CLIMATE CHANGE AND FOOD SECURITY IN DADAMU SUB-COUNTY, ARUA CITY

SUNDAY JOVIN

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A DISSERTATION SUBMITTED TO THE SCHOOL OF SOCIAL SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF SOCIAL WORK AND SOCIAL ADMINISTRATION OF UGANDA CHRISTIAN UNIVERSITY

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UGANDA CHRISTIAN UNIVERSITY

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DECLARATION

I Sunday Jovin, declare that this proposal is my original work and has never been submitted to any University or any other institution of higher learning for the award of a degree or diploma.

....25/03/2025.....

Sunday Jovin Date

APPROVAL

This study entitled Climate change and food security has been done under my supervision and am confining that it has been approved and forwarded for consideration and award of a bachelor degree in Social work and social administration

....25/3/2025.....

Mr. Odokonyero Richard Gody Date

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ABSTRACT

Climate change has become a critical global issue, significantly impacting food security, particularly in vulnerable communities like Dadamu Sub-County, Ayivu Division, and Arua City. This study explores the relationship between climate change and food security by assessing how changing weather patterns, including irregular rainfall, prolonged droughts, and rising temperatures, affect agricultural productivity. The research investigates whether climate change has direct or indirect effects on food availability, accessibility, and stability in the region. Additionally, the study examines the causes of climate change in Dadamu Sub-County, including deforestation, poor land-use practices, and rapid urbanization, which contribute to environmental degradation. By using both qualitative and quantitative research methods, including surveys, interviews, and analysis of meteorological data, the study provides a comprehensive understanding of the climate-food security nexus. Findings will contribute to identifying key vulnerabilities and the extent to which climate change threatens food security in the region. This study is expected to provide valuable insights that inform policy decisions and community interventions aimed at mitigating climate-related food insecurity.

To address the challenges posed by climate change on food security in Dadamu Sub-County, this study explores various adaptation and mitigation strategies that can enhance resilience. The research identifies climate-smart agricultural practices such as irrigation, agroforestry, and crop diversification as potential solutions to enhance food production amid changing climatic conditions. Furthermore, the study examines the role of local government and non-governmental organizations in supporting farmers through climate adaptation initiatives, including capacity building, financial support, and infrastructure development. Additionally, afforestation and reforestation programs are explored as long-term solutions to combat deforestation and restore environmental balance. The research also highlights the role of traditional and indigenous knowledge in climate adaptation, particularly in water conservation and soil management. Effective climate adaptation requires a collaborative approach involving policymakers, community leaders, researchers, and farmers to develop sustainable solutions.

Ultimately, this study underscores the need for proactive interventions and policy recommendations that can help build resilience against climate change while ensuring sustainable food security in Dadamu Sub-County.

CHAPTER ONE:

INTRODUCTION

1.0 Introduction

Climate change is increasingly becoming one of the most significant environmental and socioeconomic challenges globally, with profound effects on food security. In Uganda, agriculture is a key economic sector, and many rural households depend on it for their livelihoods. Dadamu Sub-county in Arua City, like many other areas, is experiencing the adverse impacts of climate change, which include erratic rainfall patterns, prolonged droughts, and increased temperatures. These changes have direct and indirect effects on food production and availability, influencing food security. This chapter presents the background of the study, statement of the problem, objectives, research questions, significance, and justification of the study, as well as the conceptual framework and key term definitions.

1.1 Background of the Study

Climate change is a global issue, with its impact being felt disproportionately across different regions. In Sub-Saharan Africa, where many economies depend on agriculture, climate change has had dire consequences on food production, food accessibility, and overall livelihoods (IPCC, 2019). The increase in temperatures, unpredictability in rainfall patterns, prolonged droughts, and floods are some of the climatic challenges that have been observed in Uganda over the past decade. These changes have negatively impacted food security by reducing agricultural productivity and escalating food prices (Turyahabwe & Kakuru, 2020).

In Uganda, agriculture accounts for a significant proportion of GDP and employment, particularly in rural areas such as Dadamu Sub-county. However, climate change poses a considerable threat to this sector due to its reliance on rain-fed farming systems (Nimusiima et al., 2018). Food security, which encompasses food availability, access, utilization, and stability, is under threat as these climatic changes reduce yields, disrupt supply chains, and inflate prices (Mubiru, 2018). The rural population, which relies heavily on subsistence

farming, is experiencing heightened vulnerability, particularly during prolonged dry spells or excessive rains.

The causes of climate change are largely attributed to human activities, especially the emission of greenhouse gases (GHGs) due to deforestation, agricultural activities, and industrialization (O'Reilly et al., 2020). In Uganda, deforestation for agriculture and charcoal production is a significant contributor to GHG emissions, exacerbating local climate changes (Bongomin & Ntayi, 2019). Dadamu Sub-county, located in the West Nile region, is not immune to these shifts, with local agricultural production suffering from erratic weather patterns, which further strain food security.

Addressing the impact of climate change on food security requires a multi-faceted approach. Alternative strategies, such as climate-smart agriculture (CSA), have been proposed to build resilience to climate impacts (FAO, 2017). CSA involves practices like agroforestry, improved irrigation techniques, and crop diversification to enhance agricultural productivity and sustainability (Lipper et al., 2017). Despite these strategies, there are still challenges in implementing them due to financial constraints, lack of awareness, and inadequate policy frameworks at the local level (Mugagga & Nabaasa, 2016).

This research will examine the specific impacts of climate change on food security in Dadamu Sub-county and suggest alternative measures to address the issue. With its unique geographical position and agricultural reliance, this area provides a critical case study for understanding how rural communities in Uganda are coping with climate variability and what can be done to improve their resilience.

1.2 Statement of the Problem

Climate change has drastically altered agricultural systems worldwide, with profound effects on food security. In Uganda, where a large portion of the population relies on subsistence farming, regions like Dadamu Sub-county have experienced a significant decline in food production due to changes in rainfall patterns, increased drought, and extreme weather events (Tumushabe, 2018). These climatic fluctuations are jeopardizing food

security by reducing crop yields, affecting food access, and increasing food prices, ultimately worsening poverty and hunger in the region (FAO, 2019).

Despite several government initiatives aimed at addressing food security issues, the impact of climate change remains largely unaddressed at the community level. There is limited research on how specific regions like Dadamu Sub-county are coping with the climate crisis and what strategies can be implemented to mitigate these challenges. The lack of sustainable interventions has worsened food insecurity, as farmers are ill-prepared to adapt to climate change's long-term effects. Therefore, this study aims to explore the relationship between climate change and food security in Dadamu Sub-county and identify alternative measures that could enhance food production and sustainability amidst these challenges.

1.3 Purpose of the Study

The purpose of this study is to assess the impact of climate change on food security in Dadamu Sub-county, Arua City. The study seeks to determine the causes and effects of climate change on local food systems and explore alternative solutions that can mitigate the challenges created by these environmental shifts.

1.4 Objectives of the Study

The study will be guided by the following objectives:

i) To examine the causes of climate change in Dadamu Sub-county.
ii) To ascertain the climate change has effects of climate change on food security in Dadamu Sub-county.
iii) To establish alternative remedies to address the challenges created by climate change on food security in Dadamu Sub-county.

1.5 Research Questions

This study will answer the following questions:

i) Does climate change affect food security in Dadamu Sub-county?
ii) What are the primary causes of climate change in Dadamu Sub-county?

iii) What are the specific effects of climate change on food security in Dadamu Sub-county?

iv) What alternative solutions can be employed to address the challenges posed by climate change on food security?

1.6 Scope of the Study

1.6.1 Content Scope

The study focuses on assessing the impact of climate change on food security, identifying the causes of climate change, and examining alternative solutions to mitigate its effects in Dadamu Sub-county, Arua City.

1.6.2 Time Scope

The study will cover data from the past decade (2013-2023) to evaluate trends in climate change and its impacts on food security in the region.

1.6.3 Geographical Scope

The study will be conducted in Dadamu Sub-county, Arua City, and a rural region in northwestern Uganda that relies heavily on agriculture.

1.7 Significance of the Study

This study will contribute to understanding the relationship between climate change and food security in rural Uganda. It will provide insights into the challenges faced by farmers in Dadamu Sub-county and propose solutions that can be adopted to build resilience. The findings will be valuable to policymakers, local government authorities, and non-governmental organizations (NGOs) involved in promoting sustainable agriculture and food security.

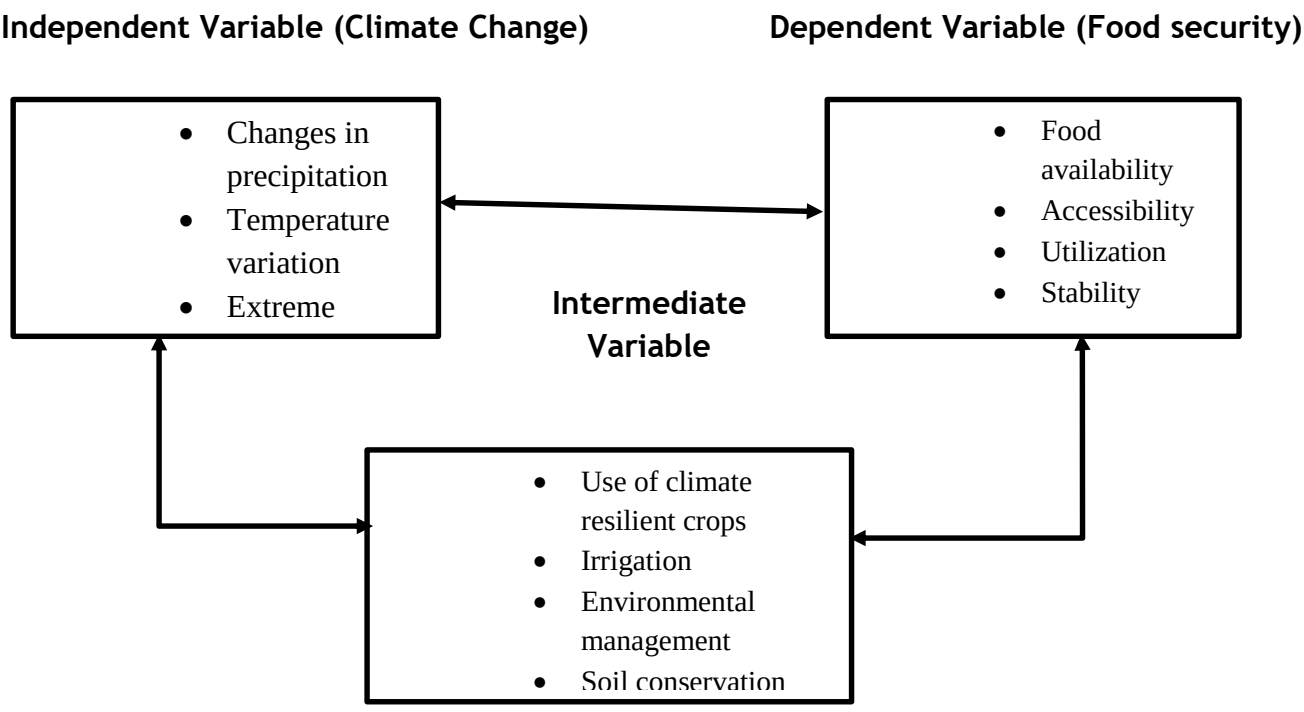
1.8 Justification of the Study

Given the growing importance of addressing climate change and food security, this study is timely and necessary. The rural communities in Uganda, especially those in Dadamu Sub-

county, are at the forefront of facing climate-related challenges due to their reliance on rain-fed agriculture. By identifying the causes and impacts of climate change and proposing alternative strategies, this research will help create sustainable solutions for improving food security in the region

1.9 Conceptual Framework

The conceptual framework for this study illustrates the relationship between climate change which consists of changes in precipitation, temperature variation and extreme weather, food security which comprises of food availability, accessibility, utilization and stability, and the mitigating factors (intermediate variables) such as government policies, agricultural practices, and community adaptation strategies.



1.10 Definition of Key Terms

Climate Change, Long-term shifts in temperature, precipitation, and other atmospheric conditions resulting from both natural factors and human activities

Food Security, A condition in which all people, at all times, have physical and economic access to sufficient, safe, and nutritious food to meet their dietary needs and preferences

Greenhouse Gases (GHGs), Gases such as carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O) that trap heat in the atmosphere, contributing to global warming (O'Reilly et al., 2020).

Agroforestry, A land-use system that integrates trees and shrubs into agricultural landscapes to enhance productivity and sustainability

Climate-Smart Agriculture (CSA), an approach to agricultural development that aims to increase productivity, enhance resilience, and reduce greenhouse gas emissions.

Rain-Fed Agriculture, Agricultural practices that rely solely on rainfall for water (Nimusiima et al., 2018).

Adaptation, Adjustments in human or natural systems in response to actual or expected climatic stimuli to minimize harm or exploit beneficial opportunities

Mitigation, Efforts to reduce or prevent the emission of greenhouse gases to limit climate change

Resilience, The capacity of a system or community to cope with, adapt to, and recover from the effects of climate change.

Sustainable Agriculture, Farming practices that meet current food needs without compromising the ability of future generations to meet theirs, ensuring long-term ecological balance.

1.11 List of Acronyms/ Abbreviations

AGRI Agricultural Research Institute

AEW Agricultural Extension Workers

SC Sub-county

CCFS Climate Change and Food Security

GCC Global Climate Change

GHG Greenhouse Gases

DRM Disaster Risk Management

CSA Climate-Smart Agriculture

IPCC Intergovernmental Panel on Climate Change

NAPA National Adaptation Programs of Action

SDG 13 Sustainable Development Goal 13 (Climate Action)

CRS Climate Resilience Strategies

EWS Early Warning Systems

CHAPTER TWO

REVIEW OF LITERATURE

2.0 Introduction

This section will review literature on climate change and food security. This chapter will specifically focus on literatures on whether climate change has effects on Food security. It will also review literatures on the causes of climate change. It will also focus on literature related to effects of climate change on food security. There will be review of related literature on alternative remedies to address the challenges posed by climate on food security.

2.1 Causes of Climate Change

Deforestation, One of the primary causes of climate change in regions like Dadamu Sub-county is deforestation, which results from activities such as agriculture, charcoal burning, and construction (NEMA, 2018). Deforestation reduces the ability of forests to absorb carbon dioxide, leading to higher concentrations of greenhouse gases in the atmosphere, which contributes to global warming (FAO, 2020). The loss of trees also disrupts local ecosystems and water cycles, further exacerbating the impacts of climate change on agriculture and food security (IPCC, 2018). In Dadamu Sub-county, widespread deforestation has been driven by the need for agricultural land and fuelwood. As trees are cut down, the local climate becomes drier, and soil erosion worsens, leading to lower agricultural productivity and reduced food security. The cumulative effects of deforestation on climate change are significant and require urgent attention.

Agricultural Practices, Unsustainable agricultural practices, such as overgrazing and the excessive use of chemical fertilizers, contribute to climate change by increasing greenhouse gas emissions and degrading soil quality (World Bank, 2019). Overgrazing leads to the destruction of vegetation, which reduces the land's capacity to sequester carbon, while the use of chemical fertilizers releases nitrous oxide, a potent greenhouse gas. These practices not only contribute to climate change but also degrade the land, making it less productive for food production (FAO, 2017). In Dadamu Sub-county, the overreliance on traditional

farming methods and the lack of access to modern agricultural technologies have resulted in environmental degradation. The cumulative impact of these practices contributes to local climate change, which in turn affects the food security of the community. Sustainable agricultural practices are essential for mitigating the causes of climate change.

Industrial Emissions, although Dadamu Sub-county is a rural area, the cumulative impact of global industrial emissions on climate change cannot be overlooked (WMO, 2021). Industrial activities, particularly in urban centers, emit large quantities of greenhouse gases into the atmosphere, contributing to global warming. These emissions affect even rural areas by altering global weather patterns and exacerbating the impacts of climate change on local food production systems (IPCC, 2022).

The global nature of climate change means that even remote regions like Dadamu Sub-county are affected by industrial emissions from other parts of the world. Local farmers may experience the consequences of these emissions through altered rainfall patterns, higher temperatures, and increased vulnerability to extreme weather events, all of which affect food security.

Population Growth, Rapid population growth in Dadamu Sub-county has led to increased demand for agricultural land, fuelwood, and other natural resources, contributing to environmental degradation and climate change (FAO, 2016). As the population expands, more land is cleared for farming, resulting in deforestation and loss of biodiversity. Additionally, the increased consumption of natural resources accelerates the release of greenhouse gases, further exacerbating climate change (NEMA, 2019). Population growth also places additional pressure on already strained food systems, leading to overexploitation of resources and contributing to environmental degradation. The link between population growth and climate change is critical, as it affects the availability of resources needed for food production and overall food security.

Burning of Fossil Fuels, The burning of fossil fuels for energy, transportation, and other industrial activities is a significant contributor to climate change on a global scale (UNEP, 2020). While Dadamu Sub-county may not be a major producer of fossil fuel emissions, it is still affected by the global increase in greenhouse gases resulting from the use of coal, oil,

and natural gas. The burning of these fuels releases large quantities of carbon dioxide and other greenhouse gases into the atmosphere, contributing to global warming and its associated impacts (WMO, 2021).

The indirect effects of fossil fuel consumption on regions like Dadamu Sub-county include changes in weather patterns, higher temperatures, and increased frequency of extreme weather events, all of which affect food security. Reducing the reliance on fossil fuels and transitioning to renewable energy sources is crucial for mitigating climate change.

2.2. Ascertain the Effects of climate change on Food Security

Impact on Crop Yields, Climate change has been shown to significantly affect crop yields by altering weather patterns, which include changes in temperature, rainfall, and the frequency of extreme weather events (FAO, 2016). Prolonged droughts and unexpected rainfall patterns can reduce crop productivity, particularly for rainfed agriculture, which is predominant in many rural areas such as Dadamu Sub-county. As the temperature increases, crops may suffer from heat stress, which affects their ability to flower and produce grains. This situation not only lowers yields but also exacerbates food insecurity by reducing food availability at the household and community levels (IPCC, 2022).

Additionally, changes in rainfall patterns can lead to delayed planting and crop failure, further reducing food availability (Thornton et al., 2018). The unpredictability of these patterns makes it difficult for farmers to plan, leading to poor harvests and food shortages, especially in regions where farming is the main livelihood (WFP, 2020).

Increased Pest and Disease Outbreaks, Rising temperatures and changing humidity levels due to climate change have been linked to an increase in the incidence of pests and diseases affecting crops and livestock (FAO, 2020). Pests such as the fall armyworm and diseases such as maize lethal necrosis have been found to thrive in warmer climates, leading to significant crop losses in various regions. This phenomenon is particularly problematic in food-insecure regions, where farmers lack the resources to manage outbreaks effectively (MWE, 2019). In Dadamu Sub-county, the proliferation of pests can lead to the destruction of staple crops, resulting in lower household food stocks and decreased income from crop

sales, further compounding food insecurity (NEMA, 2018). As pests spread more rapidly due to climate change, the effectiveness of traditional pest control methods becomes reduced, increasing the need for innovative solutions to protect food production systems.

Decline in Water Resources, Climate change affects the availability and distribution of water resources, which are critical for food production (World Bank, 2019). In regions that rely on irrigation for agriculture, reduced rainfall and increased evapotranspiration rates caused by higher temperatures lead to water shortages. As water becomes less available, farmers face difficulties irrigating their crops, resulting in lower yields and increased food insecurity (WFP, 2019). In Dadamu Sub-county, water shortages can lead to a decrease in agricultural productivity, especially during dry seasons. The decline in water availability not only impacts crop production but also affects livestock, as animals may not have enough water to drink, leading to reduced meat and milk production. These factors contribute to reduced food security and economic instability (FAO, 2020).

Shifts in Agricultural Zones, Climate change may lead to the geographical displacement of suitable agricultural zones, as certain areas become too hot or too dry for traditional crops (Olsson et al., 2019). Farmers in regions that were once ideal for specific crops may find that they need to switch to other, more resilient crops that can tolerate the new climate conditions. This transition can take time, during which food production may decline, further straining food security. In Dadamu Sub-county, the shift in agricultural zones could affect the types of crops grown, requiring farmers to adapt to new cultivation techniques and invest in new seeds, which could be a financial burden (UNEP, 2020). The long-term impact on food security will depend on the ability of local farmers to successfully transition to new crops while maintaining sufficient food production levels.

Socioeconomic Impacts, Climate change exacerbates existing socioeconomic vulnerabilities, particularly in rural areas where communities are already food-insecure (World Bank, 2020). Farmers in low-income regions like Dadamu Sub-county may not have access to the resources needed to adapt to changing climatic conditions, such as improved seeds, irrigation systems, and climate information services (FAO, 2016). Without these resources, they are less able to cope with the impacts of climate change, leading to decreased food production and higher levels of food insecurity.

Furthermore, as food prices rise due to lower agricultural output, vulnerable households may struggle to afford sufficient food, increasing the risk of malnutrition and hunger (WFP, 2020). The socioeconomic impacts of climate change are therefore closely tied to food security outcomes, as households with fewer resources are less able to adapt to changing conditions and secure adequate food supplies.

2.3 Alternative Remedies to Address the Challenges Posed by Climate Change on Food Security

Climate-Smart Agriculture, One of the most effective strategies for addressing the challenges posed by climate change on food security is the adoption of climate-smart agriculture (CSA) practices (FAO, 2017). CSA involves the use of farming techniques that increase productivity while reducing greenhouse gas emissions and enhancing resilience to climate change. Examples include conservation agriculture, agroforestry, and the use of drought-resistant crop varieties (Thornton et al., 2018). In Dadamu Sub-county, the adoption of climate-smart practices can help farmers adapt to changing weather patterns and improve food security. These practices not only increase crop yields but also protect the environment by reducing soil degradation and preserving water resources. CSA is a win-win solution that enhances both food security and climate resilience.

Improved Water Management, Addressing water scarcity is crucial for improving food security in regions affected by climate change (World Bank, 2019). In Dadamu Sub-county, where agriculture is heavily reliant on rainfall, improved water management practices such as rainwater harvesting, irrigation, and water conservation can help mitigate the effects of droughts and ensure a stable supply of water for food production (NEMA, 2018).

The implementation of small-scale irrigation systems, in particular, can significantly enhance agricultural productivity by allowing farmers to grow crops during dry seasons. By investing in better water management infrastructure, communities in Dadamu Sub-county can increase their resilience to climate change and ensure a more reliable food supply.

Diversification of Livelihoods, Encouraging the diversification of livelihoods is another important strategy for reducing vulnerability to climate change and improving food security

(FAO, 2016). In regions like Dadamu Sub-county, where most households rely on agriculture for their income and food, promoting alternative income-generating activities such as beekeeping, handicrafts, or small-scale trading can reduce the reliance on farming and increase household resilience. Livelihood diversification provides a safety net for households during periods of poor agricultural performance, helping them to maintain access to food and reduce the risk of hunger. By diversifying income sources, households can build their capacity to cope with the impacts of climate change and maintain food security even in challenging times (WFP, 2020).

Strengthening Social Safety Nets, Social safety nets play a critical role in supporting vulnerable populations during periods of food insecurity, particularly in the context of climate change (World Bank, 2020). In Dadamu Sub-county, expanding access to social protection programs such as food aid, cash transfers, and nutritional support can help cushion the impacts of climate shocks on households, ensuring that they have access to sufficient food even when agricultural production is compromised (WFP, 2019). By strengthening social safety nets, governments and development partners can provide immediate relief to food-insecure households while also investing in long-term resilience-building efforts. Social safety nets are an essential component of any strategy to address the food security challenges posed by climate change.

Community-Based Adaptation Strategies, Community-based adaptation (CBA) strategies involve engaging local communities in the design and implementation of solutions to climate change (UNEP, 2020). In Dadamu Sub-county, involving farmers and other stakeholders in decision-making processes can help ensure that adaptation strategies are tailored to local needs and conditions. Examples of CBA initiatives include the establishment of early warning systems for extreme weather events, the development of community seed banks, and the promotion of sustainable land management practices (FAO, 2020). CBA empowers communities to take ownership of climate adaptation efforts, increasing their capacity to respond to the challenges posed by climate change. By building on local knowledge and resources, CBA can enhance food security and create more resilient agricultural systems.

CHAPTER THREE:

METHODOLOGY

3.0 Introduction

This chapter provides a detailed explanation of the methodology that will guide the study on "Climate Change and Food Security in Dadamu Sub-County, Arua City." It covers the research design, study area, study population, sample size, sampling techniques, data collection methods, data collection instruments, research procedure, quality control, data analysis, and ethical considerations. These components are essential in ensuring that the study's findings are credible, valid, and reliable

3.1 Research Design

The study will adopt a descriptive cross-sectional research design, which is ideal for studying the relationship between climate change and food security. A descriptive cross-sectional design is selected because it enables the researcher to collect data from a large sample at a single point in time. This design allows the researcher to describe the characteristics of the population concerning the variables being studied without manipulating the environment. It also helps in gathering both qualitative and quantitative data, which will provide a comprehensive understanding of how climate change affects food security in Dadamu Sub-County. The design will allow the researcher to examine climate patterns, agricultural practices, food availability, and the coping strategies of the population. The cross-sectional nature of the study will enable the researcher to capture data related to current climate change effects and food security challenges, ensuring that the findings reflect the present-day reality of the Sub-County. Furthermore, the design is cost-effective and time-efficient, making it practical for the scope of this research.

3.2 Study Area

The research will be conducted in Dadamu Sub-County, which is located in Arua City in the West Nile region of Uganda. Dadamu Sub-County is predominantly an agricultural area, and most households rely on subsistence farming as their primary source of livelihood. The Sub-

County has a population that is highly dependent on seasonal rains for crop production, making it vulnerable to climate change effects such as erratic rainfall and prolonged droughts. These factors make Dadamu Sub-County an appropriate study area for researching the impact of climate change on food security. The geographical location, topography, and socio-economic conditions of the region provide a unique context to explore the climate-related challenges facing local farmers. Additionally, Dadamu Sub-County has experienced significant changes in climate patterns over recent years, which have adversely affected agricultural productivity and food availability. The study area is accessible by road, and local community leaders have been supportive of development projects, which will facilitate the research process.

3.3 Study Population

The study population will comprise of households, local farmers who grows small scale farm produce for household use, Farmer group and agricultural extension officers and Production officer in Dadamu Sub-County. The target population includes both male and female participants aged 18 and above who are engaged in farming or other food-related activities. These groups will be selected because they are directly affected by climate change and have firsthand experience with the challenges it presents to food security. Farmers in Dadamu Sub-County have been grappling with unpredictable weather patterns, which have led to reduced crop yields, food shortages, and increased food prices. The agricultural extension officers, on the other hand, have been involved in advising farmers on coping strategies and new farming techniques that mitigate the impact of climate change. The inclusion of local community leaders is also important because they play a key role in decision-making and policy implementation related to food security and climate change adaptation in the area. The study population will provide diverse perspectives, enabling the researcher to capture a holistic understanding of the climate change-food security nexus.

3.4 Sample Size

The sample size for this study will be determined using Yamane's formula for calculating sample size from a finite population. Given the total population farmers in Dadamu Sub-

County, which is approximately 100 farmers and households, the following formula will be used:

$$n = \frac{N}{1 + N*(e)^2}$$

Where:

N=100 is the total population and

e=0.05 represents the margin of error, resulting in a sample size of 80 respondents.

$n = 100/1+100(0.005)^2$

$n = 100/1+100(0.0025)$

$n = 100/1+0.25$

$n = 100/1.25$

$n = 80$

The minimum sample size has been put on the table below.

Table 1**: Respondents of the study**

Categories	**Target population**	**Sample population**
Production officer	1	1
Extension workers	5	5
Farmer group leaders	25	14
Farmers	69	60
Total	**100**	**80**

Source: citizens of Dadamu sub county.

The sample size will ensure that the study has sufficient data to draw meaningful conclusions while maintaining statistical accuracy. The sample will be representative of the entire population, including various demographic groups such as different age categories,

genders, and occupation types (farmers, production officer, extension workers, and farmer group leaders). The sample size is large enough to allow for the generalization of the results to the broader population of Dadamu Sub-County. A larger sample also increases the likelihood of capturing variations in climate change effects and food security challenges across different households and farming practices.

3.5 Sampling Technique

A multistage sampling technique will be employed to ensure that all relevant segments of the population are represented in the study. The first stage will involve dividing Dadamu Sub-County into administrative zones or villages. These zones represent natural geographical clusters where residents share similar climatic and socio-economic conditions. From each zone, a stratified random sample will be drawn to ensure that key groups, such as farmers, traders, and local leaders, are represented. Stratified random sampling is appropriate because it allows the researcher to categorize respondents based on specific characteristics, such as their role in food production or food security. Once the population has been stratified, simple random sampling will be used within each stratum to select the final respondents. This technique reduces the risk of sampling bias and ensures that all eligible participants have an equal chance of being selected for the study. By using a multistage sampling approach, the study will capture a diverse set of data, enhancing the reliability and representativeness of the findings.

3.6 Data Collection Methods

The study will utilize both quantitative and qualitative data collection methods to ensure a comprehensive understanding of the effects of climate change on food security. Quantitative data will be collected through the use of structured questionnaires, which will capture numerical information on variables such as crop yields, rainfall patterns, and food availability in households. These data will provide measurable insights into the relationship between climate change and food security. In addition to quantitative methods, qualitative data will be gathered through interviews and focus group discussions. These methods will provide deeper insights into the lived experiences of farmers and community members regarding climate change and food security challenges. Qualitative data collection will

focus on understanding the perceptions, attitudes, and coping mechanisms employed by farmers in response to climate-related stress. Combining both methods will enable the study to not only quantify the impact of climate change but also explore the socio-cultural factors that influence food security in the Sub-County.

3.7 Data Collection Instruments

3.7.1 Self-administered Questionnaires

The primary tool for quantitative data collection will be self-administered questionnaires. These questionnaires will be structured to capture key variables related to climate change and food security, such as changes in rainfall patterns, crop production, and household food consumption levels. The questionnaires will include both closed-ended and open-ended questions, allowing respondents to provide detailed information while also enabling easy data analysis. Closed-ended questions will help in quantifying the responses, while open-ended questions will provide room for additional comments and explanations. The questionnaires will be distributed to selected respondents, and trained research assistants will guide them through the process where necessary. The self-administered nature of the questionnaire ensures that respondents have the time to think through their answers, leading to more accurate and reflective responses. The questionnaires will be pilot-tested in a neighboring Sub-County to identify any issues related to clarity or bias before full-scale data collection begins.

3.7.2 Interview Guide

An interview guide will be developed for conducting semi-structured interviews with key informants such as local leaders, agricultural officers, and community elders. These interviews will allow the researcher to gather qualitative data on the participants' perspectives regarding climate change and its impact on food security in Dadamu Sub-County. The interview guide will be designed to facilitate discussions on topics such as climate change adaptation strategies, food production challenges, and local food security initiatives. Semi-structured interviews are appropriate for

this study because they allow the researcher to probe for detailed information while maintaining a structured framework for the discussion. This method also gives respondents the flexibility to express their opinions freely, which can lead to the discovery of new insights not initially considered in the study design. The interviews will be conducted face-to-face, ensuring that non-verbal cues and body language are also observed, which can add depth to the qualitative analysis.

3.8 Research Procedure

The research procedure will begin with the preparation and training of the data collection team, which will consist of trained research assistants familiar with the local language and culture. After the training, the research instruments will be pre-tested in a neighboring Sub-County to assess their clarity, consistency, and relevance. Any necessary adjustments will be made based on feedback from the pre-test. Once the instruments are finalized, the data collection process will commence in Dadamu Sub-County. The research assistants will distribute the self-administered questionnaires to the selected respondents, while the researcher will conduct semi-structured interviews with key informants. The data collection process will take approximately four weeks, during which the researcher will ensure regular monitoring to address any challenges that may arise. All data collected will be securely stored, and confidentiality will be maintained throughout the research process. Upon completion of data collection, the data will be cleaned, coded, and prepared for analysis.

3.9 Quality Control

3.9.1 Validity

To ensure validity, the research instruments will undergo a rigorous process of review and pre-testing. Validity refers to the degree to which an instrument measures what it is intended to measure. In this study, construct validity will be ensured by aligning the questions in the questionnaire and interview guide with the research objectives. Expert reviews will also be sought from academic supervisors and peers to assess whether the instruments adequately cover the key aspects of climate change and food security. The instruments will be pilot-tested to check for any ambiguous or

misleading questions, and necessary revisions will be made based on the results. Ensuring high validity is critical in this research, as it will increase the credibility of the findings and ensure that they reflect the true impact of climate change on food security in Dadamu Sub-County.

3.9.2 Reliability

Reliability refers to the consistency of the research instruments over time. To enhance reliability, the research instruments will be designed to ensure that they produce consistent results under similar conditions. The internal consistency of the questionnaire will be tested using Cronbach's alpha coefficient, with a threshold of 0.7 considered acceptable. The interview guide will be standardized, and interviewers will receive the same training to minimize variations in how interviews are conducted. Additionally, data collection will take place within a clearly defined timeframe to ensure that all respondents experience similar climatic and socio-economic conditions. Consistent application of the data collection methods will reduce the likelihood of random errors, ensuring that the findings are dependable and repeatable in future studies or similar contexts.

3.10 Data Analysis

Data analysis will involve both quantitative and qualitative methods. Quantitative data collected through the self-administered questionnaires will be coded and entered into a statistical software program, such as SPSS (Statistical Package for the Social Sciences). Descriptive statistics such as frequencies, percentages, and means will be used to summarize the data. Qualitative data from interviews will be transcribed, and thematic analysis will be used to identify patterns and recurring themes related to climate change and food security. The results from both quantitative and qualitative analyses will be triangulated to provide a comprehensive understanding of the study objectives. The mixed-method approach ensures that the data analysis is both robust and insightful, capturing the numerical trends as well as the lived experiences of the respondents.

3.11 Ethical Considerations

The research will adhere to strict ethical standards to ensure that the rights and dignity of the participants are respected throughout the study. Ethical clearance will be obtained from the relevant university ethics committee before data collection begins. Informed consent will be sought from all participants, and they will be fully informed about the purpose of the study, the data collection methods, and their right to withdraw from the study at any time without penalty. Confidentiality will be maintained by ensuring that no identifying information is disclosed in the research report. All data will be securely stored, and access will be restricted to the researcher and authorized individuals involved in the analysis. Participants will be assured that their responses will be used solely for academic purposes and that the findings will contribute to improving food security in the face of climate change. Moreover, the research will avoid any form of harm or exploitation of the participants, ensuring that the research process is ethical and responsible.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.0 Introduction

This chapter focuses on the presentation, analysis and interpretation of findings based on the research objectives. Data was presented descriptively and led to the interpretation of the findings of the study. The analysis was based on the summery of key issues from the theoretical and empirical literature. The findings are summarized from primary sources of data and presented in frequency tables and percentage contributions as follows

4.1 Back ground information of the Respondents.

In order to enrich the quality of report in analysis, the background information of respondents was taken note of and variables such as gender, age, marital status and levels of education including the working experience of youth in the study as presented.

Table 1: Showing Gender of The respondents

Sex	**Frequency**	**Percentages**
Male	52	65
Female	28	35
Total	**80**	**100**

Source: Primary Data

The gender distribution of the respondents is presented on table 1 above. Out of the 80 respondents 52 (65%) were male and 28(35%) were female. This gender distribution indicates that majority of the respondents were men.

Fig1. Pie chart showing gender variations of respondents

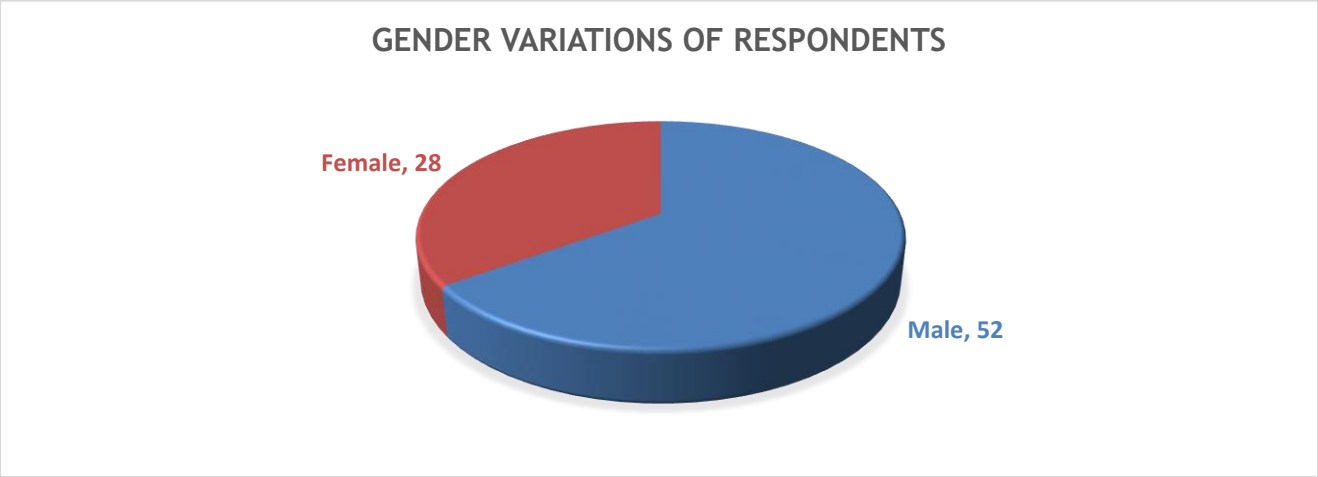


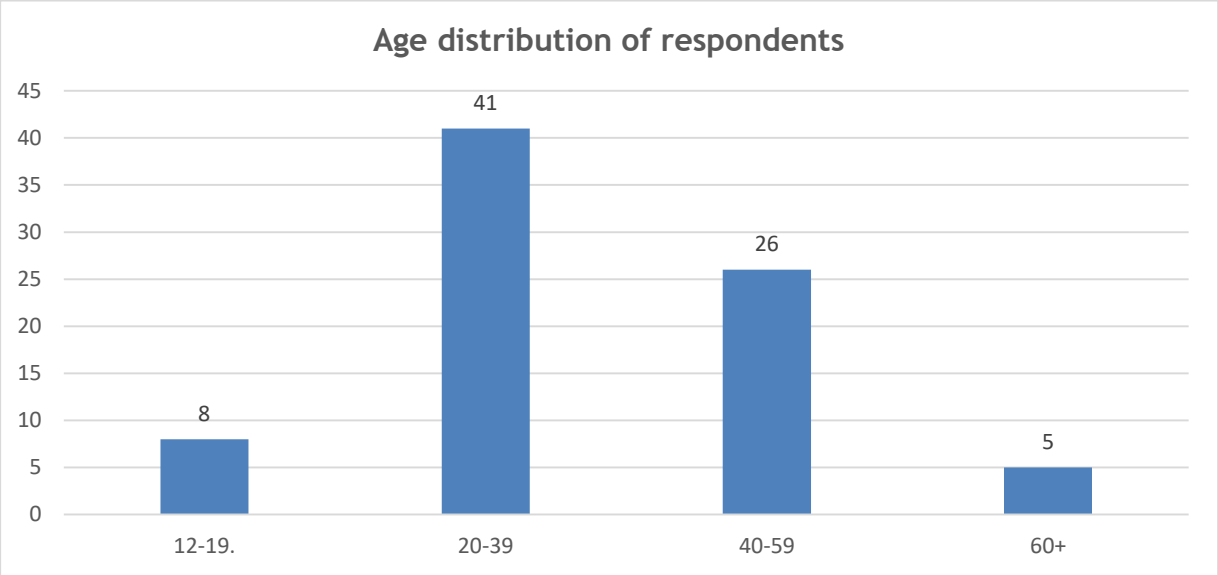
Table 2: Age Distribution of Respondents

Age Range	Frequency	Percentages
12-19	8	10
20-39	41	51.25
40-59	26	32.5
60 years Plus	5	6.25
Total	**80**	**100**

Source: Primary Data

The age groups of all the respondents are presented in table 2. Here 8 (10%) were aged between 12-19 years, 41 (51%) were aged 20-39 and 26 (33%) were between 40-59 and 05 (6%) were 60 years and above. This implies that majority of the respondents were in between the age bracket of 20-29 followed by 40-59 that comprised of mostly male youth.

Fig2. Bar graph showing representation of age group of respondents



Education Level Attained

Table3: Level of Education of Respondents

Education level	**Frequency**	**Percentage**
Not educated	18	22.5
Primary	31	38.75
Secondary	21	26.25
University/ Tertiary	10	12.5
Total	**80**	**100**

Source: Primary Data

From table 3, it can be seen that the biggest portion (31) respondents, represents 38.75% had attained primary education, followed by (21) respondents, in terms of percentage 26.25 % who attended secondary, followed by 22.5%, totaling to 18 respondents who did not attend any class and lastly 12.5%, (10) respondents who attained tertiary and university education. This means that majority of the respondents' attained primary and secondary educations respectively.

Fig3. Bar graph representing the level of education of respondents in Dadamu Sub-County

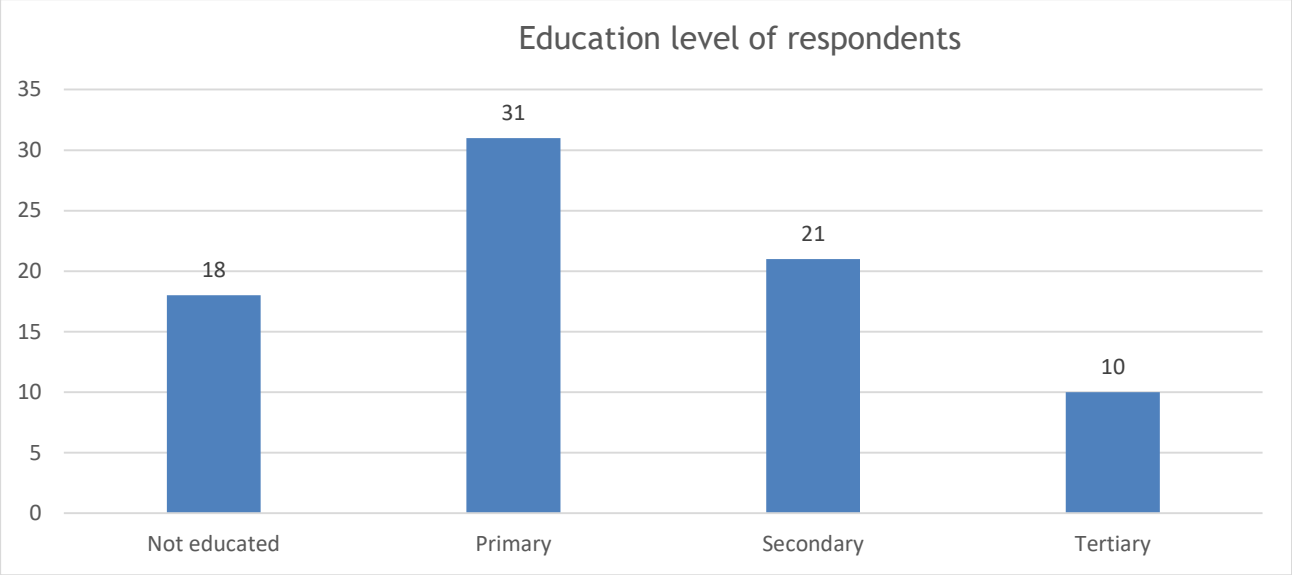


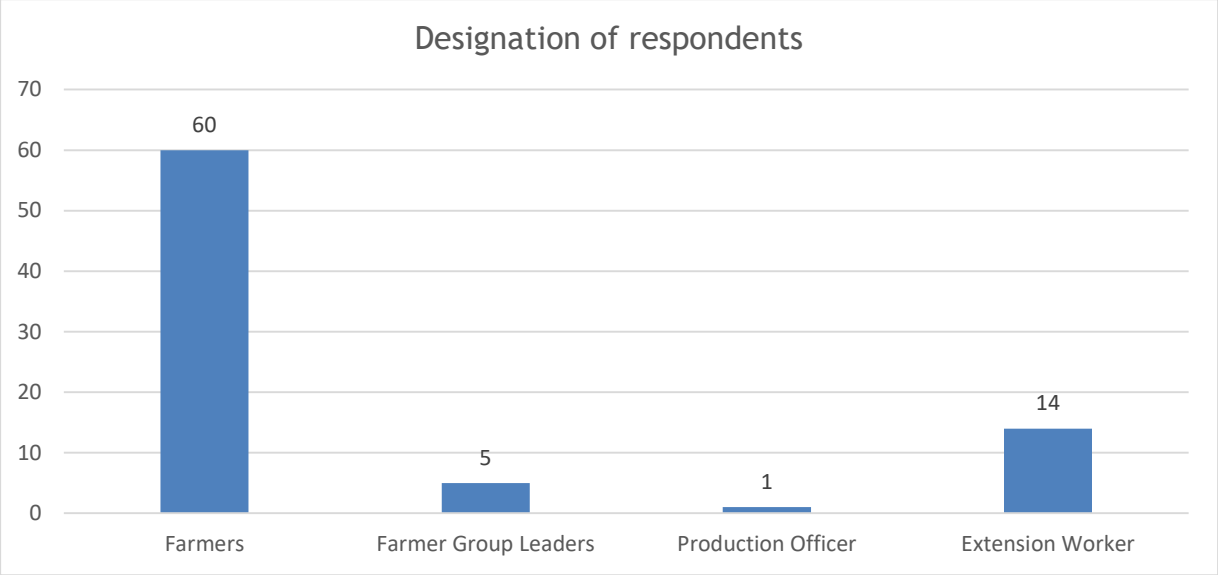
Table 4: Showing Designation of the respondents

Designation	**Frequency**	**Percentage**
Farmers	60	75
Farmer group leaders	5	6.25
Production officer	1	1.25
Extension Worker	14	17.5
Total	**80**	**100**

Source: Primary Data

The Table above indicates that majority of the respondents in this exercise were farmers who constituted (60) of the respondents, 75% followed by agricultural extension workers constituting (14), 17.5% and then farmer group leaders who constituted to (5), 6.25%. Finally the researcher also got responses from the production officer. This represents (1), 1.25%. This meant that majority of respondents by designation were farmers.

Fig4. Bar graph showing designation of the respondents during research in Dadamu Sub-County



4.2 Objective One: To examine the causes of climate change in Dadamu Sub-county

Key indicators towards the causes of climate change were: Deforestation, poor agricultural practices, industrial emission, population and burning of fossil fuels from the analyzed data.

Table 5. Showing responses to key factors contributing to climate change

Key factors contributing to climate change	Frequency	Percentage
Deforestation	27	33.75
Poor agricultural practices	14	17.5
Industrial emissions	23	28.75
Population growth	6	7.5
Burning of fossil fuel	10	12.5

Source: Primary Data.

The table above indicates the responses about causes of climate change in Dadamu Sub-County, from the findings, (27), which represents 33.75% of the respondents believed that deforestation causes climate change, (14), 17.5% of the respondents were with the view

that poor agricultural practices contributes to climate change, meanwhile (23), 28.75% of the respondents have their opinion that industrial emission greatly contributes to climate change, (6), 7.5% of the respondents suggested that population growth is one of the factors contributing to climate change. Lastly, (10), 12.75% of the respondents believed that burning of fossil fuel has impact on climate change in Dadamu Sub-County.

Fig5. Pie chart showing responses towards causes of climate in Dadamu Sub-County

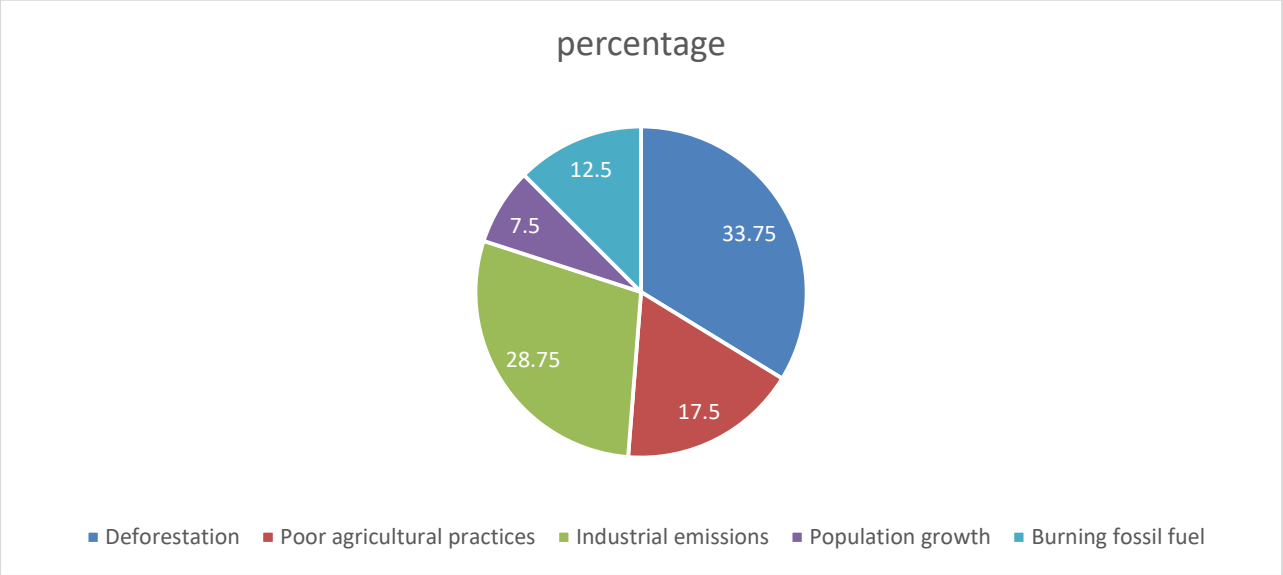


Table 6. Showing clients responses towards the fact that deforestation causes climate change

Response	Frequency	Percentage
Strongly Disagreed	**8**	**10**
Disagreed	**6**	**7.5**
Not sure	**0**	**0**
Agreed	**28**	**35**
Strongly Agreed	**38**	**47.5**
Total	**80**	**100**

Source: Primary Data

As indicated in the table above, (38), 47.5% of the respondents strongly agreed, (28), 35% agreed. While on the other hand (6), 7.5% disagreed and (8), 10% of the respondents strongly

disagreed that deforestation causes climate change. The finding shows that a greater number of respondents general accepted that deforestation leads to changes in climatic conditions in Dadamu Sub-County.

Fig6. Pie chart showing responses on deforestation during the research about climate change and its impact on food security in Dadamu Sub-County in percentage.

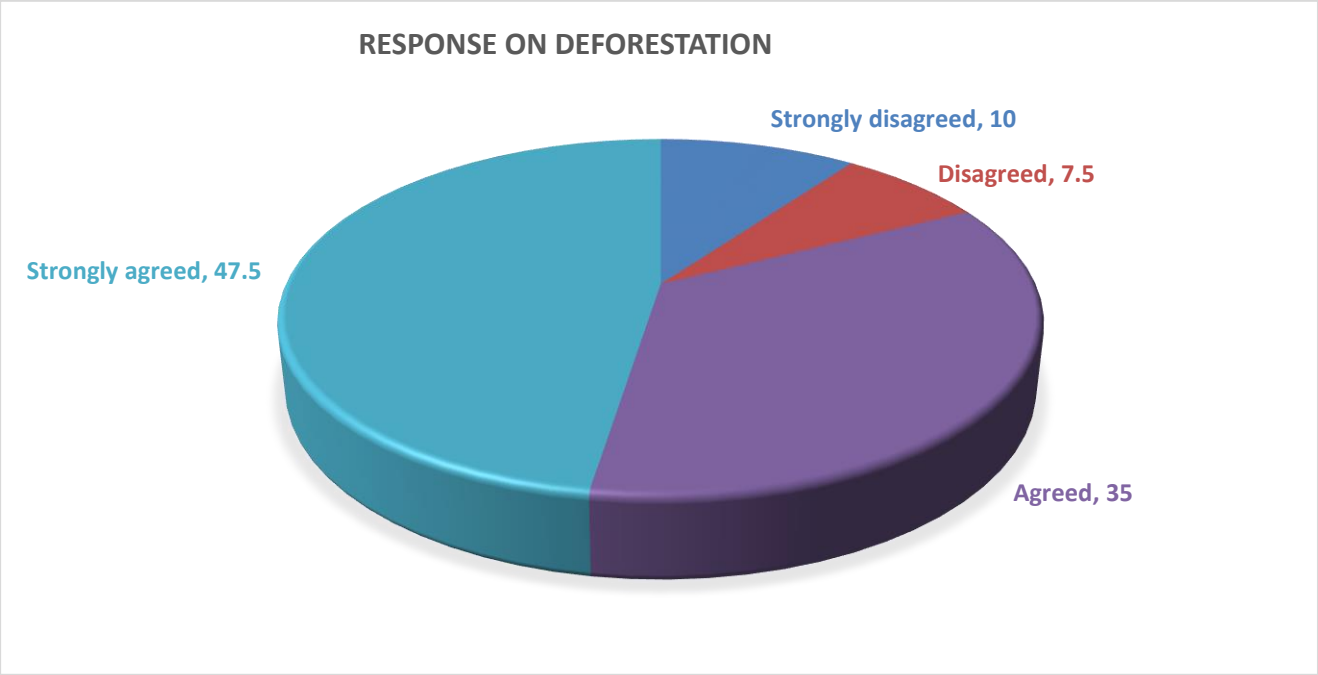


Table 7. Showing response on Poor agricultural practices

Response	Frequency	Percentage
Strongly Disagreed	12	15
Disagreed	15	19
Neutral	5	6
Agreed	22	27.5
Strongly Agreed	26	32.5
Total	**80**	**100**

Source: Primary Data

The table above indicates that (26), 32% of the respondents strongly agreed, (22), 27.5% agreed as (5), 6.5% of the respondents were neutral on whether poor agricultural practices leads to climate change and its impact on food security in Dadamu Sub-County. While (15), 18.75% of the respondents disagreed and (12), 15% of the respondents strongly disagreed. This probably means that majority of the respondents accepted the view that poor agricultural practices contributes to climate change.

Fig7. Pie chart showing responses on poor agricultural practices contributing towards climate change and food insecurity in Dadamu Sub-County

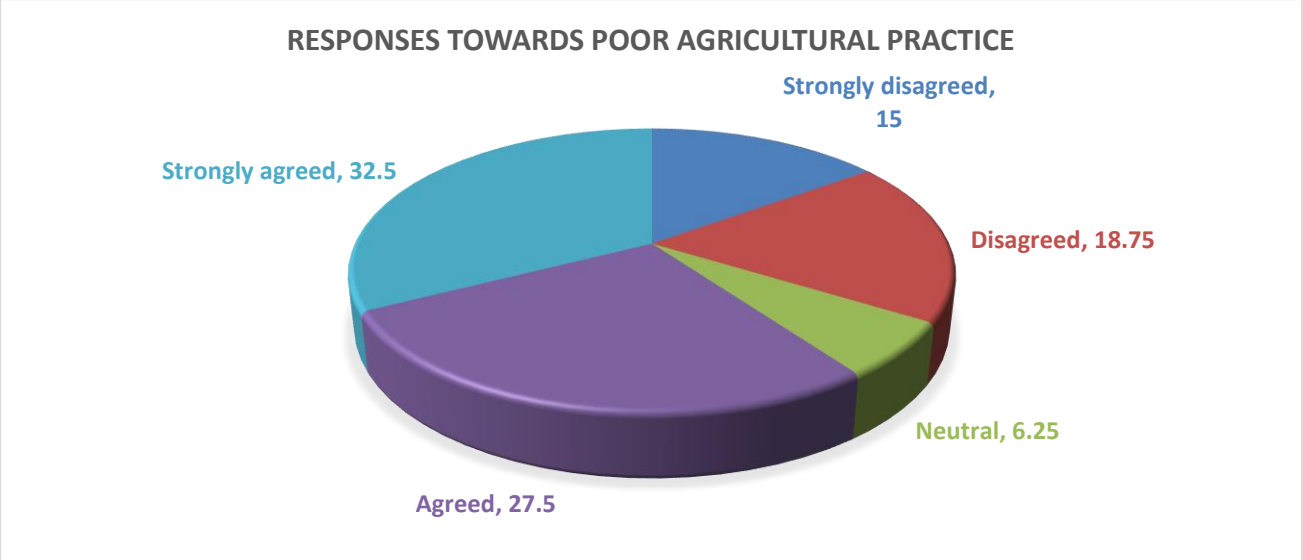


Table 8. Showing responses on industrial emissions

Response	Frequency	Percentage
Strongly Disagreed	21	26.25
Disagreed	25	31.25
Neutral	10	12.5
Agreed	14	17.5
Strongly Agreed	10	12.5
Total	**80**	**100**

Source: Primary Data

As shown from the table above it is indicated that (10), 12.5% of the respondents strongly agreed, (14), 17.5% of the respondents agreed, (10), 12.5% of the respondent were neutral. While on the other hand, (21), 26.5% strongly disagreed and (25), 31.25% disagreed. The findings indicate that the numbers of respondents who generally disagreed that industrial emissions lead to climate change in Dadamu Sub-County were more than those who accepted.

Fig8. Bar graph showing the responses towards industrial emission contributing towards climate change and its impact on food security in Dadamu Sub-County in form of percentage

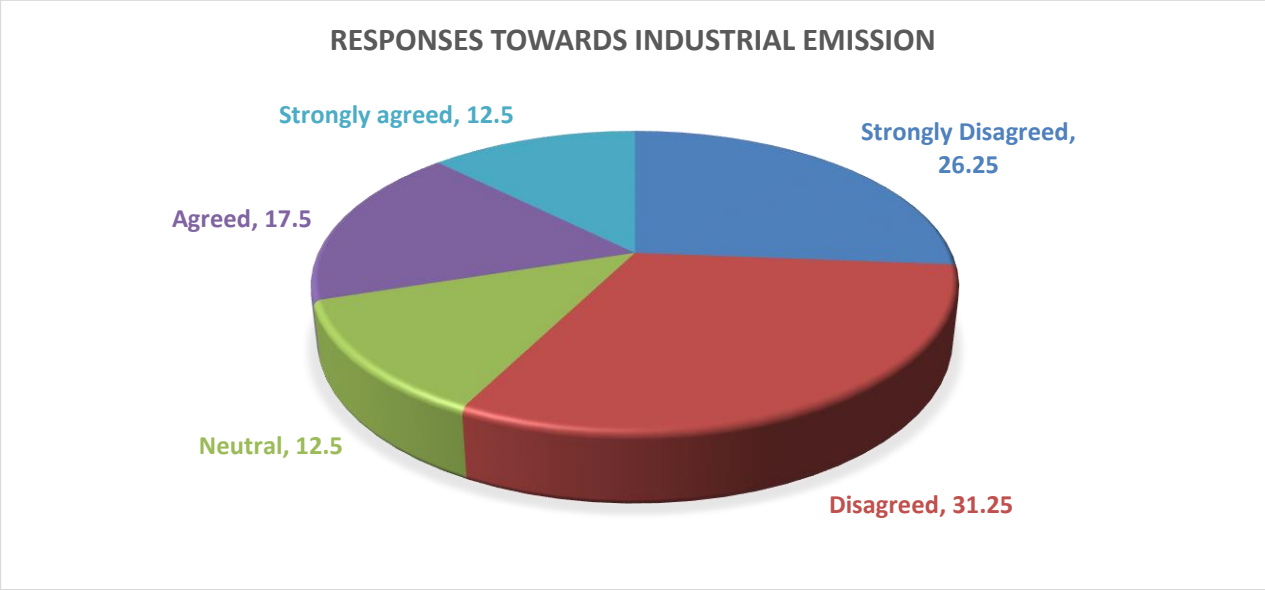


Table 9. Showing the response on population growth.

Response	Frequency	Percentage
Strongly Disagreed	11	13.75
Disagreed	6	7.5
Neutral	12	15
Agreed	21	26.25
Strongly Agreed	30	37.5
Total	**80**	**100**

Source: Primary Data

From the above table, it's shown that (30), 37.5% of the respondents strongly agreed,

(21), 26.25% agreed while (11), 13.75% of the respondents strongly disagreed, (6), 7.5% disagreed and (12), 15% of the respondents were neutral. This means that majority of the respondents sided with that fact that population growth leads to change in climatic conditions.

Fig9. Pie chart showing impact of population growth on climate change and food security in Dadamu Sub-County in form of their percentage occurrences.

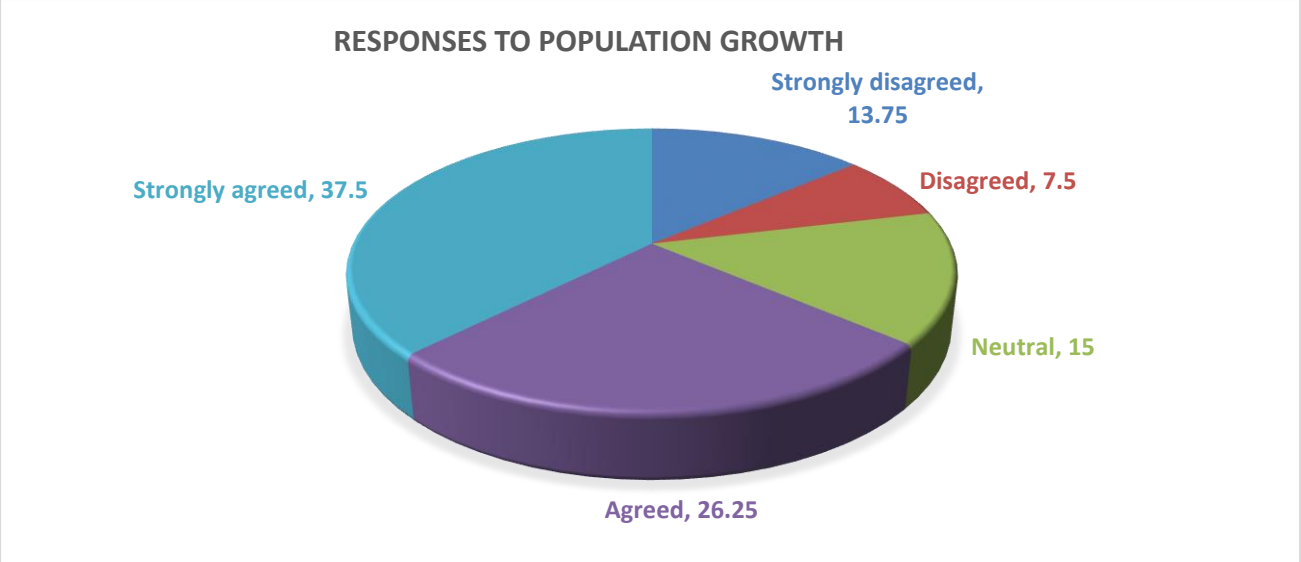


Table 10. Showing the response on burning fossil fuels

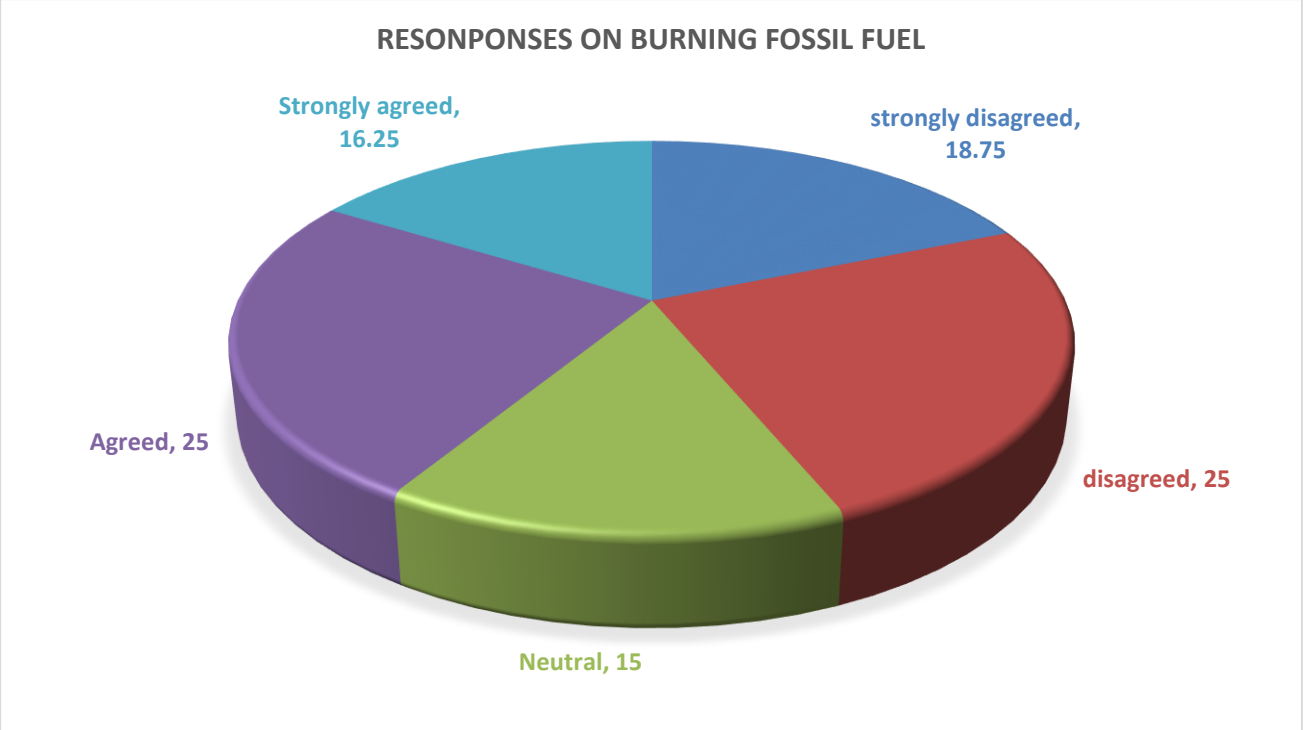
Response	Frequency	Percentage
Strongly Disagreed	15	18.75
Disagreed	20	25
Not sure	12	15
Agreed	20	25
Strongly Agreed	13	16.25
Total	**80**	**100**

Source: Primary Data

The table above shows that (13), 16.25% strongly agreed that burning of fossil fuel leads to climate change, (20), 25% of the respondents agreed, (15), 18.75% of the respondents

strongly disagreed and (20), 25% disagreed, as (12) 15% were neutral. This clearly indicates that a slight majority of the respondents refuted the view burning of fossil fuels affect climatic conditions in Dadamu Sub-County in Arua City.

Fig10. Bar graph showing responses towards burning of fossil fuel contributing to climate change and its impact on food security in Dadamu Sub-County.



4.3 Objective Two: To ascertain whether climate change has effects on food security in Dadamu Sub-county.

Table 11: Showing climate change effects on food security

SN	Statement on climate change effects on food security	Frequency						Percentage					
		SD	D	N	A	SA	T	SD	D	N	A	SA	T
1	Impact on crop yields	11	13	4	24	28	**80**	13.75	16.25	5	30	35	**100**
2	Changes in rainfall pattern	8	10	0	22	40	**80**	10	12.5	0	27.5	50	**100**
3	Increased Pests	14	11	2	23	30	**80**	17.5	13.75	2.5	28.75	37.5	**100**
4	Decline in water resources	11	9	0	28	32	**80**	13.75	11.25	0	35	40	**100**
5	Shifts in agricultural zones	8	10	0	22	40	**80**	10	12.5	0	27.5	50	**100**

Source: Primary Data, T = TOTAL

The table above indicates that climate change affects food security especially about impact of crop yields, (11), 13.75% of the respondents strongly disagreed, (13), 16.25% disagreed. On the other hand (24), 30% agreed, (28), 35% strongly agreed respectively and (4) 5% of the respondents had neutral response. This indicated that most of the respondents accepted the view that climate change has impact on crop yields.

In relation to changes in rainfall patterns, it was found out that (8), 10% of the respondents strongly agreed, (10), 12.5% agreed. While, (22), 27.5% agreed and (40), 50% strongly agreed respectively. This implied that majority of respondents highly accepted the fact that climate change leads to changes in the rainfall patterns

As regards increased pests (30), 37.5% of the respondent strongly agreed, (23) 28.75% agreed. On the other hand (11), 13.75% disagreed and (14), 17.5% strongly disagreed. This indicated that majority of the respondents greatly supported that view that climate change leads to increased pest on crops and animals reared by farmers in Dadamu sub county

As far as decline in water resources is concerned, (11), 13.75% of the respondents strongly disagreed and (9), 11.25% disagreed. While 35% agreed and 40% strongly. This clearly shows that majority of the respondents accepted that climate change leads to reduced water resources.

Regarding shifts in Agricultural zones, it has been established that, (8), 10% strongly disagreed and (10), 12.5% of the respondents disagreed, on the other hand, (22), 27.5% of the responses indicated they agreed and (40), 50% strongly agreed respectively. This indicates that majority of the responses were accepted the view that climate change contributes to shifts in agricultural zones.

Fig11. Bar graph representing the responses on climate change effect on food security in Dadamu Sub-County.

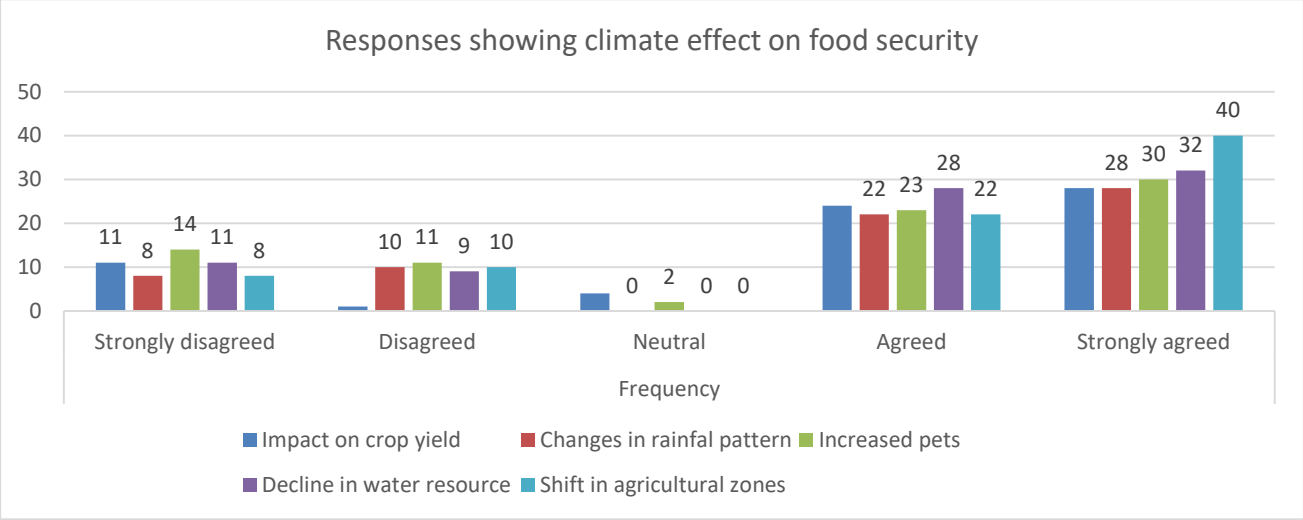
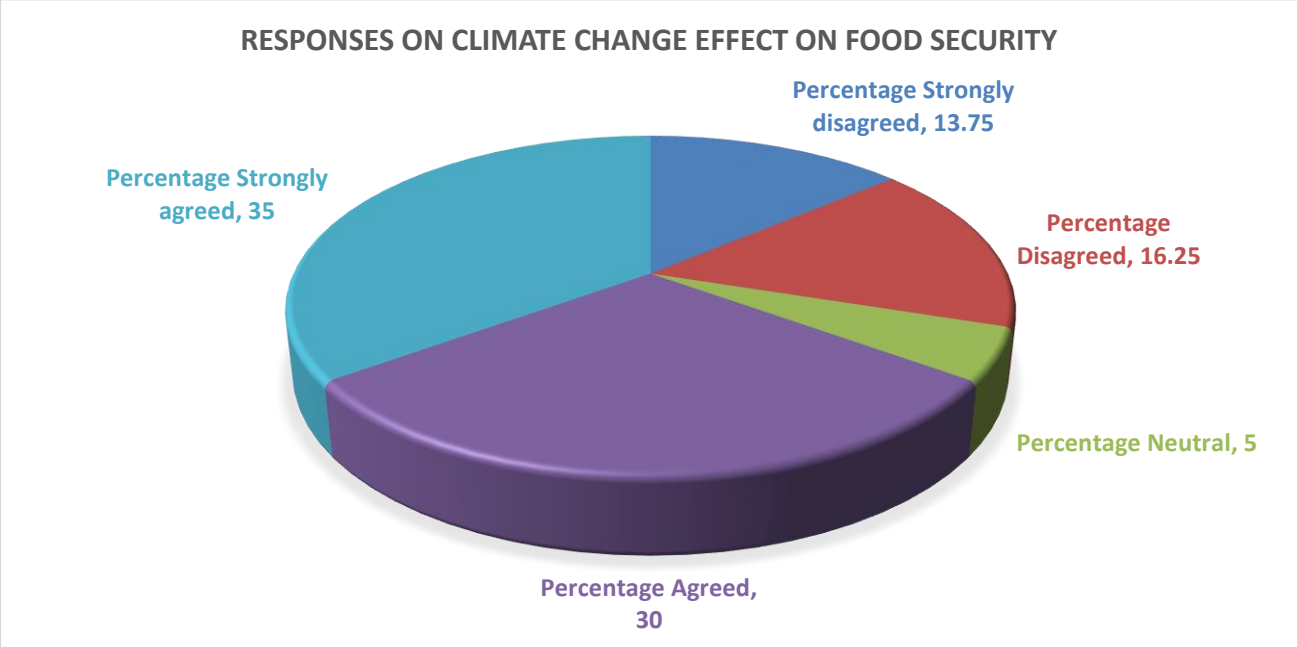


Fig12. Pie Chart representing the responses on climate change effect on food security in Dadamu Sub-County.



4.4 Objective Three: To establish alternative remedies to address the challenges created by climate change.

Table 13: Showing the comprehensive view on the alternative remedies to address climate change challenges

SN	Statement on alternative remedies	Frequency						Percentage					
		SD	D	N	A	SA	T	SD	D	N	A	SA	T
1	Climate smart agriculture	13	9	4	24	30	**80**	16.25	11.25	5	30	37.5	**100**
2	Improved water management	11	14	6	20	29	**80**	13.75	17.5	7.5	25	36.25	**100**

3	Diversificatio n of livelihood	15	14	0	25	26	**80**	18.75	17.5	0	31.25	32.5	**100**
4	Strengthening social safety nets	10	16	8	18	28	**80**	12.5	20	10	22.5	35	**100**
5	Community based adaptions	12	13	0	31	24	**80**	15	16.25	0	38.75	30	**100**

Source: Primary Data, T = TOTAL

From the table specifically on employment of climate smart agriculture, it indicates that (13), 16.25% and (9), 11.25% of the respondents strongly disagreed and disagreed respectively as (4), 5% were neutral. While (24), 30% and (30), 37.5% of the respondent agreed and strongly agreed that use of climate agriculture offers remedy for climate change challenges in Dadamu Sub-County.

Additionally, on improved water management, it is shown that (11), 13.75% and (14), 17.5% strongly disagreed and disagreed respectively as (6), 7.5% were neutral. (20), 25% and (29), 36.25% agreed and strongly agreed. This meant that a larger majority of the respondents accepted improved water management as one of the ways to address challenges of climate change in Dadamu Sub-County, Arua City.

As regards diversification of livelihoods, it's indicated that (25), 31.25% and (26), 32.5% of the respondent agreed and strongly agreed. On the other hand (14), 17.5% and (15), 18.75% disagreed and strongly disagreed respectively that diversification of livelihood addresses climatic change challenges. This meant that majority generally accepted that diversification of livelihood can help to address challenges from change in climatic conditions in Dadamu Sub-County, Arua City.

Moreover, as far as strengthening of social safety nets are concerned, it is indicated that (10), 12.5% of the respondents strongly disagreed, (16), 20% disagreed as (10), 10% were neutral. On the other hand, (18), 22.5% and (28), 35% of the respondents agreed and strongly agreed respectively. This meant that most of the respondent confined in the view that

strengthening social safety nets helps to address challenges caused by climatic changes in Dadamu Sub county.

Lastly but not the least, on community based adaptation, it is shown that (31), 38.75% and (24), 30% agreed and strongly respectively. While (13), 16.25% and (12), 15% disagreed and strongly disagreed that community based adaptation helps to address challenges caused by changes in climatic conditions in Dadamu Sub County, Arua City. This clearly indicated that majority of the respondents accepted the view that community based interventions can help reduce challenges of changes in climatic conditions in Dadamu Sub county, Arua City.

Fig13. Bar graph showing alternative remedies to climate change

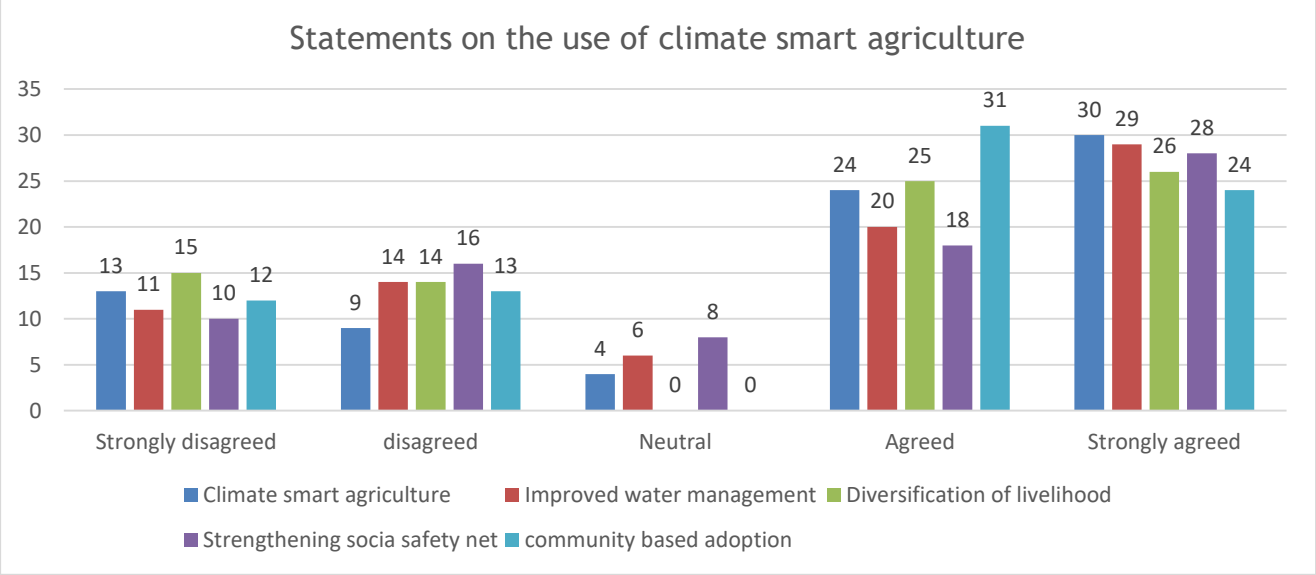
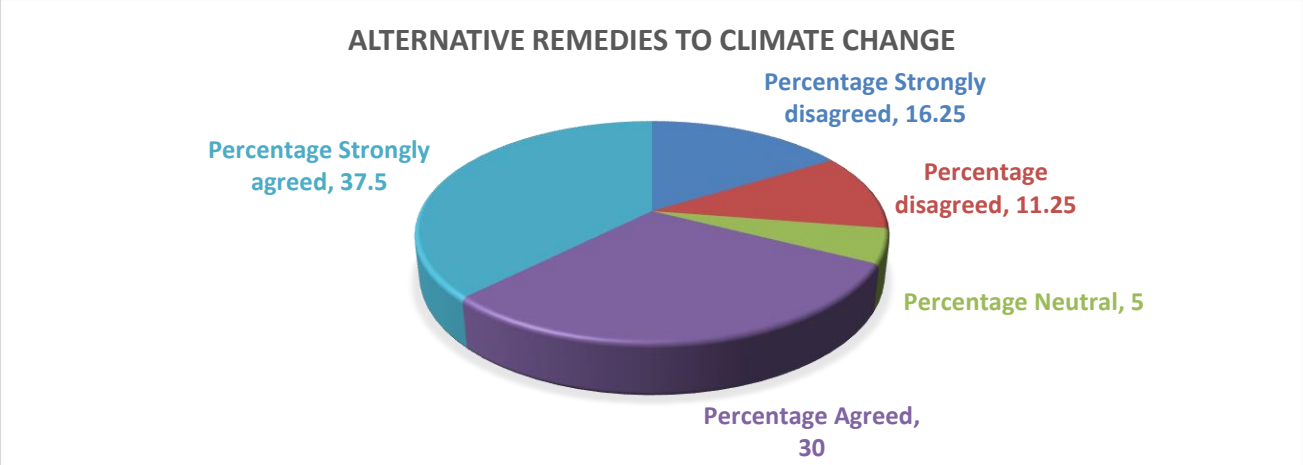


Fig14. Pie Chart showing alternative remedies to climate change



CHAPTER FIVE

DISCUSSION OF FINDINGS, CONCLUSION, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a detailed discussion of the research findings in relation to the objectives of the study. It further provides a summary of key insights drawn from the research, conclusions, and recommendations based on the findings. Additionally, areas for further research are suggested to address gaps identified during the study.

5.2 Discussion of Findings

The discussion of findings were presented as follows

5.2.1 Causes of Climate Change in Dadamu Sub-County

The research identified several causes of climate change in Dadamu Sub-county. Key contributors include deforestation, unsustainable agricultural practices, and increased human activities such as charcoal burning and bush burning. Respondents reported a significant decline in forest cover due to logging and land clearing for cultivation, which has disrupted local weather patterns. Additionally, the use of fossil fuels and improper waste disposal were highlighted as contributing factors. These findings resonate with global studies that attribute climate change to both natural and anthropogenic factors, emphasizing the need for urgent mitigation efforts.

5.2.2 Ascertain whether climate change has effects on food security in Dadamu sub-county

The study established that climate change has had significant effects on food security in Dadamu Sub-county. Findings indicate that erratic rainfall patterns have led to reduced agricultural yields, increased incidences of crop failures, and heightened food insecurity. Prolonged droughts and unpredictable rainy seasons have made farming less productive, affecting household food supply and overall economic stability. Respondents also noted an increase in pests and diseases due to changing

climatic conditions, further exacerbating food shortages. These findings align with previous studies that highlight the vulnerability of agriculture to climate variability, especially in regions dependent on rain-fed farming.

5.2.3 Alternative Remedies to Address Climate Change and Food Security Challenges

To mitigate the adverse effects of climate change on food security, respondents suggested various alternative remedies. These include afforestation and reforestation programs, sustainable farming techniques such as agroforestry and conservation agriculture, and improved irrigation systems. Additionally, awareness campaigns on climate change mitigation and adaptation strategies were recommended. Government and development partners were urged to support smallholder farmers with climate-resilient crops, modern farming equipment, and access to weather forecasting services to enhance preparedness against climate-related shocks.

5.3 Conclusion

Chapter One provided an introduction to the study, outlining the background, problem statement, research objectives, and significance of the study. It established the need for investigating the impact of climate change on food security in Dadamu Sub-county, emphasizing the growing threat of climate variability to agricultural productivity and livelihoods.

Chapter Two presented a review of existing literature related to climate change and food security. Various theories, concepts, and empirical studies were examined, providing a comprehensive understanding of the topic. The literature review highlighted the global and local perspectives on climate change, its causes, effects, and possible mitigation strategies.

Chapter Three detailed the research methodology employed in the study. It described the research design, study population, sampling techniques, data collection methods, and data analysis procedures. The study adopted a mixed-methods approach, utilizing both

qualitative and quantitative techniques to ensure comprehensive data collection and analysis.

Chapter Four presented the research findings and their analysis. The results were discussed in relation to the study objectives, highlighting the effects of climate change on food security, its causes, and possible remedies. The chapter provided statistical evidence and qualitative insights from respondents to support the research conclusions.

5.4 Recommendations

1. Farmers should be encouraged to adopt climate-smart agricultural practices such as crop diversification, soil conservation, and the use of drought-resistant crop varieties.
2. Government and local stakeholders should promote afforestation and agroforestry programs to restore forest cover and improve environmental sustainability. This would help to improve food security in in Dadamu Sub County
3. Investment in irrigation infrastructure and rainwater harvesting techniques should be prioritized to ensure a stable water supply for agricultural activities.
4. Sensitization programs should be conducted to educate local communities on climate change adaptation and mitigation strategies.
5. Government should implement strict policies on environmental conservation, including regulations against deforestation and land degradation.
6. Smallholder farmers should be provided with timely weather forecasts and climate information to help them plan their agricultural activities effectively.
7. Increased collaboration between government agencies and non-governmental organizations is essential in providing financial and technical support to farmers affected by climate change.

5.5 Areas for Further Research

Areas for further research were suggested by the researcher as follows:

1. A comparative study on the impact of climate change on food security in rural and urban areas of Arua City.
2. The role of indigenous knowledge systems in climate change adaptation and food security enhancement.
3. The effectiveness of government policies on climate change mitigation and their impact on food security.

The socio-economic implications of climate change on women and children in Dadamu Sub-county.

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APPENDICES

APPENDIX A: Questionnaire for Respondents

Dear respondent

I'm Sunday Jovin, a student undertaking a study on the topic: Climate Change and Food security in Dadamu Sub County, Ayivu Division, Arua City, in a partial fulfillment of the requirements for award of Bachelor's degree in Social Work and Social Administration of Uganda Christian University. You have been clearly chosen to participate in this study to enable me achieve a noble cause based on the trust vested in you by me. I assure you that the information you provide shall be confidentially treated and made a preserve for this study.

You do not need to indicate your name,

Thanks for you participation.

SECTION A: DEMOGRAPHIC CHARACTERISTICS (please tick where appropriate).

1. Sex. Male ☐

Female ☐

2. Age. 12-19years ☐

20-39years ☐

40-59years ☐

60years plus ☐

3. Level of Education

None ☐

Primary ☐

O' level ☐

A' level ☐

Tertiary ☐

University ☐

4. Marital status.

Married ☐

Separated ☐

5. Designation.

Farmer ☐

Production Officer ☐

Extension workers ☐

House hold heads ☐

SECTION B:

Objective one: To examine the causes of climate change in Dadamu Sub-county.

Answer the below questions as appropriate as possible: Use the Likert Scale to tick accordingly. S.D =1 (Strongly Disagree), D = 2 (Disagree), N = 3 (Neutral), A = 4 (Agree), S.A = 5 (Strongly Agree)

		Response Categories				
		SA (5)	A (4)	N (3)	D (2)	SD(1)
1	Deforestation leads to climate change in Dadamu Sub-County					
2	Poor Agricultural practices results into bad climatic change					
3	Industrial Emissions leads to depletion of ozone layer which causes climate change					
4	Population growth leads to enthronement of natural forest which causes climatic change					
5	Burning of fossil fuels increase the level of carbon dioxide in the atmosphere leading to change climate condition					

SECTION C:

Objective Two: To ascertain whether climate change has effects on food security in Dadamu Sub-county.

Answer the below questions as appropriate as possible: Use the Likert Scale to tick accordingly. S.D =1 (Strongly Disagree), D = 2 (Disagree), N = 3 (Neutral), A = 4 (Agree), S.A = 5 (Strongly Agree)

		Response Categories				
		SA (5)	A (4)	N (3)	D (2)	SD(1)
1	Climate change results into poor crop yields					
2	Change in rainfall patterns is as a result of climate change					
3	Increased pests affects the proper growth of crops that affects crop yield resulting into food insecurity					
4	Decrease in water supply affects crop production leading to shortage of food items in the market					
5	Shifts in Agricultural zones has affected crop production seasons leading to food insecurity in Dadamu Sub-County.					

SECTION D:

Objective Three: To establish alternative remedies to address the challenges created by climate change on food security in Dadamu Sub-county.

Answer the below questions as appropriate as possible: Use the Likert Scale to tick accordingly. S.D =1 (Strongly Disagree), D = 2 (Disagree), N = 3 (Neutral), A = 4 (Agree), S.A = 5 (Strongly Agree)

		Response Categories				
		SA(5)	A (4)	N (3)	D (2)	SD(1)
1	Climate smart agriculture can help in production of crops where there is season shift.					
2	Improved water management can help in farming off rain season					
3	Diversified farming method can solve the problem of climate change					
4	Strengthening social safety nets can regulate fishing and brings balance quality of fish					
5	Community based adaptation of better farming practices can improve food security in Dadamu Sub-County					

APPENDIX B: Key Informant Interview Guide

Key Informant Interview Guide on Climate Change and Food Security in Dadamu Sub-county, Arua City

Objective One: To examine the causes of climate change in Dadamu Sub-county

1. What are the major factors contributing to climate change in this sub-County?

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2. Have you observed any human activities that could be accelerating climate change in Dadamu? If so, what are they?

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3. How do local government policies and community practices influence environmental conservation and climate stability?

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Objective Two: To ascertain whether climate change has effects on food security in Dadamu Sub-County

4. In your experience, have you observed any changes in food availability and production over the past years? If so, what are the major changes?

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5. How have weather patterns and climate variations affected farming activities in this sub-County?

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6. What are the most common food security challenges faced by households due to climate-related factors?

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Objective Three: To establish alternative remedies to address the challenges created by climate change on food security in Dadamu Sub-county

7. What strategies are currently being used by farmers to cope with the effects of climate change on food production?

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8. What role do local government and development organizations play in mitigating the impact of climate change on food security?

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9. What alternative or innovative farming and environmental management practices would you recommend to improve food security amidst climate change?

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APPENDIX C: Research Budget

Category	**Estimated cost**
Personnel	50,000
Research activity	30,000
Data analysis software (SPSS)	25,000
Travels	70,000
Participant compensation	50,000
Administrative cost	20,000
Data collection tools	13,000
Printing cost	36,000
Miscellaneous	15,000
Total budget	**309,000**

APPENDIX D: Work plan

Activities	**Months**				
	October	November	December	January	February
Acceptance of research proposal					
Talks with local representatives in study area					
Development of research tools					
Sample selection and talks with community					
Training of enumerators					
Research data collection					
Research data analysis					
Research reports					