BISHOP STUART UNIVERSITY



DETERMINATION OF COPING STRATEGY OF SMALLHOLDER FARMERS TO CLIMATE CHANGE IN MUCWINI SUB COUNTY KITGUMDISTRICT

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A THESIS SUBMMITED TO THE DIRECTORATE OF GRADUATE STUDIES, RESEARCH GRANTS AND PUBLICATION IN PARTIAL FULFILMENT OF THE REQUIREMENTS OF THE AWARD OF MASTER OF AGRICULTURE AND RURAL INNOVATIONS OF BISHOP STUART UNIVERSITY

PERIOD FEBUARY, 2022

DECLARATION

I, OPIYO BARNABAS, hereby declare that this is my original work except where references have been made to earlier studies and works. This work has never been presented by anyone to any institution of higher learning for any academic award.

Signed.....Date.26/10/2023

OPIYO BARNABAS

APPROVAL

I hereby certify that the research report entitled "The Determination of Coping Strategy of Smallholder Farmers to Climate Change in Mucwini Sub county Kitgum District," is the original work of OPIYO BARNABAS. This has been under my supervision and is submitted under my approval.

Signed..... Date 4. 5. 2023

PROF. OSIRU DAVID

(Supervisor)

Signed..... Date 4th May 2023

PROF. EDWARD SSEMAKULA

(Supervisor)

DEDICATION

I wish to dedicate this piece of research work to my father Nassernery Openy (Deceased) and Lawinyo Jane (Mother) who toiled to make sure that I became what I am today. I pray that the Almighty God blesses them lavishly.

ACKNOWLEDGEMENT

I would like to acknowledge with thanks the services and material help, guidance, inspiration, and any positive criticism which impacted on my life during the course of my studies.

I am particularly indebted to Prof. Osiru David and Prof. Edward Ssemmakula my research supervisors who tirelessly guided me from the start of the work to the end of the research report despite of their tight schedules.

In the same note, I would like also to express my profound gratitude to the Dean of faculty Applied Sciences and all the other lecturers in the faculty, Bishop Stuart University Main Campus. I pray that God in his immeasurable mercy should not leave you in the time of need!

I sincerely would like to thank my beloved wife , Lapolo Rosyline for her encouragement that enabled me to concentrate on my work, brothers Openy Denish JK and Oluk Sam JP and Sister Lanong Alice and My beloved children Omaro Rwot Julious Peter,Anena Francissy Immaculate, Komagum Innocent Rogers and Rwot Omiya Barnabas. My particular appreciation also goes to Ocira Denish, Ouma Bongomin Angel and all the colleagues with whom I had interactions during this research project.

TABLE OF CONTENTS

DECLARATION ..... **Error! Bookmark not defined.**

APPROVAL ..... **Error! Bookmark not defined.**

DEDICATION iii

ACKNOWLEDGEMENT iv

LIST OF TABLES vii

LIST OF FIGURES: viii

ABBREVIATIONS ix

ABSTRACT x

1.1Background to the Study 1

1.2 Statement of the Problem 1

1.3 Research Objectives 2

1.3.1 General Objective 2

1.5 Significance of the Study 3

LITERATURE REVIEW 5

2.2 The effect of drought and sales of productive assets as coping strategy to climate change 6

3.1 Research Design. 10

3.3Characteristics of Target Population 11

3.5 Sample size and Sampling Technique. 11

3.6 Data Collection Instruments. 12

3.7 Data Quality 12

3.7.1 Data Dependability. 12

3.7.2 Data Validity 13

3.8 Data Analysis 13

CHAPTER FOUR 15

RESEARCH RESULTS 15

4.1 Socio -Demographic characteristics of the respondents 15

4.1.1 Gender of the respondents 16

4.1.2 Incidence of flood as a result of climate change 21

4.1.3 Incidence of food shortage or famine in the last 10 years 21

4.4.3 Other factors that triggered migration in the Sub County besides CC 26

4.2.3 Flood 27

6.2 Recommendations 32

Appendix 1: Budget Estimate for the Research project 37

Appendix 2: Action plan for the research proposal 38

Appendix 3: Consent form 39

Appendix 04: Data collection tools Household Questionnaire for determination of coping strategy of smallholder farmers for climate change 41

Appendix 5: Introductory Letter 49

LIST OF TABLES

Table 1: Proportion of household heads (HHs) by sex 16
Table 2: The age bracket of the respondents 17
Table 3: The level of education attained by respondents 18
Table 4: The marital status of the respondents 19
Table 5: The main economic activities of the respondents 20
Table 6: Drought situation in the last 10 year 21
Table 7: Proportion of household that experienced flood in the last 10 years 21
Table 7: Proportion of household that experienced flood in the last 10 years 21
Table 8: Proportions of household that experienced famine or food shortage in the last 10 years ... 22
Table 9: Correlation analysis of effects of climate change and their coping strategies 23
Table 10: Proportion of productive assets sold 24
Table 11: Proportion of households which sold productive assets 25
Table 12: The responses to famine at household level in the last ten years 26
Table 13: Relationship between famine and other coping mechanisms of famine 27
Table 14: Proportion that experienced flood in the last 10 years 27
Table 15: Budget Estimate for the Research project 37
Table 16: Action plan for the research proposal 38

LIST OF FIGURES:

Figure 1: The Conceptual Framework.....4
Figure 2: Administrative Units of Kitgum District.....10
Figure 3: Location of the respondents by parishes.....15
Figure 4: Gender of the respondents.....16

ABBREVIATIONS

CC	:	Climate Change
IPCC	:	Inter-governmental Panel of Climate Change
UNECA	:	United Nations Economic Commission for Africa
FAO	:	Food Agricultural organization.
UBOS	:	Uganda Bureau of Standard
DAO	:	District Agricultural Officer
DVO	:	District Veterinary Officer
AEO	:	Agricultural Extension Officer
TV	:	Television
HHs	:	Households
ACT	:	African Centre for Technology

ABSTRACT

This study was on determination of the coping strategy of smallholder farmers to climate change. The specific objectives of the study were to; investigate the effect of drought and its coping strategies, explore the effect of flood and how the smallholder farmers coped up with them and assess the effect of famine and how the smallholder farmers coped up with them. The study showed that (80.4%) of the smallholder farmers experienced the effect of drought and they coped by reduction in food consumption(r = 0.763) and sales of productive assets such as lands animals (0.769). The study also indicated that (80.6%) of the smallholder farmers experienced drought in the last ten years and they coped by reduction in food consumption and sales of productive assets such as lands animals, relocation to safer areas etc. as per the key informants guides and interview reports of focus group discussions. The smallholder farmers coped up with famine by reduction in food consumption(r = 0.85) and sales of productive assets such as lands animals (0.76). The study recommended for a project for soil water conservation and management for the smallholder farmers so that water for production is available at all time. As a source of additional earning, the smallholder farmers should consider renting out their land instead of selling it out. The area Extension officers should disseminate timely local climatic conditions to the smallholder farmers for timely course of actions by the relevant stakeholders. The researchers should avail more planting and stocking materials which are flood tolerant.

Keywords: Climate change, coping strategies, smallholder farmers, flood, famine and drought

CHAPTER ONE

1.1Background to the Study

Climate is the average state of the atmosphere and the underlying land or water on time scales of the seasons and beyond (Dana, 2008).

Climate Change (CC) is defined as long term variations in climatic conditions which persist for an extended period of time and it is usually 30 years and it has variable impacts on human life. It is any change in climate, rainfall or productivity caused by natural variability and direct or indirect human activities that alter the composition of the atmosphere (Inter-governmental Panel of Climate Change, 2007, Dell et al; 2014).

Since the twentieth century, a global average air temperature on the surface of earth has been increasing by 0.74 degrees centigrade (IPCC, 2007).

Africa particularly the Sub-Saharan region is among the most vulnerable to the impacts of climate change (IPCC, 2001). There has been upsurge change in temperature at the rate of 0.5 degree centigrade per centaury (IPCC, 2007). There has been occasional Elnino that led to floods and drought which eventually lowers agricultural output in the region (Conway et al 2007) .

The East African region has witnessed a warming trend of about 0.5 degrees centigrade. For Uganda, there has been an increase in the temperature of up to 1.5 degrees centigrade during the last twenty years by up to 4.3 degrees centigrade (Hepworth and Goulden2008).

According to United Nations Economic Commission for Africa (UNECA 2010), Uganda is likely to experience higher temperature increases, changing rainfall patterns and increased climate change due to its position to the equator. Oxfam in 2008 reported of seven droughts occurrence in the space of ten years in Uganda.

The occurrences of drought and torrential rains in early 2017 in northern Uganda resulted into food and water crises; flood and malaria infection respectively (Anyadike and United Office for Coordination of Humanitarian Affair, 2017).

1.2 Statement of the Problem

About 600,000 smallholder farmers in Northern Uganda are prone to the effect of drought due climate change .This climatic event has put the farmers to the risk of food insecurity. The combination of drought, hailstorms and floods phenomena have led to crop failures in the region, which leads to about 83% -90% declines in crop yield. The combinations of these phenomena have led to food

insecurity in this region. Currently, in Karamoja, Acholi and Teso Sub regions, about 12% of smallholder farmers are food insecure, which is the result of poor rainfall that has led to drought phenomenon in the area (FAO, 2011; African Innovation Institute, 2017; FAO, 2020).

According to Anyadike and United Office for Coordination of Humanitarian Affair 2017,the phenomena of drought and *Lanina* rain as a result of climate change in Northern Uganda , can be traced way back in December 2017 which have led to food insecurity, water shortage and disease infection to smallholder farmers.

The government of Uganda, development partners and other international community bodies have already made some efforts such as tree planting and other climate smart agriculture interventions targeting farmers in the Region in order to avert the effects CC (FAO, 2019, World Bank 2019), however the previous studies have shown that there are inexhaustive investigations about the coping strategies to the effects of CC by small holder farmers (FAO, 2020). This study is to investigate how the smallholder farmers cope with the effects of CC.

1.3 Research Objectives

1.3.1 General Objective

This study sought investigation into the coping strategy of smallholder farmers to climate change in Mucwini Sub County.

1.3.2 Specific Objectives

i. To investigate the effect of drought and sales of productive assets as a coping strategy of smallholder farmers to climate change in Mucwini Sub County.
ii. To explore the effect of flood on food consumption rate as a coping strategy of smallholder farmers to climate change in Mucwini Sub County.
iii. To assess the relationship between famine and migration as a coping strategy of smallholder farmers to climate change in Mucwini Sub County.

1.4 Research Questions

i. What is the effect of drought on sales of productive asset as a coping strategy of smallholder farmers within Mucwini Sub County?
ii. What is the effect of flood on food consumption rate as a coping strategy of smallholder farmers to climate change in Mucwini Sub County?

iii. What is the relationship between famine and migration as a coping strategy of smallholder farmers to climate change in Mucwini Sub County?

1.5 Significance of the Study

The study informed a wide range of stakeholders; farmers, government, researchers, development partners who had interest in the understanding of the coping strategies of smallholders' farmers to climate change.

1.6 Scope of the Study

1.6.1 Geographical scope

This study covered nine parishes of Akara, Pachua, Pudo, Pajong, Pakuba, OkolKal, Yepa, Bura and Ogwapokewhich are all in Mucwini Sub County. Mucwini Sub County headquarters is situated 12Km from Kitgum District headquarter and it is North East of Kitgum District. It also lies between latitude 3^{o}C N and longitude 33 ^{o}C E within an average altitude of 993M above sea level and is generally flat land. The vegetation in Mucwini Sub County is mainly of woody Savannah characterized by woody cover and grass layer. The dominant grasses are *Hyperemia*, *Penicum*, *Bracharia* and *Seteria* Spp.*Acaciac ambrelium* constitutes the dominant tree. The vegetation in Sub County also includesshrubs.The soil types in Mucwini vary with localities but are generally well-drained sandy, Clay, Loam and sand clay. In some places the following soil existsfriable soils**.**These are strongly weathered and generally with low fertility. It covers much of the Sub County, Gley soils. These are poorly drained soils, liable to water logging. They are found along Pager River. Mucwini Sub County has dry and rainy seasons. The Sub County receives average annual rainfall of 1300mm. Rain starts in late March or early April and ends in November. Rainfall is bimodal with peaks in April and August. It is dry-hot and windy from December to mid-March. The average monthly maximum temperature is 27^{o}C and average monthly minimum temperature is 17^{o}C. Like many Sub Counties in the district, Mucwini Sub County is predominantly engaged in smallholder farming. The people grow a variety of food and cash crops. Over 80% of the farmers are engaged in crop production as their major activity and a small percentage in livestock rearing, Bee keeping and fishing farming on small family holdings using family labor and rudimentary hand tools such as hoes as common input and output is mostly for home consumption. Petty trading is also done in general merchandise locally

manufactured and in imported goods. The major food crops grown include; Simsim, Upland rice, Green Vegetables, Fruit trees (Citrus/Mangoes) Beans, Groundnuts, Sorghum, Maize, Millet Cassava, Sweet Potatoes, Pigeon Peas and Sunflower. About 80 % of the farmers grow their food crops in scattered natural tree garden as means to minimize wind speed, ameliorate micro-climate of the area among others.

1.6.2 Time scope

This study was in position to review literatures about coping strategy of smallholder farmers to climate change from 2010 to 2021.It was from within this timeframe that current issues about coping strategy of smallholder farmers to climate change were discovered about the study . It was from these literatures and findings from these studies where logical conclusion about the coping strategy of smallholder farmers to climate change was drawn.

1.6.3 Content scope

This study focused on the coping strategy of smallholder farmers to climate change in Mucwini Sub County, Kitgum District in Northern Uganda.

1.7 Conceptual Framework

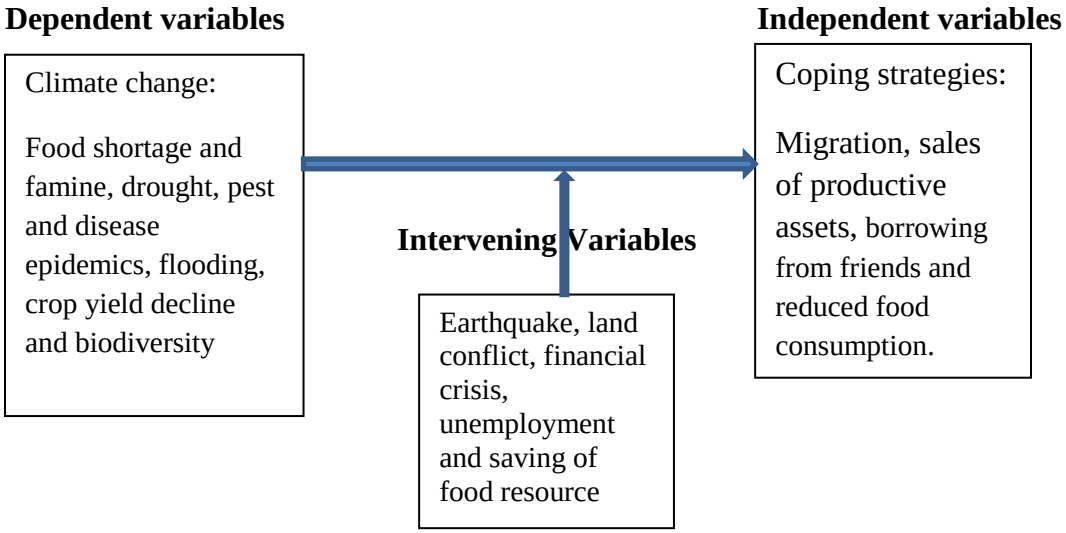


Figure 1: The Conceptual Framework

CHAPTER TWO

LITERATURE REVIEW

2.1 The relationship between food shortages; famine or crisis and migration as a coping strategy of smallholder farmers to climate change

A coping strategy is defined as an autonomous short-term location-specific action and an adjustment targeted against certain hazard or an activity which takes place within an existing structure (Ashraf and Routray 2013). There are a range of coping strategies when dealing with climate change that is, adaptive coping strategies (helpful); problem solving activities such as seeking social support or expressive coping and maladaptive (unhelpful) coping strategies, for example, avoidance of the effect by migrating away, denial to cope with climate change and doing thing in the usual way, unrealistic options and wishful thinking for the situation to change without any coping intervention (Bradley et al., 2014). Coping strategy helps smallholder farmers to buffer the negative effects of climate change within a short range of timescale (Cooper et al .2008).

As a coping strategy to famine situation in Zambia and Lake Chad Basin, smallholder farmers in the areas made quick decision to allocate more fund for purchasing food as opposed to crop farming investment. The response was a positive move as more people would die of famine since crop enterprises have relatively longer gestation period to mature. This decision had made the smallholder farmers in these areas to evade famine effect caused by climate change (Lawlor et al., 2015 CARE International 2017 and Asfaw et al., 2016).

Study carried out by Bryan et al (2009) and Deressa et al 2010 in Nile Basin of Ethiopia and South Africa outlined the coping strategies to food shortage or famine by smallholder farmers, namely; sales of productive assets like land, livestock and other agricultural inputs like seeds, storage bags among others in order get money to purchase food items for livelihoods, borrowing money from friends or banks, receiving food aid to supplement food needs, active engagement in food –for –work programs , reduction in food consumption frequency and varieties in order to conserve more food for other periods and mortgaging of land in order to get additional income.

Sorghum is one of the most important drought tolerant crops and is termed as the camel of the plant kingdom (Feteneet al.2011). Sorghum is the crucial staple food crops for the world poorest and food insecure people, for example the smallholder farmers (Timu et al .2012). The study

done by USAID 2010 proved that resource- poor smallholder farmers in Kenya relied on sorghum grains during food shortage and famine period. The crop forms the basis of food security in the region (USAID 2010). Similarly, in Papua New Guinea the smallholder farmers consumed sweet potato as their main staple food crop as over 60% of farmers depend on it (Bourke et al.2009). The crop is relatively drought tolerant.

2.2 The effect of drought and sales of productive assets as coping strategy to climate change

Drought is a natural occurrence that happens when water availability is significantly below the normal range over a longer period of time; hence the supply cannot meet the existing water demands (Schwabe et al 2015 and Hepworth et al 2015). To cope up with the phenomenon of drought in Nakasongola district in Uganda, smallholder farmers carried out a broad-based land use design that includes the practice of agro forestry trees intervention that helps to improve soil productivity and the rainfall regime in the area. The famers also engaged in off- farm employments such as trade, agro-processing among others with the intention of minimize vulnerability to the future drought occurrence (Palm et al.2014; Galacga and Balisakani 2009).

The study done in South Africa by Thomas et al. (2007) found out that smallholder farmers copped up with the drought by diversifying their farming enterprises. The farmers directed their attention to the practice of rearing livestock instead of crop based farming. The study by these scholars found out that the demand for water is far less in livestock farming compared to its counterparts. Therefore, the decision to choose livestock enterprise instead of crop technology in water crisis area is empirically justifiable as it is the practice in South Africa.

According to the study done by Lacy et al. (2006) in Mali, rainy seasons had reduced from two to one in Mali and smallholder farmers responded to this effect by growing early maturing crop varieties such as sorghum which were able to evade the effect of drought which hit the crop at the cycle when it had already matured. Similarly, the study carried out in Burkina Faso, Ghana, Nigeria and Senegal, Nigeria and Mberengwa district in Zimbabwe by Ngigi ,Jerie and Matanga in 2009 and 2002 respectively found out that stallholder farmers in these places coped up with the effect of drought by planting drought tolerant crops that would help farmers to survive up to the next season. Also in Lake Chad Basin, the research finding by Akinnagbe and Irohibe 2014 indicated that the smallholder farmers planted more wheat compared to dry rice crops since it requires less irrigation water compared to the former crop.

The study carried out in Burkina Faso showed how smallholder farmers copped up with the effect of drought in the country. Food saving to wait for uncertain future, borrowing of food and money at time of scarcity and mortgaging of crops of the following year in order to cope up with drought effect by the smallholder farmers (Roncoli et al., 2001).Similarly, the research work carried out by UNEP in 2002 in Northern Nigeria, found out that smallholder farmers coped up with the effect of drought by wild food resources reliance like leaves, berries, rodents among others as substitutes of food consumptions. Reduction in food consumption frequency was largely considered. The same study was also done in Kenya where the smallholder farmers and other women group of farmer's depended largely on eating and preservation of indigenous plants in order to cope up with drought (African Centre for Technology, 2002).

The research work carried out in Mbarangwa district in Zimbabwe pointed out that indigenous weather forecast indicators such as birds behavior such as migration, singing among others, and celestial bodies such as wind direction changes, change of cloud in the sky among others make it critical for the smallholder farmers to decide on pertinent option that make them escape the adverse effect of drought (Shoko 2012 and Shoko 2013).

2.3The effect of flood on food consumption rate as a coping strategy of smallholder farmers to climate change

Floods is one of the natural disasters that contributes to about 6.8 million deaths across the globe (Jonkman and Kelman, 2005). Asian and African regions are the most vulnerable continents according to the study done by Doocyet al.2009 and Jonkman and Kelman 2005. The occurrence of floods in Africa has increased seemingly according to the study done by Resilient Africa Network in 2015. It has been proved that Uganda is one of African countries which is highly susceptible to the effect of flood due to its terrain configuration, for example , the flood that had happened in 2010 on the river banks of Manafwa in Bududa district in Mt Elgon Region, left five thousand individuals displaced and four hundred others dead (Atuyambe et al.2011).

In the light of the above effects, smallholder farmers cope up with the flood effect through:

According to the study carried out in Bududa district in Eastern Uganda by Cao et al 2005, Smallholder farmers responded to flood adverse effect by relocation to the safer areas at that time the threats of the flood were too great to ignore. The other option was reliance on material aids and relief social support by government. By also resorting to subsistence and innovative farming practices such as terracing in order to overcome crop destruction following heavy rains.

Agro forestry intervention had been proposed by Neufeldt and Thorlakson 2012, Bryan et al.2013 and Simelton et al.2015 as one of the livelihood resilience activities that could help to build livelihood cope up to floods. Basing on the study done by Neufeldt and Thorlakson in 2012 in Kenya, some of the smallholder farmers depended on fruit trees to get income and food in the event of floods when other crops were devastated or washed away by excessive water. The proceeds from agro forestry such as fuel wood, timber among others were sold to other farmers in order to acquire food resources at that time of high demands. In fact, these agro - forestry proceeds became the alternative source of foods and income to the smallholder farmers.

CHAPTER THREE
RESEARCH METHODOLODY

3.1 Study Area

Kitgum is one of the districts in the Northern region of Uganda. It borders Gulu district in the Northwest, Lamwo in the North, Agago District in the South East, Pader District in the South, Republic of South Sudan in the Northeast and Kotido District in the East. It lies between latitudes 20 North and 40 N and longitudes 320 East and 340 East, with an average altitude of 1,100metres above sea level. Kitgum District headquarters are situated centrally in the District. The district has a total area of about 4,042 Sq. Kilometers of which land area is 4,039 sq. Km.Kitgum District lies at an altitude of 1,100 meters above sea level and is generally flat. The vegetation in Kitgum is mainly of woody Savannah characterized by woody cover and grass layer. The dominant grasses are *Hyperemia, Penicum spp, Bracharia* and *seteria spp*. *Acacia cambrelium* constitutes the dominant tree. The District is drier in the northeast and the vegetation includes shrubs. The soil type in Kitgum varies with localities but is generally well-drained sandy, Clay, Loam and sand clay. In some places the following soil exists friable soils. These are strongly weathered and generally with low fertility. It covers much of the district, Gley soil .These are poorly drained soils, liable to water logging. They are found along Pager River. Kitgum District has dry and rainy seasons. The district receives average annual rainfall of 1300mm. Rain starts in late March or early April and ends in November. Rainfall is bimodal with peaks in April and August. It is dry-hot and windy from December to mid-March. The average monthly maximum temperature is 27^{o}C and average monthly minimum temperature is 17^{o}C. Like many districts in Uganda, Kitgum district is predominantly engaged in small scale agriculture, animal husbandry and produce buying. Bee Keeping and scanty fishing is also carried out. Fish farming is also carried out by some few farmers. The people grow a variety of food and cash crops. Over 90% of the farmers are engaged in crop production as their major activity and a small percentage in livestock rearing, Bee and fish farming on small family holdings using family labor and rudimentary hand tools such as hoes as common input and output is mostly for home consumption. Petty trading is also done in general merchandise locally manufactured and in imported goods. The major food crops grown include; SimSim, Upland rice, Green Vegetables, Fruit trees (Citrus/Mangoes) Beans, Groundnuts, Sorghum, Maize,

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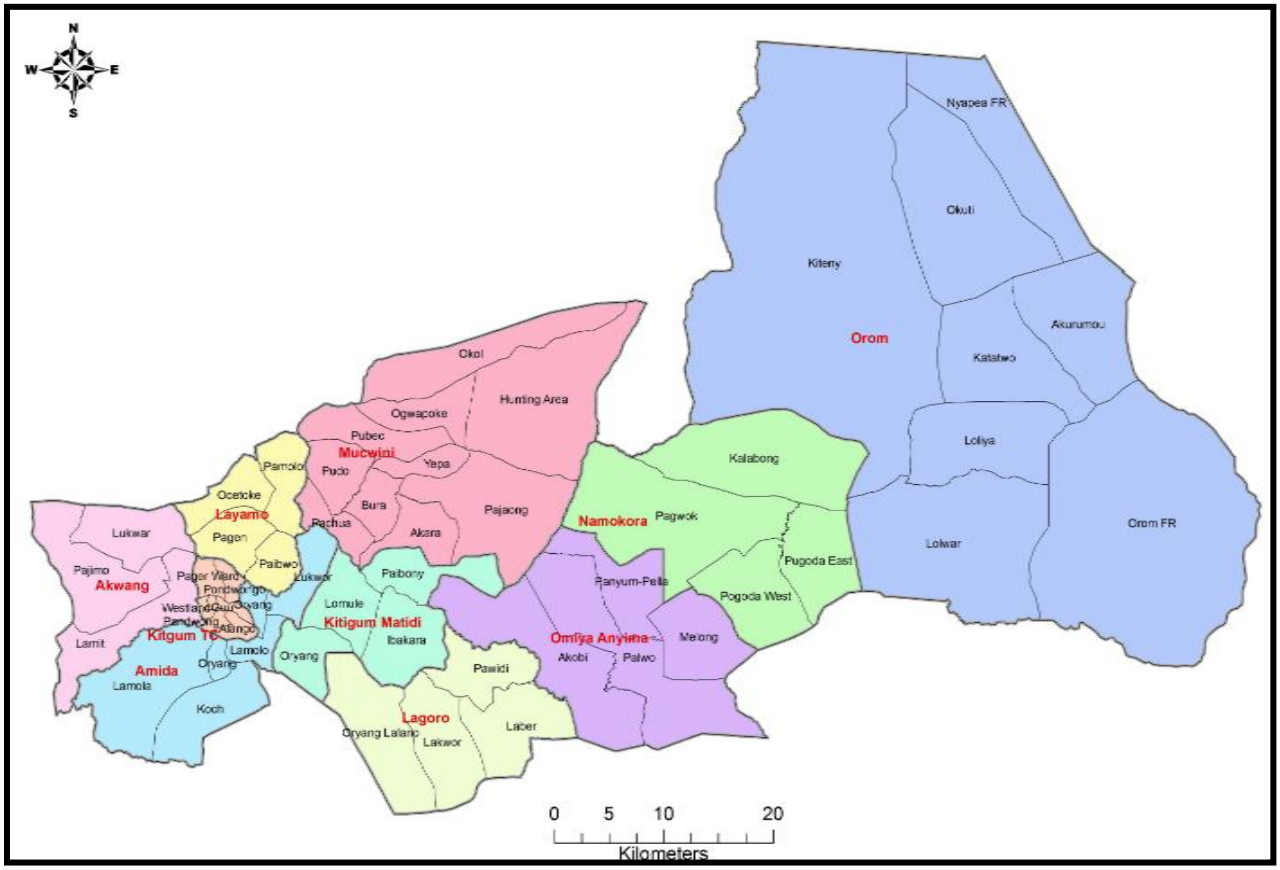


Figure 2: Administrative Units of Kitgum District

3.1 Research Design.

The Cross sectional survey design was employed to gather data with the help of questionnaires that guaranteed quantitative data collection from the main respondents and interview schedules and focus group interview were administered to generate qualitative data from these key informants (Shneiderman and Plaisnt 2005; Buns and Grove 1993).

3.3Characteristics of Target Population

The population is defined as the entire elements (individuals, objects and events) that meet the sample guideline for getting involved in the study (Buns and Grove 1993). In this study, the characteristic of the population was farmers who were smallholders experiencing the effect of climate change

3.5 Sample size and Sampling Technique.

A sample is an element selected from the target population with the interest of finding out something about the total population from which they are chosen (Mouton, 1996).

Yamane (1967) provides a simplified formula to calculate sample size:

$$n = \frac{N}{1+Ne^2}$$

Where n= sample size

N= the target population

e= the level of precision (0.5%)

In this particular study, the target population was 5,000 (UBOS, 2014) smallholder farmers.

Therefore, the sample size according to this formula is:

$$n = \frac{5,000}{1+5,000(0.05)^2} = 370.3704 \sim 370$$

n= 370, hence 370 smallholder farmers will be required to participate in this study.

To choose the initial respondent of the research, a simple random sampling was employed to select the right candidate for the response.

Systematic random sampling was employed to get individual smallholder farmers to get involved in the study. The five thousand households of smallholder farmers were registered by the researcher in order to generate the sampling frame. A sample of one farmer was sampled after every fourteenth (14th) individual farmer.

Key informants were sampled by random purposive sampling while also considering the principle of saturation responses.

3.6 Data Collection Instruments.

In this study, the structured questionnaires were used to gather the quantitative data from the small holder farmers with the guidance of the researcher. It had the advantage of creating room for better explanations to the respondents.

Key informants interview conducted to DAO, DVO and Agricultural extension workers (AEW) in order to validate the information provided by the small holder framers. This tool at the end generated a qualitative data.

Focus group interviews was used to gather the qualitative dataset from a group of 6 to 12 small holder farmer groups which had helped so much to draw a hard conclusion on the coping strategy to climate change by the small holder farmers .This tool also helped the researcher to enrich the data which was not brought clearly by the individual small holder farmer especially on the sensitive matter of land sales and food consumption rate.

3.7 Data Quality

3.7.1 Data Dependability.

This is the degree of consistency with which the data collection instrument measures the variable it is designed to measure. It measures the data trustworthiness and reliability (Thyer, 2010). The data integrity may be affected by changes of research condition in the field (Trochim 2005;

Marshall and Rossman 1995). This consistency was complied with by consulting an experienced researcher to design the data collection tools which measured the intended variables.

3.7.2 Data Validity

This is a data indicator which measures the quality of the research project, and it also helps the researcher to make proper description, explanation, interpretation and conclusion of the study (Creswell 1998 and Maxwell 2005). This was achieved through pretesting the data collection tools in an area outside Mucwini Sub County prior to the actual data collection date; the preliminary findings showed the interpretive, descriptive, theoretical and generalizable abilities of the dataset collected, this proof validity helped the researcher to make a decision of going ahead to use the data collection tools in Mucwini Sub County.

3.8 Data Analysis

This is the process of reducing on a large amount of collected data in order to make sense out of them (Patton, 1987). The all process entailed data organization; summarization and categorization, and this helped to create data patterns and themes which ultimately created linkage to the research questions.

Qualitative data analysis. In this study, it involved the scrutiny of data collected by interview schedules and focus group interviews. In this case, the responses of the respondents were categorized into the main themes and sub themes; careful understanding of their descriptive responses was made in order to get true the meanings of their communication since different words were used to give the same answers. Thereafter, the main themes were coded in order to establish the response's repetitiveness and the responses were later transcribed in order to show the meanings of the communication from the respondents. Entirely, the responses were integrated into the text of the research findings.

Quantitative data analysis. This is the analysis of the numerical values in this case; data were generated using the questionnaire the data collection instrument and later analyzed using the computer analysis software called SPSS, version 25. Different variables were represented into

descriptive statistics such as, frequency distribution tables, pie charts and correlation table (Polit and Hungler, 1995).

CHAPTER FOUR

RESEARCH RESULTS

4.1 Socio -Demographic characteristics of the respondents

Based on the statistics of UBO 2014, Mucwini Sub County has about 5,000 smallholder framers that are spread across the nine parishes. In this study, stratified random sampling was used to identify the proportions of the respondents from the parishes taking into consideration the ages, education level, gender and the number of smallholder farmers. The number of individual smallholder framers in each parish were as, Bura (750), Pubec (650), Pudo (650),Okol(500), Pajong(400),Yepa(550), Ogwapoke(500), Akara(400) and Pachua(600). From the target population (N = 5,000), the researcher intended to collect data from (n = 370) respondents; however 360 respondent's forms were returned constituting to 97% and 10 forms were not returned representing 3%. From the representation of the research findings, Bura Parish got the highest number of respondents with 15% followed by Pudo and Pubec with 13% of the respondent, Puchua drew 12% of the respondents, Yepa was represented by 11%, Ogwapoke and Okol were represented by 10% of respondents, and lastly Akara and Pajong each had a representation of 8% respondents. In conclusion, according to the findings, the sample population was fairly distributed throughout the research areas meaning that adequate data were obtained across the areas. The details of the location of the respondents are presented in **fig.1**

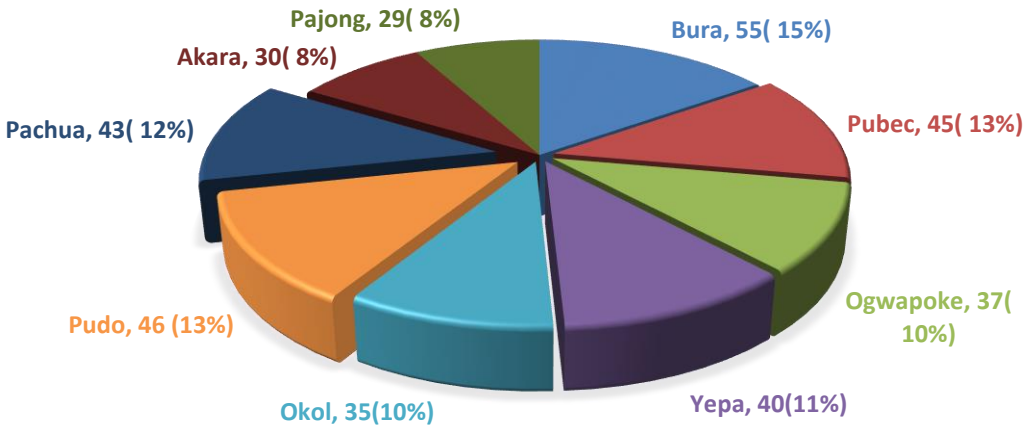


Figure 3: Location of the respondents by parishes

4.1.1 Gender of the respondents

The study showed that 57% and 43% of the respondents were males and females respectively. The details of the respondents are designated at gender level as in **fig 4.**

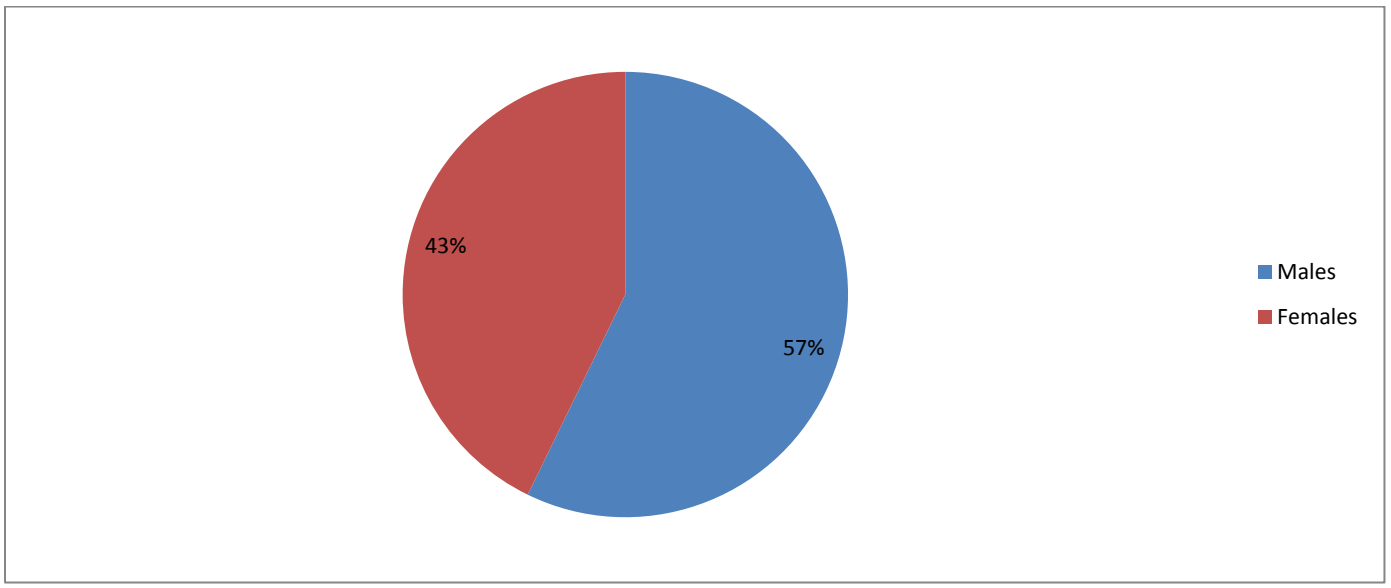


Figure 4: Gender of the respondents

4.1.2 The heads of the family

Table 1 below indicates that 83.9% of the respondents were male – headed family, while 16.1% of the households were Female- headed family. The African culture is still in practice in Mucwini Sub County in Kitgum as well as other parts of northern Uganda which holds that males are heads of the family which was why 83.9% of the respondents were male- headed households. However, 16.1% of the HHs accounted for the HH heads which have lost their husbands, never married and divorced.

		Frequency	Percent	Cumulative Percent
Valid	Male	302	83.9	83.9
	Female	58	16.1	100.0
	Total	360	100.0	

Table 1: Proportion of household heads (HHs) by sex

The respondents in the age brackets 31- 50(43.3%- 26.1%) were active participants in agriculture because they have a lot of responsibilities such as educating school- going children, food

production for the family ,health and other family basic needs and agriculture economy is their main source of livelihood. Being the active participants in agriculture, they were the most hit group of farmers by drought, famine and flood. This age group is a reproductive age and demand more basic needs for the family. Both the age brackets 18- 30 and over 51 were dependence. They depended on the age category of 31-50(26.1- 43.3%) for survivals on the required basic needs.

		Frequency	Percent	Cumulative Percent
Valid	18 -30 Years Old	80	22.2	22.2
	31-40 Years Old	156	43.3	65.6
	41-50 Years old	94	26.1	91.7
	Over 51Years Old	30	8.3	100.0
	Total	360	100.0	

Table 2: The age bracket of the respondents

The primary leavers (49.9%) had no technical skills that could to earn them other means of survival apart from practicing agriculture; hence they are the most affected category of farmers by drought, famine and flood. The farmers with lower secondary level (28.3%) had knowledge without the required employable technical skills; therefore, they had a narrow window for employment opportunity. This means that their survival remained only to be on agricultural which is heavily affected by drought and flood which resulted into famine. Post-secondary (10.3%) and non- formal education (6.9%) respectively were part-timers in agricultural since they were employed in their specific fields of studies such as teaching, health service provision to mention but a few. Their partial disengagement in agriculture made them less affected by the effects of drought, flood and famine.

		Frequency	Percent	Cumulative Percent
Valid	Non- formal education	25	6.9	6.9
	Primary School	176	48.9	55.8
	Lower Secondary school (Forms I to IV)	102	28.3	84.2
	High Secondary School (Form V to VI)	20	5.6	89.7
	Post-Secondary school e.g. Diploma, degree, Vocational	37	10.3	100.0
	Total	360	100.0	

Table 3: The level of education attained by respondents

The married farmers (25.6%) were actively engaged in agriculture because they have a lot of family responsibilities aware that they are actively engaged in reproduction. These responsibilities includes; taking children to school, health, food and other family basic needs, hence actively they participated in agriculture as source of their revenues. Therefore, they are the most affected farmers by drought, famine and flood

The single (16.7%) and the cohabiting (16.7) were farmers planning for their future responsibilities like marriage, and children - bearing responsibilities; therefore, they actively took agriculture as a source of income - generating activity to cater for their future responsibilities. This made them to be the second category of group of farmers who were affected by drought and flood.

The divorce (12.5%), separated (5.6%), widow (16.1%) and widower (6.9%) were the minority farmers group of participants in agriculture in the area. Some of these groups of people were left with children to take care off, take them to schools and provide them with food and other basic needs therefore; they were participating in agriculture as their source of livelihood too but with reservation.

		Frequency	Percent	Cumulative Percent
Valid	Single	60	16.7	16.7
	Married	92	25.6	42.2
	Cohabiting	60	16.7	58.9
	Divorced	45	12.5	71.4
	Separated	20	5.6	76.9
	Widow	58	16.1	93.1
	Widowers	25	6.9	100.0
	Total	360	100.0	

Table 4: The marital status of the respondents

4.1.3 Main source of livelihood of the respondents

Production of crops such as simsim, cassava and groundnuts are the main economic crops of the area (41.7%). Sales of the agro –produce such as simsim, groundnut and cassava, and factory-based goods are also the second economic activities in the area (22.1%). The sales of local brews such as *Kwete* and A*rege* were third economic activity, majorly by uneducated women (16.7%). For the same reason, animal rearing of animals such as pigs, cattle, goats and chicken are some of animals managed by some samallholder farmers (11.1%).

		Frequency	Percent	Cumulative Percent
Valid	Crops production	150	41.7	41.7
	Animal Rearing	40	11.1	52.8
	Trade/Business	80	22.2	75.0
	Formal Job/Salaried work	10	2.8	77.8
	Causal Work	5	1.4	79.2
	Selling charcoal/firewood	5	1’4	80.6
	selling local brew	60	16.7	97.2
	Artisan/skills technician	8	2.2	99.4
	Other (Specify)	2	6	100.0
	Total	360		

Table 5: The main economic activities of the respondents

4.2 Effects of climate change

4.2.1 Incidence of drought as a result of CC

The respondents who answered (Yes), that drought had occurred in their area in the last ten years were 81.4%.They stressed that in 2017, they had a serious incidence of the drought in the Sub County. However, about 18.3% of the respondents answered (No), they did not have the incidence of drought in the Sub County in the last ten years. The minority of smallholder farmers who did not experience drought were those who resided along River Aringa where the drought incidence was not felt. The micro – climatic condition along the river valley moderated the climatic conditions of the area especially in Bura, Akara and Pubech Parishes which lie along River.

		Frequency	Percent	Cumulative Percent
Valid	Occurrence of drought(Yes)	293	81.4	81.6
	Non- occurrence of drought(No)	66	18.3	100.0
	Total	359	99.7	
Missing	System	1	.3	
Total		360	100.0	

Table 6: Drought situation in the last 10 year

4.1.2 Incidence of flood as a result of climate change

Table 7: Proportion of household that experienced flood in the last 10 years

The respondents who answered (Yes), that flood had occurred in the Sub County in the last ten years were 80.6%.They stressed that in 2020, they had a serious incidence of flood in the Sub County. However, about 19.4% of the respondents answered (No), that they did not have the incidence of flood in the Sub County in the last ten years. The minority of smallholder farmers who did not experience flood were those who resided along upland areas and sandy type of soil which are predominant in Pudo, Pajong, Okol and Yepa Parishes where the flood incidence was not felt. Sandy soil permits free drainage of excess water and upland topography permits easier flow of excess water by gravitational force.

		Frequency	Percent	Cumulative Percent
Valid	Yes	290	80.6	80.6
	No	70	19.4	100.0
	Total	360	100.0	

Table 8: Proportion of household that experienced flood in the last 10 years

4.1.3 Incidence of food shortage or famine in the last 10 years

The majority of the respondents showed that they had famine in their households in the last ten years due to climate change (72.5%) that was between 2010 to 2020.Due to decline in harvest, the food stuffs produced was not enough to finish the one complete year. While 27.5% of the respondents said that they had no famine in the last ten years as a result of climate change between the year2010 -2020. The farmers noted that despite of insufficient harvest, they

engaged in vegetable farming along river Aringa to generate additional income to buy food from elsewhere the district,for example Lamwo district which had stable climatic conditions.

		Frequency	Percent	Cumulative Percent
Valid	Had famine between 2010-2020(Yes)	261	72.5	72.5
	Had no famine between 20210-2020(No)	99	27.5	100.0
	Total	360	100.0	
	Total	360	100.0	

Table 9: Proportions of household that experienced famine or food shortage in the last 10 years

		Drought in the last ten years	Sales of productive assets	Flood in last ten years	Food consumptions rate in people's household	Famine at the household in the last ten years
Drought in the last ten years	Pearson Correlation	1	.956**	-.234**	.763**	.769**
	Sig. (2-tailed)		.000	.000	.000	.000
	N	359	359	359	359	359
Sales of productive assets	Pearson Correlation	.956**	1	-.244**	.766**	.805**
	Sig. (2-tailed)	.000		.000	.000	.000
	N	359	360	360	360	360
Flood in the last 10 years	Pearson Correlation	-.234**	-.244**	1	-.638**	-.303**
	Sig. (2-tailed)	.000	.000		.000	.000
	N	359	360	360	360	360
Food consumptions rate in people's household	Pearson Correlation	.763**	.766**	-.638**	1	.797**
	Sig. (2-tailed)	.000	.000	.000		.000
	N	359	360	360	360	360
Famine in the household in the last ten years	Pearson Correlation	.769**	.805**	-.303**	.797**	1
	Sig. (2-tailed)	.000	.000	.000	.000	
	N	359	360	360	360	360
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 10: Correlation analysis of effects of climate change and their coping strategies

4.2 Coping mechanisms to the effects of CC

4.2.1 Drought

There was a strong positive direct correlation between drought and sales of productive assets such as land, bicycle, and animals (r = 0.956); and famine (r = 0.769) as a result of decline in agricultural productivity and production of crops and animals. In this case, drought incidence in the last ten years escalated the sales of productive assets and cases of famine different

households' families and community. But there were weak indirect correlation between flood and drought(r = - 0.234); sales of productive assets(r = - 0.244). The study found out that there was a strong direct correlation between food consumption rate and drought (r = 0.763) as less food were produced for consumption; sales of productive assets(r = 0.766) such as land, oxen, transport means were sold for immediate basic needs other than expanding of productive acreages for future food consumption, and famine (0.797) as food choices and eating frequency reduces due to inadequate food production.

According to the results in table 8 above,regarding the finding on what kind of productive assets did respndents sell to cope up with drought, 71.9% of the respondents indicated that they sold Aminals such as pigs,cattle goats and chickens, 1.1% sold Bicycles,7.2% sold Land, and 19.7 sold other items.Most respondents indicted that they sold off the animals in order to reduce on both the burden of looking after the animal and also as a requirement to raise money to buy the basic needs for the family. The sales of other items such as houses, vichcles and TVs were low because the respondents were not in economic capacity to own them.

		Frequency	Cumulative Percent
Valid	Animals	259	71.9
	Bicycles	4	73.1
	Land	26	80.3
	Other (Specified)	71	100.0
	Total	360	

Table 11: Proportion of productive assets sold

The results of the findings showed that 37.5% (strongly agreed) that many households in their community sold productive assets to cope up with drought, 26.4% (agreed) that they sold productive assets due to climate change , while 22.8% indicated (disagreed) that they did not sell productive assets due to climate change and 13.3% indicated that they strongly (disagreed) that many households in the Sub County did not sell off productive assets to cope up with drought. In conclusion ,as a matter of agreement and disagreement , the highest persentage of the respondents representing 37.5% and 26.4% respectively (strongly agreed) and (agreed) respectively people in HHs sold productive assets to cope with drought.

		Frequency	Cumulative Percent
Valid	Strongly Agree	135	37.5
	Agree	95	63.9
	Disagree	82	86.7
	Strongly Disagree	48	100.0
	Total	360	

Table 12: Proportion of households which sold productive assets

4.2.1.1 Reasons for the sales of productive assets

Based on the findings from both the key informants and the randomly selected respondents using the structured and focused group discussion questionnaires, the following reasons were mentioned as to why their households sold off productive asset as a strategy to cope with drought, the respondents stated that most households sold animals because there would be no good grasses to graze the animals and protect the animal from moving to destroy the community assets. They respondents also mentioned that to protect them from famine because they needed to raise money to buy food. Payment of basic needs like school fees, medication, food and clothes. And finally as ways of avoiding migration to the neighboring community to seek for food, water and grazing areas. In conclusion, the respondents pointed out very clearly that the asset management was a tradeoff between maintaining the current food consumption rates and protecting the future income generating capacity of their HHs.

4.2.2 Famine or food shortage

11.1 % of the respondents said that their coping mechanism to famine at household level in the last ten years was Migration; 28.3% indicated that their coping mechanism was sales of productive assets, 55.6% indicated that they reduced on their food consumptions, 3.9% indicated that for them, they engaged in food for work program and 1.1% said they borrowed money from financial institutions to cope up with the famine in the past ten years due to climate change.

		Frequency	Percent	Cumulative Percent
Valid	Migration	40	11.1	11.1
	Sales of Productive asset	102	28.3	39.4
	Reduce food consumption	200	55.6	95.0
	Engagement in food for work programs	14	3.9	98.9
	Borrowing of Money	4	1.1	100.0
	Total	360	100.0	

Table 13: The responses to famine at household level in the last ten years

4.4.3 Other factors that triggered migration in the Sub County besides CC

The respondents in focus group discussion and key informant interviews, categorically pointed out that apart from famine, the community of Mucwini moved due to soil infertility ,as they search for large pieace of land to produce food to avoid future famine owing to inadequate production . More importantly, famine of any cause mostly triggered conflict in the families and communities, therfore, as a coping mechanism, different households chose to migrate to a safe place. Other respondents also stated that they chose to migrate because that was the only way they could aquire additional land and food in the short run.

The study found out that 11.1 % of the respondents copied to famine at household level in the last ten years by migration to relatives to get some food stuffs and sometimes stay; 28.3% indicated the sales of productive assets such as land, bicycle and animals(cattle,pigs,goats and chickens) , 55.6% indicated that they reduced on their food consumptions frequency from thrice a day to once or none a day, 3.9% of the respondents showed that for them, they engaged in food for work from farmers who had cassava food and sorghum. Lastly, 1.1% showed that borrowing money from financial institutions such Village Savings and Loan Association (VSLA) and Kitgum Cooperative Savings and Credit Society –Village Bank to cope up with the famine.

The study found out that there was a strong direct positive relationship between sales of productive assets and food consumption rate($r = 0.76$) since assets such as oxen, land that aid production were sold; and famine($r = 0.85$) due to decline in food production and famine ($r = 0.769$) as a result of decline in agricultural productivity and production of crops and animals. The study also shows that there was a perfect direct correlation between famine and sales of productive assets ($r = 0.805$). This implies that an escalation in intensity of famine also increases

with the amount of productive assets sold in order to get money to buy basic resources. There is also a strong direct relationship between famine and drought(r = 0.763) and food consumption(r = 0.797). On the other hand, there was an indirect perfect correlation between famine and flood(r = - 0.303). This implies that increase in the incidence of famine decreases chance of flood.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Migration	40	11.1	11.1	11.1
	Sales of Productive asset	102	28.3	28.3	39.4
	Reduce food consumption	200	55.6	55.6	95.0
	Engagement in food for work programs	14	3.9	3.9	98.9
	Borrowing of Money	4	1.1	1.1	100.0
	Total	360	100.0	100.0	

Table 14: Relationship between famine and other coping mechanisms of famine

4.2.3 Flood

The household experienced flood in the last 10 years as it was indicated by 80.6% of the respondents who said (Yes) and 19.4% indicated who said (No). In conclusion, based on the percentage representation, respondents in the study area of Mucwini Sub County had experienced flood in the last 10 years as the result of climatic change.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	290	80.6	80.6	80.6
	No	70	19.4	19.4	100.0
	Total	360	100.0	100.0	

Table 15: Proportion that experienced flood in the last 10 years

4.3.2 Coping mechanisms to flood as a result of CC

Considering the focused group discussion and the key informants, the smallholder farmers coped with flood by they migrating from the flooding areas to the near by communities which were free of flood to allow healthy settelemnt, they had bought some food from the market since there crops were destroyed, they had to adopt to having meals once or skipping a day or reducing consumption to extend on the length of time of available food; they got involved in

growing varities of crops especially fast growing crops and vegetable, they sold off some animals to raise money for other basic needs . Some households resorted to growing food crops that were more resistant to the situation like cassava and other perenial crops such as mango.

On the other hand, there was an indirect perfect correlation between famine and flood(r = -0.303). This implies that increase in the incidence of famine decreases chance of flood. The study also realized that there was a perfect indirect relationship between food consumption and flood (r = -0.638).This implies that the incidence of flood reduced on the food consumption rate as food resources were affected negatively by the flood. This study also found out that there was a negative perfect correlation between flood and food consumption rate(r = - 0.638). This means that an increase in the incidence of flood also brings about a decrease in food consumption rates due to reduced food production and productivity. But there were weak indirect correlation between flood and drought(r = - 0.234); sales of productive assets(r = - 0.244) and famine(r = -0.303)

CHAPTER FIVE

DISCUSSIONS OF RESULTS

5.1 The effect of drought and sales of productive assets as a coping strategy of smallholder farmers to CC

The study showed that there was a drought phenomenon in the Sub County in the last 10 years (81.4%).During this time period especially in 2017, the water availability was significantly below the normal level expected over that one year. It means the supply of water could not meet the existing water demand for crops, animals and humans (Schwabe et al 2015 and Hepworth et al 2015). The results of this study indicated that the smallholder farmers in Mucwini Sub County coped up with drought by reducing in food consumption frequency($r = 0.763$); from thrice to once or none in a day. This finding agrees with the studies of African Centre for Technology (ACT), 2002.This finding agrees with the study also showed that women played a pivotal role in coping with drought by reducing the food consumption rate in the households. The study also found out that the smallholder farmers in Mucwini Sub County coped with drought by sales of productive assets such as land, animals, and oxen (0.956). The farmers sold off their productive assets such as animals due to lack of grazing grasses for their animals at that time and other assets such as land and farm tools were sold off in order to food resources and other basic needs for the households of the earlier studies of the coping mechanism of smallholder farmers to drought. However, the previous studies showed that smallholder farmers coped up with drought through practice of agro- forestry in order to improve on soil fertility and rainfall regime; off-farm employment opportunity such as trade, agro-processing among others; diversification of farming enterprises such livestock (require less water) as compared to crop enterprises; growing early maturing, efficient water uptake and drought tolerant crops such as sorghum, upland rice among others; saving of food, borrowing of food and mortgaging of crops, consuming of wild food resources such as leaves,berries,rodents among others and indigenous weather forecast such as birds behavior(migration and singing),celestial bodies(wind direction) and change of cloud in the sky in order to make the smallholder farmers make an informed decision available coping options(Palm et al;2014, Thomas et al;2007;Lacy et al; 2006;Ngigi and Jerie,2009; Matang 2002; Akinnagbe and Irohibe ,2014,Rono et al;2001 ; Shoko, 2012 and Shoko ,2013).

5.2 The relationship between famine and migration as a coping strategy of smallholder farmers with climate change in Mucwini Sub County.

The results of findings showed that (72.5%) of the HHs had famine in the last ten years due to climate change that was between 2010 to 2020.Due to decline in harvest, the food stuffs produced was not enough to finish the one complete year(Mbow et al; 2019). The study showed that the smallholder farmers in the area coped up with famine by reducing food consumption frequency and sales of productive assets such as land, bicycle and animals (0.76) in order to get income to buy food stuffs in the households. This finding agreed with studies of Bryan et al; 2009 and Deress et al; 2010 .The scholars argued that the smallholder farmers could cope up with famine by sales of productive assets such as land, livestock, seeds and reduction in food consumption rate. Nevertheless, other scholars argued that smallholder farmers could also cope up with famine by borrowing money from friends or banks, mortgaging of land, food for work, food aid, consumption of low nutrient crops such as sorghum and cassava, allocation of more fund for food purchases as opposed to crop investment and growing of drought tolerant crop such as sweet potato(Lawlor et al; 2015, CARE International ;2017 and Asfaw et al ;2016, Fetene et al; 2011 ,Timu et al; 2012 and USAID 2010; Bourrtse et al; 2009).

5.3 The effect of flood on food consumption rate as a coping strategy of smallholder farmers to climate change in Mucwini Sub County

The result of the study showed that (80.6%) of the smallholder farmers experienced the effect of flood in the last 10 years. Considering the focused group discussion and the Key informant interviews, the smallholder farmers coped up with flood effect by migrating from the flooding areas to uplands .This finding agreed with the study of Cao et al; 2005. The study found out that relocation to a safer ares formed the basis of smallholder farmers coping mechanism to flood.Other coping mechanisnms to flood according to this study include: purchases of some food from the market and stored since the crops were destroyed by flood. Adoption of consumption of meals once or skipping a day or reducing consumption based on availability food; getting involved in growing fast – maturing varities of crops and such as peas, beans etc. and vegetable such as cabbage *Hibiscuss Spp* , sold off some animals to raise money for other basic needs. Some households resorted to growing food crops that were more tolerant such as

rice and yams to flood. Theses coping strategies disagreed with findings of Cao etal; 2005 ,Neufelt and Thorlakson ;2012 and Simelton et al; 2015). Theses scholars found out that the smallholder farmers could cope up with through reliance on material aids and ssocial support such as food, clothes ,medical supllies among others by government; innovative farming systems such as terracing on the hilly areas and agro – forestry interventions such crop – tree interface, Tree – animal interface , crop – animal interface among others.

CHAPTER SIX

CONCLUSIONS AND RECOMMENDATIONS

6.1Conclusions

6.1.1 Coping with drought

In conclusion, our results suggest that the smallholder farmers in Mucwini Sub County coped up with drought by:

- Reduction in food consumption frequency from thrice to once or none a day.
- Sales of productive assets such as animals and land.

6.1.2 Coping with Famine

In conclusion, the smallholder farmers in Mucwini Sub County perhaps coped up with famine through:

- Reduction in food consumption frequency from thrice to once or none a day.
- Sales of productive assets such as animals and land.

6.1.3 Coping with flood

In conclusion, the smallholder farmers in Mucwini Sub County probably coped up with effect of flood through:

- Migrated from flood susceptible areas to uplands.
- Purchased food stuffs from markets and stored in the polythene bags.
- Reduction in food consumption frequency from thrice to once or none a day.
- Sales of productive assets such as animals and land.
- Grew flood - tolerant crops such as rice and yams.

6.2 Recommendations

6.2.1 Coping with drought

The study recommended for:

- A project for soil water conservation and management for the smallholder farmers so that water for production is available at all time.
- As a source of additional earning, the smallholder farmers should consider renting out their land instead of selling it out.

6.2.2 Coping with famine

- A project for soil water conservation and management for the smallholder farmers so that water for production is available at all time.
- As a source of additional earning, the smallholder farmers should consider renting out their land instead of selling it out.

6.2.3 Coping with flood

- The area Extension officers should disseminate timely local climatic conditions to the smallholder farmers for timely course of actions by the relevant stakeholders.
- The researcher should avail more planting and stocking materials which are flood tolerant.

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Appendix 1: Budget Estimate for the Research project

S/no.	Particulars	Quantity	Rate	Amount (UGShs)
01	Stationary	Lump sum	Lump sum	50,000=
02	Production cost	Lump sum	Lump sum	50,000=
03	Binding	4	@10,000	40,000=
04	Transport	Lump sum	Lump sum	200,000=
05	Airtime	Lump sum	Lump sum	20,000=
06	Research Assistant	02	100,000	200,000
07	Refreshment	Lump sum	150,000	150,000
	Amount			830,000

Table 16: Budget Estimate for the Research project

Appendix 2: Action plan for the research proposal

Starting Time	End Time	Activity
Jan. 2021	Jan.	Review of literature
Jan. 2021	Jan	Research title submission
Feb 2021	Feb	Proposal Development
Feb 2021	Feb	Submitting Proposal
Feb 2021	March	Development of data collection tools
April 2021	May	Data Collection
May 2021	May	Analysis and interpretation of results
June 2021	June	Draft report writing
July 2021	July	Final report submission
July 2021	July	Presentation of the thesis report
August 2021	August	Making any necessary correction(s)
September 2021	Sept	Submission of final Report

Table 17: Action plan for the research proposal

Appendix 3: Consent form

Consent Form for Bishop Stuart University Master of Agriculture and Rural Development Innovations

Informed consent Form for participant invited to participate in the study titled: Determination of coping strategy of Smallholder Farmers with climate change in Mucwini sub county, KitgumDistrict

Name of the Principal Investigator (PI), Mr. Opiyo Barnabas.

Introduction

I am Mr. Opiyo Barnabas, a Student of Bishop Stuart University, Main Campus. I am doing a research, **determination of coping strategy of smallholder farmers for climate change.**

The study seeks to assess the relationship between famine and migration as a coping strategy of smallholder farmers with climate change, investigate the effect of drought and sales of productive assets as a coping strategy of smallholder farmers with climate change and to explore the effect of flood on food consumption rate as a coping strategy of smallholder farmers with climate change in Mucwini Sub County.

The purpose of this form is to provide you with information about this study and also to seek your participation in the interview. The interview will take about one and half hours.

The Purpose of the Research

The study seeks to determine the coping strategy of smallholder farmers with climate change with the hope of coming up with a durable coping best practices**.**

Participant selection

You are being invited to participate in this study because of your knowledge and experience about coping strategy to climate change in your area.

Voluntary Participation

Your participation in this research is purely voluntary. Your participation will have no bearing on your day-to-day work, job or on any work related evaluations or report. You are free to stop at any time during the interview or to decline responding to some questions you do not wish to answer.

Procedures

During the interview, I will ask questions from a prepared guide and also some that may arise from your responses. The information will be recorded on a digital recorder for accurate transcription later. If you do not agree to being recorded, then written notes will be taken. Only the core research team members will have access to the information recorded and transcribed. The tape and other materials will be reviewed to make anonymous before analysis.

All research materials will be kept in a secure place under the custodianship of the investigator.

Risks

I do not envisage any personal risk in the answer you provide. Your name and that of your institution will not be used in any output of this research process. Furthermore, to ensure confidentiality identifiers of professional position will be removed. All your responses will remain anonymous outside of the core research team**.**

Benefits

There are no direct benefits for your participation but the information you provide will help understand more about land conflicts and its effects and also add to the available evidence in international literature. There are no monetary incentives taking part in this research.

Ethics review and approval

This proposal is submitted for review and approval by the higher Degree's Research Ethics committee (HDREC) of Bishop Stuart University, which is committees whose task is to make sure that research participants are protected from harm.

Who to contact

If you have any questions, you can ask them now or later. If you wish to ask questions later, contact the principal investigator, Mr, Opiyo Barnabas. He can be reached at: Tel. +256789575272/

Thank you again for your help.

Name of the key informant (Participant)……..

Signature/Thumbprint……. Date…….

Name of the interviewer (Person obtaining consent)……

Signature……Date-----/------/--------

Appendix 04: Data collection tools Household Questionnaire for determination of coping strategy of smallholder farmers for climate change

A. Preamble

My name is Opiyo Barnabas from Bishop Stuart University. You have been selected to participate in this study which concerns the determination of coping strategy of smallholder farmers with climate change in your community. Can you kindly spare some of your time to participate in this study? I am glad that you are willing to talk to us**. Adyero Gladys** will be taking notes during the interview. This is so that we remember correctly what you tell us. We know that we do not have all of the answers, so there is no right or wrong answers to our questions. What we really want, and need, is to know your opinions, because they matter to us and only you can share them with us. This interview is estimated to take a maximum of one hour. Your participation and responses will be kept confidential in this study. The results of this interview will be used for a better understanding of coping strategy of smallholder farmers with climate change.

Questionnaire number ☐

4 General Survey data(To be filled by the data entry person before entering the data of this questionnaire)

5 Date of interview : ----------

6 Name of interviewer : ----------

7 District : ----------

8 Sub-county/Town council : ----------

9 Parish /Ward : ----------

10 Village/cell : ----------

B.Socio-Demographic characteristics of the respondents

11 Gender: (**Observe and tick appropriate box**)

Male ☐
Female ☐

12 Who is the head of this household?(**Tick the appropriate box**)

Male ☐
Female ☐

13 To which age bracket do you belong? (**Tick one appropriate range bellow**)

18 to 30 years old ☐ 31 to 40 years old ☐ 41 to 50years old ☐ Over 57 years old ☐

14 What is the highest level of education you attained? (**Tick the box indicating the highest level of education mentioned)**

No formal schooling ☐ Primary school ☐ Lower secondary (forms I to IV) ☐
Higher Secondary school (forms V to VI) ☐ Post-secondary e.g. diploma, degree ☐
Vocation ☐

15 What is your marital status? (**Tick the appropriate box**)

Single ☐ Married ☐ Cohabiting ☐

Divorced ☐ Separated ☐ Widow ☐ Widower ☐

16 What is the main source of livelihood for your household? (**Tick the appropriate box**)

Crop production ☐ Animal rearing ☐ Trade/business ☐

Formal job/salaried work ☐ Causal work ☐ Selling charcoal/firewood ☐

Selling local brew ☐ Artisan/skilled technician ☐ others (specify) ☐

17 The relatinship between Food shortage;Famine and migration as a coping strategy with climate change in Mucwini Sub-County,Kitgum District

18 Have you ever had food shortage and or famine in your household in the last ten years as a result of famine due to climate change(Between 2010 -2020) ?

Yes ☐
No ☐

19 If yes, how did you cope up with famine /food shortage? (**Tick the appropriate box**)

Migration ☐ Sale of productve assets ☐ Reduced food consumption ☐

Engagement in food for work programmes ☐ Borrowing of money
Any other ☐

20 If migration was one of the coping strategies for famine, please give reasons why you chose to migrate.

1…….

2. ……

3……..

4……

21 It is said that there is a relationship between famine and migration as a coping strategy in your community. (**Tick the appropriate box**)

Strongly agree ☐ Agree ☐ Disagree ☐ strongly disagree ☐

22 Effects of drought on sales of productive assets as coping strategy with climate change

23 Did this community experience drought in the last 10 years?

Yes ☐ No ☐

24 If yes, did they sell any of their productive asset to cope with the drought ?

Yes ☐ No ☐

25 If yes , what kind of productive assets did they sell to cope with the drought?

Animals ☐ Bicycles ☐ Land ☐ Others(specify) ☐

26 It is said that many households in your community sold productive assets to cope with drought?. (**Tick the appropriate box**)

Strongly agree ☐ Agree ☐ Disagree ☐ strongly disagree ☐

27 Give reasons in your opinion for the sale of productive assets as strategy to cope with drought.

1…….

2. ……

3……..

4……

28 Effect of climate change on food consumption rate as coping strategy to floods

29 Has this household experienced floods in the last 10 years?

Yes ☐ No ☐

30 If yes, how did your household cope with it?

1. ……

2. ……
3. ……
4. ……

31 To what extend if at all, did flooding affect negatively food consumption rate in people's households?

Much ☐ very Much ☐ Not Much ☐ Not at all ☐

Thank you for your co-operation

Key informants interview

DISTRICT	Kitgum
SUB-COUNTY	
PARISH	
VILLAGE	
POSITION OF PARTICIPANT	
INTERVIEWER'S NAME	Opiyo Barnabas
DATE OF INTERVIEW	

I: How did people in your community cope for famine, drought and flooding as a result of climate change?

R: 1 …….

2. …….

3. ……..

4. ……..

I: Which one was the most coping strategy people engaged in as a result of the above effects of climate change?

R:

I: Explain the reasons for the answer you gave?

R:

I: Did some people migrate to other places as a result of famine due to climate change?

R:

I: Did some people sell some of their productive assets as a result of drought in your area in the last ten years?

R:

I: If they sold which productive assets were sold?

R:

I: What in your opinion do you consider as the best coping strategy to climate change?

R:

I: Why that particular strategy?

R:

I: Can you please, suggest ways of resolving climate change effect in a sustainable manner?

R:

I: Do you have any question or comments about coping strategies to climate change?

R:

Interview Guide

I want to thank you for taking the time to meet with me today. My name is Opiyo Barnabas and I would like to talk to you about your experiences and views about coping strategies to the effects of climate change

The interview should take less than an hour. I will be taping the session because I don't want to miss any of your comments. Although I will be taking some notes during the session, I can't possibly write fast enough to get it all down. Because we're on tape, please be sure to speak up so that we don't miss your comments.

All responses will be kept confidential. This means that your interview responses will only be shared with research team members and we will ensure that any information we include in our report does not identify you as the respondent. Remember, you don't have to talk about anything you don't want to and you may end the interview at any time.

Are there any questions about what I have just explained?

Are you willing to participate in this interview?

_____ _____ _____ Interviewee Witness Date

Signature of consent_____

Socio-demographic characteristics of respondent

1. Sex----------
2. What is your age?
3. What is your highest level of Education?
4. What is your marital status?
5. Are there effects of climate change you know?
6. What in your view on how people cope with the effects climate change such as famine, floods and droughts?
7. How many people in your area were affected by the effects of climate change such as floods, famine and droughts?
8. In your view, is famine linked to migration as a coping strategy? Please explain.
9. Has drought contributed to sale of productive assets in any way?
10. If yes, can you mention the productive assets sold in your community as a result of drought?
11. Do you think floods have affected food consumption rate in any way?

12. If yes, please explain?

……..

……..

…….

13. Is there anything more you would like to add?

I'll be analyzing the information you, and others gave me and submitting a draft report to the University in two months. I'll be happy to send you a copy to review at that time, if you are interested.

14. Any Question on awareness of Climate Change?

Thank you for your time.

Appendix 5: Introductory Letter

BISHOP STUART UNIVERSITY

P.O.BOX 9 MBARARA

P.O Box 9, Mbarara
Tel: 0485433222 / 0777912012

E-mail: essemakula@as.bsu.ac.ug
Website: www.bsu.ac.ug

THE COORDINATOR GRADUATE STUDIES AND RESEARCH

15th April 2021

To Whom It May Concern,

Noted
20/4/21

Dear Sir/ Madam,

CHIEF ADMINISTRATIVE OFFICER 20 APR 2021 KITGUM DISTRICT LOCAL GOVT

RE: INTRODUCTORY LETTER FOR MR. OPIYO BARNABAS

This is to introduce to you Mr. Opiyo Brnabas a student of Masters of Agriculture and Rural innovations under Reg. No; D18/BSU/MARI/017 who is conducting his study in Kitgum District.

His research topic is; Determination of coping Strategy of Small holder Farmers for Climate Change in Mucwani Subcounty, Kitgum District.

Any assistance rendered to him is highly appreciated.

Yours faithfully,

GRADUATE SCHOOL 15 APR 2021 BISHOP STUART UNIVERSITY

Prof. Edward Ssemakula
Coordinator, Graduate Studies and Research
BISHOP STUART UNIVERSTY