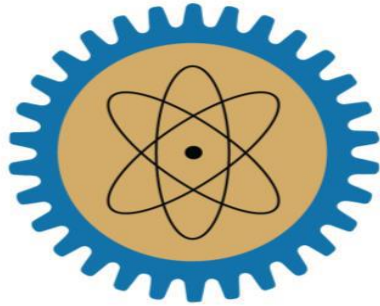




**BUSITEMA
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**SOCIO-ECONOMIC EFFECTS OF LANDSLIDES IN BUDUDA DISTRICT,
MOUNT ELGON REGION**

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BU/GIS18/MCC/30

This dissertation is submitted to the Directorate of Graduate Studies, Research and Innovations in partial fulfillment of the requirement for the award of the Degree of Master of Science in Climate Change and Disaster Management of Busitema University

OCTOBER, 2025

DECLARATION

I, Wakalanga Sulayi declare that the content of this dissertation is my own original work and has not been submitted for any award to any other institution. Statements from other people's work however, have duly been acknowledged.

Signature.....

Date.....03...../.....11...../.....2025.....

(BU/GIS18/MCC/30)

APPROVAL

This is to certify that this research report has been done under the guidance of;

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Signature..... Date...../...../.....

DEDICATION

I dedicate this dissertation to all my family members.

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LIST OF ABBREVIATIONS

UNDP:	Uganda National Development Plan
UNISDR:	United Nations International Strategy for Disaster Reduction
GDP:	Gross Domestic Product
IDP:	Internally Displaced People
UN:	United Nations
SACCOs:	Savings and Credit Cooperative Organization or Society
VSLA:	Village Savings and Loan Associations
OWC:	Operation Wealth Creation
NUSAF:	Northern Uganda Social Action Fund
YLF:	Young Lives Foundation
WEF:	World Economic Forum
UBOS:	Uganda Bureau of Statistics
n:	Sample Size
N:	Population
e:	Margin of error
CSO:	Civil Service Organization
NGO:	Non-Governmental Organization

ABSTRACT

The study assessed the socio-economic effects of landslides in Bududa district, Eastern Uganda. The study used a cross-sectional survey design, with a quantitative approach. Purposive and random sampling techniques were used to select the 400 survey respondents from eight parishes and 16 villages in two sub counties including; Buwali and Bukalasi. A questionnaire programmed into Epicollect 5 and installed on phone tablets was used to collect data from 400 households. Data were analyzed using Stata/MP 17. A descriptive analysis was used to analyze the household socio-economic perceptions about the effects of landslides. A multiple linear regression model was employed to examine the effects of landslides on household subjective wellbeing and household wealth, and a probit regression model was used to determine the probability of adopting the structural landslide risk reduction measures. Findings show that landslides are a major concern for communities, especially during the rainy season, due to their high severity and frequency. The results indicate that landslides are perceived to have considerable socioeconomic effects, particularly on the farming dependent households. Despite these effects, the majority of the affected households tend to relocate temporarily without taking proactive measures whenever landslides occur. However, the study reveals a greater likelihood of adopting structural landslide risk reduction measures among more educated households, indicating the importance of awareness and education in enhancing community resilience. To address the impacts of landslides, it is recommended that policymakers prioritize community education and awareness campaigns to encourage proactive risk reduction, particularly in vulnerable and low-literacy populations. Structural mitigation measures such as terracing and improved drainage should be supported through technical and financial assistance, especially for low-income households. Finally, recognizing the role of education in fostering resilience, disaster risk education should be incorporated into both formal and informal learning programs.

CHAPTER ONE

GENERAL INTRODUCTION

1.0 Introduction

This chapter covers the background, problem statement, purpose of the study, research objective, research questions, and significance of the study, scope of the study and definition of operational terms.

1.1. Background to the study

Globally, landslides are natural disasters which have been proven to have ties with climate change and environmental destruction (UNDP, 2014). The disaster contributes directly or indirectly to about 17% of all disaster-related fatalities worldwide and rank as the 7th most killing natural hazard (Petley, 2012). Landslides prevalence is therefore common within mountainous areas with very high rainfall amounts, sloppy landscape zones, and poor soil texture. According to Mia et al., (2016), floods are the overall determinant for the landslides outbreak within the geographical prone areas. Landslides incidences across the globe have appeared more disastrous on community livelihoods than any other sector of development. Its impacts have been noted on; loss to investment assets (human, capital, infrastructure etc.), limited crop productivity, and economic instability.

According to the United Nations Office for Disaster Risk Reduction (UNDRR), landslides account for thousands of fatalities annually and displace hundreds of thousands of people, especially in mountainous and high-rainfall regions. Globally, the socio-economic consequences of landslides include the destruction of infrastructure, homes, agricultural land, and essential services, with long-term impacts on poverty, food security, and development. Thus, landslides occurrences are becoming a global development concern due to its impacts on sustainable development. It is indeed a global disaster issue posing a threat to national development through their destructive effects to lives and property (Glade et al., 2012). Petley (2008) reports that in 2007, China was severely affected by landslides, followed by Indonesia, India, Nepal, Bangladesh and Vietnam. Previous studies indicate that globally, 89.6% of worldwide fatalities are result of landslides attributed to intense and/or prolonged precipitation. From a seasonal perspective, the dominant months for landslide occurrence in

2007, were June (12.7% of the fatalities), July (25.1% of the fatalities) and August (10.5% of the fatalities). In 2007 the Southwest monsoon rainfall was particularly intense in Southern Asia in July and August, resulting in floods that affected millions and the extensive occurrence of fatalities from landslides (Petley, 2008). Similarly, tropical cyclones resulted in landfall, especially in Central America and the Caribbean, which historically led to large number of fatalities. The World Bank and other international agencies have increasingly emphasized disaster risk reduction (DRR) and climate adaptation strategies to mitigate the effects of such natural hazards.

In Africa, the tropical highlands are considered as the hotspot of landslides under their higher population densities with advanced societal vulnerabilities. Recent studies highlighted Nigeria and South Africa among the countries highly populated and prone to landslides. According to Petley (2008), numerous sites in Africa have been classified as landslide prone areas. Equatorial Africa, East Africa, particularly the Rwenzori Mountains and Congo Nile Crest, the Cameroon Volcanic Line, Kivu region of the Democratic Republic of the Congo and the Elgon areas of Uganda. In Africa, landslides are less documented compared to other continents, but they are a growing threat, especially in regions with high rainfall and mountainous terrain such as East Africa, the Ethiopian Highlands, and parts of Central Africa. Many African countries face challenges in monitoring, early warning, and infrastructure development to manage landslide risks effectively (Brenda et al., 2015). In Africa, landslides typically affect rural, agricultural communities with limited coping mechanisms. Poor land use practices, such as deforestation, farming on steep slopes, and lack of urban planning, have increased the continent's susceptibility to landslides. These events disrupt transportation networks, hinder access to markets and social services, and strain already fragile economies.

East Africa is particularly prone to landslides due to its topographical and climatic characteristics. Countries like Uganda, Kenya, Rwanda, Burundi, and Ethiopia regularly experience landslides, especially in the highland areas (Ngecu et al., 2004). The Gigel Gibe catchment, located in the South-West of Ethiopia, is one of the areas in Ethiopia that are heavily affected by landslides. The region's increasing population pressure has led to unsustainable land use and deforestation, compounding the risks (Abebe et al. (2010). Various factors have been reported to escalate landslides in East Africa such as; deforestation and

other land use changes but also constructions and excavations. Qualitative case studies suggest that landslides in East Africa significantly affect smallholder farmers' income through the loss of houses, crops and soil fertility (Vilimek et al., 2010).

Uganda, located within the East African Rift Valley, is especially prone to landslides in the mountainous eastern and southwestern regions. The Mount Elgon area in the eastern part of the country, particularly Bududa District, is the most severely affected (Kitutu et al., 2011). However, several districts in the country have been reported to be severely affected by landslides (UBOS, 2020). These districts are densely populated, with subsistence farming as the main activity. Landslides in Uganda are commonly triggered by heavy rains during the two rainy seasons and exacerbated by deforestation, population growth, and unsustainable agriculture.

The Ugandan government, in collaboration with agencies such as the Office of the Prime Minister (OPM) and international partners, has made efforts to relocate affected communities and implement early warning systems. However, these efforts face resistance from local populations, logistical challenges, and resource constraints. The economic burden of landslides in Uganda includes loss of productive land, damage to infrastructure, and increased public spending on disaster response (UNDP, 2014). Reports from NEMA (2018) highlight that landslides have led to loss of people's lives, injuries, loss of infrastructures, destruction of property and infrastructures. According to FAO (2017), the agricultural sector has been affected severely by landslides in these areas, which has led to food insecurity and economic hardships. Thus, a Comprehensive study is needed to investigate the social economic effects of landslides in Bududa, this will help inform evidence-based policy and practice to reduce the risk and impacts of landslide disasters in the area. It calls for continuous commitment on prevention and elimination within spotted areas of occurrences hence; the need for this study.

Eastern Uganda, particularly the Bugisu sub-region where Bududa is located, is a high-risk area for landslides. The region is characterized by steep terrain, heavy rainfall, and dense population. The slopes of Mount Elgon are intensively cultivated due to land scarcity, which destabilizes the soil and increases the risk of landslides (Ketut et al, 2011). In this region, the impact of landslides is particularly severe on the socio-economic fabric. Farmers lose crops

and fertile land; schools, health facilities, and roads are often destroyed, hindering access to essential services. Additionally, frequent disasters reduce community resilience and deepen cycles of poverty and vulnerability. Despite regional awareness and periodic interventions, long-term solutions remain elusive (Brenda, et al., 2015).

Bududa District is the epicenter of landslide disasters in Uganda. Located on the slopes of Mount Elgon, the district has experienced numerous deadly landslides, with major events recorded in 2010, 2012, 2018, and beyond (Kitutu et al., 2011). These landslides have led to hundreds of deaths, mass displacements, and extensive destruction of property and farmland. The socio-economic consequences in Bududa are particularly acute. A largely agrarian population faces recurring losses in agricultural productivity and food security. Homes, schools, health centers, and roads are frequently destroyed, leading to disruption of education, healthcare services, and economic activities. Resettlement efforts by the government have been met with cultural resistance, land disputes, and issues of poor planning in the host areas (Kitutu et al., 2011). Local coping mechanisms are often inadequate, relying on communal support and minimal government assistance. The limited financial resources, poor infrastructure, and recurring nature of landslides have trapped many households in cycles of vulnerability. Research into the socio-economic effects of landslides in Bududa is therefore crucial for informing policy and interventions tailored to the unique local realities.

1.2 Problem statement

Uganda's National Policy for Disaster Preparedness and Management (NPDPM) addresses landslide disasters. This is in addition to the various government and non-governmental interventions aimed at reducing landslide risks, through measures like; designating landslide prone areas, resettling residents, promoting afforestation, enforcing laws and adopting appropriate farming techniques. However, landslides have become a recurrent and devastating natural hazard in Bududa district, located on the eastern slopes of Mount Elgon in Uganda. Over the past two decades, the district has experienced numerous landslide events, with some of the most severe incidents resulting in significant loss of life, destruction of homes, displacement of communities, and long-term disruption of livelihoods, despite these interventions aimed at resettlement, disaster preparedness, and environmental management.

Thus, the socio-economic impacts of these landslides continue to deepen the vulnerability of the affected populations.

Bududa district is predominantly rural, with most residents depending on subsistence agriculture for their livelihoods. The frequent landslides not only bury crops and fertile land but also destroy critical infrastructure such as roads, schools, and health centers, effectively cutting off communities from essential services and economic opportunities. Displacement of families, psychological trauma, school dropouts, and the breakdown of social support systems are some of the compounding effects that hinder long-term recovery and development.

Moreover, there is a significant gap in understanding the full scope of the socio-economic effects of landslides in Bududa. Most existing responses focus on emergency relief and relocation, with limited emphasis on long-term socio-economic rehabilitation and resilience building. The lack of empirical data and systematic analysis of the socio-economic dimensions—such as income loss, food insecurity, health impacts, and education disruption—undermines efforts to design effective policies and sustainable interventions tailored to the needs of the affected communities. Therefore, this study seeks to investigate the socio-economic effects of landslides in Bududa district with a view to generating evidence-based insights that can inform disaster risk reduction strategies, community resilience programs, and sustainable development planning.

1.3. Objectives of the study

1.3.1. Overall objective of the study

The overall objective of the study was to examine the socio-economic effects of landslides in Bududa district.

1.3.2. Specific Objectives

- (i) To determine the extent of use of structural landslide risk management strategies among households in Bududa district.
- (ii) To assess the household socio-economic perceptions about the effects of landslides in Bududa district.

- (iii) To analyze the effects of landslides on the subjective well-being of households in Bududa district.
- (iv) To investigate the socio-economic factors influencing the adoption of structural landslide risk management strategies in Bududa district.

1.5. Research questions

- (i) What is the extent of adoption and implementation of structural landslide risk management strategies in Bududa district?
- (ii) What are the household socio-economic perceptions regarding the effects of landslides in Bududa district?
- (iii) What are the effects of landslides on the subjective well-being of households in Bududa district?
- (iv) What socio-economic factors influence the adoption of structural landslide risk management strategies?

1.6. Conceptual framework

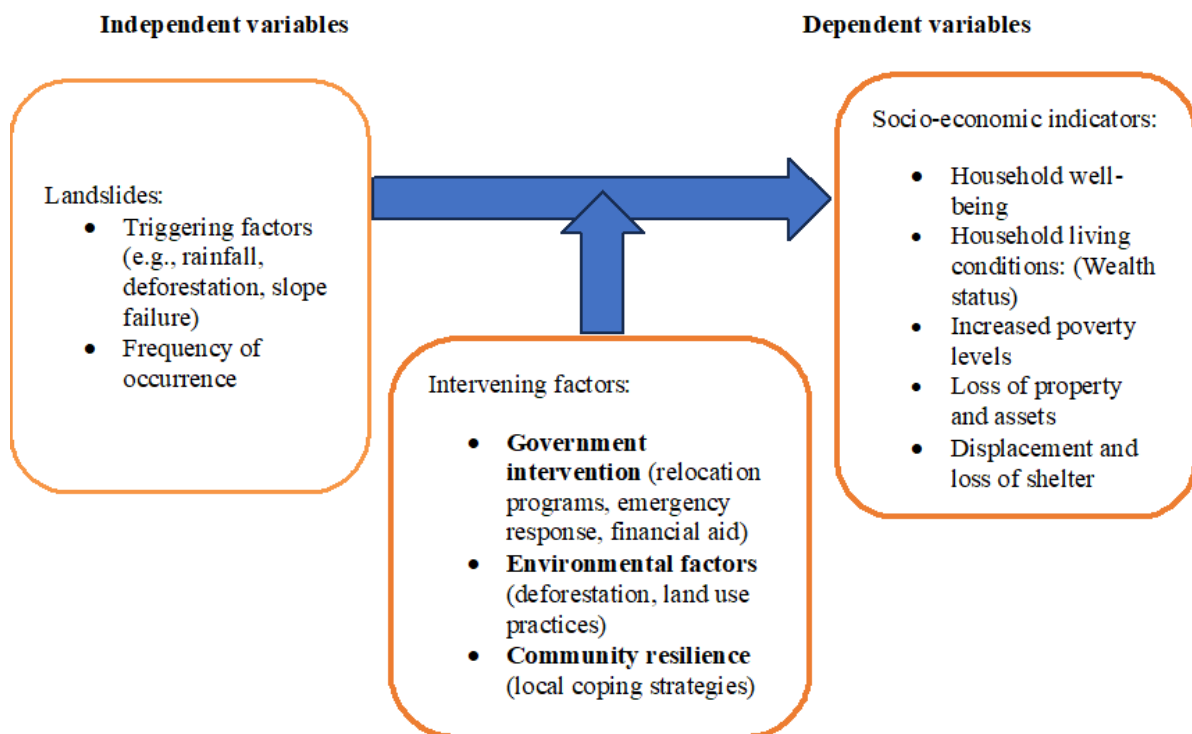


Figure 1.1: Conceptual framework for socioeconomic vulnerability analysis adapted and adjusted from Bohle (2001).

This study adopted aspects from Bohle's framework for vulnerability analysis (2001), which stipulates that disaster exposure, susceptibility and resilience determine the magnitude of disaster effects. Economic livelihood indicators; household well-being, household living conditions, increased poverty levels, loss of property and assets, displacement and loss of shelter (as the dependent variables of the study) refer to the societal engagement and approaches on generating incomes towards responding to basic human needs. It should be noted that any perceived rise in landslide occurrence, may be a function of increased exposure of population to the hazard as well as the fact that population is becoming more vulnerable. Exposure is the degree to which the local community in Bududa district is prone to landslides. This can be measured by the proximity of households to landslide prone areas, frequency, and the intensity of landslides. Relating to the study, the socio-economic effects of landslides increase with reduced proximity to landslide prone areas, increased frequency and severity of landslides. Accordingly, the socio-economic effects of landslides are influenced by the extent of community exposure, the frequency and severity of the landslide disasters.

Susceptibility explains the extent to which the local community or household is likely to be affected by the impacts of landslides. This can be measured by factors including, socio-economic status like income, access to resources, household composition and quality of physical vulnerability. The framework directly links to the current study where socioeconomic effects of landslides are explained through the community's subjective well-being and the wealth status (wealth index) as a result of the landslide disasters. On the other hand, resilience indicates the ability of a community or household to withstand, recover from and adapt to the impacts of landslides. In the current study area, these can be measured through considering community access to social services and presence of coping mechanisms for example savings, credit access, organisation membership and major source of livelihood. This can further be measured through the ability to adapt to changes like climate change and economic shocks.

Therefore, by applying this framework to the current study, we can understand the various ways through which landslide disasters affects the local community in relation to; exposure, susceptibility and resilience and how they contribute to the socioeconomic vulnerability of communities to landslide impacts. By analyzing the relationships between exposure, susceptibility and resilience, we can identify areas for intervention and support to reduce the

social-economic impacts of landslides in Bududa. In this framework the independent variables include; social, economic and environmental components of the study community which directly indicate the socioeconomic effects of landslides. On the other hand, the intervening variables include coping up mechanisms for resilience, exposure and susceptibility and include aspects such as; adaptation strategies, social support networks and savings and credit. The dependent variable here will be the outcome being studied.

1.7. Justification of the study

Landslides are one of the most devastating natural disasters in Uganda, with Bududa district on the slopes of Mount Elgon being among the most affected regions. Recurrent landslides in Bududa have caused significant destruction to life, property, infrastructure, and the livelihoods of thousands of people. Despite frequent disasters, there is limited comprehensive research focusing specifically on the socio-economic impacts of landslides in this district. This gap hinders effective planning, resource allocation, and development of sustainable disaster risk management strategies. Understanding the socio-economic effects is crucial for developing long-term and community-centered solutions. Such understanding can support the formulation of informed policies on land use, resettlement, disaster preparedness, and poverty alleviation.

1.8. Significance of the study

The study on the socio-economic effects of landslides in Bududa district holds substantial significance for several stakeholders, ranging from policy makers to local communities, humanitarian agencies, and academic researchers.

For Local Communities, the findings will provide insights into how landslides directly affect the day-to-day lives of the people in Bududa, particularly in terms of livelihood loss, displacement, food insecurity, access to education and healthcare, and social disruption. By highlighting these effects, the study can empower communities with information to demand more targeted and responsive interventions from authorities and development partners.

For Policy makers and Government agencies, this study will offer evidence-based data to guide national and district-level policy formulation. Ministries such as the Office of the Prime

Minister (Disaster Preparedness), the Ministry of Lands, Housing and Urban Development, and the Ministry of Agriculture can use the findings to improve disaster risk reduction strategies, implement safer resettlement plans, strengthen land use regulations, and enhance post-disaster recovery programs.

For Development and Humanitarian Organizations, Non-governmental organizations (NGOs), international agencies, and civil society organizations working in disaster relief, climate adaptation, and sustainable development will benefit from the research findings. It will help them design programs that are not only reactive but also preventive and development-focused, addressing the root socio-economic vulnerabilities that increase risk exposure in Bududa.

For Academic and Research institutions, this study will contribute to the academic field of disaster risk management, environmental studies, and socio-economic research. It will fill a gap in empirical literature on localized disaster impacts in Uganda and East Africa at large. Scholars and students can use it as a foundation for further research on related topics such as climate change adaptation, community resilience, and sustainable land use practices.

Finally, the study will inform long-term development planning by identifying the structural and socio-economic barriers that hinder recovery and resilience in landslide-prone areas. This will support the integration of disaster risk reduction into local development plans and contribute to the achievement of national and global development goals, including Uganda's Vision 2040 and the United Nations Sustainable Development Goals (SDGs), particularly those related to poverty (SDG 1), climate action (SDG 13), and sustainable communities (SDG 11).

1.9. Scope of Study.

1.9.1. Content scope

By content, the study; assessed the extent of use of structural landslide risk management strategies among households in Bududa, assessed the community perceptions about landslides, analyzed the effects of landslides on the subjective wellbeing of households in

Bududa and it also investigated the social economic factors influencing the adoption of structural landslide risk management strategies.

1.9.2. Geographical scope

Geographically, the study was conducted in Bududa district. The focus was the sub-counties of Bukalasi and Buwali because the two sub-counties are more prone to the impacts of landslides.

1.9.3. Time scope

The study was conducted for a total period of one year, from June 2024 up to June 2025.

1.1.0 Operational definitions of key terms

- i. **Landslides:** This is the movement of mass of rock, earth, or debris down slope due to force of gravity, attributed to natural and anthropogenic factors.
- ii. **Risk management:** This refers to a systematic process of identifying, assessing, and controlling potential threats to a community's' capital, earnings, operations and the general livelihoods.
- iii. **Adaptation:** This refers to the proactive adjustments in ecological, social, or economic systems to mitigate the impacts of disasters or to capitalize on opportunities that may arise.
- iv. **Subjective well-being:** This a crucial aspect of disaster management, encompassing an individual's overall happiness, satisfaction, and sense of fulfillment.

1.1.1. Organization of the study

The study was organized into five chapters. Chapter one provides a general introduction, including the background of the study, problem statement, research objectives and questions, significance, scope, and the overall structure of the report. Chapter two presents a review of relevant literature, focusing on the socio-economic effects of landslides in Bududa District, within the Mount Elgon region. Chapter three details the research methodology, including data collection and analysis techniques, ethical considerations, as well as the study's limitations and delimitations. Chapter four contains the presentation and discussion of findings, aligned with the specific research objectives. Chapter five concludes the report with

a summary of key findings, conclusions drawn from the study, policy recommendations and areas for further research.

CHAPTER TWO

LITERATURE REVIEW

2.1. Introduction

This chapter presents the theoretical and empirical literature review. Theoretical review is presented first, drawing attention to the different theories which guided the study and then followed by literature on different objectives of the study.

2.2. Theoretical review

2.2.1 The disaster risk reduction (DRR) framework.

This emphasizes the need for reducing vulnerability and building resilience before, during, and after a disaster. It highlights the importance of addressing both the physical hazards (landslides) and the social vulnerabilities. This includes the socio-economic vulnerabilities attributed to the socio-economic effects of the landslides revealed by the current study. The framework provides a comprehensive approach to understanding and addressing disaster risks (UNISDR, 2015). This directly relates to the current study by providing a comprehensive approach to understanding the socio-economic risks of landslides. According to Wisner et al., (2004), the framework has four components including; hazard, vulnerability, exposure and risk.

Hazard is the likelihood and potential impact of a natural hazard (Adger, 2006). Relating to this study, this is the likelihood and potential socio-economic impact of the landslide effects. Vulnerability on the other hand is explained as the susceptibility of people, environment and infrastructure to impacts of a hazard, which is the landslide in respect to the current study (Birkmann et al., 2013). The framework explains exposure as the third component, referred to as the degree to which people, infrastructures and the environment are exposed to hazards (landslide). According to UNDRR (2019) risk as the fourth component, which is the combination of hazard, vulnerability and exposure.

This framework helps to assess how the socio-economic conditions of the community (e.g., poverty, lack of infrastructure, limited education) influence their vulnerability to landslides and their ability to recover from them. The framework also helps in assessing hazard by

identifying prone areas to disasters and assessing the likelihood and potential impact of landslide events (Khan et al., 2013). According to Adger (2006), it guides the assessment of community vulnerability to landslides by identifying populations and communities that are susceptible to impacts of landslides and assesses the ability to withstand, recover from and adapt to landslides events. According to Birkmann (2006), the framework assesses the degree to which people, infrastructure and the environment are exposed to landslide hazard. It's also used in reducing risk by implementing measures to reduce the risk of landslides including infrastructure design, evacuation plans, and early warning systems (UNDRR, 2019). The framework is a mirror to examining the social economic effects of landslides in Bududa. Further still, policymakers, practitioners can develop effective strategies to reduce the socio-economic risks of landslides and promote the resilience of communities.

2.2.2. The Livelihoods Framework.

This focuses on the assets, capabilities, and activities that people use to make a living. This approach can provide a detailed understanding of how landslides disrupt local livelihoods and how individuals and communities adapt to these disruptions. This is useful for studying the socio-economic impacts of disasters like landslides and directly relates to the current study. In this respect, the framework can help identify how landslides in Bududa affect various livelihood assets, such as agriculture (loss of crops, livestock), physical infrastructure (damage to roads and homes), and social capital (displacement and community fragmentation). According to Brenda, Mulyungi & Odiambo (2015), these landslides have devastating socio economic effects on communities and livelihoods. These effects can be far-reaching, affecting not only the immediate victims but also border communities and the economy.

The framework helps to understand the complex relationships between poverty, livelihoods and environment according to (DFID, 1999). The livelihoods frame focuses on five capitals that build people's livelihoods including financial capital, human capital, social capital, natural capital and physical capital. This livelihoods framework can be used to analyze socio-economic effects of landslides on communities in Bududa for-example when landslides affect human capital causing injuries and death (Khan, et al., 2013), financial capital can be affected

by losses caused by landslides such damage to crops and businesses, physical capital can be damaged by landslides in form of destroying infrastructures (World bank, 2011). The framework can be used to analyze socio-economic effects of landslides in Bududa. Others theoretical frameworks proposed may include vulnerability theory (Adger, 2006), resilience theory (Manyena, 2006) among others.

2.3. Empirical review

2.3.1. Economic impacts of landslides

According to UNISDR (2009), landslides have important impacts on development, including disrupting livelihoods, causing loss of human lives and damages to properties and infrastructure. This impact is expected to increase due to the increasing occupation of marginal land and changing weather patterns related to climate change (Mendelsohn & Saher 2010). According to UNISDR (2015) the absolute monetary damage caused by disasters is larger in high-income countries, the absolute number of fatalities and the relative damage as a share of GDP is largest in low- and middle-income countries. Directly or indirectly landslides contribute to about 17% of all disaster-related fatalities worldwide and rank as the 7th most killing natural hazard (Lacasse et al., 2010).

The economic loss suffered by communities affected by landslides takes decades to recover from it, yet it leaves them at the risk of food insecurity (malnourishment), shelter-less, and with weak purchasing power (Claessens et al., 2011). Similarly, landslides have been proven a serious bottleneck to sufficient revenue generation (World Bank, 2015) due to its destruction of production capital and human capacity to actively engage in income generation activities. Landslides destroy agricultural farms, road network (marketing), human resource and production capital which are the essential requirement for a profitable business operation for improved revenue generation.

Studies have shown that loss of property and assets including, homes, infrastructure and businesses are some of the impacts of landslides (Khan et al., 2013). Thus, landslides escalate poverty levels especially for vulnerable households (Petley D., 2012). In addition, Brenda et al., (2015) finds that loss of livelihoods as another economic impact particularly for households that rely on agriculture or small-scale businesses.

Landslides result in significant damage to community infrastructures like roads, bridges and buildings (Khan et al., 2013). Landslides also lead to loss of community cohesion (Patel et al., 2017), and disruption of community services including health, education, and other services (Brenda et al., 2015).

Landslides cause large-scale soil degradation and loss of assets, infrastructure and human life (Knapen et al., 2006; Mugagga et al., 2010; Ngecu et al., 2004). The remoteness of the affected areas and the small size of single events lead to serious underreporting of landslides in these regions. This fact results in limited scientific attention and an underestimation of the impact of landslides on human livelihoods and development (Msilimba, 2009; & Jacobs et al., 2015).

2.3.2. Social impacts of landslides

The impacts of landslides on livelihoods of communities are both positive and negative. On a positive note, the occurrences of landslides, was known to be agents for “fertile soil distribution” from areas of high concentration to low (Cruden & Vames 2010). This is certainly right, and makes it undisputable to consent to it due to the better agricultural production within the lower belts of mountains than the upper-sloppy locations. For instance, the flow of river Nile from the source (Uganda) has benefited the “end-point countries” (Egypt, Ethiopia) more in terms of agricultural production due to the fertile soil nutrients washed and distributed along the river banks. But one may wonder whether we should look on or encourage the occurrences of floods and landslides in the community? Absolutely no, the negative effects over-weigh the positive; Studies suggest that landslides in East Africa significantly affect smallholder farmers’ income through the loss of shelter, crops and soil fertility (Mugagga et al., 2010). This may be true, though studies by Ahmed & Rubel, (2013) also put that, no methodology currently exists to quantitatively assess the direct impact of landslides on household income in underdeveloped regions. Landslides have been identified to be a source of death and casualties/accidents, which counts a lot (economically) in terms of labor loss (Claessens et al., 2011). Human beings are the engine of agricultural production and are highly demanded for planning, programming, implementing, monitoring and marketing production products/services (Msilimba, 2010).

According to Khan et al. (2013), displacement and migration are some of the social impacts of landslides. Further studies show that landslides can also result in psychological trauma especially in households that experience loss of lives and injuries (Brenda et al., 2015; Mulyungi, 2013). Accordingly, isolation is also another social impact of landslides especially for households that are displaced and forced to migrate (Patel et al., 2017).

2.3.4. Response and coping mechanisms for landslides

Different authors have put across strategies observed in responding to landslides disasters and could as well provide comfort to the Bududa landslides victims. For example, Ahmed and Rubel (2013), noted that victim/community's resettlement into safer localities more paramount for saving the lives of survivors from future attack.

The rationale for this strategy comes on the ground that the disaster occurrences are prone to certain specific localities (sloppy landscape with high rainfall amount) and can repeat its occurrences season after season (Chen C et al., 2017). According to Alimohammadlou et al., (2013), the resettlement action should not just be done for the sake, funds must be allocated for ensuring the lives of survivors or communities are safe, more importantly in terms of health service delivery, food security, shelter, and even the economic livelihoods. What appears more strategic and innovative is that which Arouri et al., (2015) point out on strengthening agricultural productivity by the landslide disaster survivors and the surrounding communities. The authors' argument is based on self-reliance for sustainable household's economic stability. Though the challenge may be on access to production land, self-engagement on agricultural productiveness is advantageous and provides sufficient economic support than relying on the external government/donor aid which is seasonal and unsustainable. The practice has been seen workable in refugee resettlement camps in Adjumani and Lamwo districts in Northern Uganda (MFPED, 2020).

Another related coping mechanism suitable for restoring the economic livelihoods of the landslides victims is strengthening their engagement in income generation activities (Froude et al., 2018). Participation in trade, casual labor employment, and farming as a business would promote faster economic recovery as well as widening revenue base for local governments

within the locality (Froude & Petley 2018). But sometimes the idea can prove challenging, knowing the background and the cause for the displacement from their ancestral home village where land could provide the biggest share of the business capital. Azam & Gubert (2010) suggest the need for strengthening access to financial lending institutions for providing soft loans that can promote profitable business engagements.

It is also important to note that the government has put in place a number of programs towards supporting household incomes that the landslides survivors would as well benefit from for their stabilized economic livelihoods (MFPED, 2020). Such community development support grants include; NUSAF, OWC, YLF, WEF and the local government community demand driven funds (Mugagga, 2011). Yes, the grants can be available but call for the existence of an effective service delivery system in all other related development sectors especially road networks, health and even good political will for lobbying and strengthening the external business market (Knapen et al., 2012).

The Ministry of Relief, Disaster Preparedness and Refugees in Uganda suggested conducting regular monitoring of the use of various interventions and response of relief items to support the affected community because researchers identified some economic mismanagement. On the other hand, results by Partel et al., (2017) revealed the need for more training and technical support from the relevant institutions to increase the level of community responsiveness to poverty eradication by having fundamental knowledge and skills on economic stability.

In general, landslides disaster incidences are on the increase especially in more prone localities. The general determinants have been attached (by the authors) to surrounds; high rainfall amounts, gravitational pull, and destructive human economic activities such as deforestation, land reclamation, and poor farming practices (Atta et al, 2020). It can also be noted that response actions have been secured as preventive, control and management systems for mitigating occurrences as well as restoring the livelihoods of the affected communities.

2.3.4. Socio-economic factors influencing the adoption of structural landslide risk management strategies

Studies highlighted have put income, social capital, access to credit education and income as some of the common factors influencing adoption of structural landslide risk management. These socio-economic factors play a big role in influencing the adoption process. A study by Mulyungi, (2013) showed that households with higher education levels, incomes and access to information were likely to adopt to landslide risk reduction measures. In addition, a study by Partel et al., (2017) showed that households with economic resources, access to information, social capital are more likely to adopt to landslide risk reduction measures.

A study conducted by Brenda et al., (2015) in the Mount Elgon region, Kenya, showed that households with higher incomes, access to credit, educational levels were more likely to adopt to structural landslide risk management strategies. Findings by Patel et al., (2018) show that households with higher education levels, higher incomes, and access to credit were more likely to adopt to disaster risk reduction measures after examining the socio-economic factors influencing the adoption of disaster risk reduction measures, including landslide risk management, in Nepal.

2.3.5. Community perceptions about landslides

Perceptions about landslides differ or vary across different communities and cultures. A study by Zainal et al., (2015), found out that communities have different risk criteria for landslides which they accept which include demographic factors such as age and education levels, these influence how often people think about landslide risks. A study in New Zealand by Glade et al., (2017) found out that community members perceived that landslide risks is influenced by the demographic factors such as age and educational levels A study by (Rahman et al., 2017) in Bangladesh found that community members perceived low risk for landslides despite living in high-risk areas.

According to Mulyungi, (2013), communities perceive landslides as a major threat to people's livelihoods. Brenda et al., (2015) outline that people in Bududa believe that landslides are caused by deforestation, heavy rainfall and human activities like farming, construction.

Kansiime et al., (2013) reported that people in Bududa reported that landslides have a significant impact on their agricultural productivity, food security and overall well-being.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1. Introduction

This chapter discusses the methodologies used in the study. It covers at the description of the study area, research design, and target population, sampling procedures, data collection and analysis procedures as well as ethical considerations.

3.2. Research design

The study adopted the cross-sectional research design employing quantitative approaches. The cross-sectional design was used because data was collected at one point in time and this allowed the researcher compare variables at the same time. The design employed quantitative data to provide a comprehensive perspective on the socio-economic effects of landslides. The quantitative data was gathered through questionnaires which provided measurable and comparable information that could be statistically analyzed in Bududa district.

3.3. Study area

3.2.1 Location

Bududa district is bordered by Sironko district to the north, Kenya to the east, Manafwa district to the south and Mbale district to the west. The district is geographically located at 1° North and 100N, longitude 34 15E the altitude ranges from 1250 to 2850m. The district receives annual rainfall above 1500mm with peaks in May and October. The district has a population density of about 952 persons per square kilometer with substance farming as the main economic activity.

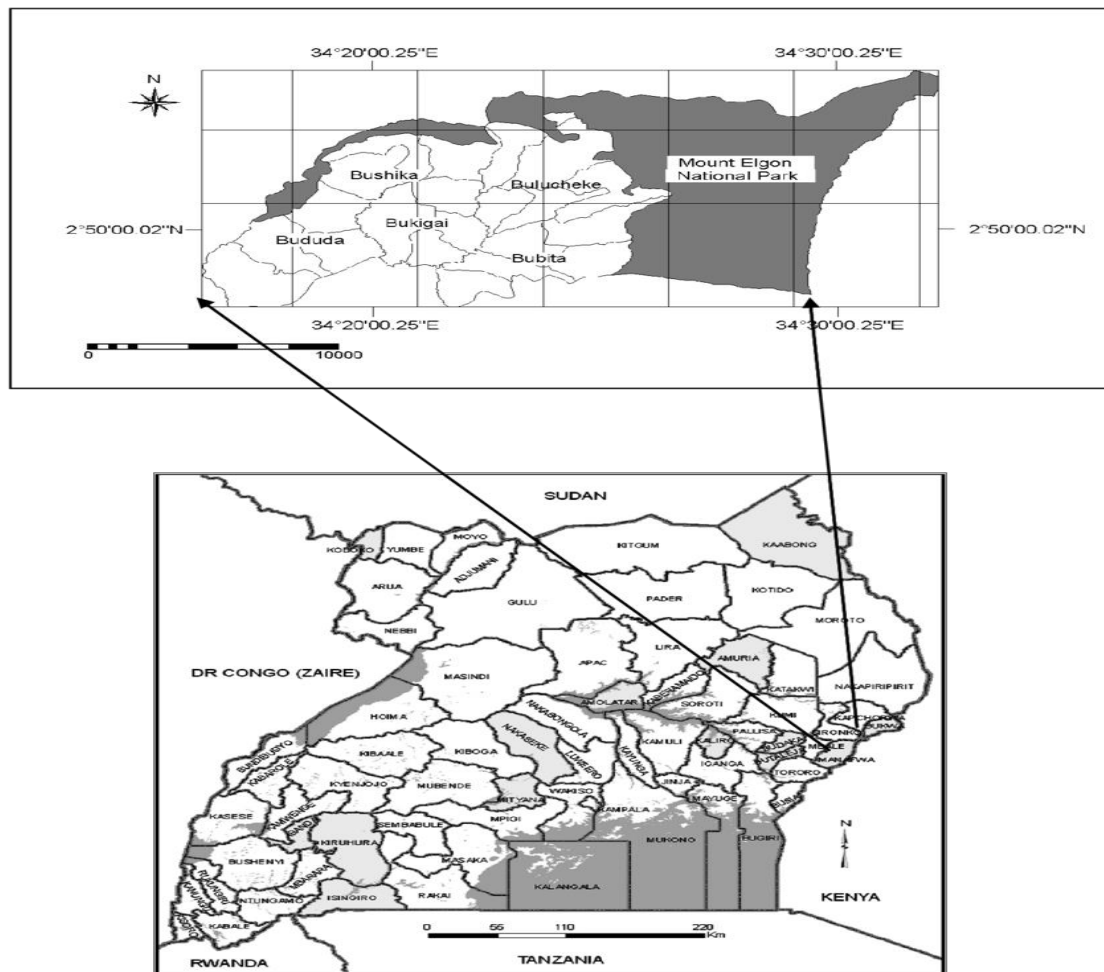


Figure 2.2: Map of Uganda showing the location of Bududa district

3.2.2 Vegetation

Bududa district in Uganda is primarily an agricultural area with a diverse range of vegetation due to its mountainous terrain and varying altitudes. The dominant vegetation includes; bush grasslands, acacia woodlands, and forest grasslands. Eucalyptus trees are also being used in agroforestry systems on graded slopes. Bamboo is being promoted for land restoration and to combat landslides, which locals are encouraged to grow along the river banks. The district includes portions of Mount Elgon National Park where vegetation varies depending on altitude.

3.2.3 Climate

Bududa district has a tropical monsoon climate (Am), characterized by high annual rainfall, typically around 6831mm, and relatively cool temperatures, averaging between 19°C and 21°C. The warmest months are January, February, and March, while June, July and August are the coolest. The district experiences a significant number of rain days and enjoys a decent amount of sunshine (Bududa District Hazard, Risk and Vulnerability profile, 2016).

3.2.4 Topography

Bududa district is characterized by its hilly and mountainous terrain, situated on the slopes of Mountain Elgon. The district's altitude ranges from 1250 to 2850 meters, rising to 3000 and 4000 meters at the peak of Mountain Elgon. The landscape is marked by steep slopes, V-shaped valleys, interlocking spur, and both gentle and rugged ridges. The terrain is primarily hilly, with steep slopes often exceeding 40 degrees, which can cause access difficulties (Bududa District Hazard, Risk and Vulnerability profile, 2016).

3.2.5 Livelihoods and Economic activities

Agriculture is the main source of livelihood for about 90% of the population, both in terms of basic nutritional needs, income generating activities and social organization. Maize, sweet potatoes and bean are the main food crops whereas banana plantations, coffee and tea, are the main cash crops grown in the district. Eucalyptus trees are also being used in agroforestry systems on graded slopes. Livestock rearing also plays a significant role, particularly among the migrants and non-migrants. Other activities include; casual labor, formal jobs, small businesses, and e-commerce. The district's proximity to Mount Elgon National Park has also spurred the growth of bee keeping and honey production (<https://bududa.go.ug/about-us>).

3.4. Study Population

According to UBOS (2020), Bududa district has a total population of 277,475 (145,148 males and 132,327 females) respectively excluding refugees and a total of 210,173 households. Buwali sub county has a total population of 6,367 (3,262 males and 3,105 females) and a total of 1,271 households. Bukalasi subcounty has a total population of 18,900 people and 2,681 households. Summee, Buwali, Bukalasi and Bunamwamba parishes have 12,634 people and 1,976 households respectively. The research focused on Summee, Buwali, Bukalasi and Bunamwamba parishes since they are closer to the Mountain Elgon.

3.5. Sample Size determination and sampling techniques

3.5.1. Sample size determination

The researcher employed Slovin's formula sampling technique to determine the sample size. According to UBOS 2014, Bududa district had a total of 210,173 households then a sample of 400 farmers was included in the survey. This was determined statistically according to the formula below: -

Using: $n = N / (1 + Ne^2)$

n = sample size

N = Population

e = margin of error

Taking a 95% confidence interval of +/- 5%

$100 - 95 = 5\%$

$= 0.05$

Therefore, $n = 210,173 / (1 + 210,173 * 0.05^2)$

n= 400

n= 400

Table 3.1 Table showing number of households selected from each village.

Sub-County	Parishes	Villages	number of households
Bukalasi	Bukalasi	Shibeya	25
		Nasisi	25
		Nangobe	25
		Nabisiku	25
	Summee	Nyeshe	25
		Summee	25
		Lwanda	25
		Nantseshe	25
Buwali	Buwali	Bunabumali upper	25
		Nashinde lower A	25
		Nashinde lower B	25
		Nashinde upper	25
	Bunamwamba	Bunamwamba North	25
		Bunamwamba West	25
		Namango	25
		Bunabumali main	25
Total			400

3.5.2. Sampling techniques

Simple random and purposive sampling approaches were used to ensure a comprehensive representation of the target population. Bududa district was selected purposively due to its frequent flood disaster experiences, which pose varied effects on the social, economic and environmental components (UBOS, 2014). In the same way, Bukalasi and Buwali sub counties were purposively selected from a list of sub counties in the district, due to frequent flood disaster experiences. Bukalasi, Buwali, summee and Bunamwamba parishes were selected by simple random sampling technique. From each parish, villages and households were randomly selected to be included in the sample. This randomization reduced bias and

thus enhanced data validity and reliability. This offered a practical and effective approach for obtaining representative samples from large and diverse population while optimizing available resources and minimizing potential biases. The target respondents were the male or female heads of the household. In cases where the household head and spouse were both absent, the next adult person in the household was selected. These categories were pre-assumed to have good understanding of the subject matter and could provide a more detailed context of the experience of living in the study area.

3.6. Data collection methods and instruments

Semi-structured questionnaires were used during the survey to obtain information from selected households in each village and the questions were both open and close ended. The questionnaire was digitized and then self-administered with the help of research assistants who were interviewing respondents and then filling in the questions. Data were collected from 400 household heads or their representatives, interviewed face to face.

3.7. Validity and Reliability of data collection instruments

3.7.1. Validity of data collection instruments

Validity of research instruments is essential in ensuring that the data collected is relevant, meaningful, and reliable for the research objectives. To ensure validity, the instruments were developed and refined based on set objectives and then subjected to vetting and judgement by the supervisors as experts to ascertain relevance, clarity of the questions in the questionnaires.

3.7.2. Reliability of data collection instruments

When an instrument is reliable, it is dependable or trustworthy and regularly yields the same outcomes when administered repeatedly under similar conditions. Therefore, to ensure reliability, the instruments were pre-tested to identify and resolve any inconsistencies. Also, research assistants were trained to ensure consistent application of the questionnaire across different respondents.

3.8. Ethical considerations

The researcher carried an introductory letter from the University that he used to introduce himself to the local authorities. It is on this basis of this introductory letter that the researcher

obtained the consent of the respondents and local authorities and also kept confidential, the information gathered from the respondents to avoid infringing on their privacy and rights.

3.9 Data management and analysis

3.9.1. Data management

The data collected from the field was imported in the excel and cleaned. Later, the data was imported to Stata 17 for further cleaning and analysis.

3.9.2 Data analysis

The data collected from the field was coded and entered in the excel. Later, the data was imported to Stata 17 for cleaning and analysis. First, univariate analysis under descriptive statistics was conducted for socio-economic characteristics of the respondents where, mean and standard deviation of variables were derived. The mean of a variable was determined as sum of all the numbers divided by the number of all numbers in that variable. The standard deviation was used to measure the variation in the values of the variable from the mean. The mean was computed for both continuous and binary variable that take the value (1=yes and 0=no). To assess the household socio-economic perceptions about the effects of landslides in Bududa district, data on survey responses using likert scale were analyzed, producing, descriptive statistics by calculating the mean/average score for each of the perceptions about landslides for different households. Additionally, frequency distributions were produced showing the number households per each category of perceived effects of landslides.

To analyze the effects of landslides on the household subjective wellbeing and household wealth in Bududa district, multiple regression models were run. In the methodology, data on community perceptions of landslide disaster were computed into an index using principal component analysis as a measure of subjective wellbeing. While information on household assets was used to compute a household wealth index. This yielded descriptive analysis in terms of frequency distributions, measures of central tendency and cross tabulations to describe the different socio-economic characteristics of the households. A multiple linear regression model was run, where the household subjective wellbeing and wealth indices were dependent on the socio-economic factors. This helped to analyze the effect of landslides on household subjective wellbeing and wealth.

To investigate the socio-economic factors influencing the adoption of structural landslide risk management strategies in Bududa district, data on socio-economic factors and adoption of multiple landslide risk management strategies were analyzed to produce descriptive statistics in terms of frequency distributions, measures of central tendency and cross tabulations to describe the different socio-economic characteristics of the households. A Probit regression model was run, where the dependent variable comprised of the information on landslide risk reduction measures and the independent variables were the socio-economic factors. This helped to analyze the probability of adopting the structural measures in the study area.

3.10. Limitation and the delimitations of the study

Among the challenges faced were; language barrier, especially to the members of the community who were not in position to understand and interpret English language as structured in the questionnaire. However, the researcher made use of research assistants who were familiar with the local languages within the study location. These helped to adequately interpret the questions to the respondents and satisfactorily recorded the responses. Interpreters were also used in some cases where minor discrepancies occurred between the local languages and English, as certain words could not be perfectly expressed in the native language.

Secondly, some respondents were hesitant to give information regarding the study due to fear of being relocated since majority resided in landslide prone areas. This was due to misconception on the purpose of the study. This issue was harmonized by orienting the respondents about the purpose of the study and presenting them with an introductory letter from the university and obtaining their consent to participate in the study.

Further still, the topographical nature of the study area made movement quite difficult while collecting the data. This impacted on the number of households reached per day and consequently affected the time scope of the project. Nevertheless, I endured all this in order to ensure data quality and reliability of the study findings.

Lastly, there was a shortage of funding to study since it required much money for feeding, transport, communication, computerization and photocopying. Nevertheless, I

managed to mobilize funds from various sources including loan money from money lenders, which made the research study a success.

CHAPTER FOUR

RESULTS AND DISCUSSION OF FINDINGS

4.0 Introduction

This chapter presents and discusses the study findings. The findings include the socio demographic information of the respondents, the extent of use of structural landslide risk management strategies, community perceptions about the effects of landslides, the effect of landslides on the subjective well-being and household wealth. Lastly, I present findings on adoption of the structural landslide reduction strategies

4.1: Household socio-demographic characteristics

The socio-demographic characteristics of respondents were summarized in the table 4.1

Table 4.1: Household socio-demographic characteristics

Variable name	Observations	Mean	Standard deviation
Age of household head (Years)	400	42.29	13.887
Education of household head (Years)	400	5.65	4.345
Marital status (1= Married)	400	0.835	0.372
Period spent in the area (years)	400	40.325	15.1596
Household size (Number)	400	4.9	1.293
Land size owned by HH (ha)	229	1.373	1.237
Household members below 18 years	400	1.978	0.897
Number of brothers and sisters in the village	400	1.62	1.09
Main source of livelihood: (1=Farming)	400	0.653	0.477
Religion: (1=Catholic)	388	0.385	0.487
Tribe of the respondent: (1=Bagisu)	400	0.58	0.494
Organisation membership: (1=Yes)	400	0.57	0.496
Land ownership: (1=Yes)	400	0.583	0.494
Distance of household from main trading centre (km)	400	3.424	1.404
Distance of household from main marram road (km)	400	3.389	1.089
Distance of household from nearby forest(km)	400	2.885	0.701
Household access to credit: (1=Yes)	400	0.608	0.489
Sex of the respondent: (1=Male)	400	0.613	0.488
Livestock ownership (1= Yes)	400	0.655	0.476
Parish (1=Summee)	400	0.243	0.429
Subcounty (1=Bukalasi)	400	0.5	0.501

Source: Author's calculations from survey data, 2024.

Results from Table 4.1 show that the average age for the household heads was 42.29 years with standard deviation of 13.887. This shows that the household heads are of reasonable age to both provide manpower and make sound decisions concerning the implementation landslide risk reduction initiatives.

Determining the household size was important since it is one of the factors that determine the magnitude of the socioeconomic effects of landslides. Table 4.1 indicates that the average household size of the total sample of respondents was 4.9 people with a standard deviation of 1.293. This slightly contradicts with the findings by UBOS (2024) which indicates that the average household size in Uganda is around 4.4 to 4.5. Nevertheless, household size has been observed to be larger in some regions and smaller others (UBOS, 2024). Large households may have enough adaptive capacity to recover from the landslide shocks as compared to the households which are small in size (Mulyungi, 2013). Thus, an average of 4.9 members shows that households in the study area contain a relatively moderate number of members who can at least offer support required to recover from the landslide effects. However, this also depends on the age distribution of the household members. Larger households may require more support in terms of resources to effectively recover from the effects of landslides.

Results in Table 4.1 indicate that, the average period spent in school for the total sample was 5.65 years in formal education, with a standard deviation of 4.345. Thus, on average the sample population attained primary six level of education. This is in line with results that, in Uganda, a significant portion of the population has achieved primary education, with a considerable number having some form of secondary education (UNESCO, 2024). This has implications on the landslide management strategies adopted and the socioeconomic effects of the landslides in the study area.

In Uganda, marital status refers to a person's legal state of being; married, single, widowed, or separated. Uganda recognizes several forms of marriage, including civil, church, Islamic, Hindu, and customary marriages (Uganda marriage Act, 2014). According to the results in Table 4.1, majority of the respondents were married (mean: 0.85). This agrees with the population and housing census which indicate that 45.5% of the Ugandans are married

(UBOS, 2024). Having more married households has implications on the choice and implementation of the landslide management strategies, and thus the socioeconomic effects of landslides. This is attributed that both men and women can get involved in landslide risk reduction interventions (Anderson & Crozier 2017).

Landslide disasters can have lasting impacts on individuals and communities, particularly in areas with frequent landslide occurrences (Glade, Anderson & Crozier (2017). Study findings in Table 4.1, indicate that the sample participants spent an average of 40.325 years in the area, which deviated by 15.159 years. This shows that respondents had spent a long time in the area which helped to collect data from respondents who had stayed in the area long enough to have knowledge on the effects of landslides. The duration of time spent in or near a landslide zone after the event significantly affects the experiences and challenges faced by the survivors (Mulyungi, 2013). Direct exposure to the landslide itself, the length of time since the event, and the need for evacuation or relocation all play in shaping disaster experience (Mulyungi, 2013). Based on the current study results, the participants experienced the landslide effects and also interfaced with the landslide risk reduction measures.

Findings in Table 4.1 indicate that majority of the study participants belonged to a religious affiliation, where on average, majority belonged to the Catholics religious affiliation (mean: 0.01). This has implications on the adoption of the landslide risk management strategies and the effects of landslides because religious belief and practice can significantly influence individuals' experiences and responses during and after landslide disasters. Some studies, such as that by Brenda, Mulyungi & Odhiambo (2015) suggest that religious beliefs can provide comfort, spiritual support, and a sense of meaning in the face of loss and diversity. However, religious interpretations of disasters can also sometimes lead to a perception of natural hazards as divine punishment, potentially hindering disaster preparedness and response (Rahman et al., 2017).

Land is one of the most important resources, as it is a base for any economic activity especially in rural and agricultural sector. Results in Table 4.1 showed that majority of the households own land (mean: 0.583), where on average one households owned 1.373 hectares of land. This, land is reasonably a large enough for the household to grow both food and cash crops, so as to build-back better after a landslide occurrence. However, this also has

implications especially when it comes to relocation, as the landslide victims remain attached to their land. However, some previous studies show that landslides disproportionately affect households with more land and plots, especially those with only one plot, leading to greater income loss and displacement (Zainal A. et al., 2015).

Results indicate that majority of the respondents owned livestock (mean: 0.655). This can indicate the community's capacity to resilience in case of landslides. This also reveals the area's potential and suitability for livestock production. However, landslides can have a devastating impact on livestock owners, leading to significant economic and psychological repercussions. Livestock, which are often a crucial source of livelihood and savings for these communities can be lost due to disaster, impacting food security, income, and overall well-being (Burby, Deyle, Godschalk & Olshansky 2000).

Accessibility to credit is important in determining income sources of respondents which is one of the factors that influence the adoption of the landslide risk reduction strategies, thereby reducing on the socioeconomic effects of landslides. Landslides can significantly impact access to credit and financial stability, especially for individuals and communities with limited resources. Landslides can destroy assets, disrupt markets, and increase debt burdens, making it harder for the affected populations to access credit and recover (Msilimba, 2009; & Jacobs et al., 2015). Results in Table 4.1 showed that, on average, majority of the households accessed credit (mean: 0.608). Thus, based on the findings by Msilimba, 2009; & Jacobs et al., 2015, it can arguably be discussed that either the community's sources of credit were not affected by landslides or some disaster risk financing mechanisms were available to provide financial support to the affected community and facilitate recover. This can also be attributed to the land and livestock ownership which can be presented as collateral security, a requirement before accessing credit.

Majority of the sample respondents depended on farming for their livelihood (mean: 0.6525) and agricultural wage labour (mean: 0.3225). Landslides significantly impact farming, leading to income loss, farm-land destruction, and increased vulnerability (Huang et al., 2012). Farmers experience crop and livestock losses, reduced soil fertility, and displacement due to landslides, affecting their livelihoods and food security (Mulyungi, 2013). Since the current study findings showed that majority of the participants depend on

farming for livelihood, it implies that households suffer more of the effects of landslides given the disastrous effects of landslides on agricultural production. Thus, the community remains without any alternative whenever landslide disasters affect agriculture which is their major source of livelihood.

Membership to organisation often indicates community cohesion and is important for social capital and they are perceived as a willingness and ability to work together (Kansiime, Mutekanga & Sempewo, 2013). Many village groups engage in cooperative economic activities, such as farming, craft production, and trade which can improve local economies and provide members with better access to resources and markets (Huang et al., 2012). Results in Table 4.1 indicate that, on average, majority of the sample participants belonged to an organisation (mean: 0.57). This indicates community cohesion, ability and willingness to work together in case of a landslide. However, some previous studies show that landslides also lead to loss of community cohesion (Patel et al., 2017), and disruption of community services including health, education, and other services (Brenda et al., 2015).

Findings from Table 4.1 show that the average distance of the household to the; main trading center was 3.424km; main marram road was 3.389km and nearby forest boundary was 2.885km. The short distances to the main trading center, forest and marram roads facilitate easy landslide rescue capabilities and thus reduced landslide socioeconomic effects. Results indicate relatively large distances and thus reduced landslide rescue capabilities for the sample households.

Perceptions about landslides differ or vary across different communities and cultures. A study by Zainal. et al., (2015), found out that communities have different risk criteria for landslides which they accept which include demographic factors such as age and education levels, these influence how often people think about landslide risks.

4.2. Extent of use of structural landslide risk management strategies among households

Findings revealed that households in Bududa district employ a number of structural landslide risk management strategies such as; building walls, creation of water drainage channels, digging of trenches, relocation, terracing, tree planting as indicated in table 4.2.

The findings show that on average, 51.1 percent of the households just relocate whenever landslides occur. This implies lack of capacity to implement the landslide risk management strategies by the individual households. This is in consensus with the results by Kansiime et al (2013) who reported that due to lack of preparedness, communities mostly seek for landslide disaster rescue and survival mechanisms. Drawing from the current study results, this clearly indicates that households in the study area suffer more of the effects of landslides since the majority just relocate. Effective management of landslides requires implementation of structural landslide risk management measures prior to the disaster occurrences rather than during the disaster occurrences (Mulyungi, 2013).

Accordingly, management of landslide risks involves a wide range of strategies in order to; prepare, respond to, mitigate and recover from landslide events. Among the strategies investigated in different empirical studies include; community-based initiatives, economic and policy instruments, non-structural measures and engineering measures (Kansiime et al., 2013). Further findings by Mulyungi (2013), suggest that structural measures such as a retaining wall, drainage systems and soil reinforcement can effectively reduce landslide risk. In addition, geotechnical measures under the engineering measures such as landslide remediation and slope stabilization have been found as effective measures to reduce landslide risk (Huang et al., 2012).

However, some previous studies reveal that non-structural measures such as early warning systems have been found to be effective in reducing landslide risks since they provide timely warning to communities (khan et al., 2013). In addition, Kelman et al., (2015), notes that public education and awareness campaigns have been found to be effective in reducing landslide risks by increasing community awareness. In addition, Burby et al., (2000) find that land use planning such as zoning, land use restrictions are also effective.

Regarding embankments, the mean value (mean :0.375) shows that 37.5 percent of the households established embankments to reduce the effects of landslides. However, embankments can be susceptible to landslides when they are constructed on unstable slopes or in areas prone to heavy rainfall. Landslides can destabilize embankments, leading to failures, especially if the embankment is not properly designed or reinforced (Kansiime et al.,

2013). Given the topography of the study area, embankments may not present a good landslide risk reduction area. This implies that a good number of households, remain at high risk of landslides. In light of disaster risk reduction (DRR) framework, these households remain exposed to landslides and are thus more vulnerable to landslides.

The mean value (mean: 0.18) for tree planting means that 18 percent of the households planted trees in order to reduce the risk of landslides despite the fact findings that tree planting significantly reduces landslide risks by anchoring soil, increasing soil stability, and modifying water flow ways that minimize erosion and slope instability. The extensive root systems of trees bind soil particles, preventing erosion and reinforcing soil layers, thereby enhancing soil structure and improving water infiltration, further stabilizing the soil (Mulyungi, 2013). If only a small number of households implement tree planting in effort to reduce landslide risk, this reveals a knowledge gap in awareness of the benefits of trees in landslide risk reduction.

Well designed and maintained terraces generally mitigate the risk of landslides (Khan et al., 2013). The study findings showed that 12.5 percent of the households practiced terracing to mitigate the risk of landslides in the study area. Thus, only a small number of landslides affected households adopted the use of terraces to mitigate the risk of landslides. This can possibly be attributed to the information that while terraces are beneficial for reducing the risk of landslides, failure to maintain them can lead to disastrous consequences and that poorly designed terraces can alter soil distribution and hydrology, influencing landslides (Huang et al., 2012).

Study findings indicate that about 6.3 percent of households established trenches to reduce the risk of landslides (mean: 0.063). The reason for this can be that they lack sufficient knowledge on design and management of these channels which makes this form of landslide risk reduction measure ineffective. Poorly designed and maintained trenches can contribute to or worsen landslides since they can act to weaken slopes. However, well designed and maintained trenches can help to mitigate landslides, particularly shallow ones (Huang et al., 2012).

Similarly, about 6.5 percent of households constructed water channels in order to reduce the risk of landslides. This implies that water channels are not an effective measure to reduce the risk of landslides in the study area. This can be attributed to a knowledge gap in designing and management of water channels.

Retaining walls are the least adopted landslide risk reduction measure in the study area with 2 percent of the households adopting, despite that retaining walls help to prevent or mitigate landslides by stabilizing slopes and preventing soil movement. These act as barriers, holding soil in place and reducing the risk of landslides, especially in areas with moderate to steep slopes (Khan et al., 2013). This can be attributed to the high costs and technical expertise required to establish the retaining walls coupled with the high economic hardships of the people in the study area.

Table 4.2: Extent of use of structural landslide risk management strategies

Landslide risk management strategies	Observations	Mean	Standard deviation
Embankments (%)	400	0.375	0.190
Relocation (%)	400	0.511	0.748
Tree planting (%)	400	0.18	0.385
Digging trenches (%)	400	0.063	0.242
Creating water channels (%)	400	0.065	0.247
Terracing (%)	400	0.125	0.331
Building walls (%)	400	0.02	0.140

Source: Author's calculations from survey data, 2024.

4.3. Household socio-economic perceptions about the effects of landslides

The findings of Household socio-economic perceptions about the effects of landslides disasters are presented in table 4.3. Households neither disagreed nor agreed that landslides are an important discussion topic in the study area (mean:3.295; SD: 1.436). This supported the need to conduct the study, to assess the socioeconomic effects of landslides, and specifically to; determine the landslide management strategies and the factors influencing adoption of the landslide management strategies. Based on the current results, where participants neither disagreed nor agreed that landslides are an important discussion topic, this reveals that the community is used to the landslide occurrences and the associated effects. This has implications that the community has little hope and thus lacks knowledge on

landslide risk management measures. This is in agreement with Mugagga et al., (2010) that due to limited knowledge on disaster risk management, the affected communities lose hope and consequently suffer more during the subsequent disaster occurrences. Thus, there is a need to; cause awareness and restore hope so as to certainly enhance preparedness, build capacity and recovery mechanisms in the study area. This is because a hopeful and well-informed community can initiate the implementation of the interventions for disaster risk reduction, which ultimately enhances community resilience and build back better (Patel et al., 2017).

Similarly, findings revealed that participants somewhat agreed that they often worry about landslides during the rainy season (mean, 3.553; SD, 1.443) which supports the fact that households usually experience and suffer the effects of landslides. In support of this, further studies showed that landslides can also result in psychological trauma especially in households that experience loss of lives and injuries (Brenda et al., 2015; Mulyungi, 2013). Accordingly, isolation is also another social impact of landslides especially for households that are displaced and forced to migrate (Patel et al., 2017). Thus, majority of the study participants neither disagreed nor agreed to that; at least a landslide was more likely to occur in the next 12 months (Mean, 3.485; SD, 1.347: 0.401).

Relatedly, participants neither disagreed nor agreed that the severity of landslides increased in the last 10 years (mean, 3.493; SD, 1.347). This can be attributed to climate change and anthropogenic causes given the increased population growth and the drive for economic development. Thus, landslides are a major disaster in Bududa district. This is in line with results by Rahman et al., (2017), that the tropical highlands of Africa and the Elgon areas of Uganda are considered as the hotspot of landslides under their higher population densities with advanced societal vulnerabilities. Relatedly, Devi R et al., (2008), explain that landslides are frequent in mountainous or hilly landscape, rather than flat surface grounds. According to Kitutu et al., (2009), the eastern zone in Uganda registered the highest number of landslide occurrences in 1997.

Participants neither disagreed nor agreed that landslides contribute to crop failure (mean, 3.41; SD, 1.465). Thus, landslides affect farming which is the major source of

livelihood of the local community, leading to food insecurity and economic hardships. In the same way, majority of the participants somewhat agreed that landslides contribute to loss of soil fertility in the study area (mean, 3.623; SD, 1.505). This in turn leads to reduced agricultural productivity, escalating food insecurity and poverty. This further agrees with reports from World bank (2015) that, landslides have been proven a serious bottleneck to sufficient revenue generation due to its destruction of production capital and human capacity to actively engage in income generation activities. It destroys agricultural farms, road network (marketing), human resource and production capital which are the essential requirement for a profitable business operation for improved revenue generation. Further studies show that landslides cause large-scale soil degradation and loss of assets, infrastructure and human life (Knapen et al., 2006; Mugagga et al., 2010; Ngecu et al., 2004). The remoteness of the affected areas and the small size of single events lead to serious underreporting of landslides in these regions. Relatedly, Brenda et al., (2015) notes loss of livelihoods as another economic impact particularly for households that rely on agriculture or small-scale businesses.

Further, findings show that landslides contributed to water pollution in the study area, as participants neither disagreed or agreed to this perception (mean, 3.438; SD, 1.475). This has socioeconomic implications such as; scarcity of water for domestic use, increased water related diseases and increased expenses on medication, among other effects of landslides (Knapen et al., 2006; Mugagga et al., 2010; Ngecu et al., 2004). Similarly, landslides can lead to outbreaks of infectious diseases like; cholera due to damage of sanitation and water infrastructure (Kennedy, 2015). The negative effects of landslides have been witnessed in the destruction of lives and property (Msilimba, 2009; & Jacobs et al., 2015). This too has devastated effects on human mental hope, economic stability and general community/national development.

Similarly, study findings revealed that participants neither disagreed or agreed to the government advise on landslide disasters (mean, 3.438; SD, 1.484). This showed that there is some government support geared towards minimizing the effects of landslides. Nevertheless, efforts to reduce the minimize the effects of landslides seem to be inadequate since communities continue to frequently worry about landslides as revealed by the current study findings.

Table 4.3: Household socio-economic perceptions about the effects of landslides

Perceptions about landslides	Obs.	Mean	Sd	Min	Max
Landslides are a big problem in my village	400	3.295	1.436	1	5
In my village, it is more likely that a landslide will occur in the next 12 months	400	3.485	1.347	0	5
The severity of landslides has increased in the last 10 years in my village	400	3.493	1.347	1	5
Landslides are an important discussion topic in my village.	400	3.675	1.444	1	5
During the rainy season, my HH members frequently worry about landslides	400	3.76	1.454	1	5
In the next 12 months, it is likely that food insecurity will increase due to landslides	400	3.553	1.433	1	5
Landslides have contributed to loss of soil fertility in my village	400	3.623	1.505	1	5
Landslides have contributed to soil erosion on the land in my village	400	3.655	1.480	1	5
Landslides have contributed to loss of lives for people and livestock in my village	400	3.638	1.379	1	5
Landslides have contributed to crop failure in my village	400	3.41	1.465	1	5
Landslides have contributed to water pollution in my village	400	3.438	1.475	1	5
Landslides have made it difficult to access the service infrastructure (Health centers, schools, water sources)	400	3.253	1.394	1	5
Landslides have contributed to reduced household incomes in my village	400	3.37	1.443	1	5
Landslides have contributed to increase in land conflicts in my village	400	3.253	1.394	1	5
My household is capable of undertaking measures to prevent landslide disasters	400	2.538	1.348	1	5
In general, I would trust the government advise on landslide disasters	400	3.438	1.484	1	5
In general, I would trust NGOs advise on landslide disasters	400	3.425	1.475	1	5
In general, I would trust neighbors advise on landslide disasters	400	3.378	1.453	1	5

Source: Author's calculations from survey data, 2024.

4.4. Households' subjective well-being

Findings regarding the perceptions about household wellbeing are presented in table 4.4. Study results showed that in general, households were unsatisfied with their life (mean, 2.7825; sd, 1.449). This may be attributed to the prolonged effects of landslides on the social, economic, environmental and infrastructural components. For instance, concerning the economic impacts, studies have shown that loss of property and assets including, homes,

infrastructure and businesses are some of the impacts of landslides (Khan et al., 2013). Most of the study participants were neither unsatisfied nor satisfied with their social life and coexistence in the community (mean, 3.183; sd, 1.108). This reflects gaps in community cohesion, which reduces the community's preparedness and capacity to respond to landslides. This is in agreement with results by Patel et al., 2017, that landslides also lead to loss of community cohesion.

Findings show that households were completely satisfied with their family situation (mean, 4.028; sd, 4.028). This has negative implications on the adoption of landslide risk reduction measures. In this scenario, it is expected that most of the households affected by the landslide disasters are more comfortable and therefore have low willingness to adopt and implement the disaster risk management strategies. This lack of willingness to adopt the landslide risk management strategies, is a likely to escalate the impacts of landslides especially on agriculture which is the major source of livelihood (Khan et al., 2013)

Households were neither unsatisfied nor satisfied with their occupation (mean, 3.155; sd, 1.131), which is farming (table 4.1). This indicates that regardless of the area's suitability for agriculture, landslides continue to affect agriculture which is the major source of livelihood in the area. This is in consensus with results by Brenda et al., (2015) who documented landslides lead to loss of livelihoods particularly for households that rely on agriculture or small-scale businesses. This further supports the current study findings that majority of the households were neither unsatisfied nor satisfied with their financial situation and food needs (mean, 3.41; sd, 1.349) and (mean, 3.175; sd, 1.133), respectively.

Participants were satisfied with the houses where they stayed with family (mean, 3.738; sd, 1.234). This may indicate that households were constructed in areas that are not landslide prone and thus experienced minimal landslide effects at the households. In the same way, majority of the participants were neither unsatisfied nor satisfied with their health status (Mean, 3.485; sd, 1.353), which may indicate minimal negative health related effects of landslides in the community. However, some previous studies such as that by Kennedy, 2015 reveal that landslides have significant impacts on physical and mental health, including; physical injuries, fatalities, and the development of distress, anxiety, depression, and post-

traumatic stress (PTSD, outbreaks of infectious diseases like; cholera due to damage of sanitation and water infrastructure.

Households were on average neither unsatisfied nor satisfied with the security in their village (Mean, 3.43; sd, 1.237), which shows that landslides bring about insecurity in the study area through increased crime rates especially; theft and domestic violence attributed to the economic hardships experienced whenever landslides destroy crops, houses, infrastructure among other effects (Brenda et al., 2015). Relatedly, Majority of the households were neither unsatisfied nor satisfied with their level of education (Mean 3.208; sd, 1.237), this is supported by the results on socioeconomic characteristics of the participants (Table 4.1), where majority had attained primary six as their highest level of education. Low education implies limited resilience against natural disasters such as landslides and capacity mechanisms (Mikos, 2023).

Households were neither unsatisfied nor satisfied with their freedom to choose the way of life (Mean, 3.298; sd, 1.148). This implies that most of the participants do not have power to make decisions, own and access resources. This has further implications on landslide disaster management, for instance, lack of power to implement landslide risk reduction measures escalates the effects of the landslides (Brenda et al., 2015). On the other hand, households were on average satisfied with the management of the village by local authorities (mean, 3.673; sd, 1.212). This reveals that the local authorities are supportive in implementing community rescue and landslide risk management strategies. This is in agreement with previous findings such as that by Kansiime et al., (2013) who mention that on most occasions, the disaster rescue is guided by the local authorities and disaster management committees.

Table 4.4: Households' subjective wellbeing

Household wellbeing statements	Obs.	Mean	SD	Min	Max
Your life in general	400	2.7825	1.449	1	5
Your social life and coexistence in the community	400	3.183	1.108	1	5
Your family situation	400	4.028	4.028	1	5
Your occupation	400	3.155	1.131	1	5
Your financial situation	400	3.41	1.349	1	5
Your food needs in the household	400	3.175	1.133	1	5
Your house where you stay with your family	400	3.738	1.234	1	5
Your health status	400	3.485	1.353	1	5
The security in the village	400	3.43	1.237	1	5
Your level of education	400	3.208	1.423	1	5
Your freedom to choose the way of life	400	3.298	1.148	1	5
Management of the village by local authorities	400	3.673	1.212	1	5

Source: Author's calculations from survey data, 2024.

4.5 Effect of landslides on the subjective well-being of households

The findings on the effects of landslides on subjective well-being and household wealth are presented in table 4.5. Results show that households which were affected by landslides during the previous 12 months experienced a decline in household wealth and wellbeing as compared to households which did not experience the landslides (Coefficients: -0.002 and -0.009) respectively. This is in line with previous findings such as that Kansime et al., (2013) who reported that people in Bududa reported that landslides have a significant impact on their agricultural productivity, food security and overall well-being. This shows that these households are susceptible to landslide disasters which directly relates to Bohle's framework for vulnerability analysis (2001), that disaster exposure, susceptibility and resilience determine the magnitude of disaster effects.

Households which had access to credit experienced a decline household wealth (Coefficient: -0.008) as compared to the households which did not have access to credit. On the other hand, households that had access to credit experienced improved subjective wellbeing (Coefficient: 0.207) as compared to households which did not have access to credit. This is supported that landslides can significantly impact access to credit, disrupt economic activities and financial stability as well. This is in agreement with previous studies that

landslides can destroy assets, disrupt markets, and increase debt burdens, making it harder for the affected populations to access credit and recover (Msilimba, 2009; & Jacobs et al., 2015). In relation to Bohle's framework, rise in disaster occurrence increases the population's susceptibility and vulnerability.

Households that owned livestock experienced improved household wealth (Coefficient: 2.083) as compared to households which did not own livestock. However, these households experienced a decline in subjective wellbeing as compared to households with no livestock (Coefficient: -0.002). Previous studies express that, livestock are often a crucial source of livelihood and savings for these communities. However, livestock can be lost due to disaster, impacting food security, income, and overall well-being (Burby et al., 2000). In this scenario, landslides can have a devastating impact on livestock owners, leading to significant economic and psychological repercussions.

Increase in the size of land owned by a household was associated with increased household wealth (Coefficient: 0.003). On the other hand, increased land size was associated with a decrease in the subjective wellbeing (coefficient: -0.020). This can be attributed to the social, economic and environmental effects of landslides. However, previous studies indicate that landslides disproportionately affect households with more land and plots, especially those with only one plot, leading to greater income loss and displacement (Zainal A. et al., 2015).

Households headed by the Bagisu experienced a decline in household wealth and subjective wellbeing (Coefficients: -0.009 and -0.028) respectively, than the households headed by other tribes.

Households which belonged to the Catholic religious affiliation experienced increased household wealth than the households which belonged to other religious affiliations (Coefficient: 0.010). However, these households experienced a decline in their subjective wellbeing (Coefficient: -0.035) as compared to other households. This can be attributed to the fact that religious beliefs and practices can significantly influence individuals' experiences and responses during and after landslide disasters, provide comfort, spiritual support, and a sense of meaning in the face of loss and diversity (Brenda et al., 2015), and that religious

interpretations of disasters sometimes lead to a perception of natural hazards as divine punishment, potentially hindering disaster preparedness and response (Rahman et al., 2017).

Households whose main source of livelihood was farming were associated with a decline in household wealth and subjective wellbeing (Coefficients: -0.000 and -0.016) respectively, as compared to other households. This is in consensus with literature that, the effects of landslides on agriculture are worthy to note as revealed in previous studies, that landslides lead to loss of livelihoods particularly for households that rely on agriculture or small-scale businesses (Brenda et al., 2015). This relates Bohle's framework for vulnerability analysis (2001), which stipulates that disaster exposure, susceptibility and resilience determine the magnitude of disaster effects. Thus, landslides affect household well-being, and living conditions, leading to; increased poverty levels, loss of property, displacement and loss of shelter.

In addition, household wealth is associated with increase in the size of the household (Coefficient: 0.007). However, household subjective wellbeing reduced with increase in the household size (coefficient: -0.036). This is in line with results by Mulyungi (2013) that, depending on the age distribution, large households may have enough adaptive capacity to recover from the landslide shocks as compared to the households which are small in size.

Households in which the household heads were married were associated with improvement in both household wealth and subjective wellbeing (Coefficients: 0.081 and 0.081) respectively, than the households, whose household heads were not married. This can be explained in relation findings by Anderson & Crozier (2017) that having more married households has implications on the choice and implementation of the landslide management strategies.

Further still, male headed households experienced a reduction in household wealth (Coefficient: -0.015), and improved subjective wellbeing as compared to the female headed households (Coefficient: 0.016). This can be possibly because men often engage in casual labor and thus spend less time at home. This implies that the men do not have time to implement the landslide risk reduction initiatives. In this respect, women who spend much

time at home and gardens and at the same time experience more of the landslide disasters will have much time and desire to implement the landslide risk reduction measures than the men.

Household wealth and household wellbeing reduced with increase in the age of the household head (Coefficients: -0.002 and -0.009) respectively. This is probably because landslide experiences increase with age and thus old people have much landslide experiences, awareness and capability to implement the landslide risk reduction measures than the youths. This is supported with findings by UBOS (2024) which depict that, age is an important variable in measuring the potential manpower.

Study findings show that household wellbeing reduced with an increase in the number of years of education of the household head (Coefficient: -0.003). This shows that landslides affect household wellbeing regardless of the education levels can further be attributed to the spontaneous nature of landslide disaster occurrences in the study area. Concerning this, previous findings by Anderson & Crozier (2017), which show that education enhances the community's knowledge concerning landslide risk reduction. Nevertheless, the fact findings are that Education increases knowledge, skills and competences (UNESCO, 2017). Increase in the years of education is expected to increase knowledge, skills and competences required for reducing disaster risks, and thus increasing community's resilience and capacity to manage disasters, as explained in Bohle's framework for vulnerability analysis (2001).

Household wealth and household wellbeing increased with increase in the number of years that the household spent in the community (Coefficients: 0.001 and 0.001) respectively. This implies that as a result of prolonged experiences with landslides households probably adopt landslide risk reduction and other alternative mechanisms such as relocation to safer places. This is in line with results that direct exposure to the landslide itself, the length of time since the event, and the need for evacuation or relocation all play in shaping disaster experience (Mulyungi, 2013). In relation to Bohle's framework for vulnerability analysis (2001), increase in the number of years lived in the community increases landslide experiences and resilience due to increased disaster preparedness by the affected households.

Households located on steep slopes experienced improved household wealth and household wellbeing than the households which were located on gentle slopes (Coefficients:

0.012 and 0.128) respectively. This is probably because steep slopes are usually fertile and offer conducive environment for crop growth and livestock rearing. However, previous studies indicate that very steep land slopes are strongly associated with an increased risk of landslides because the steeper the slope, the less friction and the greater the potential for down slope movement, making it easier for landslides to occur (Zainal et al., 2015). This implies that steep slopes are landslide prone areas, and are thus susceptible to landslides. In relation to Bohle's framework for vulnerability analysis (2001), disaster exposure, susceptibility and resilience determine the magnitude of disaster effects, which in this case are on; household well-being and household incomes.

Household wealth and wellbeing reduced with an increase the distance of the household to the nearby trading center (Coefficients: -0.001 and -0.001) respectively. This indicates that households nearer to the trading centers easily access landslide rescue services and thus they experience less landslide effects than the other households. In light of the aspects from Bohle's framework for vulnerability analysis (2001), households that are located far war from the trading centers are more exposed and susceptible to landslides and thus have less resilience and capacity mechanisms against landslides.

Similarly, household wealth reduced with an increase in distance of household from the main marram road (Coefficient: -0.002). This implies that households located far away from the main marram road are affected more by landslides than the households located near the main marram road. The marram road provides room for easy relocation of the household and household property during a landslide and thus reducing the landslide risk. In light of Bohle's framework, households situated near to the main marram road have more landslide rescue capabilities which increases their resilience and survival mechanisms. On the other hand, household wellbeing increased with an increase in distance of household location from the main marram road (Coefficient: 0.003). This is possibly because increase in distance from the main marram road increases access to land used for agriculture which is the main source of livelihood.

Household wealth and wellbeing increased with an increase in the distance of household from the nearby forest reserve (Coefficients: 0.013 and 0.028) respectively. This implies that areas around the forest reserve are more prone landslides and thus, households

located near the forest reserve experience more landslide effects than the other households. In light of Bohle's framework, households situated near to the forest reserve are more susceptible to landslides which increases their vulnerability as well. This is in agreement with previous findings that the effects landslides on a given household may vary depending on the household location or nearness to the landslide prone zone (Anderson & Crozier 2017).

Households which had organisation membership were associated with increased household wealth and subjective wellbeing (Coefficients: 0.016 and 0.164) respectively, than the households which did not belong to any organisation. This is attributed to previous findings that membership to organisation leads to community cohesion and is important for social capital and they are perceived as a willingness and ability to work together (Kansiime et al., 2013). Organisation membership also helps households to engage in cooperative economic activities, such as farming, craft production, and trade which can improve local economies and provide members with better access to resources and markets (Huang et al., 2012). In light of Bohle's framework, organisation membership increases community's preparedness, resilience and capacity mechanisms against landslides. However, community cohesion can be broken due to the persistent landslide occurrences (Patel et al., 2017), and disruption of community services including health, education, and other services (Brenda et al., 2015).

Households in Bukalasi sub county experienced reduced household wealth (Coefficient: -0.011) than households in Buwali sub county. However, Bukalasi subcounty experienced improved household wellbeing than households in Buwali sub counties (Coefficient: 0.089).

Table 4.5: Linear regression results on the effect of landslides on the subjective well-being and household wealth.

Parameter	Dependent variable	
	Wealth index	Subjective well-being index
	Coefficient	Coefficient
Household affected (1 =Yes)	-0.002 (0.010)	-0.009 (0.152)
Credit access (1= Yes)	-0.008 (0.007)	0.207 (0.104)
Livestock ownership (1= Yes)	2.083 (0.007)	-0.002 (0.106)
Land ownership (hectares)	0.003 (0.003)	-0.020 (0.048)

Tribe (1=Bagisu)	-0.009 (0.007)	-0.028 (0.105)
Religion (1= Catholic)	0.010 (0.007)	-0.035 (0.104)
Source livelihood (1= Farming)	-0.000 (0.007)	-0.016 (0.107)
Household size (Numbers)	0.007 (0.003)	-0.036 (0.043)
Marital status (1= Married)	0.081 (0.098)	0.081 (0.098)
Sex (1=Male)	-0.015 (0.007)	0.016 (0.111)
Age (Years)	-0.002 (0.001)	-0.009 (0.008)
Education (Years)	-0.000 (0.001)	-0.003 (0.012)
Time of stay (Years)	0.001 (0.001)	0.001 (0.001)
Slope (1= steep)	0.012 (0.010)	0.128 0.151)
Distance to the trading centre (Kms)	-0.001 (0.003)	-0.001 (0.045)
Distance to the marram Road (Kms)	-0.002 (0.003)	0.003 (0.051)
Distance to the forest reserve (Kms)	0.013 (0.005)	0.028 (0.073)
Organisation membership (1= Yes)	0.016 (0.007)	0.164 (0.114)
Sub county (1=Bukalasi)	-0.011(0.008)	0.089 (0.122)
Constant	-1.399 (0.025)	0.559 (0.264)
Number of observations	398	398
F (18, 379)	5279.03	1.00
Prob > F	0.0000	0.4606
R-Squared	0.9960	0.0453
Adj. R-Squared	0.9958	-0.0001
Root MSE	.06414	.99352

Standard errors are reported in parentheses. Coefficients significant at * $p < 0.10$;

** $p < 0.05$; *** $p < 0.01$ (Source: Author's calculations from survey data, 2024)

4.6. Adoption of structural landslide risk reduction strategies

Table 4.6 presents the results of adopting the structural landslide risk reduction strategies. Study results indicate that household livestock ownership increases the likelihood of adopting the landslide risk reduction measures (Coefficient; 0.119). In relation to Bohle's framework (2001) on vulnerability, livestock ownership enhances community's preparedness and capacity to reduce landslide risks, and consequently reducing landslide vulnerability.

Findings show a likelihood of adopting landslide risk reduction measures for households which mainly depend on farming as their main source of livelihood (Coefficient: 0.013). Livestock, and crops are often a crucial source of livelihood and savings for these communities (Burby et al., 2000). Thus, it is expected that these households are always yearning and more likely to protect their livelihoods than the other households.

In addition, there is a higher likelihood of adopting landslide risk reduction measures in Bagisu headed households as compared to other households. This can be probably because of the persistent landslide disaster experiences in the region as compared to the other regions in the country. In addition, the other households could have been be new settlers in the community, with low landslide disaster experiences.

Membership to the organisation increased the likelihood of adopting landslide risk reduction measures as compared to other households. This is because such households can easily get information on landslide early warnings and the other information on landslide risk reduction measures. The likelihood to adopt the landslide risk reduction measures can be attributed to the findings that organisation membership leads to community cohesion and is important for social capital and they are perceived as a willingness and ability to work together (Kansiime et al., 2013). Thus, enhancing community's disaster preparedness, resilience and capacity mechanisms, as reflected in Bohle's framework on vulnerability (2001). This is further supported by the information that organisation membership also helps households to engage in cooperative economic activities, which can improve local economies and provide members with better access to resources and markets (Huang et al., 2012). Thus, these households have a higher chance of adopting the landslide risk reduction measures than the other households.

Similarly, study findings show that increase in the age of the household head increases the likelihood of adopting landslide risk reduction measures. Thus, it is likely that households headed by old will adopt landslide risk reduction measures as compared to those headed by the young people who have less experiences of landslides. This is supported with findings that age is crucial in determining the potential manpower and potential population future projections, important for adoption of landslide risk reduction measures (Partel et al., 2017).

The likelihood of adopting landslide risk reduction measures increases with an increase in the education level. This is attributed to fact findings that increase in the level of education increases the ability to read, write and interpret scenarios, such as landslides. Education equips people with knowledge and skills (UNESCO, 2017) thus enhancing their adoption. Thus, the study findings revealed a likelihood of adoption of the landslide risk

reduction measures with an increase in education (Coefficient: 0.025). Similarly, a study by Mulyungi, (2013) showed that households with higher education levels, incomes and access to information were likely to adopt to landslide risk reduction measures. Further studies such as that by Partel et al., (2017) showed that households with economic resources, access to information, social capital are more likely to adopt to landslide risk reduction measures. In light of Bohle's framework, education increases the community's knowledge, skills and competences which helps to build landslide rescue capabilities, resilience and survival mechanisms as well.

The likelihood of not adopting landslide risk reduction measures increase with access to credit. This implies that households are likely not to prioritize landslide risk reduction initiatives which further puts the community at high risk. This can be attributed to the negative mindset towards landslide disaster management. However, Brenda et al., (2015) in the mount Elgon region, Kenya, investigated the factors influencing the adoption of structural landslide risk management strategies among households and results in the study showed that households with higher incomes, access to credit, educational levels were more likely to adopt to structural landslide risk management strategies.

The findings show that the likelihood of adopting the landslide risk reduction measures reduces with an increase in the land size owned by the household. Increase in the land size owned by a given household increases the available area for relocation rather than implementing the available landslide risk reduction measures. In this case, households find it easier to extend their farming and other economic activities on the less landslide prone areas. This is in consensus with some previous studies show that landslides disproportionately affect households with more land and plots, especially those with only one plot, leading to greater income loss and displacement (Zainal A. et al., 2015).

There is less likelihood of adopting landslide risk reduction measures in the male headed households than in the female headed households. This can be possible because in most cases, the males are more engaged in off-farm activities such as boda-boda and petty trade. Men spend less time in the household than the women who often engage with the various household chores. This implies that men suffer less of the effects of landslides as compared to the females and children (Mulyumgi, 2013). Thus, men fail to prioritise the

implementation of landslide risk reduction measures as revealed by the current study findings. Since the men who have the control over the household resources, especially land have a less likelihood to implement landslide risk reduction measures, this implies that women who in most cases lack ownership and control over resources hardly implement these strategies. However, given the tremendous effects of landslides especially on farming on which households depend for livelihood, women headed households implement these measures than the other counterparts.

Study findings reveal that increase in the period of existence of the household in the landslide affected community reduces the probability of adopting the landslide risk reduction measures (Coefficient: -0.009) This is possibly because these households develop alternative landslide rescue and survival mechanisms in case of a landslide such as; relocation to safer places owned by their relatives. This is in line with results that direct exposure to the landslide, the length of time, and the need for evacuation or relocation all play in shaping disaster experience (Mulyungi, 2013).

Findings showed that increase in the distance of the household to the main road reduces the likelihood of adopting landslide risk reduction measures (Coefficient: -0.022). This can be possibly because, nearness to the main road may imply easy access to the various landslide rescue mechanisms by the households (Mulyungi, 2013). In this case, households in close proximity to the main road may implement the landslide risk reduction measures. On the other hand, households that are far from the main road hardly access the flood disaster rescue mechanisms and thus may not implement the landslide risk reduction measures, which reduces their preparedness, resilience and capacity to mitigate the effects of landslides, consequently increasing their vulnerability, as reflected in Bohle's framework on vulnerability (2001).

Thus, study findings showed that there is a less likelihood of adopting the landslide risk reduction measures in households that are located far away from the main marram road (Coefficient: -0.022). This implies that these households possibly experience less effects landslide effects as compared to the households that are close to the main marram road. However, this can be further attributed to limited awareness concerning the landslide risk reduction measures. Similarly, households that are situated far from the nearby forest would

be experiencing more landslide effects than the other households. This could be the reason why the study results showed that the probability of adopting the landslide risk reduction measures reduced with increase in household distance from the nearby forest.

The findings indicated that there is a likelihood of not adopting the landslide risk reduction measures with an increase in the household size (Coefficient: -0.031). However, depending on the age distribution, increase in the household size increases the available labour force to implement landslide risk reduction initiatives (Kansiime et al (2013). This then indicates that in households where the members are very old, adoption is likely to be lower than in the other households within medium age bracket.

Table 4.6: Probit regression results for adoption of structural landslide risk reduction measures.

Variables	Coefficient	S.E
Credit access (1= Yes)	-0.024	0.132
Livestock ownership (1= Yes)	0.119	0.134
Land (hectares)	-0.021	0.06
Tribe (1=Bagisu)	0.072	0.133
Religion (1= Catholic)	-0.017	0.132
Source of livelihood (1= Farming)	0.013	0.136
Sex (1= Male)	-0.171	0.141
Age (Years)	0.012	0.010
Education (Years)	0.025	0.015
Organisation membership (1= Yes)	0.114	0.145
Time of stay (Years)	-0.009	.009
Distance-Forest (Km)	-0.017	0.093

Distance-Trading centre (Km)	0.034	0.057
Distance-marram Road (Km)	-0.022	0.066
Household size (Number)	-0.031	0.055
Subcounty (1=Bukalasi)	-0.0572	0.155
Constant	-0.084	0.494
Number of observations	398	
LR chi2(17)	10.75	
Prob > chi2	0.8694	
Pseudo R2	0.0197	
	-	
Log likelihood	268.06176	

Standard errors are reported in parentheses. Coefficients significant at * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$
 (Source: Author's calculations from survey data, 2024)

CHAPTER FIVE

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

In this section I present the summary of the findings, conclusions, recommendations and areas of further research.

5.1 Summary of the findings

The study revealed that landslides are a major disaster in the study area, causing significant destruction to livelihood sources, thereby negatively impacting household incomes and overall community wellbeing. Despite the severity of the disaster, most community members tend to relocate during landslide events rather than implement proactive risk reduction measures. The impact of landslides on household wealth and subjective wellbeing was found to be influenced by a range of factors, including previous disaster experience, access to credit, livestock ownership, land size, tribe and religion of the household head, livelihood source, household size, marital status, gender, age, education level, length of residence, topography, organization membership, and proximity to infrastructure and natural features. Adoption of landslide risk reduction measures was more likely among households with livestock, headed by members of the Bagisu tribe, reliant on farming, and involved in local organizations. Conversely, non-adoption was associated with factors such as credit access, larger landholdings, Catholic affiliation, male household heads, long-term residence, greater distance from key infrastructure, and larger household size. Additionally, Bukalasi Sub-County showed lower adoption rates of mitigation measures compared to Buwali Sub-County.

5.2. Conclusions of the study

The findings highlight that landslides are a major concern for communities, especially during the rainy season, due to their high severity and frequency. They are perceived to cause significant environmental damage—such as crop failure, soil fertility loss, and water pollution—and have considerable socioeconomic impacts, particularly on farming-dependent households. This relates to the Livelihoods Framework that disasters affect communities' assets, capabilities, and activities that people use to make a living and thus providing a detailed understanding of how landslides disrupt local livelihoods and how individuals and

communities adapt to these disruptions. Despite these effects, most affected households tend to relocate temporarily without taking proactive measures. In relation to the disaster risk reduction (DRR) framework, the likelihood of not adopting landslide risk reduction measures results in reduced disaster preparedness, less resilience which increase disaster risk and vulnerability. However, the study reveals a greater likelihood of adopting structural landslide risk reduction strategies among more educated households, indicating the importance of awareness and education in enhancing community resilience. In relation to Bohe's framework, information leads to preparedness, which further helps to build resilience and recovery mechanisms through mitigation and adaptation.

Overall, landslides disasters remain disastrous and impactful on the social, economic and environmental aspects of the community. This too has devastated effects on economic stability and general community/national development.

5.3 Recommendations for the study

Since the study results revealed that structural landslide risk management strategies are not extensively implemented in the district, there is an urgent need to;

Increase community awareness and education through the promotion of education and awareness campaigns on landslide risks and prevention, targeting vulnerable communities to encourage proactive response and adoption of mitigation measures. This will help to change the negative mindset of the local population and at the same time build the capacity to implement these strategies. For example, promoting awareness on agroforestry especially in mountainous areas will enhance the soil's physical properties such as structure and soil texture, thus encouraging soil cohesion processes.

Support structural risk-reduction measures through the Provision of technical and financial support to households, especially less-educated and low-income ones, to implement structural landslide mitigation strategies (such as; terracing, drainage systems).

Strengthen disaster preparedness programs, through the development and integration localized disaster preparedness and early warning systems to reduce the impact of landslides, particularly during the rainy season.

Promote sustainable land use practices by implementation of policies that encourage soil conservation, reforestation, and sustainable agricultural practices to reduce environmental degradation and landslide vulnerability.

Integrate relocation with long-term resilience planning, through the design of relocation programs that are not just reactive but part of broader resilience-building efforts, ensuring relocated households have access to safe land and livelihood support.

Target education as a risk reduction strategy, through recognition of education as a key factor in disaster resilience and integrate disaster risk education into formal and informal learning platforms.

Given the effects of landslides on household wealth and household wellbeing, revealed in this study, there is a need to create alternative sources of livelihood such as; Participation in trade, casual labor employment, and farming as a business to faster economic recovery as well as widening revenue base for local governments within the locality and reduce reliance on agriculture. In addition, strengthening access to credit is key to promoting business developments.

5.4. Areas of further research

Based on the conclusions and policy recommendations, the following are possible areas for further research, that can help to provide deeper insights into sustainable, inclusive, and context-specific solutions for landslide risk management. Further research should explore the long-term effectiveness, cost-efficiency, and community acceptance of structural mitigation measures in rural and low-income settings. It is important to examine how different levels and types of education influence household decisions on adopting risk reduction strategies, as well as to identify the socioeconomic, cultural, and institutional barriers that hinder the implementation of such measures. Additionally, studies should assess the short- and long-term impacts of relocation on livelihoods, social networks, and economic stability. Research should also investigate how gender roles influence vulnerability and participation in resilience-building, and examine the relationship between land use practices, deforestation, and increased landslide risks to inform better land management policies.

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Appendices

Appendix 1:

Table A1: Factor analysis results for wealth index

Table 11. Factor analysis results for wealth index

Factor analysis Method: Principal factors		Number of observations = 440		
		Retained factors = 1		
Rotation: Unrotated		Number of params = 10		
Factor	Eigen value	Difference	Proportion	Cumulative
Factor 1	2.10784	1.35062	0.8273	0.8273
Factor 2	0.75722	0.51125	0.2972	1.1245
Factor 3	0.24598	0.18683	0.0965	1.2210
Factor 4	0.05914	0.03095	0.0232	1.2442
Factor 5	0.02819	0.04128	0.0111	1.2553
Factor 6	-0.01309	0.08042	-0.0051	1.2501
Factor 7	-0.09351	0.03206	-0.0367	1.2134
Factor 8	-0.12557	0.02538	-0.0493	1.1642
Factor 9	-0.15094	0.11638	-0.0592	1.1049
Factor 10	-0.26732		-0.1049	1.0000
LR test: Independent vs. saturated: Chi2(45) = 892.94 Prob>Chi2 = 0.0000				
Factor loadings (Pattern matrix) and unique variances				
Variable	Factor 1	Uniqueness		
HH owns a telephone (1=yes)	0.3173	0.8993		
HH owns charcoal stove (1=yes)	0.3474	0.8793		
HH owns a radio (1=yes)	0.1959	0.9616		
HH owns a television (1=yes)	0.4655	0.7833		
Mode of lighting (1=electricity/solar)	0.4927	0.7573		
Roof material (1=permanent)	0.0758	0.9943		
Wall material (1=permanent)	0.7817	0.3890		
Floor material (1=permanent)	0.8222	0.3240		
Land ownership	0.0817	0.9933		
Livestock ownership	0.2988	0.9107		
Scoring coefficients (method = regression)				
Variable	Factor 1			
HH owns a telephone (1=yes)	0.09339			
HH owns charcoal stove (1=yes)	0.09054			
HH owns a radio (1=yes)	0.05620			
HH owns a television (1=yes)	0.16233			
Mode of lighting (1=electricity/solar)	0.13468			
Roof material (1=permanent)	0.01929			
Wall material (1=permanent)	0.31335			
Floor material (1=permanent)	0.41809			
Land ownership	0.02820			
Livestock ownership	0.08533			

Table A3: Factor analysis results for women empowerment index (WEI)

Factor analysis Method: Principal factors		Number of observations	=	440
		Retained factors	=	1
Rotation: Unrotated		Number of params	=	14
Factor	Eigen value	Difference	Proportion	Cumulative
Factor 1	7.82861	7.15459	0.9111	0.9111
Factor 2	0.67401	0.36904	0.0784	0.9896
Factor 3	0.30498	0.11003	0.0355	1.0251
Factor 4	0.19494	0.08230	0.0227	1.0477
Factor 5	0.11264	0.03824	0.0131	1.0609
Factor 6	0.07440	0.04259	0.0087	1.0695
Factor 7	0.03181	0.03650	0.0037	1.0732
Factor 8	-0.00469	0.04149	-0.0005	1.0727
Factor 9	-0.04618	0.02041	-0.0054	1.0673
Factor 10	-0.06659	0.04025	-0.0077	1.0595
Factor 11	-0.10683	0.00966	-0.0124	1.0471
Factor 12	-0.11649	0.01009	-0.0136	1.0336
Factor 13	-0.12658	0.03518	-0.0147	1.0188
Factor 14	-0.16176		-0.0188	1.0000
LR test: Independent vs. saturated: Chi2(91) = 4833.11		Prob>Chi2 = 0.0000		
Factor loadings (Pattern matrix) and unique variances				
Variable		Factor 1	Uniqueness	
Use and control of the income earned by the respondent		0.3242	0.8949	
Use and control of the income earned by the partner		0.3126	0.9023	
Purchase of major household items		0.7966	0.3654	
Ownership of land		0.7452	0.4447	
Participation in paid work outside the household		0.8407	0.2933	
Access to credit from the financial institution		0.8597	0.2609	
Programs listened/viewed on TV/Radio		0.7280	0.4700	
Visits to family and friends		0.8233	0.3222	
Community participation		0.8425	0.2902	
Education attainment of the boy child		0.8727	0.2384	
Education attainment of the girl child		0.8882	0.2111	
Access and utilization of health services		0.6525	0.5742	
Use of birth controls		0.6881	0.5265	
Marriage of girl child		0.7891	0.3773	
Scoring coefficients (method = regression)				
Variable		Factor 1		
Use and control of the income earned by the respondent		0.00891		
Use and control of the income earned by the partner		0.00961		
Purchase of major household items		0.10095		
Ownership of land		0.07578		
Participation in paid work outside the household		0.11120		
Access to credit from the financial institution		0.13023		
Programs listened/viewed on TV/Radio		0.05647		
Visits to family and friends		0.09925		
Community participation		0.12641		
Education attainment of the boy child		0.13064		
Education attainment of the girl child		0.16783		
Access and utilization of health services		0.04163		
Use of birth controls		0.06707		
Marriage of girl child		0.06554		

Appendix 2: Household Questionnaire

Dear respondent.

I am Wakalanga Sulayi a master's student from Busitema University. I am conducting research on **“Socio-economic effects of Landslides in Bududa district”** in partial fulfillment for the award of Master of Science degree in Climate change and disaster management of Busitema University. You have been identified as one of the respondents in this study, and I would like to ask you questions concerning this research. This will take about 30 minutes. The information you provide will be used only for academic purpose of the study and will be kept confidential. You are therefore requested to honestly answer as many questions as possible that apply to your situation.

Please use the following codes for the selected sub-county, Parish and village

Sub-county	Code
Bukalasi	1
Buwali	2
Parishes	Code
Summee	1
Bukalasi	2
Buwali	3
Bunamwamba	4
Villages Summee	Code
Nyeshe	1
Summee	2
Lwanda	3
Nantseshe	4
Villages in Bukalasi	
Shibeya	5
Nasisi	6
Nangobe	7
Nabikisu	8
Villages in Buwali	
Bunabumali Upper	9
Nashinde Lower	10
Nashinde Lower	11
Nashinde upper	12
Villages in Bunamwamba	Code
Bunamwamba North	13
Bunamwamba West	14

Namango	15
Bunabumali Main	16

Section A: Preliminary information

A.1. Questionnaire/HH number:_____

Please identify the following Sub-counties using the following codes (Buwali. 1, Bukalasi 2)

A.2. Sub county_____

A.3. Parish_____

A.4. Village_____

Section B: Knowledge and awareness about landslide occurrences

B.1. Are you aware of any landslides that have happened in this community?

1. Yes 2. No 3. Not sure

B.2. If yes, how often do you experience landslides in this village?

1. Once a year
2. Twice a year
3. More than twice a year

B.3. What is the main source of information about landslides?

1. Radio
2. Government agencies
3. Civil Society Organizations
4. Family/Friends
5. Television
6. Others (Specify) -----

B.4. when did you last experience a landslide in this village?

Month.....Year.....

1. Yes 2. No 3. Not sure

B.7. If yes, what are the causes of landslides in this area?

B.8. what is the description of the location/topography of your household?

Section C: Effects of landslides on livelihoods in Bududa district

1. Loss of life
2. Household members injured
3. Destruction of crops
4. Loss of livestock
5. House damaged
6. House destroyed
7. Displacement
8. Damaged infrastructure
9. Food insecurity
10. Land conflicts
11. Others.

C.3. In case of injuries, how many members of your household were injured?

1. Roads
2. Schools
3. Health facilities
4. Water sources
5. Places of worship
6. Others (specify).....

C.5. In case of a displacement, where did you evacuate to?

1. Nearby school
2. A church/mosque
3. Others (specify).....

Section D: Landslide disaster management (Adaptation measures)

D.1. Are there measures that have been put in place to minimize landslides?

1. Yes
2. No
3. Not sure

D.2. If yes, what measures have you put in place to minimize the impacts of landslides?

1. Embankments
2. Relocation
3. Tree planting
4. Digging trenches
5. Creating water channels
6. Terracing
7. Building Tall and gigantic walls
8. Others (specify).....

D.3. Did any member of your HH receive information/ training on landslide disaster risk management in the last 12 months?

1. Yes
2. No

D.4. If yes, who provided the training/sensitization?

1. Government agencies
2. NGOs
3. Media (TV/Radio)
4. Community members,
5. Friends/Relatives
6. Others (specify):

D.5. Is there a landslide disaster management committee in your village?

1. Yes_____
2. No_____
3. Not sure_____

D.6. Are you a member of any other local association, committee, women's group, CSO, or any social group? 1. Yes_____ 2. No_____

D.7. Did you ever change the location of your house because you feared its previous location was prone to landslide disaster? 1. Yes; 2. No

D.8. Did you ever pray to appease Gods or spirits with regard to landslides? 1. Yes; 2. No

D.9. Did you ever pay money or made gifts to cultural leaders or religious institutions to appease Gods or Spirits with regards to landslide disasters? 1. Yes; 2. No

Section E: Subjective well-being and perceptions about landslide disasters

Please score the following statements concerning the extent to which you are satisfied with the following circumstances using the following Likert scale (1=completely unsatisfied; 2= Unsatisfied; 3= neither unsatisfied nor satisfied; 4= satisfied; 5= completely satisfied)

No.	Statements	Code
E.1	Your life in general	
E.2	Your social life and coexistence in the community	
E.3	Your family situation	
E.4	Your job and occupation	
E.5	Your financial situation	
E.6	Your food needs in the household	
E.7	Your house where you stay with your family	
E.8	Your health status	
E.9	The security in the village	
E.10	Your level of education	
E.11	Your freedom to choose the way of life	
E.12	Management of the village by local authorities	

Section F: Perceptions about landslide disasters.

Please score the following statements concerning your perceptions about the impacts of landslides

using the following likert scale (1=completely disagree; 2= somewhat disagree; 3= nor disagree nor agree; 4= somewhat agree; 5= completely agree)

No	Statement	Code
F.1	Landslides are a big problem in my village	
F.2	In my village, it is more likely that a landslide will occur in the next 12 months	
F.3	The severity of landslides has increased in the last 10 years in my village	
F.4	Landslides are an important discussion topic in my village	
F.5	During the rainy season, my HH members frequently worry about landslides	
F.6	In the next 12 months, it is likely that food insecurity will increase due to landslides.	
F.7	Landslides have contributed to loss of soil fertility in my village	
F.8	Landslides have contributed to soil erosion on the land in my village	
F.9	Landslides have contributed to loss of lives for people and livestock in my village	
F.10	Landslides have contributed to crop failure in my village	

F.11	Landslides have contributed to water pollution in the village	
F.12	Landslides make it difficult to access the service infrastructure (health centers, schools, water sources etc)	
F.13	Landslides have contributed to reduced household incomes in my village	
F.14	Landslides have contributed to increase in land conflicts in the village	
F.15	My household is capable of undertaking measures to prevent landslide disasters	
F.16	In general, I would trust government advice on landslide disasters	
F.17	In general, I would trust local NGO's advice on landslide disasters	
F.18	In general, I would trust my neighbor's advice on landslide disasters	
F.19	If my HH would be affected by landslides, our family would help us with shelter, food or money.	
F.20	If my HH would be affected by landslides, our neighbours would help us with shelter, food or money.	
F.21	If my HH would be affected by landslides, an NGO or other organization would help us with shelter, food or money.	
F.22	If my HH would be affected by landslides, the government would help us with shelter, food or money.	

Section G: Household assets and living conditions

Describe your housing and water access conditions

G.1. Is this house owned by the household? **1. Yes, 2. No**

G.2. What is main roof material of your house? **(1=Grass thatched; 2= Iron sheets; 3= Roofing tiles; 4= others-specify)**

G.3. What is the main wall material of your house? (1=Mud and poles; 2= Un burnt bricks; 3= Burnt bricks; 4=Cement bricks; 5=other- specify)

G.4. What is the main floor material of your house? (1=Mud/Earth; 2= Cow dung; 3= Bricks; 4=Cement; 5= Tiles; 6=other- specify)

G.5. How many rooms are in the house, excluding the kitchen?

G.6. What is the main mode of lighting for the HH currently (1=Fuel wood; 2= Paraffin; 3=Electricity; 4=Solar energy; 5=other- specify)

G.7. What is the main source of cooking fuel currently used by the HH? (1=Fire wood; 2= Charcoal; 3=Paraffin; 4= Gas; 4=Electricity; 5=other- specify)

G.8. What is the main source of drinking water for the HH? (1=private tap water; 2= Public tap water; 3= public borehole; 4=protected well; 5= River stream; 6=Un protected well; 7=other- specify)

Household Assets

Does any household member own the following household movable assets?

G.9. Telephone (1=yes; 2= No)

G.10. Cooking stove (1=yes; 2= No)

G.11. Radio (1=yes; 2= No)

G.12. Television (1=yes; 2= No)

G.13. Livestock (1=yes; 2= No)

G.14. Land (1=yes; 2= No)

Section. H: Household food security situation.

The following questions enquire for food security (access) in the past 4 weeks. So following questions should be explicitly asked for the last 30 days!

H.1. In the last 12 months, was there a month(s) when the HH did not have enough food to satisfy its food needs? **1. Yes, 2. No**

H.2. If YES In which month (s)? /___/ January /___/ February /___/ March /___/ April /___/ May /___/ June /___/ July /___/ August /___/ September /___/ October /___/ November /___/ December

During the last 30 days	If yes, how many times did it happen?			
	Yes/No	1 to 2 times	3 to 10 times	More than 10 times
H.3. Did you worry that your HH may not have enough food?				
H.4. Did any HH member fail to eat their preferred food due to lack of resources?				
H.5. Was any member of your HH forced to eat limited variety of food due to lack of resources?				
H.6. Was any member of your HH forced to eat certain foods that s/he does not like due to failure to get the type s/he likes?				

H.7. Was any member of your HH forced to eat lower quality food compared his/her needs, due to lack of food?				
H.8. Was any member of your HH forced to reduce the number of daily meals because of limited availability of food?				
H.9. Was there a day in when you did not have food of any kind of food in your HH due to lack of resources?				
H.10. Was any member of the HH forced to sleep hungry because there was not enough food?				
H.11. Was any member of your HH forced to spend a whole day and night (24hours) without food because there wasn't enough food?				

Section. I: Socio-economic and demographic characteristics of respondents

I.1. Sex of the household head

1. Female 2. Male

I.2. Age of the respondent (In complete years) (Probe using year of birth):

I.3. Highest level of education of the respondent:

1. No formal education 2. Primary 3. Secondary 4. Tertiary level

I.4. Marital status of the respondent:

1. Single 2. Married 3. Divorced/Separated 4. Widowed

I.5. For how long have you been staying continuously in this area? (Years).....

I.6. How many members are in this household (including yourself)?

I.7. Of the household members, how many are less than 18 years?

I.8. How many brothers and sisters do you have in this village?.....

I.9. What is your major source of livelihood?

1. Farming 2. Non-farm business 3. Formal employment
4. Agricultural wage labour 5. Others (Specify)

I.10. What is your religious affiliation

1. Catholic 2. Protestant 3. Moslem 4. Born Again 5. Others(Specify)

I.11. What is your tribe: 1.Bagisu 2. Basoga 3. Iteso 4. Baganda 5. Japadhola 6. Others (specify)

I.12. Is there any household member who belongs to a village organization, (e.g. farmer organization, cooperative group, youth organization, sports organization, Village Savings and Lending Association (VSLA), religious organizations, etc.)?

I. 13. Do you own any piece of land? 1. Yes 2. No

I. 14. If yes, how many hectares of land do you own?

I. 15. Do you own livestock in this household? 1. Yes 2. No

I.16. what is your household distance (in km) from the main trading centre?

.....

I.17. what is the distance of your household from the main murrum road (in km)?

.....

I.18. what is the distance of your household from the forest boundary (in km)?

.....

I.19. Have you had access to credit in the last 12 months from a formal financial institution?

1. Yes 2. No

END