFITS OF AGROFORESTRY BEYOND FOOD SECURITY AMONG HOUSEHOLDS IN ISINGIRO DISTRICT, SOUTH-WESTERN UGANDA

Abstract

Globally, agroforestry is well known as a pathway for providing multiple benefits to households. The study aimed to assess the benefits of on-farm trees beyond producing enough food in the Isingiro District. The design employed in this study was cross-sectional. Data were gathered using a qualitative and quantitative approach. Systematic random sampling was used to choose 284 families that were interviewed. The study used Multiple Linear Regression for analysing the relationship between a dependent variable and many independent variables. The study used Chi-Square tests to find out the statistical value of variables and their effect on agroforestry adoption. The results indicated that households (41%) in Kabaare, 37% in Kikokwa, and 22% in Kigyendwa practiced agroforestry. Of all the agroforestry adopters, only 20.7% of the households obtained benefits from agroforestry practice. The socio-economic factors that were positive and insignificant with a positive influence on household agroforestry benefits were the main occupation and income while the size of the household, land size, land acreage utilized for producing food, gender, and marital status were negative and unimportant. The study recommends policy review, strengthened governance institutions, nurturing transformative leadership for supporting household agroforestry practices, innovative agroforestry technologies, and change of households' perception of agroforestry management through awareness creation.

Keywords: agroforestry; benefits; food security; governance; livelihood; policy review; transformative leadership;

6.1 Introduction

Globally, agroforestry is a high-yielding system and is well known as a pathway for providing multiple benefits of Sustainable Development Goals (SDGs). Between 2000 and 2010, worldwide tree cover improved by 3.7%, resulting in a 4.6% increase in biomass carbon emissions. It has also been reported that over 46% of the global's farmland is now shielded by more than ten trees (Zomer *et al.*, 2016). This increase in the tree cover amplifies the significant role trees play in storing biomass, carbon sequestration, and other aspects. Worldwide, agroforestry is seen as an approach to sustainable land management though not extensively implemented in temperate and developing countries (Santiago-Freijanes *et al.*, 2018).

From the time when the International Council for Research in Agroforestry (ICRAF) was founded around the 1970s, it has scaled up on-farm tree research as well as transformation activities globally. The use of such aspects of development can eradicate poverty besides hunger and promote human well-being, good health, and other SDGs (Goparaju *et al.*, 2020). The adoption of trees on farms thus has gained global support to provide adequate and sustainable farming and ecosystem services. The success of this practice requires good governance since this has been successful in India (Chavan *et al.*, 2015).

In Africa, several farmers have adopted agroforestry due to its various benefits. Earlier study results in Southern Africa show how conservation agriculture patterns positively influence adaptation and efficiency. Additionally, these conservation agriculture patterns uphold greater permeation degrees, protect topsoil moistness, and have the potential to curtail droughts. This study shows that such outcomes would brand conservation farming further gorgeous to farmers

owing to their capacity to boost harvest returns (Thierfelder *et al.*, 2017). Within Sub-Saharan Africa, the practice of on-farm trees exists for providing raw materials and reducing rural poverty and other services (Partey *et al.*, 2017). Incredibly, the practice has persistently prevailed because of its multiple benefits.

In Uganda, encouraging people to adopt on-farm trees began around the 1990s. This reality occurred in the designated areas in the Lake Victoria sphere and the western zone. Later, there was the realization of this practice in the rest of the parts of the country. A good example is the Kabale district (Magunda, 2020). Documented information on domestic gardens exists in Greater Bushenyi, the south-western region of Uganda. Noted also is the fact that this information presents 225 diverse plants, 54% provide foodstuff, 15% have monetary significance and exist for commercial purposes, and 11% provide medicine. These results underline this significance of home garden plants for domestic farming households. This fact highlights how homes are indispensable spaces for preserving and conserving botanical agro-biodiversity (Whitney *et al.*, 2018). Despite these benefits, the earlier study in Uganda (Zinngrebe *et al.*, 2020) shows little government support for agroforestry systems. This study also points out that incentives promote farming practices while putting less emphasis on trees and biodiversity, and such a practice may promote ecological degradation.

In Isingiro District, the importance of tree adoption on farmlands and its various benefits is evident (Niyongere *et al.*, 2018). Homegrown traditional practices are used in small-scale agriculture to lessen susceptibility to fluctuating climate patterns. However, despite efforts to promote sustainable forest plantations, Isingiro District experiences governance shortcomings that hinder

community efforts in environmental conservation. These challenges include negative perceptions; inadequate assets intended to reinforce the translation of plans into action, and the minimal civil desire to ensure the effective practice of on-farm trees for food production. Another challenge faced in the Lake Victoria region, in the Isingiro district, is an inadequate adaptive capacity which makes households susceptible to induced weather threats (Tolo *et al.*, 2014).

This paper aims at assessing benefits of on-farm trees adoption beyond producing enough food in the Isingiro District. As its contribution, this article provides illumination on households to internalize the gains of mixing trees with food and to recognize various factors influencing families toward attaining them. The study discards the hypothesis, “There is a significant relationship between social and economic factors and household benefits of agroforestry in the study sites”.

6.2 Materials and Methods

Isingiro District is where the study occurred in five villages in each of the three civil parishes. This study area was purposively selected because of convenient accessibility, farming nature of the population, farming practices, and geographical characteristics like historical record of dry seasons, low and irregular precipitation. The district lies in south-western Uganda, bordering Tanzania, Mbarara, Ntungamo, Kiruhura, and Rakai districts. It possesses a land area of 2,610 sq. Km. Its topography is usually described by deep gorges, gentle and steep slopes, and low acreages. Its soil profile includes clay, latrine loam, and sandy soil. This area enjoys tropical weather, gets average precipitation equivalent to 1200 mm, and seasonal water shortage limits agriculture (District Planning Unit, 2015). The study utilized a cross-sectional survey, with a qualitative and quantitative approach for collecting data regarding the benefits of agroforestry. Targeted households were 26 in every village and the selection of the households was through systematic

sampling. Determining the sample size was through using a formula by Yamane 1967 (Anokye, 2020) as indicated below:

$$N = \frac{N}{1 + N(e)^2}$$
 where N signifies sample size, e marginal error at 10% (0.05) and N the total population being studied. Therefore,
$$N = \frac{486360}{1 + 486360(0.05)^2} = 400$$

A semi-structured questionnaire was used to interview household head per family. Fifteen key informants (KIIs) were selected among the family agrarians, and LC I and II leaders using purposive sampling. This selection was based on their understanding of the study problem, and their experience in farming. The study used KII questionnaire to generate information. Focus group discussions (FGDs) comprising of fifteen participants were conducted using structural discussion. The analysis of qualitative data was through grouping it in thematic areas for obtaining interviewees' views. Quantitative data were coded, entered, cleaned, and condensed using descriptive statistics, frequencies and chi-square. The study employed Multiple Linear Regression to analyse the association between dependent variable and numerous independent variables for forecasting the worth of a dependent variable. The study also used the observation method to gather data. The population of the three civil parishes consisted of 4,810 in Kabaare, 2,803 in Kikokwa, and 2880 in Kigyendwa (District Planning Unit, 2015). The study did not use any tool to quantify the benefits of agroforestry due to time constraints and limitations in accessing adequate information about the most reliable tool to use.

6.3 Results

6.3.1 Social Demographic Characteristics

Gender

The study indicated that regarding gender (Fig. 6.1), the sum of males and females varied across the study sites. However, Kigyendwa Parish registered a significant proportion of men and women. Females were more than men in each study site. This finding implies that females are more involved in primary activities than their male counterparts.

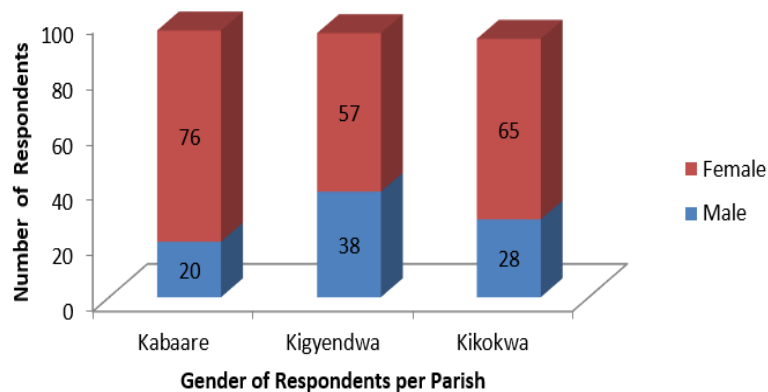


Figure 6.1: Gender of Interviewees for Each Parish

Age

More of the respondents of the reproductive age (30-59) were in Kabaare than in other parishes (Fig. 6.2). This finding implies that Kabaare being near the city, its strategic position, and more opportunities attracts relatively more young people than the remote areas.

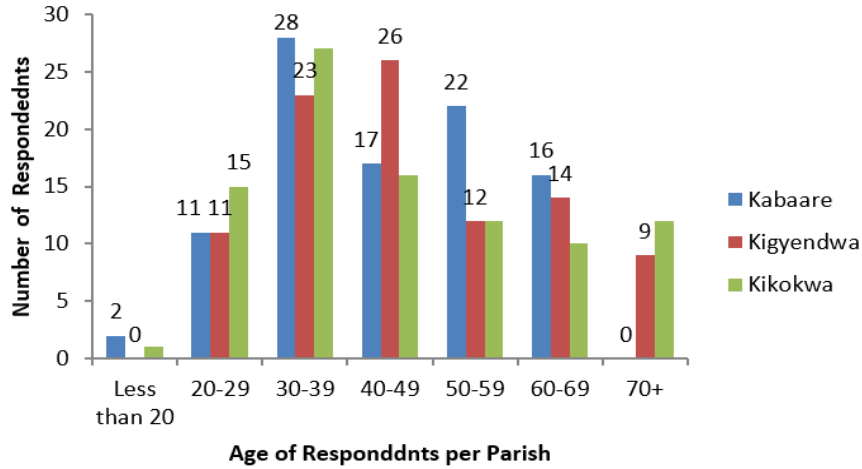


Figure 6.2: Age of Respondents per Parish

Marital status

In all the parishes, married respondents were more than unmarried though Kabaare Parish had more couples than Kigyendwa and Kikokwa (Fig. 6.3). The implication of this finding shows that marriage has a significant impact on agroforestry adoption and its benefits.

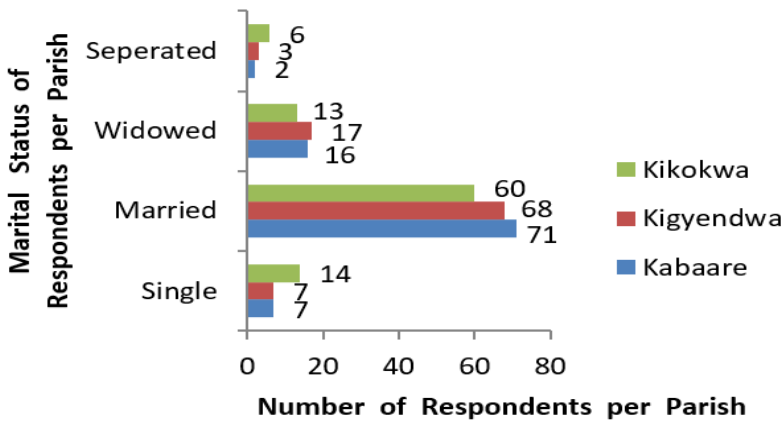


Figure 6.3: Marital Status of Respondents per Parish

Education

Most household partakers practicing agroforestry possessed elementary education (Fig. 6.4). This finding implies that though many respondents can read and write, their level of education is not enough to equip them with enough knowledge and innovative skills in on-farm tree enterprises.

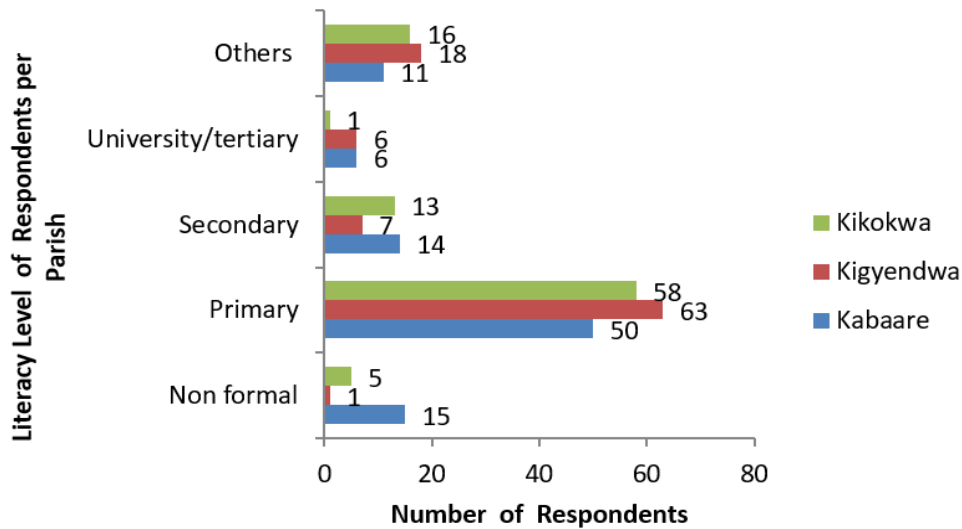


Figure 6.4: Literacy Level of Household Respondents per Parish

Family size

A good number of families were large sizes. Kabaare Parish had the uppermost fraction (Fig. 6.5). The implication of a large household necessitates adequate resources, essentials, and high expectations of labor provision.

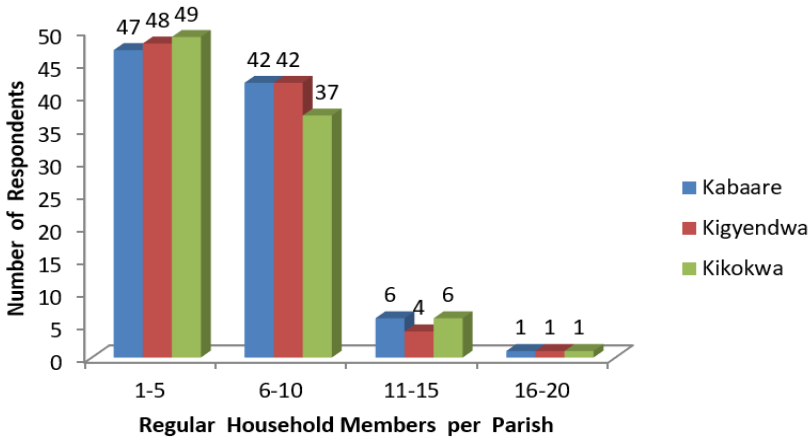


Figure 6.5: Regular Household Members (family size) per Parish

Main Occupation

Regarding the core livelihood, all the households were engaged in farming (Fig 6.6). There was no substantial variation regarding the proportion of agrarians in each study site. However, the two parishes of Kabaare and Kikokwa registered a higher proportion of agrarians compared to Kigyendwa Parish. As the implication of this finding, agriculture remains a core livelihood.

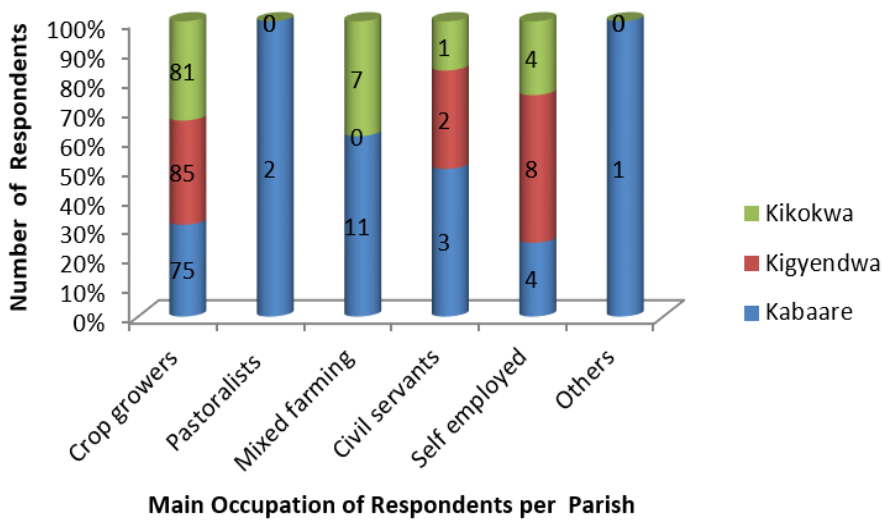


Figure 6.6: Main Occupation of Household Respondents per Parish

Land size

Land possession and usage differed among the study sites (Fig. 6.7). Most families owned less than an acre on which they lived. The implication of this finding shows land scarcity which limits households' benefits of agroforestry beyond food security.

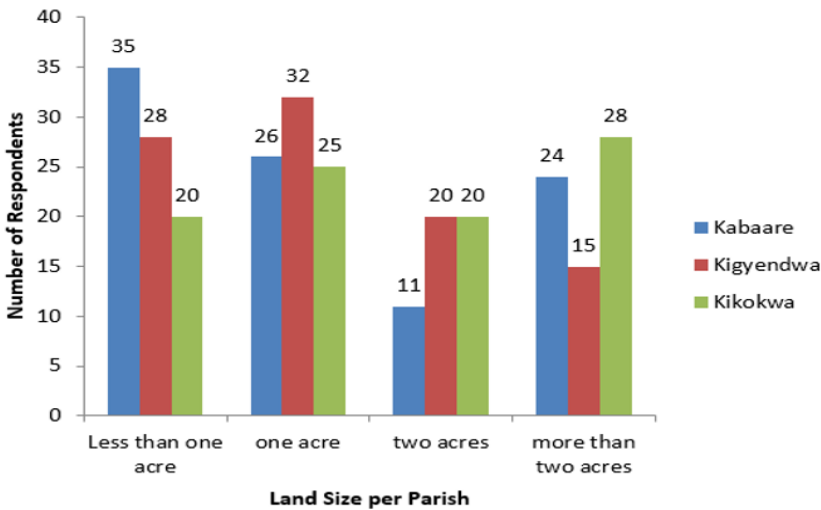


Figure 6.7: Land Size per Parish

Acreage for food production

In the context of acreage utilized for farming, the majority of the families were found to own insufficient landholdings (Fig. 6.8), with (177) equivalent to 62%, using one acreage or less, particularly amid larger families. However, they used more acreage for agroforestry practices than they owned. By implication, families that used more exceeding what they owned hired from outside.

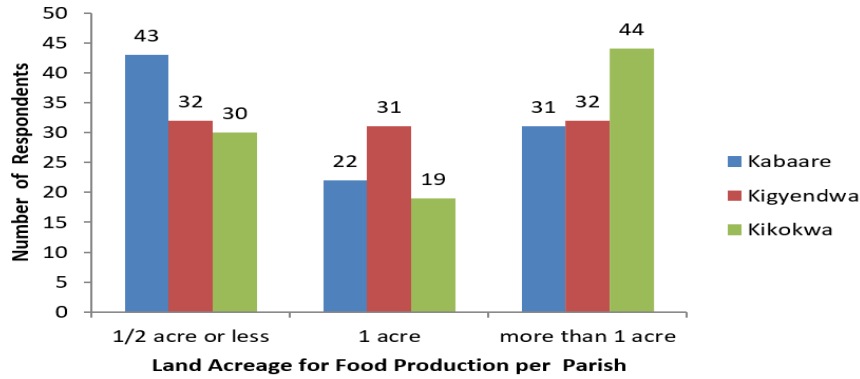


Figure 6.8: Acreage utilized per Parish

Monthly income

Regarding income earned every month, the majority of families earned little income from their overall sources of livelihood (Fig. 6. 9). Even families that happened to earn above that of the majority, found themselves getting little income. This finding implies that families engaged in farming may earn little income, which further limits their efforts to engage in agroforestry practices to benefit beyond the basic need of food.

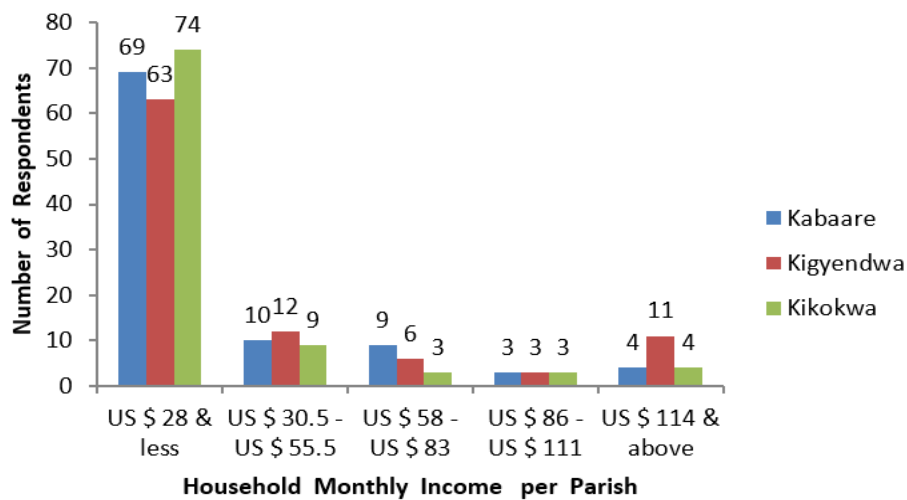


Figure 6.9: Household Monthly Income per Parish

6.3.2 Demographic Characteristics of FGDs and KIIs

Demographic features of FGDs and KIIs are indicated below in Table 6.1.

Table 6.1: Demographic Characteristic of FGD and KII Respondents

Variable	FGD Respondents		KII Respondents	
	Frequency	Percentage	Frequency	Percentage
Gender				
Females	10	67	6	40
Males	5	33	9	60
Age				
20-39	1	7	1	7
40-59	9	60	5	33
60-70	5	33	9	60
Marital Status				
Married	11	73	13	86.6
Widowed	2	13	1	6.6
Separated	1	7	0	0
Single	1	7	1	6.6
Education				
Non-formal	0		0	0
Primary	8	53	3	20
Secondary	4	27	8	53
University /tertiary	3	20	4	27
Major Occupation				
Famer	10	67	12	80
Civil servant	5	33	3	20

Source: Field Data

6.3.3 Association among Household Farm Factors, Agroforestry and Food Fecurity

The relationship among variables was verified using Chi-Square analysis. The variables were the size of the family, the size of the land, significant occupation, revenue, acreage, and marital status. According to the analysis, variables related to agroforestry were not significantly associated since they were above the significance level of 0.005. The variables included family size as well as the

land size, the size of the family together with land acreage, and marital status with land acreage. The implication is that the inadequacy of these variables hinders the enhancement of agroforestry and its benefits beyond the basic need of food. However, income and occupation showed a significance level of 0.000 indicating a positive association with agroforestry benefits. This finding implies that much effort could be engaged in improving household income and source of livelihood by looking into other variables because a change in one variable will likely not bring a change in food security.

Family size and land size

Table 6.2: Chi-Square of Family Size and Land Size

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	10.825 ^a	9	.288
Likelihood Ratio	11.498	9	.243
Linear-by-Linear Association	.904	1	.342
N of Valid Cases	284		
a. 8 cells (50.0%) have expected count less than 5. The minimum expected count is .54.			

According to cross-tabulated data of the family size and land size in the three parishes (Table 6.2), a bigger percentage of households (61%) possessed less than an acre of land. This finding implies inadequate land available for agroforestry and food production.

Family size and land acreage

Table 6.3: Chi-Square of Family Size and Acreage

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.932 ^a	6	.553
Likelihood Ratio	5.522	6	.479
Linear-by-Linear Association	1.085	1	.298
N of Valid Cases	284		

Cross-tabulation of the family size and land acreage (Table 6.3) indicated that households that utilized less an acre were the majority. This finding implies that several households are likely not to participate significantly in agroforestry due to inadequate land.

6.3.4 Marital Status and Acreage used pro Agroforestry

Chi-Square of marital status and acreage

Table 6.4: Chi-Square of Marital Status and Acreage

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	8.860 ^a	6	.182
Likelihood Ratio	9.088	6	.169
Linear-by-Linear Association	2.574	1	.109
N of Valid Cases	284		
a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 2.79.			

The relationship between marital status and acreage committed to agroforestry adoption is critical in each studied parish. Findings showed that married couples utilized extra acreage intended to produce enough food and agroforestry, and Pearson's χ^2 value of association emerged to stand at $P= 0.182 >0.05$ (Table 6.4). The association between these variables is insignificant and has less influence on agroforestry. This finding implies that households can invest in alternative areas which may help them improve and use landholdings intensively if they are to benefit from agroforestry beyond the basic food need.

Chi-Square of occupation and income

Table 6.5: Chi-Square of Major Occupation and Monthly Income

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	67.458 ^a	20	.000
Likelihood Ratio	46.070	20	.001
Linear-by-Linear Association	16.699	1	.000
N of Valid Cases	283		
a. 23 cells (76.7%) have expected count less than 5. The minimum expected count is .03.			

Based on the data analysis, χ^2 put the association between household occupation and income at $p= 0.000$ (Table 6.5). The major association among the twofold variables means that farmers need to focus more on income generation if they desire to benefit from agroforestry adoption beyond food security.

6.3.5 Main Type of Adopted Agroforestry System, Practices and Benefits

Table 6.6: Main Type of Agroforestry System Adopted and Household Benefits

<i>Dominant Type</i>	Kabaare	Kigyendwa	Kikokwa
Agrosilviculture	41%	22%	37%
<i>Household benefits beyond food security</i>			
Income	39%	25%	36%
Shade	43%	0%	57%
Manure	0%	20%	80%
Timber	33%	0%	67%
Windbreaks	11%	11%	11%

More households practicing agrosilviculture as the dominant agroforestry system were in Kabaare than in Kikokwa and Kigyendwa (Table. 6. 6). FGD participants (100%) showed that agrosilviculture, alley cropping, boundary cropping, home gardens, and woodlot were all practiced at the study sites though the level of adoption was low. The low adoption rates show that many families have not yet fully benefited from agroforestry practices.

6.3.6 Household Adopted Elementary Tree Species

Table 6.7: Elementary Tree Species Households Grow Across the Three Parishes

No.	Tree specie	Kabaare Parish		Kigyendwa Parish		Kikokwa Parish		Percent	
		Frequency	%	Frequency	%	Frequency	%		
1	Mango	36	22	15	16.6	28	18.0		
2	Avacado	40	24.5	18	20	35	22.4		
3	Pawpaw	31	19	21	23.3	33	21.1		
4	Jackfruit	27	16.5	15	16.6	25	16.0		
5	Casta oil	6	3.6	5	5.5	4	2.5		
6	African satinwood	3	1.8	1	1.1	4	2.5		
7	Guava	11	6.7	6	6.6	19	12.1		
8	Markhamia lutea	0	0	1	1.1	2	1.2		
9	Erythrina abyssinica	1	0.6	1	1.1	1	0.6		
10	Diospyros abyssinica	1	0.6	0	0	0	0		
11	Cordia Africa	0	0	0	0	1	0.6		
12	Coffee	6	3.6	7	7.7	3	1.9		
13	Ficus exesperata	1	0.6	0	0	1	0.6		
	Total	163	100	90	100	156	100		

The primary and dormant tree species households planted were mangoes, avocados, and jackfruits, with Kabaare dominating over mangoes, avocados, jackfruits, including other kinds of tree species (Table 6.7). This finding implies the location of Kabaare and its transport network to Mbarara City makes it enjoy a comparative advantage over other parishes in terms of market and extension services accessibility.

6.3.7 Challenges and Suggested Ways of Enhancing Agroforestry Benefits beyond Food Security

6.3.7.1 Challenges and household ways of enhancing agroforestry

Table 6.8: Challenges Faced in Enhancing Agroforestry and Adopted Means to Overcome Them

Challenges	Kabaare	Kigyendwa	Kikokwa
Poverty	57%	10%	33%
Agricultural inputs	30.70%	7.60%	61.50%
Pests & diseases	37.50%	25%	37.50%
Limited knowledge & skills	32%	44%	24%
Ways households suggested to overcome the above challenges			
Training & sensitization programs	36%	28%	36%
Extension services	38%	38%	24%
Provision of seedlings	36%	9%	55%
Creation of favorable market	75%	25%	0%

Regarding challenges faced by the households in tapping the benefits of agroforestry, poverty in Kabaare constituted the highest percentage contrasted with Kigyendwa and Kikokwa. Farming inputs were predominantly lacking in Kikokwa. Pests and diseases affected more households in Kabaare and Kikokwa than in Kigyendwa. Lack of knowledge and skills accounted for the highest percentage in Kabaare and Kikokwa. The suggestions for promoting agroforestry included training programs, extension services, provision of seedlings, and a favorable market (Table 6.8). This finding implies that most respondents lacked broad knowledge for enhancing agroforestry and extension services for overcoming limiting factors.

6.3.8 Socioeconomic Factors Influencing Household Agroforestry Adoption and Benefits

6.3.8.1 Model summary of Multiple Liner Regression

Table 6.9: Model Summary of Multiple Liner Regression

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.286 ^a	.082	.062	.468

a. Predictors: (Constant), Marital status of the respondent, Main occupation, Marital status of the respondent, Main occupation, Land size in acres, Regular household members, Monthly income, Acreage

b. Dependent Variable: Income generated

Findings from the model summary (Table 6.9) using marital status: the main occupation, land size in acres, family size, monthly income as well as acreage used to produce food show an Adjusted R Square value of 0.062. Such value entails that 6.2% of variations in income are predicted by marital status, the main occupation, land size in acres, family size, monthly revenue, as well as acreage for producing foodstuff, while the remaining 93.8% are due to the other factors.

6.3.8.2 Regression Coefficients of Determination Value

Table 6.10: Regression Coefficients of Determination Value

		Table 9: Coefficients ^a			T	Sig.
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
1	(Constant)	1.820	.140		12.998	.000

Number of regular household members	-.097	.043	-.130	-2.241	.026
Land size in acres	-.053	.054	-.125	-.994	.321
Acreage	-.058	.071	-.104	-.816	.415
Major occupation	-.027	.026	-.063	-1.055	.292
Monthly income	.042	.025	.103	1.686	.093
Marital status of the respondent	.082	.045	.107	1.841	.067

a. Dependent Variable: Income generated in US \$

Regarding coefficients indicated in Table 6.10, family size has a beta value of -0.130 at a significance value of 0.026, land size in acres reveals a beta value of -0.125 at a significance level of 0.321, land acreage -0.104 at 0.415, main occupation -0.063 at 0.292, monthly income 0.103 at 0.093 and marital status 0.107 at the significance value of 0.067. The monthly income and marital status have a positive and insignificant effect on agroforestry. This finding means that the farmers should invest enough in agroforestry while looking for other areas which may bring more benefits. The hypothesis, “There is a significant relationship between the socioeconomic factors and household benefits of agroforestry in the study sites” is rejected.

6.4 Discussion

6.4.1 Influence of Social-demographic Characteristics on Household Agroforestry Benefits

According to the study, socio-demographic characteristics are influential regarding household benefits of agroforestry. Although most households were male-headed in all sites, females constituted a more fraction. These results mean that women were the majority found at home at the time of the interview. These views agree with the previous study results obtained from the Kapsaret Sub-county, Uasin Gishu County, Kenya where cultural norms may have somehow evolved (*Rotich et al., 2017*). This outcome is commonly not what is expected culturally except in female-headed households. One would expect household male respondents to be the majority due

to their cultural-based headship roles in a family. The reason accounting for this scenario is that women do most of the domestic work related to land in terms of food production, tree caring, and looking after children. Such connectedness and role enhance the chances of finding women at home during the study. This view is supported by the previous results, (Rotich *et al.*, 2017), where women's counterparts go out searching for job opportunities to generate income for family sustainability, and doing business. The implication is that cultural roles and other factors contribute to the significant representation of women at home during the sampling period. These roles and factors include female-assigned roles, their significant association with traditional activities like agriculture, and men's quest for work outside their families.

Further, although women contribute significantly to the benefits of agroforestry than men in the study sites, they generally have no much or equal say in deciding over agroforestry benefits. Women's less power means that men dominate intra-household decision-making pertaining to resources such as land access and usage which limits agroforestry benefits. The present result resembles the past outcome results from northwest Vietnam (Catacutan & Naz, 2015), where men dominated decision-making on crops, varieties, and tree species to plant. A lesser ratio of women (nine percent) indicated that they had participated in deciding on the type of tree as well as a crop to propagate. The low participation of women could be associated with men's capacity to get modern farming knowledge via being members of cooperatives and better extension contacts, and this reality is combined with patriarchal power to control their wives. Most of the rights and decision-making on resource utilization especially land lie in the hands of men. Women's limited exercise of equal rights to use household resources affects the household capacity to enjoy the benefits of agroforestry beyond food security. This view is consistent with the findings in Kapsaret

Sub-County of Uasin Gishu County, Kenya where men make decisions on on-farm trees and producing foodstuff, with limited involvement from women (Rotich *et al.*, 2017). Men's dominance in making decisions on household resource use implies that women's invisibility in household decision-making limits households' potential for tapping agroforestry benefits.

Education is a significant factor in influencing households to benefit from agroforestry. Most households practicing agroforestry possessed elementary education. Although, notably, this level of education allows people to practice agroforestry, it is still limited to let households reap profitably. The households need more support regarding refresher courses to boost their knowledge capacity and equip them with innovative skills in on-farm tree enterprises. These results are similar to the past study findings in the Kapsaret Sub-county of Uasin Gishu County, Kenya (Rotich *et al.*, 2017), and in Manafwa District, Uganda (Kabiru *et al.*, 2018). These studies show that limited education affects the household benefits of on-farm trees. These findings are reliable since a higher literacy level determines household agroforestry benefits. The primary education level alone is not adequate to enable farmers to understand and benefit adequately from agroforestry. The lower the level of education, the fewer households may be able to analyze, interpret, and assimilate the available farming information. Nevertheless, there is no consistency between the present findings and earlier results in Malawi (Toth *et al.*, 2017) and in the Southwest zone, Nigeria (Akinawalere, 2017), where education plays a significant role in influencing households to benefit from agroforestry. The implication is that unless household respondents who have a primary education level undergo refresher capacity-building courses in agricultural skills, most of them may not be able to benefit significantly from agroforestry as a result of the knowledge gap between their education levels and potential to benefit from agroforestry.

The majority of households in all the parishes owned less than one acre and less than two acres of land. This means that households experienced land shortages. This finding resembles previous study results in Vihiga Sub-county, Kenya (Asena *et al.*, 2017) on household land size. According to these earlier results, most participants (about 75%) had less than two acres, with 37.4% owning less than 1 acre. Both outcomes match because limited land may not motivate households to increase the benefits of trees on farms. The land has become the most sensitive resource in the study sites since it is inadequate, fragmented, and over-cultivated. Consequently, land scarcity results in resource conflict among the neighboring households due to trespass in search of survival. In concurrence with KIIs and FGDs, households that have less land opt to use it for growing legumes, and cereals instead of integrating trees with crops. In one of the families, a key informant said, “My husband planted coffee in our banana plantation against my will and that of our children. We want to eliminate the coffee trees. Although this disagreement has escalated into a conflict, we are determined to get rid of it because our land is too small to accommodate both crops and trees which fail other crops to grow well”.

One male FGD participant also asserted, ‘due to land shortage we are facing, I cannot plant trees on my small landholding since trees override other crops and fail them’. This is attributed to farmers’ perception that their small landholdings cannot accommodate trees. This view echoes the earlier study in Kapsaret Sub-county, Kenya (Rotich *et al.*, 2017) which reveals that limited land for cultivating drives crop growers to put their portions of land to small-scale farming, while sidelining on-farm tree practice. However, small landholders can still benefit from agroforestry technology by utilizing the available space efficiently. This notion underlines the necessity for interventions and inventive practices to improve land usage efficiency. This, in turn, supports

making the best utilization of the diverse returns that agroforestry can deliver to households. This implies that regardless of its size, the land remains a significant factor in realizing agroforestry benefits.

6.4.2 Association between Household-farm Factors and Agroforestry Benefits beyond FoodSecurity

Household land acreage used for agroforestry benefits does not significantly differ among the study sites. The χ^2 established no major association between the size of the household and the size of the land ($p= 0.288>0.05$) and between the size of the household as well as acreage for agroforestry benefits ($p= 0.553>0.05$). This finding does not reflect the earlier results from the district of Dale District, southern Ethiopia (Adane *et al.*, 2019) where the family size (4-6 members) and land size were significantly associated (<0.05). In the current study sites, large family units have a negative impact on family agroforestry benefits due to a combination of major factors mainly land shortage and lack of each household member's participation in household farming. Further, households that face land inadequacy and swelling of household sizes focus more on the expenditure needs than making use of the accessible land industriously. Although the family size has a positive and insignificant impact upon land size, and land acreage at Phi Cramer's $V= 0.195$, $P= 0.288$ and 0.132 , $P=.553$ respectively, their correlation is statistically insignificant and influences household agroforestry benefits less positively. This implies that large families experiencing land shortage fail to save reasonable income which affects household investment in agroforestry benefits.

Findings show a significant association between significant occupation, and revenue intensity reflected in the effect it has on household benefits of agroforestry. The χ^2 ranked the relationship at $p= 0.000$. This means that household occupation has both a positive and significant effect on

income at Phi Cramer's $V=0.488$, $P=0.000$. This is consistent with past study results in Bungoma and Kakamega counties, Kenya (Hughes *et al.*, 2020), where farmers reported higher income from selling agroforestry yields and 14% higher cash value from fuelwood as a result of their farming occupation. It can be argued that families that have occupational opportunities that provide them with reasonable income increase their chances of investing in the benefits of agroforestry than those which do not have. As an implication, if the household revenue rises, there is higher likelihood for the family to practice agroforestry for diverse benefits. This notion demonstrates the link between the sum of one's monthly income invested in agricultural practices and the subsequent generated revenue.

According to multiple regression findings and the coefficient of determination (Adjusted R square) value, monthly income, and marital status had a positive and insignificant effect while family size, land size in acres, land acreage for agroforestry benefits, and main occupation had a negative and insignificant influence on household income. This finding disagrees with the finding gathered from southern Tigray Ethiopia (Gebru *et al.*, 2019), where variables such as family size, landholding, and marital status, had a significantly positive ($p < 0.000$) effect on household agroforestry adoption. The present study finding in Ndabibi, Nakuru County Kenya (Kaua, 2020) supports the present study results on the negative and insignificant effect of land size on agroforestry adoption though it differs from its income which it shows as having a positive and insignificant effect. Households in the study sites are resource restrained and combined with other factors such as low awareness, affects the level of household agroforestry benefits.

6.4.3 Livelihood Benefits Households Derive from Agroforestry Practices

According to the study assessment, agrisilviculture is the dominant agroforestry system, and households were interested in boundary cropping, intercropping, alley cropping, and woodlots. This finding matches earlier results in the Nyamagabo constituency, the southern region of Rwanda (Kiyani *et al.*, 2017), where alley cropping, boundary, and woodlots are adopted. The adopters of these practices find it easier to engage in them since they are much easier to establish though the adoption by the majority is wanting. Most of the benefits fall below the average in all the parishes. The practitioners got low income and benefited less from other ecosystem services. The implication is that unless the government strengthens its support to the households, the contribution of agroforestry, in general, will remain insignificant, hence limiting the improvement of households' well-being.

Despite the variations among agroforestry practitioners in the study sites, most benefits fall below the average, except where Kikokwa lead in timber, Kabaare in shade trees, and Kigyendwa in windbreaks. The low benefits of agroforestry mean that households that practice and benefit from the practice are still a few. This level of agroforestry benefit differs from the study in some communities like Ayakomaso, Mantukwa, Dumasua, and Fiapre in Ghana, which indicates that the number of agricultural household practitioners improved from 54% in 2007-to 155% in 2013 (Ashiagbor *et al.*, 2020). This past study also shows that growers' responsiveness to familiarized tree adoption skills scaled from 26 to 90%, with nearly 76% involved in the agroforestry practices due to government support and training programs.

It is difficult for farmers to engage in any practice and significantly benefit from it due to their perceptions about the adoption and other demotivating factors. Some respondents engaged in agroforestry adoption have not remained the same. FGD participants stated, ‘We are enjoying the benefits of agroforestry through getting additional income, and shade for my gardens. We have to plant more around our land. This outcome agrees with the past results collected from the two communities namely Burat and Kinna, Isiolo County, Kenya (Quandt *et al.*, 2019), where on-farm trees enhanced the well-being of respondents by 25.8% and 41%. This change shows that agroforestry has the power to promote the well-being of households, their level of income, and household socioeconomic status. This finding matches past results in Latin America (Krishnamurthy *et al.*, 2019), which indicate an increment in rural farm incomes and crop production.

Further, results revealed that the most common and highly ranked type of fruit trees households integrated with legumes and cereals across the study sites were mango (*Mangifera indica*), pawpaw (*Carica papaya*), and avocado (*Persea Americana*), all of exceptional origin. The practice of these trees means that households are interested in fruit tree adoption on their farmlands, which serve various purposes beyond food security. This finding is similar to the previous finding gathered from Tigray, Ethiopia (Gebru *et al.*, 2019), in which the most numerous fruit species preferred by small farmers were: mango (*Mangifera indica*), pawpaw (*Carica papaya*), and avocado (*Persea Americana*). The median fruit tree richness per farm was six species ranging from 1-to 15. Despite low adoption of trees on farm, the findings showed that the adoption of fruit trees is still low. Fruit tree species have a high value in providing other benefits beyond food security like income and crop shades. This view matches an earlier study in Southwestern Ethiopia (Fida, 2019) on the role

of home gardens in promoting livelihood. This understanding implies that diverse tree species provide alternative sources of livelihood to families.

6.4.4 Conclusion and Recommendation

This thesis acknowledges the role that agroforestry plays by providing multiple benefits to households. This study emphasizes the benefits of on-farm trees based on qualitative data. Socio-economic variables influence household benefits from mixed cropping. The study has rejected the hypothesis, “There is significant relationship between socioeconomic factors and household benefits of agroforestry” in the study sites. Isingiro District being a semi-arid zone faces several challenges including food shortage in most households and effects of climate change like prolonged droughts. Many households look at unreliable rainfall, dry spells, and land shortage as an excuse for not having adopted trees on their farms. These factors demonstrate why the majority of the households are non-beneficiaries of agroforestry. Assessment of the study results indicates that households that adopted agroforestry are to some extent benefiting from the practice. However, the number and quality of tree species that households integrate with legumes and cereals are low and ineffectively managed. This is attributed majorly to inadequate awareness, the absence of extension workers, weak governance, and leadership gaps at both household and government levels. The study recommends policy review, strengthened governance institutions, nurturing transformative leadership for supporting household agroforestry practices, innovative agroforestry technologies and change of households’ perception of agroforestry management through awareness creation. The study also suggests that government empowers household heads in agroforestry, and helps households to bridge the knowledge gap and their potential through refresher hands on training courses.

Further study into the specific aspects influencing adoption rates is needed to facilitate the broader implementation and success of agroforestry initiatives in the region.

CHAPTER SEVEN

SUMMARY OF RESEARCH FINDINGS, GENERAL DISCUSSION, CONCLUSION AND RECOMMENDATIONS

7.1 Introduction

Chapter 7 summarizes the main results and provides a synopsis of the general discussion, conclusions and recommendations based on the results embedded in chapter four to six in this thesis. The chapter presents the summaries under sub-sections that match with the specific objectives. Further, this chapter proposes fields for future investigation.

7.2 Summary of the Research Findings

Household food security in the Isingiro District, and specifically in the three parishes where the study was conducted is influenced by several factors.

This study recognized the existence of more food-secure households being headed by males contrasted to households headed by females.

Gender participation was identified as one of the primary factors that affect the mode of household food production. According to the study, females in families that were headed by males engaged more in household food production. Related to this factor, the findings showed that women are usually assigned core domestic and cultural roles that keep them close to their homes and more so to household gardening.

The study revealed a high dependency ratio of 5-6 children per woman which affects food security. It was found that some men and children leave the burden of farming to the women. This affects the level of food production in the family.

Household decision-making was also highlighted as a key factor contributing to food security in Kabaare, Kikokwa, and Kigyendwa Parishes. This investigation noticed disparities in the decision-making process. Among the three parishes, Kabaare Parish had the leading family members who participated in decision-making about agroforestry-based food security. However, together with other parishes, the performance was below the average.

Some families have adopted agricultural strategies such as crop diversification, cost-effective storage systems, proper farming methods, and the use of organic manure to overcome food insecurity.

The study further indicated that most variables: land size, family size, principal livelihood, and marital status under socio-economic factors have a positive and insignificant effect. On the other hand, acreage for food production and monthly income have a negative and insignificant effect on maize production

Both the family size and land size play a vital role in decision-making on mixed farming. Households with high numbers of household members at home and yet experience land shortages find it hard to decide on mixed farming. Thus, it was realized that land shortage is a demotivating factor in household decision-making on agroforestry practices.

Most agroforestry benefits to the households fell below the average. Households (20.7%) obtained benefits from agroforestry practices. However, most households did not indicate having benefited from agroforestry. The study revealed land shortage associated with lack of knowledge of how to adopt trees, drought, and inadequate extension services as some of the factors responsible for the low percentage of beneficiaries. Most households had adopted 1-10 tree species. The major socio-

economic determinants influencing agroforestry benefits in the study sites included family size, farm size, education, income, and occupation. The only socioeconomic factor that was identified as having a positive influence on agroforestry benefits was family income.

The findings further revealed that land shortage was a major problem encountered in most households. Most households across the study sites owned less than one acre and less than two acres of land. Such land size influenced by the household perceptions about it as not being enough to accommodate trees, ends up limiting the adoption of agroforestry.

7.3 General Discussion

7.3.1 Household and Farm Level Governance Factors Affecting the Transition to Household Food Security

This thesis demonstrated that most households across the study sites did not have sufficient food. It also recognized the existence of more food-secure households being headed by males contrasted to households headed by females as reflected in the previous results in Teleyayen Sub-watershed, Ethiopia (Agidew & Singh, 2018). The reasons accounting for this are that marriage may most likely make households stable, access resources easily, effective users of the available resources, and may grant them more probability of obtaining extra farming land. One argument is that two responsible individuals in conjugal life are better than one in matters of decision-making and planning about food production.

Gender participation is a primary factor that affects the mode of household food production. According to the study, females in families that were headed by males engaged more in household food production. This finding is supported by the earlier results gathered from Africa (Palacios-

Lope, 2015). This study positions female engagement in agricultural production at 60-80% in Africa. The significant contribution of women to domestic food production is also supported by the study findings in studies (Kilby *et al.*, 2019) as well as (Suárez *et al.*, 2018) traced from India besides Colombia. From a general perspective, women spend more time on staple and other food crops compared to men who spend more time on cash crops and other off-farm activities. However, male mobility in search of higher income opportunities may not let males participate actively in household food production as they may be away at the time of making decisions.

Other factors which affect food security include a high dependency ratio where there are 5-6 children per woman. This is a high number too demanding to feed in semi-arid areas, with irregular and low precipitation, poor soils in some areas, and governance gaps.

Household decision-making was highlighted as a key factor contributing to food security in Kabaare, Kikokwa, and Kigyendwa Parishes. This study notices variations in the decision-making process. Among the three parishes, Kabaare Parish has the biggest household members involved in decision-making about agroforestry-based food security though together with other parishes, the performance falls below the average.

Some families are urged to adopt agricultural strategies such as crop diversification, cost-effective storage systems, proper farming methods, and the use of organic manure to overcome food insecurity. However, the performance in most adopted strategies falls below the average **except** for Kabaare which scored above the average in cost-effective systems proper farming methods, and organic manure. This is unlike in Karenga and Kapchesombe Sub-counties, Eastern Uganda (*Tiyo et al.*, 2015). The low adoption of such strategies is due to inadequate information and extension services.

The study further established that most variables: land size, family size, principal livelihood, and marital status under socio-economic factors have a positive and insignificant effect whereas acreage for food production and monthly income have a negative and insignificant effect on maize production. Regarding beans production, the size of the land, number of regular household members, and once-a-month revenue have a positive and insignificant effect while acreage of land, main occupation, and marital status have a negative and insignificant effect. As for banana growing, most variables (acreage, number of regular household members, key livelihood, every monthly revenue, and marital status) have a positive and insignificant effect while land size in acres has a negative as well as insignificant effect on banana growing. Therefore, based on regression analysis of the main food crops, this study rejects the null hypothesis which stated that “There is a significant relationship between household and farm level-governance factors that affect the transition to household food security in the study sites.” This prevailing situation has influenced most households to view food security as a complex phenomenon. Such a reality links to one fact that this world is considered to have enough food to feed every human being yet access to food inefficiency of necessary food nutrients has remained a problem (Stringer, 2015).

7.3.2 Effect of Household Decision-making on Household Agroforestry-based Food Security

This study realized imbalance in the context of the frequency of participants. Female participants were more than male respondents as related to the study findings in Machakos County, Kenya (Kinyili *et al.*, 2020), where female respondents were 56.9%. However, Kabaare Parish had more female participants and a few male respondents. Why females interviewed were more than males was a result of men searching for job opportunities, and norms as found in a previous study in Nigeria (Baba *et al.*, 2015).

Although both males and females engaged in domestic agriculture, males dominated household decision-making. In some male-headed households decisions were made jointly, though the majority of the male-headed households excluded women from participation in decision-making on agroforestry-based food production study as indicated by the results in Lubungo A and Maseyu villages in Morogoro rural district, Morogoro, Dar es Salaam (Uissoa *et al.*, 2016). As a result, exclusion in decision making especially on land and control over the farm produce affects agroforestry adoption and the level of household food production. Due to serious land shortage, most women are generally seen as holding no decision-making power over the land resources (Nyantakye, 2017).

Both the family size and land size play a critical role in decision-making on mixed farming. Households that have high numbers of household members staying at home while they are facing land shortages find it hard to decide on mixed farming adoption. The land shortage is a significant factor upon which most households base their decision not to adopt agroforestry. Consequently, for some households with an average of 6-7 children for every woman, there is high demand also for settlement land which decreases land for mixed farming. This view is supported by the past study results in Rombo District, Tanzania (Mmbaga *et al.*, 2017), where 80% of the land for seasonal agriculture has been affected by settlements.

7.3.3 Benefits of Agroforestry to Households

The study found that most agroforestry benefits to the households fell below the average, except where Kabaare and Kikokwa took the lead in the fresh air, Kikokwa in timber, Kabaare in shade trees, and Kigyendwa in windbreakers. Findings showed that households (20.7%) obtained benefits from agroforestry practices. However, the study also reveals that most households did not

indicate having benefited from agroforestry. Among the factors responsible for the low percentage of beneficiaries include land shortages associated with the lack of knowledge of how to adopt trees, drought, and inadequate extension services. Most households had adopted 1-10 tree species which is too limited to enable households to move towards the attainment of food security. The major socio-economic determinants influencing agroforestry benefits in the study sites included family size, farm size, education, income, and occupation. The only socioeconomic factor that was identified as having a positive influence on agroforestry benefits was family income.

Although women contribute significantly to the benefits of agroforestry than men in the study sites, they generally have not much say in deciding over agroforestry benefits. As a result, the authority to make decisions is male-centered, which affects household capacity to enjoy the benefits of agroforestry beyond food security as supported by the previous study findings in Kapsaret Sub-County of Uasin Gishu County, Kenya where decisions on on-farm trees as well as integration of food crops are generally made by men, with less involvement of women (Rotich *et al.*, 2017). Men's dominance reduces females' visibility as well as limits households' potential for tapping agroforestry benefits.

The land shortage was a major problem experienced by most families. Most households across the study sites possessed less than one acre and less than two acres of land. Such land size according to the study findings, whereby households perceive it not to be suitable for accommodating trees, ends up limiting adoption of agroforestry. This finding resembles previous study results in Vihiga Sub-county, Kenya (Asena *et al.*, 2017) on household land size regarding land size. This study showed most respondents (about 75%) had less than 2 acres, with 37.4% owning less than 1

acre. However, despite the size of the land in Vihiga Sub-county unlike in the study sites, households were able to practice agroforestry using innovative means.

7.4 General Conclusion

Most male-headed households were more food secure than non-male-headed ones. Most variables: land size, family size, main livelihood, and marital status under socioeconomic factors have a positive and insignificant effect on maize production whereas land acreage and monthly income have a negative and insignificant effect. Regarding crop production, most of the variables had a positive and insignificant effect on the production of beans, maize, and bananas. Therefore, based on the regression analysis of the main food crops, this study rejects the null hypotheses.

The study has noted that variables such as land size and, family size accompanied by geographical conditions, and institutional and governance gaps have significantly affected food production across Kabaare, Kikokwa, and Kigyendwa Parishes. This is confirmed by documented evidence from Isingiro District itself which highlights some of these factors that affect food security.

Household decision-making remains a basic factor in household agroforestry practices for food security. Although males and females engaged in domestic husbandry, men dominated women by using their power to decide on the allocation and use of resources such as land as well as proceeds to produce food. The dominance of men in household decision-making has a significant effect on food production and adoption of agroforestry. This dominance reduces women's visibility and limits households' capacity and potential for tapping agroforestry benefits.

According to the findings, only 20.7% of the households benefited from agroforestry practices. This finding implies that the majority of households never benefited from on-farm trees. Among

the factors responsible for the low percentage of beneficiaries include land shortage, lack of knowledge of tree practice, drought, and inadequate extension services. The major socio-economic determinants influencing agroforestry benefits in the study sites included family size, farm size, education, income, and occupation. The only socioeconomic factor that had a positive effect on agroforestry benefits was family income.

The land shortage was a major problem experienced within several households. Most households across the parishes possessed less than one acre and less than two acres of land. From the findings, most respondents (about 75%) had less than 2 acres, with 37.4% owning less than 1 acre.

7.5 Recommendations

This study suggests several recommendations for households to be able to produce enough food:

Households in the study sites and the district as a whole need a significant transition to the level where they have sufficient food. If this outcome is to be realized, this thesis recommends making and ensuring effective decisions on household food security and strengthening them using a participatory and bottom-up approach. There is a need for an enormous and concerted effort to nurture transformative leadership starting from the village level that possesses all the qualities of governance: accountability, inclusiveness, responsibility, transparency, participatory among others, and ecological consciousness. The study sites need servant type of leaders who are not driven by self-centered interests but are ready to work within the interests of the people they lead to ensure that daily needs, in particular, the attainment of agro-based food security are realized.

The study recommends building and strengthening household joint decision-making processes for ensuring that households work towards attaining food security on a teamwork basis. However, this

requires awareness creation at the household level by government leaders who are well-informed about the issues affecting household food security. This calls upon the establishment of a household decision-making policy that discourages individual decisions and this can be assimilated through using the available modes of communication and participation. In this way, household decision-making can firmly be linked to the local government and gain momentum to address issues affecting household food security.

Taking to the household's timely agricultural extension services is one of the premium ways of minimizing food insecurity. The local government supported by the central government needs to complement the functioning of the decentralization policy, by fulfilling its responsibility as well as exercising its mandate of taking to the households essential services. Those services include training aimed at agricultural craftsmanship awareness of food security strategies and the advantage of keeping in equilibrium agricultural and ecological integrity. The study thus proposes improved national support to ensure that strong resolves are made and successfully implemented. The emphasis should be put on the participation of households in decision-making. The study also recommends increased external support in the form of farm inputs as well as finances to single mothers and divorced people at the household level.

This thesis further recommends policy appraisal and strengthened governance institutions for supporting households to benefit from agroforestry.

There is a need for using well-designed development models such as the Parish Development Model (PDM) to establish an exceptional demonstration agricultural model in the area of agroforestry in each rural civil parish or sub-county. The model is intended to give a sense of

direction to the households in the area of promoting mixed farming for diverse benefits, of which food security remains a priority.

For the recently established Parish Development Model to be relevant to household food production and poverty elimination, Isingiro District Local Government the government has to eliminate corruption by putting nondiscriminatory rules, engage rural households in studying the situation on the ground, do a lot of populace sensitization, support households in terms of inputs accompanied with regular monitoring and evaluation. There is also a need for the government to support households to move towards food security, and ecological integrity by overseeing, monitoring, and evaluating agrarian-linked programmes and playing an advisory role in matters of food security.

7.6 Areas for Further Research

This thesis suggests empirical analysis regarding policies, practices, and discrepancies at various governance layers affecting household engagement concerning on-farm trees and crop growing. Alternative strategies and motivational factors for adopting on-farm trees, and embracing a new mode of diversifying benefits of agroforestry beyond the ordinary become another area this study proposes. To fully comprehend and verify agroforestry benefits, future investigations should focus on quantifying them, using suitable metrics and procedures.

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APPENDICES

Appendix I: Semi-structured survey questionnaire for the household level

Consent

My name is..... from the University of Nairobi, Wangari Maathai Institute for Peace and Environmental Studies doing Doctor of Philosophy in Environmental Governance and Management. I am carrying out a research on Analysis of the Impact of Transformational Governance and Agroforestry on Household Food Security in southwestern Uganda with an aim of ensuring food security and ecological well-being at the household level. I am therefore going to ask you questions about the status of food in relation to agroforestry and how household governance system in place has been helpful in enhancing agroforestry-based food security. I would kindly request you to spare some of your time into helping me respond to questions regarding your household. The information that you provide for this study is only for academic purpose and will be treated with utmost confidentiality. Your participation and contribution in this exercise is voluntary and will be highly recognized.

Appreciation for your time and participation

SECTION A

Social Demographic Information

	✓ Tick the right answer to the question
1.	Name of the village.....
2.	Name of the parish.....
3.	Name of the sub county
4.	Gender of respondent 1. Male 2. Female
4.	Age (optional)
5.	Marital status 1. Single 2. Married 3. Others Please (specify)

6.	Your highest education 1. Non formal education 2. Primary 3. Secondary 4. University/tertiary 5. Others (specify)
7.	If you are the household head, how many members are regularly living with you.....
8.	Of the members who regularly live with you, how many are gainfully employed?
9.	How long have you lived in this area?.....years
10.	What is your main occupation? 1. Farmer 2. Pastoralist 3. Both 4. Civil servants 5. Self- employed 6. Others (specify).....
	What is your monthly Income?
11.	How much land (acres) do you own and how is it utilized?

SECTION B [HOUSEHOLDS]

Objective 1: Determine contributory factors for households’ transition to food security

1. Do you consider your household as food secure? 1. Yes or No.

2. If no, why?

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3. When did your household begin to be food insecure?

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4. Mention what you consider to contribute to food insecurity in your household.

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5. Mention ways in which you are trying to overcoming what contributes to food insecurity in your household.

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6. In the past what used to improve food security in your household?

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7. Mention the type of crops you grow?

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8. What are your household's alternative sources of food during the time of prolonged droughts?

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9. How do you go about food management from one season to another season?

Objective 2: Evaluate household governance system for agroforestry-based food security

1. Are your household members involved in agroforestry? 1.Yes 2.No

2. If no, why?

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3. Mention ways how your household makes decisions on the practice of agroforestry?

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4. Who makes the decisions in your household?

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5. Mention how the decisions made and environment within your household could be affecting your potential to practice agroforestry?

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6. Are there means of communication within your household about the agroforestry initiatives? 1. Yes 2. No.

7. If no, why?

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8. Do you get support from the local government for enhancing agroforestry for food security? 1. Yes 2. No

9. If yes, mention the support you get.

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10. If no mention the ways in which you would like local government to support your household.

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11. Would you be willing as a household to practice agroforestry if the local government supported you? 1. Yes 2. No.

12. How would you use the support?

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Objective 3: Assess potential benefits of agroforestry to the household

food security

1. Do you know about agroforestry practice? 1. Yes 2. No.
2. Is agroforestry practiced in your household? 1. Yes 2. No
3. If no, how does your household survive in terms of food security during prolonged droughts?

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4. Do you know the benefits of practicing agroforestry? 1. Yes 2. No.
5. If yes, mention them

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6. Do you know how agroforestry can promote and improve food security? 1. Yes 2. No.
7. If yes, how does it do it?

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8. What types of tree species do you plant and how do you select them?

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9. Mention challenges of practicing agroforestry.

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10. Suggest ways of enhancing agroforestry at the household level?

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Appendix II: Checklist Key Informants (KIIs) and Focus Group Discussions (FGDs)

A. Checklist for KIIs at the Parish Level

1. Is there practice of agroforestry at the household level? 1. Yes 2. No.
2. Is there training on agroforestry practice at the household level? 1. Yes 2. No.
3. If yes, how does the training benefit households in the practice of agroforestry?

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4. What measures exist to govern agroforestry within households?

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5. To what extent are those measures effective in governing agroforestry?

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6. Mention how decisions on agroforestry practice are made at the household level?

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7. How do you think those decisions made on agroforestry affect household beneficiaries?

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8. What do you think could be the best way to decide on and implement agroforestry at the household level?

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Thank you

B. Checklist for FGDs

1. Do you consider households as food secure? 1. Yes or No.
2. Mention what you consider to contribute to food insecurity in the households.
3. Mention what used to improve food security in the households.
4. Give the ways households are using to overcome food insecurity?
5. Do households practice agroforestry for food security?
6. How do households benefit from agroforestry?
7. What alternatives for meeting the basic need of food are there during droughts for those who do not practice agroforestry?
8. Do households receive support for enhancing agroforestry from the local government?
9. If any, mention the kind of support they get?
10. Mention challenges of practicing agroforestry at the household level.
11. How would agroforestry be enhanced at the household level?

Thank you.