THE IMPACT OF HUMANITARIAN AID IN BUILDING COMMUNITY RESILIENCE TO DROUGHT IN KITUI COUNTY, KENYA

Agnes Kalekye Kithikii

A thesis submitted in partial fulfilment of the requirements for the award of the degree of Doctor of Philosophy in Disaster Management and Sustainable Development of Masinde Muliro University of Science and Technology

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DECLARATION

This thesis is my own original work prepared with no other than the indicated sources and has not been presented for a degree or any other award in any other University or any other institution.

Signature..... Date…….

Agnes Kalekye Kithikii,

CDS/H/206/14

CERTIFICATION

We the undersigned certify that we have read and hereby recommend for acceptance by Masinde Muliro University of Science and Technology, a thesis entitled "**The Impact of Humanitarian Aid in Building Community Resilience to Drought in Kitui County, Kenya".**

Signature..... Date…….

Prof. Samuel China (Ph.D.)

Department of Disaster Management and Sustainable Development

Masinde Muliro University of Science and Technology

Signature..... Date…….

Dr. Edward M. Mugalavai (Ph.D.)

Department of Disaster Management and Sustainable Development

Masinde Muliro University of Science and Technology

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DEDICATION

I dedicate this thesis to my late father Daniel Kivoto Katheng'u, my late mother Mary Muli Kivoto, my husband Kithikii Kasungo, my daughters: Dr. Flora Kalimi and Mary Muli, my sons Tony Kasungo and Danny Kivoto and my niece Eng. Mercy Mboya for their prayers, support, and encouragement during the process of undertaking this study.

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ABSTRACT

In Kenya, droughts influenced by climate change have become more protracted and severe. Arid and semi-arid lands have been disproportionately affected due to their fragile ecosystems, unfavourable climate, and historical marginalization. Kitui County, an arid and semi-arid County has endured the brunt of protracted droughts. Despite the growing global, regional, and national attention in building community resilience to disasters, there is a paucity of research examining the impact of humanitarian aid in building community resilience to drought in Kitui County. The overall objective of this study was to bridge this gap by examining the impact of humanitarian aid in building community resilience to drought in Kitui County. To achieve this overall objective, three objectives were formulated i) to examine the types of humanitarian aid implemented in response to drought disaster in Kitui County; ii) to determine the level of community resilience to drought in Kitui County; and iii) to evaluate strategic options for enhancing community resilience to drought in Kitui County. The study was conducted in Mwingi North and Mwingi West Sub-Counties which were selected using purposive sampling technique. The study utilized data collected from 385 households sampled using systematic sampling techniques. Descriptive, correlation, and evaluation research designs were used. Results based on descriptive analysis revealed the types of humanitarian aid implemented in response to drought disaster in Kitui County include food support 77%, planting of drought resilient crops 11.7%; awareness creation on drought mitigation measures 9.6% among others with food support being the most prominent. The impact of humanitarian aid in building community resilience to drought was significant at p-value = 0.000. On the level of community resilience to drought, the results based on descriptive statistics revealed that 89.4% of the household respondents earned their income from crop and livestock production, income sources which are highly sensitive to drought risks, 62.6% had no food in store and, 67%, earned less than Ksh.5,700 monthly. On strategic options for enhancing community resilience to drought in Kitui County, support for sustainable water sources was ranked highest at 34.4%; while community engagement in disaster risk assessments was ranked lowest at 5.5%. In conclusion, the study found that humanitarian aid has had an impact in increasing community resilience to drought in Kitui County. However, to expedite progress in realizing the objectives of the Sendai Framework for Disaster Risk Reduction 2015-2030 and the Sustainable Development Goals, the study recommends a shift from the current humanitarian focus on immediate emergency response to a broader approach addressing longer-term community resilience building needs during the recovery and reconstruction phases of drought response. Emphasizing strategic policy options, it recommends increased humanitarian aid investment for constructing sustainable water supply systems, expanding access to credit facilities, implementing livestock and crop insurance, and establishing food banking facilities for drought-affected communities in Kitui County and other regions. This study offers insights for improving the impact of humanitarian aid in enhancing community resilience to drought, serving as a valuable academic reference.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACCI	Adaptation to Climate Change
ADRA	African Adventist and Relief Organisation
ADS	African Development Services
AFC	Agricultural Finance Corporation
AfDB	African Development Bank
AIDS	Acquired Immunodeficiency Syndrome
AMREF	African Medical Research Foundation
ANOVA	Analysis of Variance
APHIA	AIDS, Population and Health Integrated
ARC	Africa Risk Capacity
ASALs	Arid and Semi-Arid Lands
BPH	Benign Postrate Hypertpophy
CAFOD	Catholic Agency for Overseas Development
CART	Community Advancing Resilience Toolkit
CBOs	Community Based Organisations
CCA	Climate Change Adapation
CDAP	Community Drought Action Plan
CDF	Constituency Development Fund
CEFA	Closed End Fund Association
CHS	Centre for Health Solutions
CIDPs	County Integrated Development Plans
CIFA	Community Initiative and Facilitation Assistance

CLT	Central Limit Theorem
CoBRA	Community Based Resilience Assessement
CPF	Common Programme Framework
CREADIS	Community Research on Environment and Development
CRED	Centre for Research on Epidemiology of Disasters
DANIDA	Danish International Development Agency
DDC	Drylands Development Centre
DFID	Department for International Development (UK)
DHS	Demographic and Health Survey
DMC/S	Community Management Committees
DOK	Diocese of Kitui
DPS	Directorate of Postgraduate Studies
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
DRRAP	Drought Risk Reduction Action Plan
ECHO	European Commission for Humanitarian Aid and Civil Protection Department
EDE	Ending Drought Emergencies
EMMS	Essential Medicines and Medical Supplies
EU	European Union
EWS	Early Warning Systems
FAO	United Nations Food and Agriculture Organization
FBOs	Faith Based Organisations

FEWSNET	Faminie Eary Warning System Network
FGD	Focus Group Discussion
GASP	Goat and Sheep Programme
GDI	Gender Development Index
GHA	Global Humanitarian Assistance
GOK	Government of Kenya
GROOTs	Grassroots Organisation Operating Together in Sisterhood
GWPEA	Global Water Partnership Eastern Africa
HDI	Human Development Index
HIV	Human Immunodeficiency Virus
ICHA	International Center for Humanitarian Affairs
ICT	Information Communication Technology
IDDRSI	IGAD Drought Disaster Resilience and Sustainability Initiative
IDNDR	International Decade for Natural Disaster Resilience
IDS	Institute of Development Studies
IEA	International Energy Agency
IFPRI	International Food Policy Research Institute
IFRC	International Federation of Red Cross and Red Crescent Societies
IGAD	Intergovernmental Authority on Development
IHDI	Inequality-adjusted Human Development Index
INGOs	International Non Governmental Organisations

IPC	Integrated Food Security Phase Classification
IPCC	Intergovernmental Panel on Climate Change
KABP	Knowledge, Attitude, Beliefs and Practices
KDHS	Kenya Demographic and Health Survey
KFSM	Kenya Food Security Meeting
KFSSG	Kenya Food Security Steering Group
KIIs	Key Informant Interviews
KMIS	Knowledge Management and Information Sharing
KNBS	Kenya National Bureau of StatisticsK
KUMEA	Kujenga Maisha East Africa
LRA	Long Rain Assessment
MAM	Moderate Acute Malnutrition
MIYCN	Maternal Infant and Young Child Nutrition
MMUST	Masinde Muliro University of Science and Technology
MoALFC	Ministry of Agriculture, Livestock, Fisheries, and Cooperatives
MSME	Micro, Small and Medium Enterprises
MTP	Medium Term Plan
NACOSTI	National Commission for Science, Technology and Innovation
NCCAP	National Climate Change Action Plan
NCCRS	National Climate Change Response Strategy
NCDs	Non-Communicale Diseases
NDEF	National Drought Emergency Fund

NDMA	National Drought Management Authority
NDMC	National Drought Mitigation Centre
NGOs	Non Governmental Organisations
NHIF	National Health Insurance Fund
NHO Plus	Nutrition and Health Program Plus
NRM	Natural Resources Management
OCHA	United Nations Office for Coordination of Humanitarian Affairs
ODA	Official Developmet Assistance
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
OP-CT	Older Persons Cash Transfer
OVC-CT	Orphans and Vulnerable Children
PRRO	Protracted Relief and Recovery Operations
PWSD	Persons with Severe Disabilities
RPLRP	Regional Pastoral Livestock Resilience Project
SAM	Severe Acute Malnutrition
SASOL	Sahelian Solutions Foundation
SDGs	Sustainable Development Goals
SEKU	South Eastern Kenya University
SHGs	Self Help Groups
SIDA	Swedish International Development Cooperation Agency
SLIM	Sustainable Land Management

SPSS	Statistical Package for Social Scientists Software
SWC	Soil and Water Conservation
TB	Tuberclosis
TVET	Technical and Vocational Education and Training
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
UNISDR	United Nations International Strategy for Disaster Risk Reduction
URTI	Upper Respiratory Tract Infection
USAID	United States Agency for International Development
USD	United States Dollar
USDA	United States Department of Agriculture
VSLA	Village Savings and Lending Associations
WFP	World Food Programme
WHO	World Health Organisation
WHS	World Humanitarian Summit

OPERATIONAL DEFINITION OF TERMS

Absorptive capacity: Taking precautions and employing healthy coping mechanisms to lessen vulnerability to the harmful effects of shocks and pressures.

Adaptive capacity: making proactive and well-informed decisions about alternate means of subsistence based on an awareness of evolving circumstances

Climate Change: A shift in the climate that lasts for a long time, generally decades, and can be detected by measuring variations in the mean and/or variability of the climate's attributes (through statistical methods, for example). Natural internal processes or external forcings, as well as persistent anthropogenic changes in the composition of the atmosphere or in the land use, are all potential causes of climate change.

Community Resilience to Drought: Is the ability of individuals, households, communities, and countries to absorb and recover from drought shocks and stresses without compromising their long-term living standards through sustainable resource use.

Community: A community is a collection of individuals living in the same area who have different backgrounds and priorities but who are bound together through social ties, interactions that shape local life, a sense of shared identity and purpose, the ability to act collectively, and access to additional resources.

Coping Capacity: Refers to people's ability to recover from calamities such as droughts and other shocks with the help of their own means as well as those of their families, communities, and governments.

Disaster Risk Management: Disaster Risk Management (DRM) refers to the systematic process of analyzing, assessing, and reducing the risks associated with natural and man-made disasters, as well as planning for and responding to such events in order to minimize their impact on people, property, and the environment. The primary goals of Disaster Risk Management are to enhance the resilience of communities and societies in the face of disasters and to reduce the potential for loss of life, damage, and disruption caused by these events.

Disaster Risk Reduction: is used to describe both the idea and the practice of reducing disaster risks by analyzing and managing the factors that lead to disasters. This is done in various ways, such as limiting exposure to hazards, decreasing vulnerability, managing land and the environment wisely, and increasing readiness.

Disaster: Involves widespread human, material, economic, or environmental losses and damages that outweigh the ability of the afflicted community or society to manage with its own resources and disrupts the normal functioning of the community or society.

Drought Management Cycle: is a systematic approach to managing and responding to drought events. It involves a series of phases and actions that help mitigate the impacts of drought on water resources, agriculture, ecosystems, and communities. The specific steps and processes may vary depending on the region and the severity of the drought, but generally it is comprised of monitoring and early warning, assessment and declaration, planning and

preparedness, response and rehabilitation, mitigation and risk reduction and learning and adaptation. The helps communities and governments better prepare for and respond to drought events, with a focus on building resilience and reducing the impacts of these natural disasters and requires a combination of scientific knowledge, policy development, community engagement, and adaptive management.

Drought resilience: Refers to the ability of a system, where it's a community, an ecosystem or an individual, to withstand and recover from the impacts of drought.

Drought Risk reduction: refers to the a set of strategies, policies, and actions aimed at minimizing the adverse effects of droughts on society, the environment, and the economy.

Drought: is a period of below-average precipitation in a specific region, leading to extended water supply shortages, whether in the form of atmospheric, surface water, or groundwater deficits. In simpler terms, it signifies a period when an area receives significantly less rainfall than what is considered normal for that region.

Drylands: They are classified as arid, semiarid, and dry subhumid.

Early Warning System: refers to the collection of abilities required to produce and broadcast timely and accurate warning information that will allow people, communities, and organizations endangered by a hazard to get ready and respond appropriately in time to minimize the risk of harm or loss.

Ex-ante drought response strategies: These are proactive measures and plans implemented before a drought event occurs to reduce its impact on communities, agriculture, and the environment. These strategies aim to build resilience, prepare for water scarcity, and mitigate the effects of drought.

Ex-post drought drought response strategies: refer to actions and measures taken after a drought has occurred in order to mitigate its impact, aid recovery, and reduce future vulnerabilities. These strategies are essential for managing the consequences of droughts and building resilience in affected communities.

Exposure: Losses that could occur because of the presence of people, property, or systems in danger areas.

Finacial Capital: Describes the monetary means through which individuals and groups pursue their economic and social goals. Money and other liquid assets (such savings, credit, remittances, pensions, etc.) fall under this category.

Hazard: Dangerous phenomenon, substance, human activity, or circumstance that has the potential to inflict death, injury, or other negative health outcomes, destruction of property, interruption of essential services, social and economic upheaval, or harm to the natural environment.

Human Capital: Means having the resources necessary to make a living, such as education, experience, physical fitness, and employment prospects.

Humanitarian Aid: it is a form of assistance provided to people in need, often in the context of a crisis or emergency situation. It is primarily aimed at alleviating human suffering and preserving human dignity, particularly in situations

where people are affected by natural disasters, armed conflicts, epidemics, or other humanitarian crises.

Impact: A drought is a prolonged period of abnormally low precipitation, which can result in a significant water deficit in a particular region or area. This lack of precipitation, coupled with increased evaporation and water use, can lead to reduced water availability, both on the surface (such as rivers and lakes) and underground (in aquifers). Droughts can vary in duration and intensity, and they can have various impacts on the environment, agriculture, water resources, and society, as previously described. The severity and impact of a drought depend on factors such as its duration, geographical extent, and the vulnerability of the affected region's ecosystems and communities.

Mitigation: Is the process of reducing the destructive potential of disasters and other dangers.

Natural Capital: consists of the land, water, forests, rangelands, fisheries, wildlife, biodiversity, and environmental services that are owned by a community and used by its members to make a living.

Natural hazard: used to describe any occurrence in the natural world that has the potential to produce human casualties, medical problems, economic losses, social upheaval, or ecological harm.

Physical Capital: Included in this category are the tools used in manufacturing, as well as the fundamental infrastructure (such as transportation, shelter, electricity, communications, and water systems, health facilities, and marketplaces) that allow people to stay safe and improve their well-being.

Political Capital: Consists of people's connections to one another in positions of authority, as well as their ability to participate in and shape political and governmental processes at both the state and federal levels.

Preparedness: Preparedness is the set of skills and resources that help communities, governments, and individuals prepare for, respond to, and recover from the effects of potential, potential, or ongoing hazard events or circumstances.

Prevention: Is the complete and utter avoidance of the negative effects of dangers and disasters

Recovery: Means putting in place measures to lessen the likelihood of future disasters, as well as restoring and bettering the lives of those who have been harmed by them.

Resilience: is the capacity of a hazard-exposed system, community, or civilization to withstand the impacts of the danger, absorb the shock of the hazard, adapt to the new circumstances, and recover quickly and effectively, all while keeping and restoring its most fundamental structures and functions.

Response: providing aid to those in need during and soon after a disaster in order to preserve lives, lessen the severity of the event's effects on health, maintain order, and provide for the survivors' most basic necessities.

Risk: Is the sum of an event's likeliness and its potential drawbacks

Sensitivity: This is the extent to which people are vulnerable to shocks like droughts, which are in turn affected by the diversity and stability of their income and asset bases.

Social Capital: This refers to people's access to and use of various forms of social capital (such as their networks, the groups to which they belong, the relationships they maintain, and the institutions to which they belong) in their quest to make a living.

Sustainable Development: means creating a world where current demands are met without sacrificing the ability of future generations to do the same.

Sampling strategy: is a statistical plan encompassing the key steps in sample selection and the estimation procedure. It is a subset of a population, usually chosen from a sampling frame, which is a comprehensive list of all population items.

Transformative capacity: systemic change is possible because of the enabling environment, which consists of governance processes, policies/regulations, infrastructure, community networks, and formal and informal social protection measures.

Vulnerability: This term describes the features and conditions of a community, system, or asset that make them vulnerable to the destructive effects of a hazard.

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

In recent years, the administration of humanitarian aid has faced numerous challenges, including its frequent inability to meet the actual needs (Venton, 2018; Devi, 2022) and the increasing call for accountability from humanitarian actors, which presents a notable challenge in the management of humanitarian aid, particularly in the context of protracted, enduring, and multifaceted crises where the parameters for humanitarian assistance delivery extend beyond the provision of immediate relief (Rose *et al*., 2013). Additionally, there have been concerns about the crucial role of humanitarian aid in saving lives, with issues such as late arrival hindering its effectiveness (Venton, 2018). There is a growing awareness of the fact that addressing chronic and prolonged crises with continuous emergency assistance is both expensive and unsustainable (Urquhart & Girling, 2022). Further, the effectiveness of humanitarian aid is hampered by various factors, such as inefficient management, inappropriate policies, institutional and administrative obstacles, and a lack of consensus regarding what constitutes effective aid (Safarpour *et al*., 2020).

On the other hand, droughts, increasingly exacerbated by the impact of climate change, are increasing in both frequency and severity, posing significant challenges to sustainable development (IPCC, 2022; Manyena, 2016). These prolonged drought events have far-reaching implications for ecosystems, agriculture, economies, and the well-being of millions of individuals worldwide (IPCC, 2022; Birhanu *et al*., 2017).

The enduring impacts of drought and other disasters have placed a significant burden on the humanitarian system (2018) and has garnered the attention from the governments on a global scale (Manyena, 2016), aligning with the commitment for disaster risk reduction (DRR) and building community resilience to disasters as articulated in the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR, 2015) and with a view of addressing the challenges of escalating economic toll of natural disasters, coupled with the shrinking governmental budgets (Clarvis *et al*., 2015; Urquhart & Girling, 2022). However, despite this growing focus to bolster the resilience of both communities and nations, the frequency, duration, and severity of drought have continued to intensify (Ayugi *et al*., 2022; CRED., 2019 & Manyena., 2016).

While it is widely recognized that reliable funding is crucial for averting the loss of lives, livelihoods, and financial resources (Clarvis *et al*., 2015), there is a noticeable absence of a significant transition toward multi-year humanitarian financing. Furthermore, there is a lack of systematic provision for early financing to mitigate the severe repercussions of recurrent disasters such as droughts (Barakat & Milton, 2020). Further, the current humanitarian aid has continued to predominantly emphasize immediate, reactive measures and is yet to fully adjust itself to prioritize long-term community resilience-building initiatives (IPCC, 2022; Urguhart & Girling, 2022). Despite recent efforts to improve humanitarian aid effectiveness and the recognition of the role played by national and international NGOs (I/NGOs) within the global policy framework of the Grand Bargain (UN, 2016), progress has been sluggish

(Urguhart & Girling, 2022). A significant portion of international funding has continued to flow through multilateral organizations, leaving local and national actors with comparatively limited resources (Urguhart & Girling, 2022). Furthermore, climate finance has predominantly concentrated on preventative measures, with only a fraction reaching nations already vulnerable to multiple catastrophes (Urguhart & Girling, 2022). In 2020, a small portion of bilateral Official Development Assistance (ODA) funding and climate-related ODA was allocated to adaptation in countries facing prolonged crises (Urguhart & Girling, 2022).

Further, a debate over whether humanitarian aid should prioritize community resilience in the long term has raged on. Critics argue that emphasizing resilience detracts from immediate life-saving efforts, shifting the focus towards bolstering local and national systems (Hilhorst *et al.*, 2019). Nevertheless, some argue that given humanitarian actors' involvement in prolonged crises, bear a responsibility to proactively construct robust systems to prevent future calamities. Failing to address long-term needs risks perpetuating dependence on costly, undignified, and unsustainable short-term aid. Striking a balance is essential, as ignoring immediate needs can push communities deeper into vulnerability.

Additionally, humanitarian aid and international development are interconnected, necessitating sustained support for resilience projects both before, during, and after disasters to bridge the gap between short-term and long-term relief efforts.

Humanitarian aid growth slowed significantly in the 2010s, with only a 2.6% increase from 2017 to 2021 (Urguhart & Girling, 2022). This deceleration has been worsened by donor base volatility, resulting in persistently high aid costs and limited funding (Urguhart & Girling, 2022). In the humanitarian system, operational partners include national governments, local civil society organizations, UN agencies, the Red Cross Movement, and major NGOs (Sli, 2015). Most of the humanitarian funding comes from OECD governments and private donors.

Africa has witnessed a concerning increase in extreme drought occurrences in recent decades, leading to environmental degradation, food insecurity, and decreased agricultural production (Ayugi *et al*., 2022; IPCC, 2022). This has particularly affected regions heavily reliant on rain-fed agriculture, leaving them susceptible to climatic fluctuations and heightening vulnerabilities (Nhamo *et al*., 2019). Vulnerable populations, especially those residing in Arid and Semi-Arid Lands (ASALs), have suffered as economic development funds are diverted to combat climate change (Ayugi *et al*., 2022). Inadequate preparedness and limited adaptive capacity exacerbate drought severity in Africa (Nhamo *et al*., 2019), and the impact of weather extremes and hazards largely depends on preparedness measures, which, regrettably, face a shortage of sustained multi-year funding from the current humanitarian aid system (Clarvis *et al*., 2015). East Africa, and Kenya in particular, have experienced increasingly frequent, prolonged, and severe drought events, posing a significant threat to food security (Wens *et al*., 2020).

ASALs are especially vulnerable due to their fragile ecosystems, adverse climate conditions, inadequate infrastructure, and historical marginalization (Ayugi *et al*., 2020; Mbuthia *et al*., 2017). The 2011 East Africa drought, considered the most severe in 60 years, had a devastating impact on food security and the livelihoods of approximately 10 million people (Ayugi *et al*., 2020). The more recent 2020-2023 drought, the longest and most severe in 70 years, exposed over 21 million people to the risk of starvation, extensive population displacement, and a substantial increase in humanitarian needs (AHN, 2022; UNOCHA, 2023). Unfortunately, responding to drought crises and building community resilience to drought has been impeded by inadequate and delayed funding, falling significantly short of the necessary assistance (UNOCHA, 2023). Given the expected intensification of extreme climate events by the end of the 21st century, this worrying pattern is likely to persist (IPCC, 2022). The Kenyan government's Ending Drought Emergencies (EDE) Strategy Framework recognizes drought as the most pervasive and potentially devastating hazard in the country (Republic of Kenya, 2014).

Kitui County, an ASAL, faces persistent and prolonged droughts (Khisa, 2017), increasing vulnerability and hindering recovery (Wens *et al*., 2021; Marigi). Scarce and irregular rainfall due to arid conditions (Republic of Kenya, 2022) threatens food security, depletes assets, and hampers adaptation strategies (Wabwoba, 2017).Since 2013, the Kenyan government has pursued the EDE strategy to mitigate drought risks in ASALs like Kitui County (Republic of Kenya, 2014).

EDE focuses on peace and security, climate-resilient infrastructure, human capital, sustainable livelihoods, drought risk management, and institutional development. Various stakeholders, including the Kenyan government, INGOs, and UN agencies, implement drought response actions in ASAL counties (Republic of Kenya, 2022). The EDE initiative aligns with regional and global efforts to address drought emergencies. At the regional level, IGAD coordinates the Drought Disaster Resilience and Sustainability Initiative (IDDRSI), with NDMA overseeing its implementation in Kenya. Globally, EDE in Kenya contributes to the Sendai Framework for Disaster Risk Reduction (2015–2030) and Sustainable Development Goals 1-8, 16, and 17 (Republic of Kenya, 2020). The EDE aims to eliminate vulnerability, enhance ASALs' potential, and strengthen drought risk management. Progress reports for 2019-2020 and June 2022 indicate significant progress in EDE implementation in Kenya (Republic of Kenya, 2022; Republic of Kenya, 2020). In Kitui County, EDE activities received funding from various sources, totalling USD 17,235,802.22 for 2011-2024 (NDMA, 2022).

Humanitarian aid's impact on drought resilience in Kenya is a subject of debate in the literature. Arielle *et al*. (2018) claim it improves drought preparedness and mitigation, whereas Muricho *et al*. (2019) argue it often prioritizes risk reduction over long-term adaptability. Levine (2014) highlights that programs concentrating on bolstering household assets can bolster community resilience. Levine stresses that community resilience goes beyond financial resources, encompassing access to power structures, social organization, governance, and institutional roles in society.

1.2 Statement of the Problem

Recurrent droughts in Kitui County pose an enduring threat to local communities, leading to heightened food insecurity and a growing reliance on external food assistance (Wens *et al*., 2021; Marigi *et al*., 2016). These challenges obstruct poverty alleviation efforts and impede sustainable development (Wens *et al*., 2021; Marigi *et al*., 2016). The escalating intensity, frequency, and duration of droughts are primarily attributed to climate change (Khisa, 2017; Marigi *et al*., 2016). These persistent droughts result in crop failures, livestock losses, reduced incomes, and an increased vulnerability to food insecurity among rainfed agriculture-dependent rural farmers, making them less adaptable to drought conditions (Ayanlade *et al*., 2018; Mutu *et al*., 2017). While humanitarian aid is provided in response to drought emergencies (UNOCHA, 2023), it is becoming evident that sustained humanitarian aid is both costly and unsustainable (Urguhart & Girling, 2022). There is a growing consensus on the imperative need to invest in community resilience, reduce dependence on humanitarian aid, alleviate human suffering, and reduce response costs (Urguhart & Girling, 2022; Venton, 2018). Nonetheless, the actual impact of humanitarian aid on enhancing community resilience to drought remains insufficiently explored (Avdeenko & Flolich, 2019). The relationship between humanitarian aid and community resilience remains under-researched. This study seeks to address this knowledge gap by examining the impact of humanitarian aid on community resilience to drought in Kitui County. By doing so, it contributes to the existing body of knowledge and advances our comprehension of strategic options for mitigating the adverse effects of drought while enhancing community resilience within the county.

1.3 Research Objectives

The overall objective of this study was to examine the impact of humanitarian aid in building community resilience to drought in Kitui County, Kenya with a view of generating strategies and informing policy formulation for improving community resilience to drought.

1.4 Specific Objectives

The specific objectives of the study were, To;

i. Examine the types of humanitarian aid implemented in response to drought disaster in Kitui County, Kenya
ii. Determine the level of community resilience to drought in Kitui County, Kenya.
iii. Evaluate the strategic options for enhancing community resilience to drought in Kitui County, Kenya.

1.5 Research Questions

i. What types of humanitarian aid are implemented in response to drought disaster in Kitui County, Kenya?
ii. What is the level of community resilience to drought in Kitui County, Kenya?
iii. What strategic options are suitable for enhancing community resilience to drought in Kitui County, Kenya?

1.6 Significance of the Study

This study investigates the impact of humanitarian aid on building community resilience to drought in Kitui County, Kenya. Despite its pertinence within the framework of the Sendai Framework for Disaster Risk Reduction (DRR) 2015-2030 and various sustainable development goals (SDGs), there is a noticeable dearth of formal research on the effectiveness of humanitarian aid in supporting DRR on order to build community resilience to drought disasters (Avdeenko & Flolich, 2019). This research examines the types of humanitarian aid used in response to drought disasters in Kitui County, assesses the level of community resilience, and evaluates strategic options for enhancing community resilience to drought in the County.

The study contributes to existing knowledge on the role of humanitarian aid in bolstering community resilience to drought and therefore it is beneficial to the humanitarian policy actors and local communities and underscores the importance of effective strategies during the recovery and reconstruction phases of drought management. Further, the study sheds light on the progress in implementing the Sendai Framework for DRR 2015-2030 and specific SDGs (1-3, 6, and 11). It provides empirical evidence and insights that may stimulate further academic research and discussions about humanitarian aid's role in building community resilience to drought, making it a valuable reference in academia. The significance of this study extends beyond the local context, offering insights into the role of humanitarian aid in building community resilience at regional and global scales.

It bridges knowledge gaps, offering insights that have the potential to enhance the effectiveness of humanitarian aid in strengthening community resilience in the face of growing drought challenges.

1.7 Scope of the Study

This study primarily focused on Mwingi North and Mwingi West Sub-Counties in Kitui County, Kenya. Kitui County is an ASAL region known for its susceptibility to drought, characterized by frequent drought occurrences. The research targeted a diverse range of stakeholders including household heads and individuals who were males and females above 18 years of age and were living in villages consistently affected by drought in the study areas. Biophysical environment was observed and recorded. Other stakeholders targeted included community groups, representatives of I/NGOs, CBOs, FBOs, Ward, Sub-County, relevant County Government ministries and agencies.

The study assessed variables such as food security, economic security, management of natural resources, management of public goods, infrastructure and social systems and community engagement in collective action on DRR, humanitarian aid, financial facilities, existing polices and levels of exposure and sensitivity to drought conditions. The data collection took place between February to May 2018 and relied on secondary data spanning a ten-year period from 2008 to 2018. This study enhances our understanding on humanitarian aid's role in bolstering community resilience to drought.

It offers insights for Kitui County and global efforts. The findings highlight humanitarian aid's crucial part in reinforcing community resilience post-drought, guiding leaders, and policy makers.

1.7.1 Inclusion Criteria

The study was conducted in two sub-counties of Mwingi North and West which were purposively selected as they were the most typical of the population with regard to the characteristics under investigation. This study focused on household heads and individuals who were living in villages consistently affected by drought conditions in the study areas. The household respondents were females and males above 18 years of age. Village and Ward representatives were also interviewed, and biophysical environment was observed and recorded. At the Village, Ward, Sub-County and County levels representatives of various organisations such as government and Nongovernmental organisations were interviewed through key informant interviews. These included: NDMA, the County Government of Kitui Ministries and departments such as the Ministries of Agriculture and Livestock, Water, Education and the office of the Governor and I/NGOs such as Action Aid, Care International, Caritas Kitui and the Anglican Development Services which were working in the study areas. Representatives of these agencies were interviewed during the key informant interviews. In addition, the study focused on organised community groups during the focus group discussions.

1.7.2 Exclusion Criteria

To enhance sample relevance and mitigate confounding variables, we applied exclusion criteria. Key informant interviewees were chosen from diverse stakeholders (government entities, FBOs, INGOs) while excluding recent recruits and those not directly involved in drought-related programs. Stakeholders selected for interviews had to be actively engaged in implementing drought-responsive initiatives. In household surveys, participants under 18 were excluded to refine the study's focus and representativeness.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter reviews existing relevant literature, primarily focusing on key variables in humanitarian aid and community resilience to drought. It also reviewed literature related to the impact of humanitarian aid in building community resilience to drought, the types of humanitarian aid implemented in response to drought and the level of community resilience to drought, and finally and on strategic options for enhancing community resilience to drought. The literature review focused on the specific research objectives with the aim of answering specific research questions related to this study.

It also reviewed fundamental conceptual frameworks, which not only serve as the basis for evaluating and interpreting research findings but also enhance our understanding of the study's thematic scope. These include: the Community Resilience: Conceptual Framework Measurement Feed the Future Learning Agenda, created by Frankenberger *et al*. (2013); the Community Based Resilience Assessment (coBRA) Framework; and finally, the Conceptual Framework for Assessing Resilience, developed by Kwasinski *et al*. (2016). Drawing inspiration from these frameworks, the study constructed a conceptual framework for community resilience to drought. The conceptual framework illustrates the interdependencies among variables, aiding in the identification of research problems, gaps in the current literature and in the selection of the variables for the assessment.

2.2 Humanitarian Aid used in Building Community Resilience to Drought

2.2.1 The concept of Humanitarian Aid

Traditional humanitarian aid has historically adhered to the classical Dunantist paradigm, rooted in humanitarian ethics (Hilhorst *et al*., 2019). In recent times, a shift towards 'resilience humanitarianism' has emerged, aligning relief efforts with long-term development goals, and emphasizing the empowerment of local communities and institutions as primary crisis responders (Ilcan & Rygiel, 2015). Initially, resilience humanitarianism was prevalent in DRR but now plays a significant role in aiding refugees in post-conflict transition nations.

Governance approaches diverge between classical and resilience humanitarianism. Classical humanitarianism relies primarily on the United Nations (UN), international donors, and International Non-Governmental Organizations (INGOs) as key actors in governance. Conversely, resilience humanitarianism places greater emphasis on the participation of national and local authorities, crisis-affected region service providers, and the affected communities (Hilhorst, Desportes, & de Milliano, 2019). Humanitarian aid is founded on a moral and ethical framework rooted in humanitarian philosophy, promoting humanity, impartiality, neutrality, and independence (Urguhart & Girling, 2022). The objective of humanitarian aid is to save lives, relieve suffering, uphold human dignity, and enhance preparedness before, during, and after disasters (Urguhart & Girling, 2022). It is administered temporarily through a humanitarian system to disaster-affected communities when the national and local resources are insufficient to meet the needs (Scott, 2014).

2.2.2 The Role of Humanitarian Aid

Humanitarian aid serves a critical role in alleviating human suffering during crises, with a primary focus on saving lives, reducing suffering, and preserving human dignity (Urquhart & Girling, 2022). In contrast to development aid, humanitarian aid prioritizes immediate relief (UNOCHA, 2022; Scott, 2014). This aid is instrumental in preventing, responding to, and rebuilding after crises. Avdeenko and Flolich (2019) emphasize that it fosters adaptive behaviors among beneficiaries, supports disaster risk reduction (DRR) efforts, and contributes to achieving SDGs (Lattimer & Swithern, 2017). Despite its relatively modest volume compared to other resource flows, international humanitarian aid fulfills a specific and crucial function for crisis-affected populations (Scott, 2014).

According to UNOCHA (2022), humanitarian aid plays a pivotal role in coordinating various aspects of humanitarian action. UN agencies like the Office for the Coordination of Humanitarian Affairs (OCHA), the UN High Commissioner for Refugees (UNHCR), the United Nations Children's Fund (UNICEF), UN Women's inter-agency, and the World Health Organization (WHO) each have distinct responsibilities in this regard. Moreover, humanitarian aid has been instrumental in reducing poverty by fostering economic growth, enhancing education, generating employment, improving global health, enhancing infrastructure, boosting agriculture, and aiding climate change mitigation efforts (Ball, 2023). However, Walling (2013) highlights that humanitarian aid interventions may not be universally suitable.

2.2.3 Challenges of Humanitarian Aid

There have been many difficulties in recent years with the administration of humanitarian aid (Rose *et al*., 2013). One of the biggest problems with humanitarian help is that it often falls short of actual requirements. For example, in 2021, a total of US$38.4 billion was requested via UN-coordinated appeals; this was down by US$895 million from 2020 but still represented an increase of US$7.9 billion from 2019. There were a total of 48 UN-coordinated appeals made, down from 55 in 2020 but still a third higher than the 36 appeals made in 2019 (Urguhart & Girling, 2022). The percentage of indicated conditions met by these appeals increased to 56% from 51% in 2020. With a deficit of $16.9 billion, the amount of cash supplied is second only to the $19.1 billion gap in 2020 (Urguhart & Girling, 2022).In addition, the rising demand of accountability by humanitarian actors poses a significant challenge to the management of humanitarian aid in the context of chronic, long-term, complex emergencies where the criteria of humanitarian assistance delivery are expanded beyond the need for immediate relief (Rose *et al*., 2013). The dominance of an intervention model developed in the West but offered mostly to people in the Rest of the World is another source of difficulty (Rose *et al*., 2013).

Humanitarian help is hampered by ineffective management and inappropriate policies due to a number of factors, such as institutional and administrative roadblocks and a lack of consensus on what constitutes efficient aid (Safarpour *et al*., 2020). Scott (2014) identifies a number of distinct difficulties facing the humanitarian aid sector, including a diminishing humanitarian space, increasing negative trends in the

protection of civilians in general and women in particular, limited humanitarian access, security threats to humanitarian workers, and the perception of a growing risk aversion among major humanitarian actors. Environmental, social, demographic, and geo-political upheavals, as well as the growing sway of technology and a globalized economy, and the accompanying increase in inequality, are further complicating the humanitarian system. More people, in more places, including those who live in cities, have been affected by these crises, and the cost of providing aid has gone up as a result (Scott, 2014).

Along with inter-acting resource pressures, volatile commodity prices, food security, and demographic shifts, the rising cost of natural disasters like drought is one of several global trends that the humanitarian aid system must address (Urguhart & Girling, 2022; Devi, 2022; Clarvis *et al*., 2015). Funding for humanitarian efforts is very inadequate in comparison to rising demand (Venton, 2018; Urguhart & Girling, 2022). The importance of adequately managing and preparing for natural hazards is becoming increasingly apparent to governments worldwide. The risk burden for DRR has increased as the economic costs of natural disasters have grown and as governmental budgets have continued to diminish (Clarvis *et al*., 2015). Examples include a surge of $0.8 billion in 2021, when the total amount of international humanitarian aid hit an all-time high of an expected $31.3 billion (Urguhart & Girling, 2022). On top of that, existing humanitarian aid focuses more on short-term reactive response than on long-term community resilience building initiatives (IPCC, 2022).

Although it is widely acknowledged that having access to reliable funding is essential for preventing loss of life, livelihoods, and financial resources (Clarvis *et al*., 2015), there is little evidence of a major shift towards multi-year humanitarian financing, and there is also no systematic provision of early financing to mitigate the most severe impacts of recurrent disasters like droughts (Barakat & Milton, 2020).

The efficiency of humanitarian aid can be greatly enhanced by allowing for greater financial flexibility in meeting humanitarian needs. This was a primary goal of the negotiations leading up to the Grand Bargain that followed the World Humanitarian Summit in May 2016 in Istanbul, Turkey (UN, 2016). Despite repeated promises over a long period of time to reform public donors' practices, no discernible shift has occurred in their donation patterns (Urguhart & Girling, 2022; Devi, 2022). Urguhart & Girling, (2022) estimates that in 2021, funding for multilateral organizations will receive 54% of overall international humanitarian assistance, down from 60% in 2020 and the 10-year average of 56%.

In terms of public donations, non-governmental organizations (NGOs) received the second-highest percentage, at 19%. This was a decline in volume from 2020's projections, when it was US$5.3 billion. The percentage of international humanitarian funding received by NGOs in 2020 (at 20%) was the highest it had been in the previous decade. South Sudan, Somalia, Syria, Lebanon, Ethiopia, Yemen, the Democratic Republic of the Congo, Afghanistan, Turkey, and Nigeria were among the top 10 countries receiving humanitarian aid in 2021.

Countries dealing with chronic crises received the lion's share of humanitarian aid (Urguhart & Girling, 2022). Eighteen of the top twenty receivers of official humanitarian aid in 2015 were considered medium or long-term recipients who were dealing with recurring or protracted disasters (Lattimer & Swithern, 2017).

2.2.4 Contemporary Concepts on Humanitarian Aid

Contemporary discussions on humanitarian aid have traditionally framed it within a stark dichotomy of crisis and normalcy, enshrined in the legal and cultural norms of the international humanitarian aid system (IDS, 2017). This perspective positioned humanitarian aid as a last-resort response to catastrophic events, a temporary solution for unmet needs (Scott, 2014). It has been a topic of heated debate among academic critics and frontline relief workers for decades. However, a significant shift in this prevailing outlook has transpired over the past decade. The Hyogo Framework for Action (UNISDR, 2005) marked the inception of this transformative approach to disaster relief by emphasizing the importance of local response mechanisms and the resilience of local communities. The Sendai Framework for DRR 2015-2030 (UN, 2015), further redirected attention in this direction.

This framework delineates seven development goals and four priority actions to mitigate both existing and emerging disaster risks. The UN proposed four key areas of focus in 2015: i) enhancing risk awareness, ii) strengthening disaster risk governance, iii) investing in DRR for heightened resilience, and iv) enhancing disaster preparedness to facilitate a "Build Back Better" approach post-disaster.

The framework aspires to significantly reduce disaster risks and associated losses in terms of lives, livelihoods, health, and economic, physical, social, cultural, and environmental assets for individuals, businesses, communities, and nations. The approach articulated in the framework encompasses various activities, including the development of resilient livelihoods, bolstering institutional capacities for disaster preparedness and response, and promoting sustainable growth (UN, 2015).

Additionally, investing in community resilience building has gained prominence, driven by the imperative to safeguard development funding and reduce the costs of recovery due to diminished disaster losses (IPCC, 2022; Graveline & Germain, 2022). Nevertheless, the burgeoning volume of humanitarian aid has been somewhat reticent in prioritizing substantial investment in long-term community resilience efforts (Suda, 2000; Urquhart, 2019). Moreover, a recent assessment conducted by Nyandiko & Otwori (2022) on the progress of Africa Union (AU) member states in developing DRR strategies, as mandated by Target E of the Sendai Framework, revealed that only about 68% of AU member states have formulated national DRR strategies, and 35% have established subnational DRR strategies.

The sluggish advancement in enhancing DRR strategies in compliance with the Sendai Framework's Target E can be largely attributed to deficiencies in technical and institutional capacities, financial constraints, limited decentralization of DRR efforts, and governance shortcomings. In the past few decades, considerable deliberation has centred on whether humanitarian aid should prioritize the enhancement of long-term

community resilience (Ahmed, 2021). Critics of the resilience concept argue that it diverts attention away from immediate life-saving interventions towards fortifying local and national systems to withstand and recover from shocks.

However, some authors propose that humanitarian actors, having been actively involved in prolonged crises, bear a responsibility to proactively build robust systems to reduce the likelihood of future calamities (Hilhorst *et al*., 2019). Failing to address long-term needs is likely to perpetuate dependence on frequent, costly, undignified, and unsustainable short-term assistance, leaving many individuals in a precarious situation (Urquhart, 2019). Striking a balance is imperative, as neglecting immediate needs can condemn communities to further vulnerability. Humanitarian aid and international development represent two facets of the same continuum. Thus, it is vital to bridge the gap by providing sustained support for resilience-building initiatives before, during, and after disasters occur. Avdeenko & Flolich (2019) emphasize the pressing need for effective humanitarian responses to the growing frequency of natural disasters. They highlight a critical research gap, particularly in understanding ex-ante mechanisms, coping strategies, and novel approaches to enhance resilience. This gap hinders timely and efficient aid allocation, impeding DRR efforts.

2.2.5 Types of Humanitarian Aid

Recent decades have witnessed a surge in drought disasters, with increasing temperatures and erratic rainfall affecting various continents (Wens *et al*., 2022; Haile *et al*., 2019; Marigi *et al*., 2016).

These droughts have had profound and far-reaching impacts on human beings, agricultural production, food security, water resources, and the environment (Ayugi *et al*., 2022; Haile *et al*., 2019; Lolemtum *et al*., 2017). To address the dire consequences of droughts and alleviate human suffering (Scott, 2014), individuals affected by humanitarian crises induced by droughts rely on a range of humanitarian aid interventions. This study highlights the diverse types of drought response measures supported by humanitarian aid. The first crucial form of humanitarian aid is food assistance (Ball, 2023). Drought-affected populations often grapple with food insecurity (Ayugi *et al*., 2022; Birhanu *et al*., 2017). Humanitarian organizations address this critical need by distributing life-saving food to mitigate the impacts of food insecurity and ensure the survival of those affected.

Food aid is typically provided to individuals on the brink of poverty to prevent famine, save lives, preserve dignity, and prevent malnutrition (Wens *et al*., 2022). Nevertheless, a recent study by Rustad *et al*. (2020) conducted in Sub-Saharan Africa found limited evidence that food aid results in measurable child health gains for recipient populations. Notable humanitarian aid agencies, such as the World Food Programme, Oxfam, and Action Contre la Faim, prioritize food aid (Ball, 2023).Humanitarian relief encompasses not only food but also water and sanitation facilities during crises (Ball, 2023). When a drought disaster strikes, it can severely impact access to safe drinking water and sanitary facilities. The absence of clean water and sanitation services can exacerbate the effects of drought disasters (Humanitarian Coalition, 2021).

Disease outbreaks stemming from inadequate water and sanitation facilities are linked to disasters (Ball, 2023) and are responsible for the suffering and death of disaster victims. Humanitarian organizations provide Water, Sanitation, and Hygiene (WASH) services to curb the spread of cholera and other waterborne diseases, saving lives and preventing additional crises resulting from poor sanitation (Humanitarian Coalition, 2021). Humanitarian WASH responses are imperative for nearly all types of humanitarian crises. Organizations like WaterAid, CARE International, Oxfam, and CAFOD emphasize WASH in their humanitarian efforts.

Humanitarian aid, particularly in the context of drought crises, often includes vital livelihoods programs (Ball, 2023). When drought disasters strike, the livelihoods of many people are devastated (Ayugi *et al*., 2022; Khisa, Kenya, 2017). Recurrent, severe, and protracted drought events adversely affect people's capacity to earn a living (Marigi *et al*., 2016) and disrupt the economic and workforce systems. For example, droughts force individuals to abandon their usual occupations in search of food. Humanitarian aid organizations typically assist drought-affected populations in revitalizing their livelihoods (Ball, 2022). The primary objectives of humanitarian livelihoods work are to support local economies and prevent protracted crises. CAFOD, Oxfam, Save the Children, and the International Rescue Committee are just a few of the humanitarian relief organizations that fund humanitarian livelihoods programs.

Cash transfers represent another essential type of humanitarian aid for individuals affected by drought disasters (Ball, 2023). This support entails directly providing funds to those impacted by drought disasters. Cash transfers empower recipients to purchase the items they need, enabling them to make choices and minimizing aid wastage, as each supported individual can acquire specific household-level necessities (Ball, 2023).

Cash transfers also stimulate the local economy, reduce the cost of shipping emergency response supplies for humanitarian agencies, safeguard local markets from external disruptions, and enhance community resilience to drought disasters (Wens *et al*., 2022). UNHCR, Oxfam, and Save the Children are some of the humanitarian aid agencies with a specialized focus on cash transfers. Education in emergencies is another vital form of humanitarian aid provided to populations affected by drought disasters. Drought disasters disrupt schooling and impact school-going children. Drought-related food shortages reduce school attendance, and some children may drop out of school, resulting in diminished educational outcomes (Waswa *et al*., 2015). Support for education in emergencies by humanitarian aid organizations, such as nutrition support and educational interventions, has proven effective in enhancing the dietary diversity of school children and caregivers' nutrition knowledge (Waswa *et al*., 2015). Given the significant impact of drought disaster crises on children, education in emergencies has become a crucial form of humanitarian aid in recent years (Ball, 2023). Save the Children and CARE International are some of the humanitarian aid agencies with a strong focus on education in emergencies.

Child nutrition programming is another critical form of humanitarian aid that helps prevent malnutrition in young children, particularly in areas affected by famine (Ball, 2023). Protracted drought-induced famines result in reduced food access and availability for most affected people. Climate change, as demonstrated by Tirado *et al*. (2015), diminishes the ability of vulnerable populations to cope with and adapt to its adverse impacts, hindering economic growth. The goal of humanitarian child nutrition programming is to reduce child malnutrition prevalence due to food insecurity. However, a recent study by Rustad *et al*. (2020) in Sub-Saharan Africa found limited evidence that food aid results in measurable child health gains for recipient populations.

Save the Children and UNICEF are some of the humanitarian aid agencies with a major focus on humanitarian child nutrition programming. Communities in need also benefit from healthcare provisions as part of humanitarian aid. In situations marked by drought, the incidence of drought-related diseases tends to rise. Some of these diseases are linked to diminished access to water and food, resulting in many individuals affected by drought disasters requiring assistance in obtaining healthcare services. In response to these needs, humanitarian aid organizations provide essential healthcare services (Ball, 2023). Prominent humanitarian aid agencies that specialize in healthcare services include Medical Corps, Relief International, Médecins Sans Frontières, and others. Communities requiring humanitarian assistance also benefit from protection measures.

In times of crises, specific groups, such as women, children, and individuals from sexual and racial minority backgrounds, often face heightened vulnerabilities (Ball, 2023). Humanitarian protection assistance is typically extended through initiatives like case management programs, facilitating referrals to pertinent organizations, and conducting awareness campaigns targeting at-risk community members. Prominent humanitarian aid agencies, such as Save the Children and Terre des Hommes, are at the forefront of delivering effective humanitarian protection assistance.

While humanitarian aid has been crucial in saving lives during drought situations, it has historically arrived late, well into the peak of a crisis (Venton, 2018). Moreover, a significant portion of international humanitarian aid is allocated toward emergency responses rather than long-term development-focused actions, which are critical for addressing the root causes of community vulnerability and enhancing community resilience to drought (Munene *et al*., 2022; Clarvis *et al*., 2015). There is an increasing recognition that responding to chronic and protracted drought crises with ongoing emergency aid is becoming increasingly costly and unsustainable (Urquhart, 2019). Simultaneously, the humanitarian system struggles to keep pace with the growing humanitarian needs in the face of rising disasters (Urquhart, 2019; Venton, 2018). Further, the current humanitarian aid predominantly emphasizes immediate, reactive, and unsustainable humanitarian response measures (Munene *et al*., 2022) and has yet to fully shift its focus toward prioritizing long-term community resilience-building initiatives (IPCC, 2022; Urquhart & Girling, 2022) to significantly contribute to the commitments outlined in the Sendai DRR Framework 2015-2030 and the SDGs.

It is increasingly recognized that investing in community resilience to manage drought shocks and stresses is critical for reducing the cost of humanitarian assistance in complex and protracted drought crises (Wens *et al*., 2022; Avdeenko & Flolich, 2019; Venton, 2018). However, despite this recognition, Avdeenko & Flolich (2019) asserts there is a key challenge for researchers and policymakers. There is an urgent need for evidence to support more timely and efficient aid allocation. Little is known about mitigating the consequences of natural disasters, especially the use of ex-ante strategic options that could be implemented and provide better outcomes in enhancing community resilience to drought. There is also, need to develop a better understanding on the coping and adaptation strategies and effective approaches that can increase community resilience to drought. Further, as more policy actors push for strategies for building resilience of individuals and communities to drought shocks and stresses, specific preparedness and resilience building activities need to be systematically tested (Avdeenko & Flolich, 2019).

2.2.6. Humanitarian Aid in Kitui County

For decades, governmental bodies and humanitarian relief organizations have actively intervened in Kitui County to address the challenges of drought and hunger (Munene *et al*., 2022). Munene *et al*. (2022) note that humanitarian aid agencies support initiatives such as seed distribution, fertilizer assistance, and mechanization in response to drought disasters. However, the success of these efforts has been hampered by issues like incorrect timing of supply delivery, corruption, beneficiary engagement, and project oversight.

According to Ndungu *et al*. (2021), many households actively counteract food insecurity during droughts through food aid. Several humanitarian relief organizations, including the World Food Programme (WFP), World Vision-Kenya, CAFOD, and the African Network for the Prevention and Protection of Child Abuse and Neglect (ANPPCAN), have taken proactive steps by funding drought response operations in Kitui County. Nevertheless, existing research emphasizes that the region remains susceptible to drought-induced hunger (Munene *et al*., 2022). This vulnerability persists because many of these organizations have primarily focused on providing emergency food assistance without addressing other essential needs. Consequently, while humanitarian aid interventions in Kitui County have been effective in saving lives, they have contributed minimally to building resilience as they failed to target the underlying causes of vulnerability ASALs (Njoka *et al*., 2016).

However, over the years, various organizations have been actively developing numerous drought resilience programs. These efforts have contributed to an enhanced capacity for communities to withstand drought. In Kitui County, the Sahelian Solutions Foundation (SASOL), a local non-governmental organization, has been actively collaborating with nearby communities to design and construct small-scale sand dams to increase the water-storage capacity of ephemeral rivers (Pauw *et al*., 2008). SASOL's primary aim was to enhance water accessibility and reduce travel distances to water sources across Kitui County.

In their case study of Kitui County, Pauw *et al*. (2008) found that by 2008, SASOL had successfully built a total of 500 sand dams in the region, effectively achieving their objectives. Sand dams, which are unassuming concrete structures constructed in seasonal riverbeds, play a vital role in improving water availability during dry seasons by retaining water from the rainy periods beneath a layer of sand. In Kitui County, a significant portion of the population relies on these temporary rivers for drinking water. During the dry seasons, river levels significantly decrease, leaving dry riverbeds as the only water sources. The construction of sand dams has alleviated drought-related concerns associated with Kitui County's severe water shortage in targeted areas. By building these dams, SASOL reduced the average distance to water sources from 2300 to 1700 meters, significantly reducing the time spent collecting water (Pauw *et al*., 2008).

As a result of these efforts, targeted families reduced their daily water-collection time by an average of 99.8 minutes and increased their daily water consumption from 194 to 668 litres. The availability of water has expanded, and the time spent fetching water has diminished duet to these sand dams. The social and economic landscape of Kitui County has improved significantly due to their presence. Targeted households have enhanced their crop yields through irrigated agriculture, diversified their sources of income by utilizing water for brick production, and improved home hygiene. Kitui County has achieved success in using sand dams to mitigate the impacts of drought and climate change (Pauw *et al*., 2008).

To ensure safe, affordable drinking water, it is imperative to invest in suitable infrastructure, provide sanitation facilities, promote hygiene practices, and protect and restore water-related ecosystems (UNDP, 2015). Farmers in Kitui County appreciate the government's active initiative to provide them with free seeds, fertilizer, and grants for basic farm mechanization, all of which contribute to self-sufficiency and the eradication of hunger in the area (Munene *et al*., 2022). However, timely delivery remains a critical factor in the success of these endeavors.

2.2.7 Measurement of Effectiveness of Humanitarian Aid

Humanitarian groups whose mission is to lessen suffering and strengthen communities frequently judge their success by the number of lives they save rather than the number of individuals they help. The gradual decrease in the need for external humanitarian aid is further evidence that communities are becoming more resilient and better able to absorb drought shocks (Scott, 2014). Governments can save money in the long run by investing in resilience measures like catastrophe preparedness (Suda, 2000). Boosting local investment is necessary for resilience building.

When tragedy strikes, the first responders are often local and national actors who have been in the area for some time prior to, during, and after the crisis. Because of this, local and national responders are in the finest position to comprehend the predicaments of the communities to which they are a part. They share common linguistic, cultural, and informational grounding.

To those in need, they are the only ones to turn to, and they are relied upon (IFRC, 2015). Resilient communities can only be realized through a global humanitarian system realignment and a healthy equilibrium between local and international actors. More direct access to funds, especially from international sources, and greater participation in decision-making and coordination by local actors are required (IFRC, 2015).

Humbleness and a dedication to bolstering local capability are essential while providing international help. Long-term collaboration between domestic and foreign players is essential. Therefore, they need to be in place before a crisis occurs and continue to function after recovery activities have ended. However, the political dimension of crisis response, the expansion of the humanitarian mandate, new types of actors, new ways of coordinating, novel responses, divergent interpretations of humanitarian principles, a shift toward more demand-driven approaches, and modifications to the sources and tools used for humanitarian financing are all likely to impact the humanitarian operating environment (Scott, 2014). As the landscape shifts, actors need a clear understanding of what factors are most important for the success of the humanitarian response so that they can create more effective policies, programs, tools, and partnerships; improve institutional configurations and incentives; and, most importantly, avoid doing any harm. As a result, humanitarian actors need to have a clear understanding of what aspects are crucial for the success of humanitarian effectiveness to build better policies, programs, instruments, and collaborations and to devise better institutional structures in such a dynamic environment.

Effectiveness in humanitarian systems is measured by the capacity to offer adequate guidance on how to handle protection issues, such as addressing the difficulties of the contracting humanitarian space and escalating unfavourable trends in the protection of civilians, especially vulnerable groups like women, children, and people with disabilities (Scott, 2014). The effectiveness of the humanitarian aid system is significantly impacted by these difficulties, which are exacerbated by access restrictions, security threats to humanitarian workers, and the perception of growing risk aversion among major humanitarian actors (Scott, 2014). Effective humanitarian response also depends on major humanitarian actors and affected populations agreeing on what effective means and using that agreement to hold one another to account. Better results may be expected from humanitarian programs if they were planned with room for reflection on both their triumphs and failures.

Humanitarian investments in terms of resources, time, and skills should be more effective and efficient if everyone involved has a common view of what constitutes humanitarian efficacy. However, there is a rising number of actors providing humanitarian aid in a variety of ways, each with good intentions but maybe lacking a common set of ideals. A common understanding of what constitutes humanitarian effectiveness and the use of this knowledge to enhance the delivery of humanitarian assistance is difficult to achieve because what motivates different actors ultimately depends on what they regard as effective. This includes state agencies, civil society organizations, multilateral agencies, the private sector, military actors, concerned citizens, neighbours, and people affected by crises.

According to Wens, *et al*. (2022), analyses of future agricultural drought impacts require a multidisciplinary approach in which both human and environmental dynamics are studied.

2.2.8 Drought: What is it?

The effects of drought are widespread and complicated (Wilhite, 2011). Unfortunately, there is no one accepted definition of drought that can be used across all industries (Hill *et al*., 2014). Drought is defined in a variety of ways, each of which reflects the meteorological and economic specifics of a given location or industry. While most sources agree that drought occurs when water supplies drop below average (Mishra & Singh, 2010; Wilhite, 2011; Hill *et al*., 2014), Van Loon & Laala (2015) describe drought as an interruption of the typical seasonal pattern.

According to the literature, droughts are long-lasting natural disasters that wreak havoc on water supplies and agricultural communities (Borona *et al*., 2021; Wilhite & Vanyarkho, 2000). There is disagreement among scientists and policymakers on the criteria for declaring the end of drought (Wilhite & Glantz, 1989) because of the slow onset characteristics of drought, which is why it is often referred to as a 'creeping phenomenon' whose effects accumulate slowly over extensive period. More people are impacted by drought than any other natural hazard because of its widespread and persistent character (Zarafshani *et al*., 2016). In this context, drought refers to a lack of precipitation throughout the course of an entire growing season, which leads to lost crops and a general drying out of the landscape.

2.2.9 Types of Droughts

Droughts can be broken down into four groups based on their causes: weather, water, crops, and people (Borona *et al*., 2021). This classification is based on the different ways that water scarcity affects people's ability to go about their daily lives (Hasan *et al.*, 2019; Wilhite, 2011). To begin, a meteorological drought is characterized by much lower levels of precipitation than would normally be expected given the local climate and the length of time since the last significant rainfall event (Zarafshani *et al*., 2016). Because what constitutes typical precipitation in one area may be different in another, the occurrence of this form of drought varies from place to place. Second, a lack of water in the hydrological system is what we mean when we talk about hydrological drought, which shows up as abnormally low stream flow in rivers, lakes, reservoirs, and groundwater.

This form of drought is typically associated with meteorological droughts but may be aggravated by human activities and is impacted by changes in climate and terrestrial features (geology, land use) (Van Loon, 2015). Thirdly, agricultural drought is characterized by low soil moisture levels, which inhibits plant growth (Sharafi *et al*., 2016). Focusing on precipitation shortages, variations between actual and potential evapotranspiration, soil-water deficits, and decreased groundwater levels, agricultural drought connects numerous elements of meteorological drought to agricultural implications. Droughts in the environment can be meteorological, hydrological, or agricultural, and are characterized by low precipitation, groundwater, or soil moisture levels (Hasan *et al*., 2019).

When people start to feel the effects of a water shortage and demand for economic commodities exceeds supply, we have a socioeconomic drought. This is distinct from meteorological, hydrological, and agricultural droughts in that its occurrence is dependent on the processes of supply and demand for economic goods like water, hydroelectric power, food, and pasture (Zarafshani *et al*., 2016).

2.2.10 Impact of droughts in Kenya

Drought is one of the costliest natural disasters that affects nearly every region of the world as a normal element of the climate system (Hasan *et al*., 2019; Balint *et al*., 2013), and it affects more people than any other natural hazard on the planet (Quandt, 2021). Droughts have become more recurrent, intense, and common in recent years (Ayugi *et al*., 2020). The effects of drought vary from place to place, depending on factors such as vulnerability (a country's ability to prevent, prepare for, respond to, and recover from drought) (Quandt, 2021).

Wilhite & Vanyarkho *et al*. (2000) found that drought has a significant negative impact on the economy, society, and environment. The length of a drought or the magnitude of a shortfall in streamflow are two measures of the hydrological drought event's severity that can be used to gauge its effects (Van Loon, 2015). Drought has become a serious issue in Africa over the past few decades, leading to losses in assets, deterioration of the natural environment, increased unemployment and poverty, and even forced migrations (Ayugi *et al*., 2022; Shiferaw *et al*., 2014). Droughts that last for an extended period of time have far-reaching consequences for people's standard of living in Kenya, particularly in the country's arid and semi-arid regions (ASARs),

where they have been linked to a decline in crop quality and quantity, a decline in forest productivity, and a deterioration of aquatic life and infrastructure services (Borona *et al*., 2021; Njogu, 2022).

The Republic of Kenya (2015 b) states that drought is a major obstacle to achieving Kenya Vision 2030. Over the course of its known history, Kenya has experienced all four classes of drought. For example, from 2008-2011, Kenya experienced a meteorological drought characterized by below-average precipitation duration and intensities at different times; an agricultural drought characterized by insufficient soil moisture to meet the needs of various crops in the country; a hydrological drought characterized by deficiencies in the availability of surface and groundwater supplies over extended periods of time; and a socio-economic drought characterized by physical water shortages affecting the health, well-being, and economic activity of the population. Total damages and losses during this time period were assessed at US$ 12.1 billion due to the effects of the drought, which reduced GDP by an average of 2.8% annually (Republic of Kenya, 2015 b).

More than 80% of Kenya's land mass is comprised of ASALs; these ASALs provide sustenance for 36% (15 million) of Kenya's total human population, who depend on nearly 75% of the country's livestock and crop production (Ndung'u *et al*., 2021). The absence of safe housing, sustainable means of subsistence, and adequate sanitation that already plagues many communities is exacerbated by repeated droughts (IPCC, 2022; Avdeenko & Flolich, 2019).

Decreased agricultural productivity, cattle hunger, mortality, and relocation, a shortage of water in rivers, human hunger, disease, and violent conflict were all cited as perceived effects of drought in a recent study by Quandt (2021) in Burat and Kinna, Isiolo County, Kenya. Human migration, economic commerce, food production and distribution, and other factors, according to Shiferaw *et al*. (2014), can cause drought impacts to spread far beyond the geographic area of the actual drought. Reduced agricultural production, high levels of food insecurity, increased environmental degradation, and overall household vulnerability, as well as impacts on the overall economy and society as a whole, are just some of the problems that people whose livelihoods depend heavily on natural resources, like smallholder farmers, face during droughts.

Climate change-induced drought has significantly impacted Kitui County, Kenya. The region, classified as one of Kenya's ASAL, faces erratic precipitation patterns due to its hot and arid climate (Borona *et al*., 2021). This climatic challenge leads to reduced agricultural productivity and heightened food insecurity (Mwangi *et al*., 2020; Khisa *et al*., 2017). As Munene *et al*. (2022) reported, recurrent drought disrupts food availability, compelling households to purchase essential commodities, depleting their already limited financial resources. A significant proportion of Kitui County's households rely on food production systems vulnerable to drought and water scarcity issues (Ndung'u *et al*., 2021; Nyandiko *et al*., 2015). To address this pressing issue, it is imperative to enhance community resilience in the face of climate change-induced drought shocks and stresses (IGAD, 2013).

Recent research underscores the necessity of bolstering the county's adaptive, absorptive, and transformative capacities to better cope with the impact of climate change (Ndung'u *et al*., 2021; Khisa, 2017; Mutunga *et al*., 2018).

2.3. Community Resilience to Drought

2.3.1 The Concept of Community Resilience to Drought

In in past years, disaster response professionals, policy makers, and academics have increasingly embraced the concept of community resilience to drought in discussions on DRR, climate change, and development policies (Twigg, 2015; Lisa *et al*., 2015). Patel *et al*. (2017) conducted a literature review that identified nine key components of community resilience, which encompass local knowledge, community networks and relationships, communication, health, governance and leadership, resources, economic investment, preparedness, and mental outlook. Instead of seeking to define and study community resilience as a distinct concept, Patel *et al*. (2017) recommend concentrating on these individual attributes.

The concept of disaster resilience has received both praise and criticism in the international humanitarian and development policy discourse. According to Béné *et al*. (2012), the concept has not significantly contributed to humanitarian or development aid. While resilience is acknowledged for its role in encouraging an integrated approach across sectors, Béné *et al*. (2012) argue that it does not suffice as a pro-poor notion, and that efforts to reduce poverty cannot be replaced by increasing resilience alone.

Concerns have been raised that the concept of disaster resilience has been depoliticized (Walker *et al*., 2010), shifting the responsibility for reducing disaster vulnerability from state actors (Norris *et al*., 2008) to individuals and communities. Some experts argue that bottom-up disaster resilience building will place an additional burden on women and girls (Ganapati, 2013). It has also been argued that the language around catastrophe preparedness has the potential to stigmatize those who are not very resilient.

Nyamwenza (2012) argues that there is a significant gap between the perspectives on resilience and adaptive capacity in DRR, climate change, and socio-ecological perspectives, and the resilience and adaptive capacity perspective of people's livelihoods. Resilient and adaptive livelihoods are seen as crucial to the success of DRR and climate change adaptation. Some have pointed out that not all theories of resilience are scientifically derived, and empirical tests of theories are often lacking. Although resilience is typically perceived as a process, several different explanations for it, along with their empirical tests, are detailed in the section.

To corroborate the fundamental processes of resilience proposed by these ideas, more research is needed using longitudinal data to follow the same individuals over time as they cope with stress (Meadows *et al*., 2015). The difficulty in quantifying resilience has been argued by other authors (Patel *et al*., 2017). However, there are several existing measures that have the potential to evaluate community resilience by employing features that are frequently recommended as crucial for a resilient community (Frankenberger *et al*., 2013; Kwasinski *et al*., 2016; UNDP *et al*., 2013b).

Twig (2015) argues that local communities play a crucial role in effective risk management. Through the use of community-based disaster risk reduction (CB-DRR) and management practices, communities are better equipped to address local issues, meet local demands, and improve their own technical and organizational preparedness.

2.3.2 Dimensions of Community Resilience to Drought

The World Bank's (2015) framework identifies three pivotal components that contribute to community resilience: exposure, sensitivity, and coping capacity. According to the World Bank (2015), as a community's resilience strengthens, its exposure, sensitivity, and coping capacity with regards to events like drought and other shocks also experience enhancement. Consequently, these three interconnected factors jointly determine the level of resilience within a community. It's important to note that poverty plays a significant role in shaping a community's ability to adapt to changing circumstances. For example, droughts can lead to temporary periods of impoverishment among populations (World Bank, 2015). These dimensions served as the foundational framework guiding the assessment of objective two, which was to determine the level of community resilience to drought in Kitui County, Kenya.

2.3.3 Characteristics of Drought Resilience Communities

The International Federation of the Red Cross (IFRC, 2012) identifies six critical characteristics of a resilient community which include: Knowledgeable and healthy which is comprised of the ability to assess, manage and monitor risk; organised, the

capacity to identify problems, establish priorities and act; connectedness, having relationships with external actors who provide them with wider supportive environment and supply of goods and services when they are needed; has infrastructure and services that include strong housing, transport, power, water and sanitation as well as the ability to maintain, repair and renovate them; has economic opportunities, the diverse range of employment opportunities, income and financial services as well as being flexible, resourceful and has the capacity to accept uncertainty and respond proactively to change; and finally, it can manage its natural assets by recognizing their value and having the ability to protect, enhance and maintain them (IFRC, 2014).

These traits acknowledge the significance of human health and well-being, the role of individual knowledge and awareness in households' ability to prepare for, prevent, respond to, and recover from shocks and stresses stemming from a drought disaster, and the value of assets and access to wider resources beyond the control of the local community. On the other hand, local knowledge, community networks and relationships, communication, health, governance and leadership, resources, economic investment, readiness, and mental health are just some of the nine fundamental characteristics of a resilience community identified by Patel *et al.*, (2017). Governance, risk assessment, knowledge and education, risk management, vulnerability reduction, and catastrophe preparedness are essential components of resilience, as outlined by Twigg (2009).

The purpose of objective two of this study is to measure the level of community resilience to drought in Kitui County by utilizing the three important characteristics of resilience as described by the World Bank (2015): exposure, sensitivity, and coping ability and ten characteristics adopted from the work of the IFRC (2012), Patel *et al*., (2017), and Twigg (2007) that include: Knowledge and education; health; organized with established governance and leadership structures; connectedness - established community networks and relationships; good infrastructure and access to essential services; economic investments and opportunities; communication are all factors that will be used to gauge the level of community resilience in Kitui County. These characteristics are also reflected in the community resilience frameworks by (Frankenberger *et al*., 2013; Kwasinski *et al*., 2016; UNDP, 2013).

2.3.4 Kitui County andDrought Resilience Characteristics

2.3.4.1 The level of exposure and Sensitivity to Drought Risks

Rising in frequency and intensity, droughts have become a global concern, particularly in Africa (Epistein *et al*., 2020). Stemming from diminished natural water availability due to insufficient rainfall, these droughts extend far beyond their immediate occurrence, resulting in enduring land degradation (Wilhite, 2003) and a cascade of consequences such as asset depletion, environmental degradation, impoverishment, unemployment, starvation, and forced migrations in Sub-Saharan Africa (Hellmuth *et al*., 2007; Kogo *et al*., 2021). The impact on agricultural output, affecting both crops and cattle, is profound, with rural African families, heavily dependent on agriculture for sustenance and income, facing devastation during prolonged droughts (Ayanlade *et* al., 2018; Ayugi *et al*., 2022).

Despite efforts to enhance community resilience to drought, these endeavours may prove ineffective in the face of persistent drought conditions (Hellmuth *et al*., 2007). The Horn of Africa, for instance, has witnessed consistently inadequate rainfall, ranging from 50-75% below normal for decades, hindering agricultural and pasture growth and jeopardizing livelihood security (Nicholson, 2014). Sub-Saharan Africa often grapples with drought as a primary natural factor contributing to starvation and famine (Shiferaw *et al*., 2014), as evident in continuous drought occurrences over the years (Wens *et al*., 2022; Nhamo *et al*., 2019). Notably, the 2011-2012 drought triggered a significant refugee crisis in East Africa, while Southern Africa endured a two-year El Niño-induced drought between 2014 and 2016, leading to emergency declarations in multiple countries and endangering around 38 million people (Epistein *et al*., 2020).

In Kenya, where 80% of the land is classified as ASAL, droughts have become more frequent, prolonged, and severe (Lolemtum *et al*., 2017; Nicholson, 2014). Recurring droughts in ASALs have given rise to chronic food insecurity and reliance on humanitarian aid (Huho & Mugalavai, 2010; Asena *et al*., 2017). Up to 75% of Kenyans depend on agricultural production for their daily food requirements, a production severely hindered by recent drought (Huho & Mugalavai, 2010; Wens *et al*., 2022). Kitui County faces a significant threat from drought, primarily due to limited and erratic rainfall, influenced by its ASAL characteristics (Khisa, 2017; Ndung'u *et al*., 2021). Severe climate fluctuations greatly impact the County's agricultural output and food security (Nyandiko *et al*., 2015; Mutunga *et al*., 2018).

With a substantial portion of the population relying on fragile means of livelihood, the County is highly susceptible to the impacts of drought, especially considering the prevalence of rain-fed small-scale farming, which is exceptionally vulnerable to climate change and environmental deterioration (Oremo, 2013; Wens *et al*., 2021)

2.3.4.2 Coping capacities to drought conditions

Developing coping capacities is crucial for communities to enhance resilience against drought-related risks, aiding in risk reduction (Khisa, 2017). In Kitui County, a study by Oremo (2013) found that a significant proportion of respondents in Kaveta and Mikuyuni villages had adopted diverse adaptation strategies in response to declining rainfall and unpredictable rain patterns, including shifting to livestock husbandry, cultivating drought-tolerant crops, early planting, soil conservation, reduced livestock keeping, altered planting schedules, income diversification, water harvesting, and land-use adjustments.

Asena *et al*. (2017) highlight that suboptimal farming practices and equipment are hindering optimal agricultural outcomes. In Kitui West, Lower Yatta, and Matinyani, Makau *et al*. (2014) discovered that 43.3% of farmers still used traditional tools, with merely 11.3% using greenhouses, and even those didn't derive financial benefits from this technology. Furthermore, Kitui County faces challenges in accessing clean drinking water, with 55.5% of households lacking upgraded water sources (KNBS, 2019). In 2018, 57.6% of residents had to walk at least 30 minutes to fetch water for their homes.

The cumulative impacts of climate change and population growth have led to escalating food insecurity, environmental degradation, and poverty in the County (Population Action International, 2015). Kitui County's integrated development action plan for 2018-2022 identifies drought emergencies, food and water shortages, and infrastructure deficiencies as its primary challenges. These issues underscore the need for effective coping strategies and adaptive measures to mitigate the consequences of drought in the County.

2.3.4.3. Top of Form

Poverty Levels

Kitui County experiences high poverty levels. According to KNBS (2019), nearly 47.5% of the county's population lives in poverty. This is notably higher than the national poverty rate in 2016, which stood at 36.1%. Agriculture serves as a vital industry within the county, contributing significantly to employment, sustenance, and income for rural inhabitants. Within Kitui County, 39.4% of the population faces food insecurity, while 12.8% live in extreme poverty (KNBS, 2019). Furthermore, a substantial 87.3% of the income for rural residents originates from agriculture (County Government of Kitui, 2018). The county primarily engages in crop cultivation, livestock rearing, fisheries, and aquaculture (Republic of Kenya, 2019). Common food crops include cassava, sweet potatoes, arrowroots, cotton, sisal, sunflowers, mangoes, pawpaws, watermelons, citrus fruits, bananas, cabbages, tomatoes, kales, onions, sugarcane, and bullet chilies.

These crops form a significant portion of the county's food and income supply (Republic of Kenya, 2019). Nevertheless, the region faces challenges due to insufficient and unpredictable rainfall, posing constraints on agricultural production systems (Nyandiko *et al*., 2015). Approximately 49% of children fall under the classification of absolute poverty and vulnerability. In contrast, the national average stands at 33.7%. In Kenya, if a family falls below the absolute poverty threshold, all its children are considered poor (KNBS, 2018). Such children may include those heading their own households, those enduring extreme poverty, those under the care of grandparents, or orphans.

2.3.4.4 Drought Resilience characteristics

What indicators of drought resilience does Kitui County exhibit? The following sections describe various aspects that characterize drought resilience communities. Resilient communities are characterized by their capacity to perform risk analysis and engage in catastrophe preparation in the face of drought (UNISDR, 2009). To effectively anticipate, respond to, and recover from imminent or ongoing hazard events and conditions, it is crucial for governments, professional response and recovery organizations, communities, and individuals to foster disaster preparedness (UNISDR, 2009). Quick and effective disaster response is a vital aspect of community resilience (Patel *et al*., 2017; Twigg, 2009). Some scholars argue that the technical definition of resilience lies in the degree of disaster preparedness (Béné *et al*., 2012; IPCC, 2012).

Community resilience to hazards encompasses both ex-ante and ex-post drought response strategies aimed at helping people cope with and mitigate disaster impacts (Cutter *et al*., 2008). Some of the ex-ante drought response strategies include risk assessments, early warning information systems, land use planning, community education, water infrastructure, risk reduction financing, collaboration, and cooperation among others. Some of the ex-post strategies include drought contingency planning, water conservation and efficiency measures, water storage management, rangeland management, economic financial preparedness, education awareness, legislation and regulations research and innovation among others.

Drought, often labelled one of the most intricate and least comprehended natural hazards due to its far-reaching consequences (Wilhite *et al*., 2014), is a recurring climatic occurrence across the globe, characterized by its gradual onset and unpredictable durations (Wilhite *et al*., 2000). The recurrent nature of droughts inflicts catastrophic repercussions on economies, societies, and ecosystems (Suda, 2000). Unlike other natural calamities, droughts predominantly yield non-structural and dispersed effects, as noted by Wilhite (2003). The challenge in drought-prone regions lies in accurately assessing the severity, hindered by the non-structural nature of these impacts. To mitigate the risks associated with drought, governments and vulnerable communities can establish and execute drought preparedness and mitigation strategies (Wilhite *et al*., 2014). Such efforts can enhance the resilience of drought-prone communities against future drought hazards (Donald *et al*., 2000).

Drought risk in a region results from its exposure to the natural hazard and susceptibility to extended water scarcity (Wilhite, 2003). This risk encompasses potential losses in life, health, income, property, and services for drought-prone communities in the future (UNISDR, 2009). Assessing drought risk aims to comprehend the drought hazard and its impact on vulnerability (Twigg, 2007). By scrutinizing their exposure to drought risk, countries and communities gain insights into the hazard's nature and influencing factors, enabling more effective DRM.

In drought-prone regions, both national and local governments can shift their focus from the traditional crisis management approach towards long-term planning. This transition involves developing drought policies and preparedness plans with a strong emphasis on DRM, as crisis management diminishes community resilience by fostering reliance on external aid (Wilhite *et al*., 2014). However, Kenya's disaster preparedness to drought disasters has traditionally prioritized crisis response over prevention (Suda, 2000). Kitui County follows the national trend (Development Initiative, 2017). National Drought Management Authority (NDMA), established in 2011, guides drought preparedness and response in ASALs.

Strong government, parliament, and development partner support further reinforces NDMA's mission. The NDMA Act of 2016 solidifies NDMA's role, which encompasses crafting national drought policy, coordinating responses, EWS, and aligning drought management with international processes. NDMA's stability marks a vital milestone in enhancing institutional capacity at state, and county levels.

National coordination is facilitated by the Kenya Food Security Meeting (KFSM) and the Kenya Food Security Steering Group (KFSSG), mirrored at the county level by County Steering Groups. NDMA's involvement has improved Kenya's drought readiness at both national and subnational levels, leading to standardized DRM objectives across all counties (Development Initiative, 2017).

Consequently, ASAL counties have developed more systematic DRM approaches compared to non-ASAL counties. Kitui County is under risk of drought year-round, which threatens residents' crops, livelihoods, and food supplies (Wens *et al*., 2021). Humanitarian aid efforts in Kitui County in the wake of a drought are very successful at preventing further loss of life, but they are not intended to address the ASALs' underlying vulnerability. No disaster preparedness strategy has been established by the county. The resilience-building capacities of communities hit by drought are weakened since no catastrophe plan has been implemented, which endangers both present and future generations. Long-term, integrated, and multisectoral approach that incorporates recovery response strategies into existing development programs (Suda, 2000) and long-term financing mechanism are necessary for effective resilience building initiatives that facilitates shifting of the focus from emergency relief and short-term drought response measures. To ensure the long-term success of drought preparedness programs, community involvement in the creation of the programs is critical. For these plans to be effectively implemented, stable, long-term funding must be made available for the associated programs (Suda, 2000).

The participation of drought-prone populations in disaster preparation, however, is not sufficient in a resource-constrained economy. To improve the efficiency of drought management, it is necessary to pursue a strategy that emphasizes the formation of new partnerships between government agencies, I/NGOs, the drought-prone communities, and the private sector. Effective drought planning and response by drought-prone communities can be improved with the help of a comprehensive disaster management policy and a supportive legislative framework.

Without long-term means for funding drought preparedness initiatives in drought-prone areas, it may be impossible to achieve effectiveness and increase community resilience (Avdeenko & Flolich, 2019; Suda, 2000). Effective communication during times of crisis is another hallmark of a resilient community. Enhancing community resilience to drought disasters requires clear and consistent communication (Patel *et al.*, 2017). Norris *et al*., (2008:140). For a group to function effectively, its members must be able to effectively communicate their needs, opinions, and other perspectives. The creation of suitable communication infrastructure that might be exploited prior to and following a disaster is crucial to ensuring effective communication. Information from a variety of reliable and well-known sources could be shared to help spread urgent announcements in the event of a drought emergency. Before, during, and after a disaster, accurate sharing of information about the risks is essential. The public needs to understand these messages and take them into account in light of the existing vulnerabilities. The ability to communicate during disasters improves cooperation between humanitarian aid actors involved in the response.

Enhancing community resilience to drought hinges on a high degree of education and information. Awareness of vulnerabilities equips a community to effectively confront drought crises (Suda, 2000; UNPD, 2013). This entails bolstering the community's factual disaster knowledge and readiness measures, encompassing mitigation, response, and recovery (Patel *et al*., 2017). A community's belief in its capacity to overcome disasters links directly to collective efficacy and empowerment, essential for local knowledge (Patel *et al*., 2017).

To foster resilience, Feng *et al*. (2018) suggests that informal education for community resilience must transcend mere disaster self-sufficiency, emphasizing the need to enrich people's lives and strengthen communities while Wilhite (2003) asserts establishing comprehensive integrated drought information system is crucial in bolstering drought resilience. The governance and leadership systems within a community play a pivotal role in enhancing its resilience to drought. Verner (2012), Twigg (2007), and Patel *et al*. (2017) all emphasize the significance of having a stable leadership and governance structure for the success of drought management and the development of community resilience.

This is because governance and leadership structures provide the necessary guidance to assess drought risks and formulate effective strategies to mitigate these risks (Suda, 2000), thus minimizing their impact on the lives and livelihoods of individuals in drought-prone regions.

According to Patel *et al*. (2017), governance and leadership also shape how communities respond to disasters by facilitating the dissemination of disaster information and through effective coordination response efforts, ensuring the effectiveness, efficiency, and competence of a community's infrastructure and services essential for swift response. Community resilience is bolstered when community members actively participate in disaster preparedness, response, and recovery phases of the disaster. Consequently, the involvement of community leaders, who possess first-hand knowledge and experience of the drought affected areas, is indispensable.

Connectedness, a key indicator of a resilient community, emphasizes the importance of local connections and assets in disaster recovery and addressing external shocks (Cheshire *et al*., 2015). Social capital is a fundamental element of a thriving community (Norris *et al*., 2008; Carmen *et al*., 2022; Aldrich, 2012),. Resilient communities also rely on external actors for a supportive environment and access to essential goods and services during times of crisis (IFRC, 2015). Adger (2010) stresses that a society's adaptability to climate change is closely linked to collective action and calls for responsibility among individuals, communities, institutions, and governments in making adaptation decisions. Social acceptability, institutional constraints, and the broader economic and social context affect adaptation effectiveness (Frankenberger, *et a*l., 2013). Interdependence among agents, institutions, and resources is crucial for adaptation (Kwasinski *et al*., 2016).

Aldrich (2012) emphasizes strong social networks as vital for resilient communities, aiding post-disaster recovery for individuals connected to influential groups beyond their locality. The coBRA framework considers households' capacity to adapt, harness their knowledge and networks in response to challenges or opportunities, focusing on variables like food, income, water, and education (UNDP, 2013). Although certain scholars have highlighted connectivity as a crucial element in natural and social systems and facilitates post-disruption recovery, Clarvis *et al*., (2015) observes that, it can also enable rapid spread of issues, impacting the entire system. Resilient communities prioritize well-maintained infrastructure and easy access to life-sustaining services (Frankenberger *et al*., 2013).

Maintenance, repair, and renovation of critical infrastructure and essential services, including water, sanitation, transportation, energy, housing, and irrigation, are vital for human well-being and modern society's efficiency (van der Merwe *et al*., 2018; Kioli & Ngare, 2019; Kwasinski *et al*., 2016). Resilience in a community is also characterized by easy access to healthcare services (Frankenberger *et al*., 2013; Kwasinski, *et al*., 2016). Patel *et al*. (2017) emphasize the significance of pre-disaster community health and the availability of post-disaster healthcare services. When individuals proactively address their health risks, they enhance drought disaster preparedness and mitigate health-related repercussions. Drought events disrupt healthcare systems, leading to issues like low water levels, power shortages, and inadequate electricity access in small-scale healthcare facilities. Verner (2012) highlights that investing in training and capacity building at healthcare facilities can greatly contribute to drought community resilience.

Prolonged droughts are associated with mental health problems such as post-traumatic stress disorder, anxiety, and depression, as indicated by Patel *et al*. (2017). The documented impact of drought on human health (Stanke *et al*., 2015) is primarily attributed to an increase in water and food-related illnesses (Epstein *et al*., 2020). Hence, a well-developed healthcare infrastructure is crucial to mitigate health issues resulting from drought.

2.3.5 Social, Economic and Environmental Factors that Affect Building of Community Resilience to Drought

Zeng (2003) conducted research highlighting Sub-Saharan Africa's increased vulnerability to weather shifts, with drought as a significant contributor to issues like malnutrition and hunger. Various factors influence the severity and recovery speed from drought-related consequences. Shiferaw *et al*. (2014) emphasized that drought exerts a substantial impact on Sub-Saharan Africa's economy, society, and environment, jeopardizing the region's economic and development achievements. Recurrent droughts, intensified by climatic variability, strain businesses and societies in affected countries, disrupting social, infrastructure, environmental, and productive systems.Climatic vulnerability is particularly challenging for countries relying heavily on climate-sensitive industries like agriculture and fishing, with low income, high poverty, and limited capacity (Verner, 2012). Resilient communities manage natural resources effectively, while natural environment degradation contributes to frequent droughts, especially in ASALs (Suda, 2000).

Unsustainable production and consumption practices, like depleting renewable resources without adequate replacement, further contribute to environmental deterioration (Kioli & Ngare, 2019) and impacts on long-term prosperity (IFRC, 2015). Poverty, environmental degradation, and susceptibility to drought crises interact, with natural resource depletion exacerbated by poverty, high population, and extensive resource use (Suda, 2000). Further, unsustainable land and water use trends emerge due to population growth and urban development (Population Action International, 2015).

Efforts to combat deforestation, like afforestation programs prompt unsustainable land and water utilization (Population Action International, 2015). Recurrent droughts trigger factors affecting perennial plant mortality, including grazing management and ecosystem resilience (Vetter, 2009). Therefore, effective natural resource management practices are essential for enhancing community resilience to drought and fostering wealth creation and poverty reduction (Vetter, 2009). Ecosystem resilience, livelihood diversification, resource availability, and institutional support impact a community's ability to weather drought (Vetter, 2009). Maintaining forest cover preserves natural and cultural value.

Effective natural resource management practices are crucial for wealth creation, job creation, and poverty reduction. Social, economic, and environmental variables make communities more vulnerable to drought, leading to repeated, complex shocks affecting families, livelihoods, and migration (Republic of Kenya, 2012).

Drought burdens national finances and foreign aid efforts (World Bank, 2011), undermining safety net efforts (Wisner *et al*., 2003). Kitui County faces social, economic, and ecological challenges as an ASAL County (Khisa, 2017), with minimal rainfall and recurring droughts (Nyandiko *et al*., 2015). Heavy reliance on rainwater, especially in agriculture, makes the County highly susceptible to drought (World Bank, 2011). Recurrent drought weakens local resilience and hampers aid agency attempts to improve it, leading to poverty, food insecurity, and environmental deterioration (Oremo, 2013).

Even with increased humanitarian aid, the County remains vulnerable to climate change (Njoka *et al*., 2016). Drought decreases water supplies, exacerbating hunger, livestock and wildlife deaths, malnutrition, and health issues (Republic of Kenya, 2019). This leads to rural-to-urban migration, high unemployment, and poverty, burdening national finances and foreign aid (County Government of Kitui, 2014). Growing population, reduced food production, and low climate change resilience stress resources and increase food insecurity and poverty (Population Action International, 2015). Sustainable agriculture, like cash crop cultivation, offers economic and food security benefits (Mwaniki *et al*., 2017).

Frequent drought shocks result in acute food shortages, malnutrition, and reliance on humanitarian food relief (County Government of Kitui, 2014). Kitui County Climate Information Services Plan identifies climate-related vulnerabilities, including temperature increases, water shortages, erratic rainfall, crop failures, and resource conflicts (County Government, 2018).

Limited surface water sources and high evaporation rates affect water availability, and gender inequality and lack of localized early warning information challenge drought readiness (Republic of Kenya, 2015). Consequences of drought disasters include food insecurity, decreased agricultural production, and environmental degradation, straining households and recovery efforts (ARC, 2014). In conclusion, drought prone communities faces numerous social, economic, and environmental challenges due to recurrent droughts, exacerbated by poverty, environmental degradation, and limited resource access. Effective natural resource management and sustainable agriculture are crucial for enhancing community resilience to drought.

2.4 Strategies for Enhancing Community Resilience to Drought in Kitui County

2.4.1 Best Strategic Options for Enhancing Community Resilience to Drought

Strengthening the resilience of local communities to drought is crucial for reducing drought risks, alleviating poverty, and advancing sustainable development (Munene *et al*., 2022; Shiferaw *et al*. 2014). Reducing drought disaster risks and poverty are interconnected and essential for promoting sustainable development (Hallegatte *et al*., 2017). Drought disaster impacts are experienced in two phases: before and after the event (Hansen *et al*., 2010; Shiferaw *et al*., 2014). Ex ante strategic options aim to reduce vulnerability to drought by diversifying and adapting decision-making approaches, while ex post strategic options seek to mitigate negative outcomes after a drought event (Shiferaw *et al*., 2014). Various factors, including land use patterns, water use, population, societal behavior, technology, policy, economic development, cultural composition, and environmental characteristics, contribute to a community's

susceptibility to drought risk (Mizrak & Cam, 2022). Enhancing community resilience to drought involves implementing a wide range of strategic options, despite the challenge of completely eliminating drought risks in a changing climate (Khisa, 2017). Development-oriented strategies play a critical role in disaster management by promoting sustainable livelihoods and their preservation during drought disasters (Béné *et al*., 2012; Frankenberger *et al*., 2013). These strategies also reduce households' exposure and vulnerability to drought risks, making their assets more resilient and enhancing their adaptive capacities (Béné *et al*., 2012; Frankenberger *et al*., 2013).

Strategic options for enhancing community resilience include climate adaptation strategies to promote sustainable resource use, adoption of drought-tolerant crop varieties, drought-tolerant livestock breeds, fodder conservation, soil and water conservation, conservation agriculture, and water harvesting techniques (MoALFC, 2010). Ex post drought coping strategies that are effective in reducing the negative effects of drought include public services in water supply, healthcare, education, insurance, pensions, credit, and cash transfer programs (Shiferaw *et al*., 2014; Hellmuth *et al*., 2009). Boosting remittances and social protection, especially for the poor, improves resilience and well-being, as does reducing overall poverty (Hallegatte *et al*., 2017). Microfinance investment reduces risk exposure, alleviates poverty, enhances the agency of marginalized groups, and strengthens the overall capacity of affected populations (Gatto & Sadik-Zada, 2022).

Investment in these measures fosters economic and social inclusion, serving both adaptation and development goals (Hansen *et al*., 2010). Conversely, insufficient investment in social protection and safety nets increases the vulnerability of people living in drought-prone areas (Shiferaw *et al*., 2014). Integrated technological, institutional, and policy options can reduce drought risk factors and increase livelihood resilience (Shiferaw *et al*., 2014).

Drought, as a long-term development challenge, requires a multi-sectoral and multi-dimensional response (Ayugi *et al*., 2020; UNDP, 2013). Strategies to reduce drought risks and enhance community resilience need to encompass technological, institutional, and policy options (Shiferaw *et al*., 2014; (Frankenberger *et al*., 2013). Communities employing integrated approaches to reduce drought exposure and vulnerability are better equipped to withstand drought events (Hellmuth *et al*., 2007).

Market insurance, as suggested by Hallegatte *et al*. (2017) and Shiferaw *et al*. (2014), offers protection against catastrophic asset losses. Private sector organizations in Kenya, including insurers and banks, have been assisting farmers in mitigating drought risks. These efforts, combined with collaboration between the insurance and banking sectors and the local communication and information sector, help farmers address weather-related issues effectively. Good agricultural practices and weather-based index insurance promote resilience and economic inclusion (Hallegatte *et al*., 2017; ARC, 2014). Diversifying income sources is a viable strategy to help vulnerable households withstand drought shocks (Hallegatte, 2017).

Government transfers, remittances, and non-drought-sensitive income sources can mitigate the adverse effects of natural disasters on individuals and families (Hallegatte *et al*., 2017). Enhanced financial services, including credit facilities and insurance, provide poor individuals with options to reduce the impact of drought and secure their future (Gatto & Sadik-Zada, 2022; Mavhura, 2017). Private sector businesses in rural areas also play a significant role in enhancing resilience by contributing to economic and social development (Steiner and Atterton, 2014). The ability of a community to cope with and recover from drought reflects its level of development and socioeconomic progress (Verner, 2012).

Although access to financial instruments in drought-affected communities is crucial for long-term development, humanitarian aid system often pays little attention to them. However, Cochrane & Cater (2017) cautions that diversification strategies need to be carefully considered to avoid maladaptive outcomes, and social protection measures are crucial for reducing vulnerability. Kenya's national policy for disaster management highlights the importance of DRR actions (Republic of Kenya, 2017). The National Climate Change Response Strategy and Action Plan recognize the significance of climate change impacts and aim to make the country less vulnerable to climate-related effects (Republic of Kenya, 2012). Various climate change adaptation (CCA) strategies are available, both short-term and long-term, to promote sustainability (Ongeko *et al*., 2017). These strategies include agricultural technologies, natural resource management, and drought-tolerant crop varieties (Béné *et al*., 2012; Frankenberger *et al*., 2012).

Diversifying crops with better drought tolerance is a common tactic for dealing with water scarcity (Shiferaw *et al*., 2014). Enhanced crop varieties developed by research organizations have significantly improved drought tolerance in Africa (Shiferaw *et al*., 2014). Market insurance and collaborative efforts with private sector organizations help mitigate drought risks and increase resilience (Hallegatte *et al*., 2017).

NGOs in Kenya are engaged in various activities related to climate change adaptation, including rural livelihood improvement, group-based risk management, water and soil management, and early warning systems (CREADIS, GROOTs Kenya, CIFA, KFSN). Access to accurate climate information is essential for informed policy-making at the local level (Verner, 2012). Reliable data on temperature, precipitation, water quality, and river flows is crucial for predicting water availability and preparing for drought (Wilhite *et al*., 2014). EWS and monitoring information are essential for planning and implementing ex ante strategies and safety nets (Shiferaw *et al*., 2014; Arielle *et al*., 2018). 'Green' projects that focus on soil and tree preservation contribute to community resilience (Kuriakose *et al*., 2012; Frankenberger *et al*., 2013).

Cooperation is crucial for vulnerable individuals living in poverty and enhances social capital, which increases resilience at multiple levels (Adger, 2010; Aldrich, 2012). Strong social networks and partnerships are essential for effective disaster preparation and response (Adger, 2010).

2.4.2 Methodologies for ranking the strategies for Improving Community Resilience to drought

In the context of addressing new and unforeseen risks, climate change adaptation disciplines have introduced resilience measurement approaches (Quinlan *et al*., 2016). The field of economics has also witnessed advancements in resilience metrics, incorporating inclusive wealth measures as indicators of sustainability (Pearson *et al*., 2013). Resilience measurements may need to integrate various metrics, drawing inspiration from the modelling of complex systems (Quinlan *et al*., 2016). Resilience measurements have gained ground in social sciences and related fields, integrating insights from these disciplines to mitigate people's vulnerability to and the impact of natural disasters (USAID, 2020).

It is widely accepted that assets, income-generating activities, public services, and safety nets, measured over at least a 5-year period, play a critical role in ensuring food security and resilience. Cross-scale temporal dynamics become apparent when measuring resilience over time relative to a baseline due to changes in livelihood and environmental variables (Quinlan *et al*., 2016). To effectively measure resilience in social-ecological systems, local stakeholders, practitioners, and knowledge-holders must collaborate to establish resilience indicators. Furthermore, resilience metrics extend beyond the business sector, offering tools for progress tracking, leadership guidance, and reporting. These measures can streamline key system properties, evaluate the efficacy of interventions, facilitate comparisons across different locations over time and geography, and guide strategy development across various scales (Quinlan *et al*., 2016). In our investigation on enhancing community resilience, we

carefully selected indicators of exposure, sensitivity, and adaptive capacity. To assess increased community resilience to drought, we utilized Equal Weight Analysis to assign relative importance to these indicators.

2.4.3 Challenges for Enhancing Community Resilience to Drought

The adoption of adequate strategic policy alternatives to increase community resilience to drought faces a variety of obstacles. Climate change is a big obstacle because of its unpredictability and variability, which can severely limit options and stunt their growth (Shiferaw *et al*., 2014; Hellmuth *et al*., 2009). Several drought mitigation measures have been implemented in Kenya over the past few decades (IGAD, 2013), but the vast majority of these have been ad hoc, uncoordinated, and short-term response measures characterized by reactive tendencies, primarily in the form of emergency relief services to the drought-affected communities (ARC, 2014).

One of the main issues facing resilience building activities has been ensuring that they are not offering sustainable solutions to ongoing drought crises (Munene *et al*., 2022; Suda, 2000), despite the fact that these measures are aiding in lessening drought disaster. However, a significant portion of international humanitarian aid goes toward emergency responses rather than long-term development focused actions, which are essential for tackling the root causes of community vulnerability, strengthening local capacity to withstand and recover from drought, and promoting sustainable growth (Clarvis *et al*., 2015). One of Kenya's long-standing development issues has been the lack of national and county-level disaster preparedness programs (Suda, 2000).

Strategic policy choices for bolstering community resilience to drought require not just sufficient flexible finance alternatives (Clarvis *et al*., 2015), but also a flexible and holistic risk management strategy (Hallegatte *et al*., 2017). Organizations that provide humanitarian relief are unwilling to provide adequate and flexible funding for such initiatives at the present time. The humanitarian aid system has a long history of favoring policies with reactive tendencies over those that promote long-term solutions (ARC, 2014).

Additionally, while increasing the availability of financial tools for communities affected by drought is a long-term development initiative that the current humanitarian aid has been reluctant to pay close attention to (Clarvis *et al*., 2015), doing so would make it simpler for communities and households in drought-prone areas to absorb, cope with, and recover from damages caused by drought (Mavhura, 2017). Lack of institutional and legal competence, issues of affordability, and high transaction costs, especially for the poor, impede initiatives to provide universal access to insurance. Kenya has been working to adapt to climate change and take use of its benefits since 2012, when the country's National Climate Change Action Plan was drafted. Despite the 2010 National Climate Change Response Strategy (NCCRS) (Republic of Kenya, 2010) recognizing the importance of climate change implications for Kenya's development, the country has made little progress in addressing these issues. DRR initiatives have been supported by a number of aid organizations, but their funding is insufficient, making it impossible for them to have a significant impact on reducing drought risk, especially in a context where drought occurrence has

become widespread and severe, and has become a part of the climate system (Development Initiative, 2017). However, promoting social capital can reinforce sexist attitudes and lead to conflict between women and the government, which is counterproductive in making communities more drought-resistant (Ganapati, 2013).

2.4.4 Drought Mitigation Measures

Addressing the challenges of enhancing community resilience to drought necessitates multifaceted mitigation efforts. Integrating disaster planning and early recovery strategies into ongoing development initiatives is fundamental for sustainability and drought resilience (Suda, 2000). Additionally, bolstering adaptability to drought conditions can be achieved through personalized extension services, improved early warning systems (EWS), ex-ante financial assistance, and low-interest loan programs (Wens *et al*., 2021). While humanitarian interventions have been effective in saving lives during drought emergencies, they often fall short in building long-term resilience. These efforts fail to address the fundamental vulnerabilities in ASALs (IGAD, 2013).

To enhance community resilience and address these underlying vulnerabilities, humanitarian aid need to support programs aimed at safeguarding livelihoods in ASAL regions (Blaike *et al*., 1994) by allocating sufficient funding for DRR initiatives to substantially reduce drought risk (Development Initiative, 2017). Improving the impact of EWS and drought preparedness requires integration of information on food production and the supply chain with weather and water data, to facilitate better tracking of climate-related impacts on agriculture and livestock

(Verner, 2012; Suda, 2000). Additionally, coordination between the local and national governments in development and implementation of drought strategies and coordination among key stakeholders in enhancing local capacties for community resilience. Moreover, sustainable funding aligned with local capacity-building and drought management needs is essential for the successful execution of DRR programmes.

2.5 Frameworks and Models on Community Resilience Building to Drought

As the idea of community resilience evolves, the need for effective assessment methods and tools becomes increasingly significant. Multiple models have been developed to streamline the connection between hazards and resilience factors. This study examines three theoretical community resilience models.

2.5.1 Community Resilience: Conceptual Framework and Measurement Feed the Future Learning Agenda

Frankenberger *et al*. (2013) illuminates the interplay between community vulnerability and resilience. Drawing on DRR principles and incorporating Béné *et al*.'s (2012) absorptive, adaptive, and transformative capacities, the framework depicts resilience as an ongoing process rather than a fixed attribute. In times of drought shocks and stresses, communities can follow either a resilience pathway or a vulnerability pathway. Vulnerability pathways are followed by those lacking collective action capacity, while resilient communities possess adequate access to food, water, safety, income sources, healthcare, education, and socioeconomic advancement.

However, the framework's applicability in complex emergencies and communities with intricate dynamics under changing conditions is uncertain. Critics argue that its generality and complexity make implementation challenging, overlooking community intricacies, social disparities, and evolving dynamics. Its suitability for addressing drought disasters remains questionable. In sum, while offering valuable insights into humanitarian aid and drought resilience, the framework faces difficulties in addressing complex emergencies and diverse community dynamics. Frankenberger *et al*. (2013) community resilience conceptual framework and measurement is presented in Table 2.1. It describes the characteristics of a resilient community.

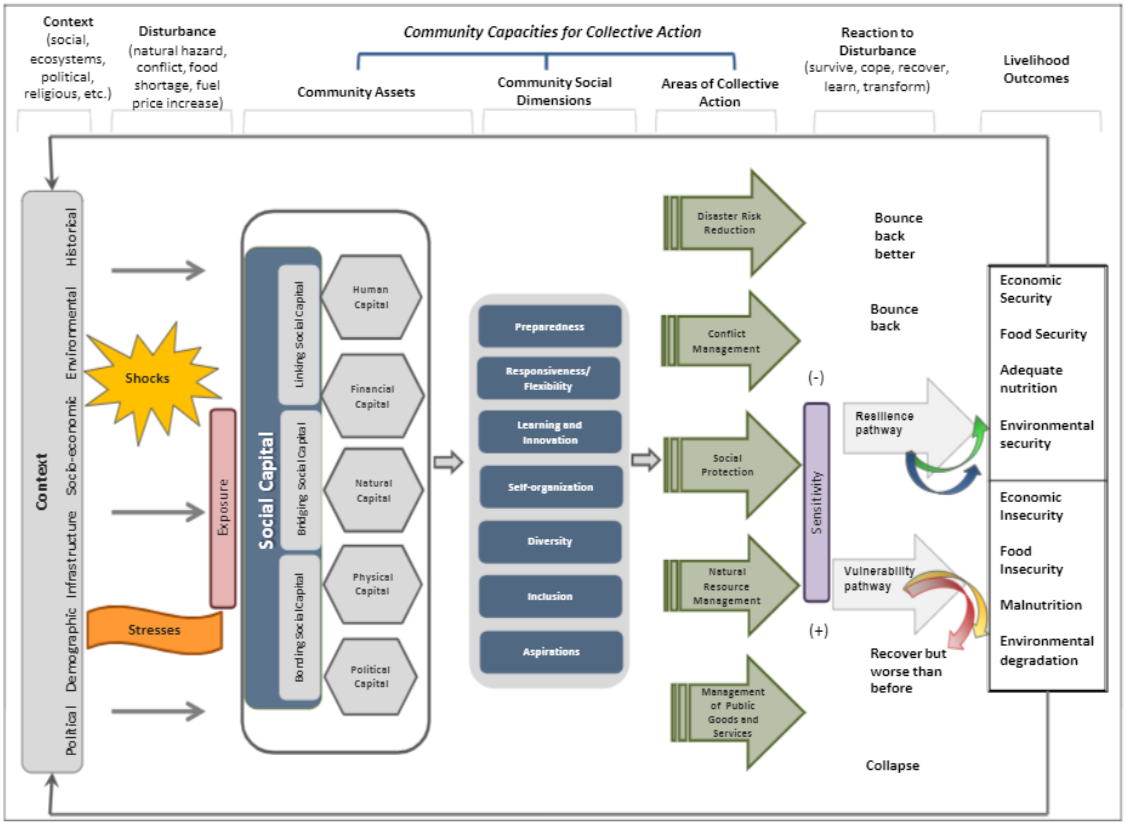


Figure 2. 1: Conceptual Framework for Community Resilience

Source: Frankenberger *et al*. (2013).

This study drew from Frankenberger *et al*.'s (2013) resilience framework, adopting key dependent variables such as water access, income sources, healthcare, education, and socio-economic engagement as vital markers for resilient communities in mitigating drought impacts. It also drew key independent variables such as environmental, economic, social, historical and demographic. It also considered adaptive, absorbptive, and transformative capacities, along with natural resource preservation.

Table 2. 1 Community Resilience: Conceptual Framework and Measurement Elements of Community Resilience Framework

Elements of Community Resilience Framework
Context: Environmental, political, socio-economic, historical, demographic, religious, conflict, policy conditions that affect & are affected by community resilience
Disturbance: Rapid or slow onset drought shocks or longer- term stresses (e.g., environmental degradation, price increases).
Community Capacities for Collective Action: Building resilience requires an integrated approach and a long-term commitment to improving three critical capacities: absorptive capacity, adaptive capacity, and transformative capacity. The capacity for collective action are evident in the processes of: DRR, social protection, natural resource management, management and maintenance of public goods and services (e.g., schools, health clinics, roads). ***Community Assets:*** These enable communities to meet their basic needs. Livelihood security depends on six capitals: financial, physical, political, human, social, and natural. Certain assets are interdependent on others. Livelihood, Landscapes, soils, new skills and abilities, and new markets can be developed. ***Community Social Dimensions:*** A resilient community can manage community-based assets in an equitable and sustainable way by having capacities on preparedness, responsiveness, connectivity, learning and innovation, self-organization, diversity, inclusion, social cohesion, and aspirations. ***Areas of Collective Action:*** these include efficient and equitable use of community assets and optimization of community social dimensions. The areas of collective action include DRR, conflict management, social protection, natural resource management, and the management of public goods (roads, community water pumps, and community latrines) and services.
Resilience and Vulnerability Pathways: Communities that combine their assets, social dimensions, and collective actions to manage the shocks and reduce their vulnerability are less sensitive and are on a resilience pathway while those with limited capacity to engage in collective action to manage shocks or stresses are sensitive and may follow a vulnerability pathway.
Livelihood Outcomes: Resilient communities are able to meet their food security needs; ensure access to adequate nutrition; protected environment; have income security and health security; educate their children; and participate in broader socioeconomic processes that affect the lives of their members. Vulnerable communities experience deficits or a high risk of deficits in these aspects.

Source: Frankenberger *et al*. (2013).

2.5.1 Community Based Resilience Assessment Framework

The CoBRA framework assesses DRR intervention impact on community resilience during droughts. It quantifies short and long-term improvements, compares resilience across communities, and highlights intervention effects in challenging conditions. CoBRA recognizes resilience as a multi-dimensional, long-term concept and emphasizes understanding the initial status before improving it. It acknowledges that capabilities, beyond wealth, are pivotal in resilience-building. The framework considers households' capacity to adapt, harness their knowledge and networks in response to challenges or opportunities, focusing on variables like food, income, water, and education.

However, implementing this framework faces challenges in identifying and collecting resilience indicators while maintaining research quality within resource limitations. CoBRA is built on the premise that community resilience evolves due to various factors over time, including policies, external assistance, contextual changes, and family autonomy. A community's success in resilience-building depends on its ability to recover or improve following a crisis, while communities facing deterioration are considered less resilient. The model is a valuable tool for enhancing community resilience to drought by providing a structured approach for assessment and interventions in vulnerable areas as depicted in Figure 2.2. From this conceptual framework, indicators for dependent variables on community resilience to drought that include access to food, income, water and education were borrowed while on independent variables the study borrowed variables such as humanitarian aid (external assistance) and policies.

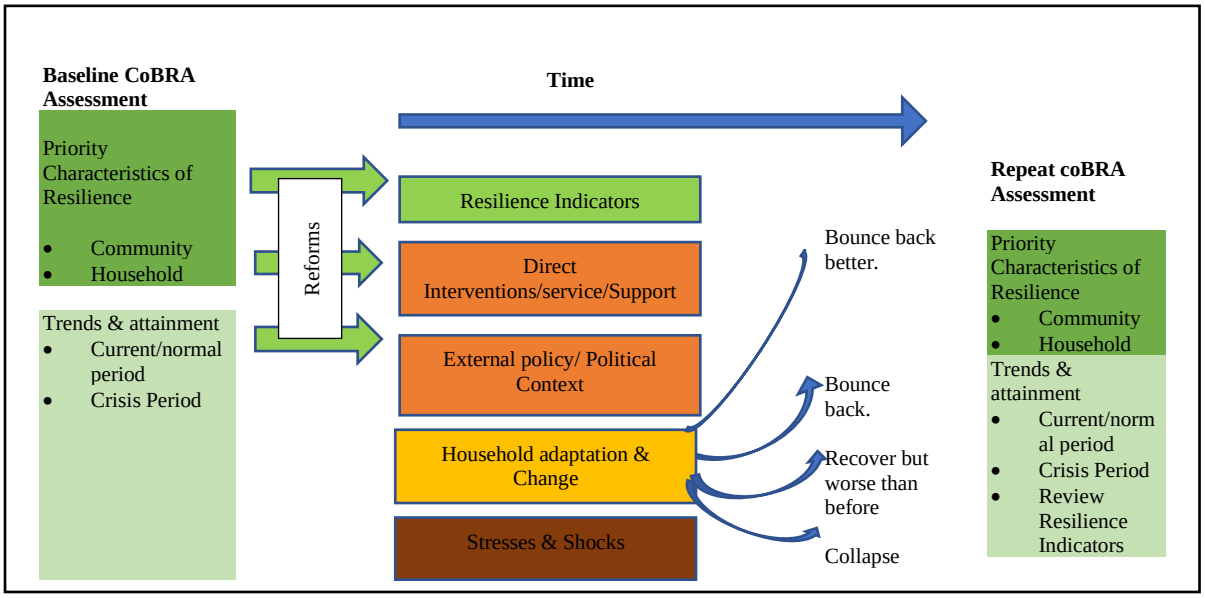


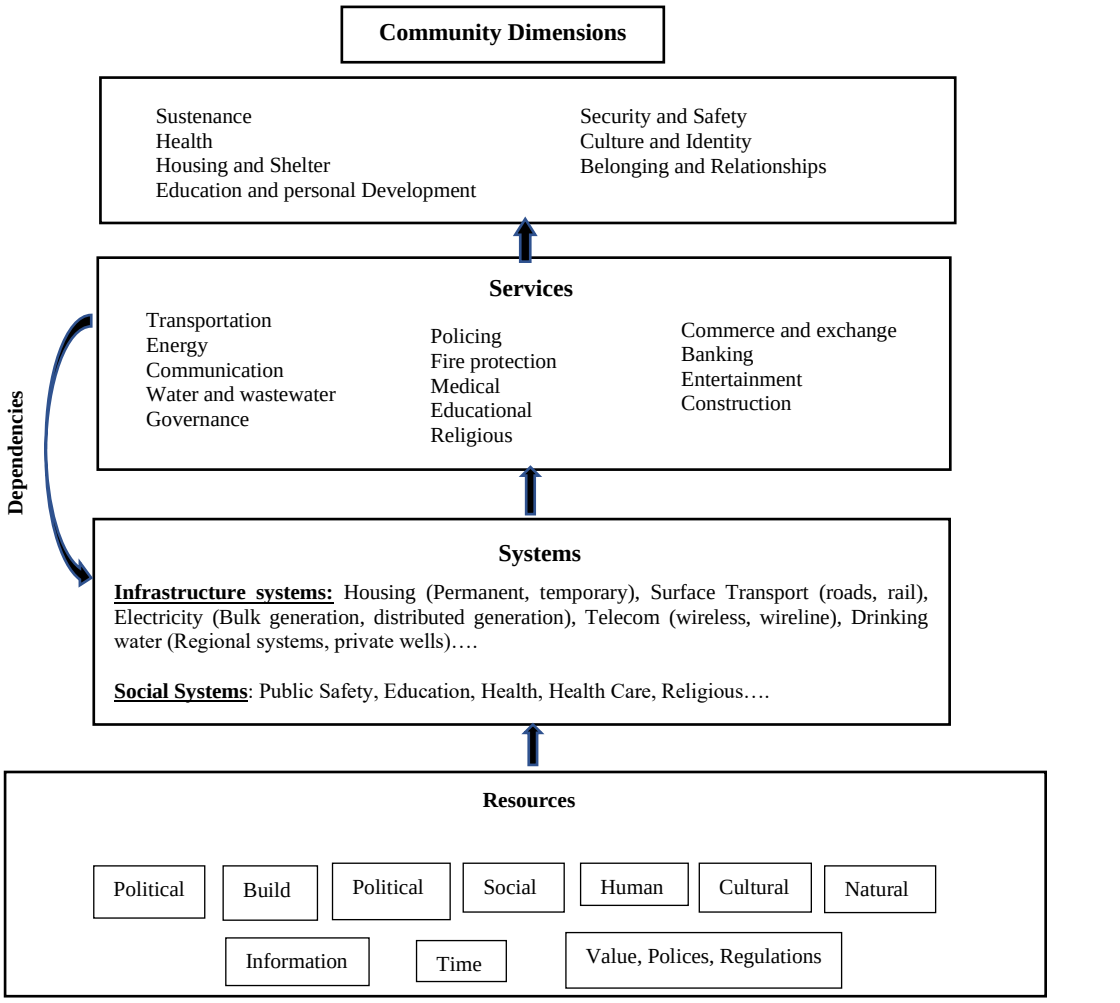
Figure 2. 3 Revised CoBRA Model

Source: UNDP

2.5.2 Conceptual Framework for Assessing Resilience at Community Level

Kwasinski *et al.*'s (2016) community resilience framework draws on infrastructure management principles and prioritizes understanding a community's unique history, natural setting, culture, and sub-groups. The framework encompasses critical variables like sustenance, health, housing, security, education, and culture, acknowledging the role of services such as communication, transportation, healthcare, and education in enhancing resilience. It classifies elements shaping community resilience into two categories: infrastructural and social systems, emphasizing their interconnectedness. The framework highlights the need to consider how these systems interrelate and impact individual and community compoments on resilience.

Nevertheless, the framework has some limitations, including overlooking community diversity, such as family structures, cultural norms, and motivations. Additionally, community boundaries can extend beyond geographical or legal boundaries, influenced by external factors. Defining dependencies can evolve over time, making assessment intricate and time-consuming. Despite its limitations, this model provides a robust foundation for assessing community resilience to drought, emphasizing the importance of community-specific attributes and system interdependencies. It underscores the significance of adopting a holistic approach to resilience assessment.



Community Dimensions are those broad purposes or desires of the community.

Services are those provisions of specific activities, supplies or goods that support community dimensions.

Infrastructure Systems are specific combinations of resources and human actions organised to deliver services primarily through the built environment and the cybernetic sub-systems. Infrastructure systems comprise three primary domains as infrastructure systems, human, physical and cybernetic.
Social systems are specific combinations of resources and human actions organised to deliver services primarily through human interaction. Social systems Social systems are formed by the same three primary domains as infrastructure systems, but with an emphasis on the human domain over the physical and cybernetic domains.
Resources are inputs to systems that are used, and in some instances consumed, in order to deliver services.
Dependencies are the reliance of infrastructure or social systems on services provided by other infrastructure or social systems. The services may be be provided by permanent or temporary systems.

Figure 2.4: Kwasinski *et al.*'s (2016) Conceptual Framework on Resilience

(Adopted from Kwasinski *et al.*, 2016)

2.5.3 The Conceptual Framework of Community Resilience Building

Drawing from Frankenberger *et al*. (2013), Kwasinski *et al*. (2016), and UNDP (2013), this study developed a model to understand the factors impacting community resilience to drought. Key independent variables included humanitarian aid, financial support, cash transfers, food aid, environmental, social, historical, and demographic factors. Dependent variables for community resilience encompassed food and economic security, public goods management, natural resource stewardship, infrastructure and social systems, and engagement in disaster DRR. Intervening variables encompassed ties to county and national drought management policies, NGO policies, geographical locations, and political strategies, as well as exposure and sensitivity to drought conditions. Figure 2.4 illustrates the research framework. This model offers valuable insights for policymakers and organizations seeking to enhance community resilience to drought.

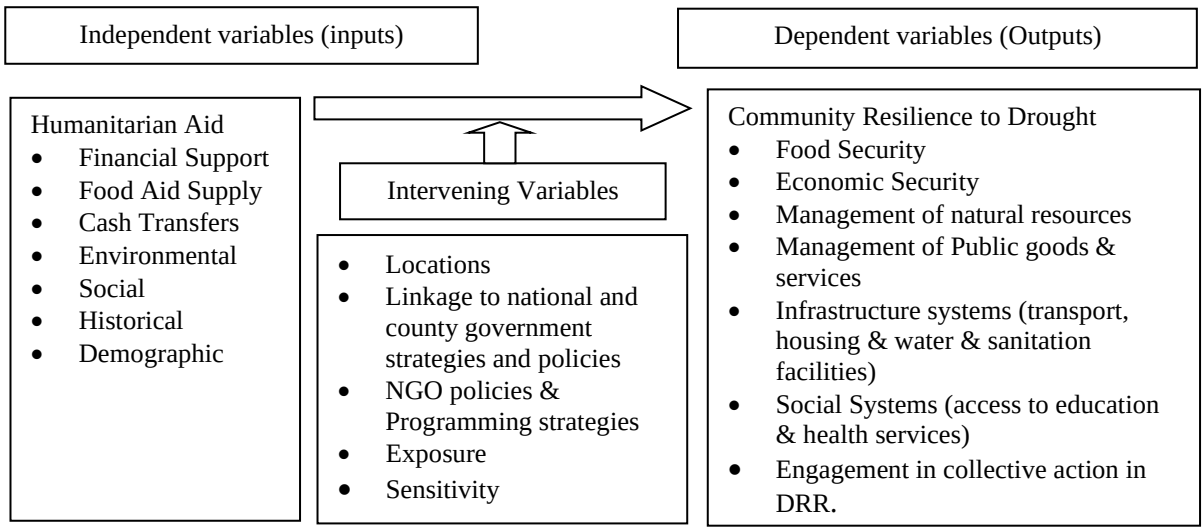


Figure 2. 5: Conceptual Research Framework on Community Resilience Building

Source: Author 2022 - Modified from Frankenberger *et al*. (2013), UNDP, (2013) and Kwasinski *et al*. (2016)

2.6. Knowledge Gap from Reviewed Literature

Avdeenko & Flolich (2019) stress the need for additional evidence to improve the efficient allocation of humanitarian aid, particularly in the context of drought disasters, which are pivotal for building community resilience to drought. However, research on pre-emptive and recovery measures to mitigate drought risks remains in its nascent stages, presenting a significant challenge for researchers and policymakers (Avdeenko & Flolich, 2019). Avdeenko & Flolich (2019) also highlight the scarcity of information concerning ex-ante strategies for reducing the impact of natural disasters.

With climate change and natural disasters on the rise, existing coping mechanisms prove insufficient, leaving communities more vulnerable. This underscores the urgency of research to inform policies on planned adaptation and coping with a changing environment, as demonstrated in studies by Mwangi *et al*. (2020), Ndungu *et al*. (2021), and Wens *et al*. (2020). The overarching objective is to identify the most effective strategies for enhancing community resilience against the adverse effects of drought shocks and stresses. Wens *et al*. (2020) emphasize the need to investigate future adaptation decisions within evolving policy frameworks to guide policies on future drought risk. Mwangi *et al*. (2020) highlight the vulnerability of Kitui County's communities due to the increasing frequency and severity of extreme weather events, rendering current coping mechanisms inadequate. Consequently, there is an urgent demand for data to inform strategies for assisting the people of Kitui County in adapting to and mitigating the detrimental effects of climate change (Ndungu *et al*., 2021).

CHAPTER THREE
RESEARCH METHODOLOGY

3.1 Introduction

This chapter describes the study area in terms of its location, physical and topographical characteristics, climatic conditions, sources of subsistence, demographic characteristics, and administrative units. In addition, it describes the research's design, methodology, sampling strategy, data acquisition, and analysis methods. Other aspects of the study, including the dependability and validity of the research instruments, limitations and restrictions, and ethical considerations, are also discussed.

3.2 Study Area

The research area is located between Latitude $1^0$10’ and $3^0$0’ South and longitudes $37^0$50’ and $39^0$00’’ East as shown in Figure 3.1 which depicts the location of Kitui County on the Kenyan map and the location of the study Sub-Counties of Mwingi North and Mwingi West within the Map of Kitui County. Kitui County is one of Kenya's 47 counties, located approximately 170 kilometers east of Nairobi. It is the sixth largest county in the country, with a total area of 30,496.4 km2, 6,369 km2 of which are occupied by Tsavo East National Park. It has a lower population density than the national average, which is 82 people per km2. It is bordered by Tana River to the east and southeast, Taita-Taveta to the south, Makueni and Machakos to the west, Embu to the northwest, and Tharaka-Nithi and Meru to the north and Embu to the northwest. The county's elevation ranges from 400 to 1800 meters above sea level.

The meaning of the name Kitui is a place where ironsmiths settled in the county long before the colonial period (Kitui County government, 2018). Kitui County is designated as an ASAL county (MoALFC, 2021; Kitui County Government, 2018; Njoka *et al*., 2016). Due to its semiarid climate, the county is one of Kenya's most drought-prone regions. The average annual precipitation range is between 400 and 1000 millimetres, with an annual average of 750 millimetres.

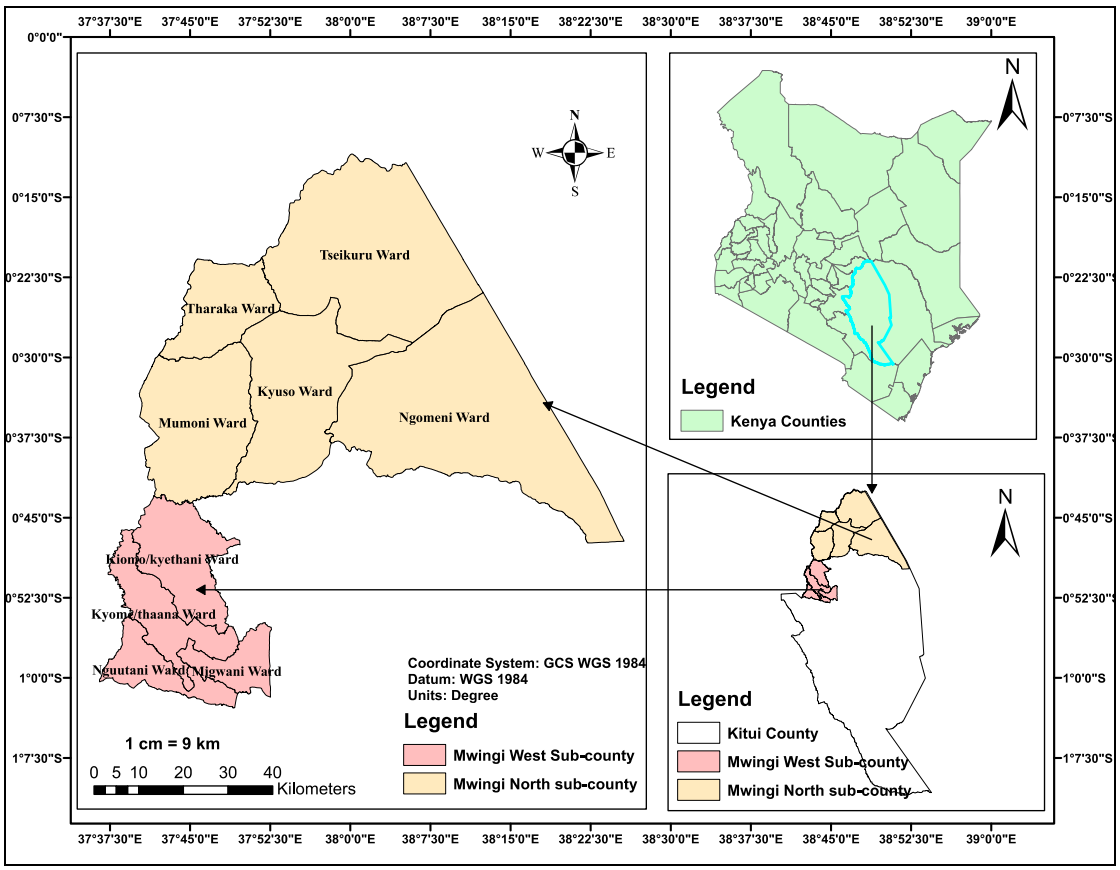


Figure 3. 1 The Map Showing the Location of Kitui County, Kenya

Source: Author, 2022

Kitui County's eastern part receives less than 500 mm of annual precipitation, with unpredictable rainfall during the long season (March to May) and more reliability in the short season (October to December). The brief rainy period is crucial for farmers, contributing 60% to the county's crop production, while the long season contributes 40%. Kitui's average annual temperature ranges from 21 to 31 degrees Celsius, with the western region approximately 10°C colder than the eastern part. The county is divided into eight sub-counties: Mwingi Central, Mwingi North, Mwingi West, Kitui South, Kitui East, Kitui Rural, Kitui West, and Kitui Central (County Government of Kitui, 2018). This study exclusively cantered on Kitui County within the context of Kenya. The 47 counties of Kenya were stratified into two distinct categories: arid and semi-arid (ASALs), and non-arid counties, as delineated in Table 3.1. Kitui County was then purposively selected from the category of ASALs counties.

Table 3. 1: Classification of Counties according to the extent of Aridity

Category	County	No
Arid & Semi-Arid Counties	Embu, Kilifi, Kwale, Laikipia, Lamu, Makueni, Meru, Narok, Nyeri, Taita Taveta, Tharaka Nithi, Kitui, Kajiado, West Pokot, Isiolo, Garissa, Mandera, Wajir, Baringo, Marsabit, Samburu, Tana River, Turkana	23
Non-Arid Counties	Bomet, Bugoma, Busia, Elgeyo Marakwet, Homa Bay, Kakamega, Kericho, Kiambu, Kirinyaga, Kisii, Kisumu, Migori, Mombasa, Muranga, Nairobi, Nakuru, Nandi, Nyamira, Nyandarua, Siaya, Trans Nzoia, Machakos, Uasin Gishu, Vihiga	24

Source: Njoka, *et al*. (2016)

In Kitui County, the study focused on Mwingi North and Mwingi West Sub-Counties, purposively chosen due to their heightened vulnerability to drought (Mwangi *et al*., 2020; Cassim & Juma, 2018). Mwangi *et al*. (2020) revealed varying vulnerability patterns across Kitui County, with the western and central areas exhibiting lower vulnerability compared to the eastern and northern regions. The County Government of Kitui (2018) and Cassim & Juma (2018) emphasized the County's susceptibility to drought due to frequent occurrences of drought and low rainfall.

Situated in Kenya's ASAL region, Kitui County grapples with notably high poverty rates. With an expected absolute poverty rate of 47.5%, surpassing the national average of 36.1% in 2016 (KNBS, 2019). The county houses approximately 522,000 people, constituting 3.2% of Kenya's impoverished population. Food insecurity is anticipated to reach 39.4%, exceeding the national average of 32.5%. The County faces challenges in water accessibility, with half of the residents lacking modern water systems, and 57.6% of families reporting a daily trek of thirty minutes or more to fetch water (County Government of Kitui, 2018).

3.2.1 Physical and Topographic Features

Kitui County, with its low-lying and semiarid terrain, experiences unpredictable precipitation patterns. Elevations vary from 400 to 1800 meters above sea level, creating steep ridges and expansive low-lying areas in the central part. Notable high points include Kitui Central, Mutitu Hills, Yatta Plateau, Migwani, Mumoni, and Mui.

These regions, like Yatta Plateau, boast higher productivity due to increased rainfall compared to lowlands such as Nguni, Kyuso, and Tseikuru. The landscape showcases craggy uplands and plains, with the Yatta Plateau standing out as the primary geographical feature in the western part of the county. This plateau, situated between the Rivers Athi and Tiva, exhibits regularly spaced, wide, shallow troughs, defining the distinctive topography of Kitui County (County Government of Kitui, 2018).

3.2.2 Climatic Conditions

Kitui County, as per the County Government of Kitui (2018), faces an ASAL climate marked by unpredictable rainfall patterns. Notably, Migwani, Mumoni, Kitui Central, Mui, Mutitu Hills, and the Yatta plateau receive more rain compared to the lowlands of Nguni, Kyuso, and Tseikuru. This discrepancy poses a heightened risk of frequent droughts, exacerbated by the influence of global warming on extreme weather events (MoALFC, 2021; Cassim & Juma, 2018). Most of the county falls within the ASAL climate zone (Kitui CIDP, 2018), characterized by persistent hot and dry conditions. The warmest months—September, October, January, and February—see temperatures ranging from 26°C to 34°C. Conversely, July records the lowest average temperatures at 14 degrees Celsius, while September reaches the highest at 34 degrees Celsius. Mean annual potential evaporation ranges from 1800 to 2000 mm in central and northwestern regions, increasing to 2200 to 2400 mm in the eastern and northeastern areas. Kitui County experiences two distinct wet periods annually. March through May witnesses prolonged, yet erratic, showers, while October to December brings more consistent, brief rains.

Remarkably, the duration of the rainy season does not correlate with the success of long-term or brief rains. Long rains exhibit reliability at a 40% rate, while brief rains have a 66% success rate. The remainder of the year remains dry, contributing to the County's erratic annual precipitation, as reported by the County Government of Kitui (2018). Strategies such as cultivating early maturing crop varieties can leverage the relative climate stability during the brief rains season (October–December) (MoALFC, 2021).

3.2.3 Agroecological Zones

Kitui County, Kenya, boasts diverse natural features, including forests, rivers, hills, rocks, and wildlife. The county is divided into nine Agroecological Zones, with UM3 as the smallest and UM3-4 as the transitional marginal coffee zone in Migwani and Kitui Central, both falling under semi-arid farming. UM4 is dedicated to sunflowers and maize (or pigeon peas), while the cotton growing region, LM3, is tiny and situated mainly on steep inclines, with forest reserves dominating most slopes. LM4 serves as a fringe area for cotton cultivation. In contrast, LM6 and IL6 are ranching zones where rain-fed agriculture is impractical. The LM5 livestock-millet zone is suitable for animal husbandry and millet cultivation, benefiting from IL5. Despite population pressure, semi-arid ranching areas witness increased food crop production and livestock keeping. However, the rain-fed agriculture limitations in these regions result in frequent crop failures (County Government of Kitui, 2018). The agricultural sector in these semi-arid zones holds significant potential for growth.

3.2.4 Sources of Livelihoods

Agriculture is a cornerstone of Kitui County's economy, contributing significantly to job creation, food production, and rural income, as highlighted by the Kitui County Government (2018). According to the Ministry of Agriculture, Livestock, Fisheries, and Cooperatives (MoALFC, 2021), the agriculture sector is responsible for 87% of rural household income and plays a crucial role in ensuring food security. The county has more than 355,825 people directly employed in agriculture, with 82% of households engaged in farming activities (KNBS, 2019). The majority of households (93%) cultivate food for self-consumption, including cereals, pulses, root crops, industrial crops, and horticultural crops (KNBS, 2019). Cereals such as maize, sorghum, and millet, along with pulses like green grams, cowpeas, beans, and pigeon peas, contribute to the county's food diversity.

Additionally, livestock, including beef and dairy goats, indigenous and foreign sheep, and various fowl, play a vital role in Kitui County's agricultural landscape (County Government of Kitui, 2018). Livestock not only serves as a source of income but also acts as a buffer against the impacts of drought. Despite the significant agricultural potential in the region, only 5.22% of households are engaged in commercial farming (Republic of Kenya, 2019). The majority of farmers (206,970 out of 215,322 households) practice subsistence farming. The County faces threats from climate change, particularly drought, impacting both rain-fed and irrigated crop production. To address this, farmers have adopted on-farm adaptation strategies, including drought-tolerant crop varieties, conservation agriculture, and water harvesting

techniques (MoALFC, 2021). However, optimal farming in Kitui County faces challenges such as a lack of irrigation services, poor farming techniques, and insufficient storage facilities (Makau *et al*., 2014; County Government of Kitui, 2018). Only 5 irrigation schemes and 31 irrigation clusters are currently operational, serving a limited number of residents (Republic of Kenya, 2019). With proper investment in irrigation infrastructure, Kitui County could harness its water sources, including rivers, dams, and water pans, to enhance agricultural productivity.

Ranching is another significant aspect of Kitui County's agricultural activities, contributing approximately Ksh. 916 million annually through three working ranches (County Government of Kitui, 2018). Beekeeping (apiculture) is also a sustainable farming method in the County, with traditional log hives dominating honey production. Honey processing plants and cooperatives have been established to add value to honey production (County Government of Kitui, 2018). Kitui County, despite its agricultural potential, faces high poverty rates, with 48% of its population living in poverty (MoALFC, 2021). Droughts, high food costs, and nutritional deficits contribute to the challenges faced by the County.

The County government and the Kenyan government are exploring environmentally friendly coal mining methods, while other economic drivers include trade, Jua Kali businesses, boda boda operations, and Micro, Small, and Medium-Sized Enterprises (MSMEs) (County Government of Kitui, 2018). The county boasts untapped assets such as arable land, animals, livestock, woods, and minerals like coal, iron, sand, and

limestone. Kitui County's economic pursuits, along with tourism destinations like Mwingi National Reserve and Tsavo East National Park, contribute to its economic development and population expansion. Land ownership, predominantly passed down through families, remains a key aspect of Kitui County's social and economic fabric, with approximately 25% of landowners possessing title deeds.

3.2.5 Management of Natural Resources

The majority of homes in Kitui County, Kenya utilize either solar energy (37.3%), electricity (17.1%), or a paraffin lantern (13.8%). In comparison to the national average of roughly 16.2%, about 33.2% of homes in this area make use of paraffin lanterns. Kitui County has a lower rate of home electricity connection (17.1%) than the rest of Kenya (50.4%; KNBS, 2019). In contrast to the national average of 55.1%, 81.3% of homes here utilize firewood as their primary cooking fuel. When compared to the national averages of gas (23.9%), paraffin (7.8%), and charcoal (11.6%) (Republic of Kenya, 2019), the percentage of households using Liquefied Petroleum Gas (LPG), Kerosene, and charcoal is low. Compared to the national average of 46.4%, 76.4% of Kitui County families still utilize traditional stone fires as their primary cooking device (County Government of Kitui, 2018).

3.2.6 Administrative Units

Kitui County is comprised of eight (8) sub-counties: Kitui Central, Kitui West, Kitui East, Kitui South, Kitui Rural, Mwingi North, Mwingi Central, and Mwingi West. The County Government of Kitui (2018) has organized the County into forty (40) wards, each of which is further divided into 247 settlements.

3.3 The Target Population

The target population was comprised of the residents of Kitui County was the specific area under investigation. As of 2019, Kitui County had an overall population of 1,136,187 (KNBS, 2019), comprising 549,003 males, 587,151 females, and 33 individuals identifying as intersex.

3.4 The Study Population

The study population in the study area consisted of drought prone 11,560 families from two Wards of Nguutani and Thaana Nzau in Mwingi West Sub-County and 13,680 homes sampled from two Wards of Ngomeni and Kyuso in Mwingi North Sub-County, as indicated in Table 3.2. The Wards were chosen using simple random sampling technique. The research targeted different villages within the Wards. The study focused on population comprising of community representatives, adults aged 18 years and above who are members of communities exposed to drought risks; household representatives; organised community groups; community based organisations (CBOs); self-help groups (SHGs); women groups; youth groups; opinion leaders; UN agencies; International NGOs (INGOs); NGOs; and Faith Based Organisation (FBOs); that had been supporting drought resilience building initiatives in the County, government policy makers, humanitarian aid agency representatives and administrative officials.

Table 3. 2: Target Population

Sub-County	Ward	Population per KNBS	Estimated Population
Mwingi North	Ngomeni	18447	4290
	Kyuso	40375	9390
Mwingi West	Nguutani	27265	6341
	Thaana Nzau	22443	5219
Total		**108530**	**25240**

Source: KNBS, 2019

3.5 Research Design

De Vaus (2001) defines research design as the overarching strategy a researcher adopts to systematically integrate various study components, ensuring an effective resolution of the research problem. It acts as a roadmap, guiding the collection, measurement, and interpretation of information (Kothari, 1990; Kothari & Garg, 2014). In essence, it is the systematic execution of a research technique within a study, facilitating assessment by readers and encouraging replication (Sovacool et al., 2018). Research methods can vary based on the study's nature, and a research design encompasses any predetermined system, culture, or plan to address a research topic. Its primary goal is to ensure that collected data adequately addresses the research question (De Vaus, 2001). In the social sciences, gathering relevant information involves defining the evidence needed for hypothesis testing, program efficacy analysis, or the description and evaluation of observed phenomena.

This investigation utilized a combination of descriptive, correlational, and evaluative research designs. Descriptive research, encompassing surveys and fact-finding inquiries (Kothari, 1990), was chosen for its ability to accurately depict reality (Mugenda & Mugenda, 2003).

Employing both qualitative and quantitative approaches, the descriptive design gathered information from a diverse population in the study locations, aiming to paint a comprehensive picture of their behaviors, attitudes, and values. While descriptive studies excel at depicting real-world connections, they fall short in providing definitive explanations for observed phenomena (Given, 2007). The first three research questions focused on the types of humanitarian aid implemented in response to drought in Kitui County, Kenya, employing descriptive and correlational research strategy. Inferential statistics were applied to assess the impact of humanitarian aid on various measures of community resilience with respect to objective one of the study. Additionally, they explored how Kitui County's social, economic, and environmental conditions influenced residents' ability to overcome adversity.

Descriptive research design was employed to assess the level community resilience in Kitui County, Kenya in relation to objective two of the study while evaluation research design was applied in assessing the strategic objectives for enhancing community resilience to drought in Kitui County, Kenya, addressing the fundamental question: What happened? A systematic review facilitated drawing conclusions from both quantitative and qualitative data, answering the crucial question: What do the results mean? Table 3.3 outlines the study's aims, variables for analysis, and employed research strategies. The researcher successfully acquired a comprehensive dataset by employing both quantitative and qualitative designs.

Table 3. 3: Summary of Research Design of each study objective and Measurable Variables

Research Objective		Measurable Variables/Indicators	Research Design
i.	To examine the types of humanitarian aid implemented in response to drought disaster in Kitui County	Household coping mechanisms, Types of humanitarian aid, acceess to external support for DRR work, existing drought mitigation measures eg., community based drought early warning and contingency planning, impact of drought mitigation measures	Descriptive and Correlation
ii.	To determine the level of community resilience to drought in Kitui County	Community capacities, demographic characteristics in term of gender distribution, age distributions, years lived in the study area, & marital status, family size, community/household assets, household farming & irrigation systems, DRR measures, social protection measures, economic security, access to food, access to water & sanitation, & environmental security, management of goods & services, existing drought management structures & policies, community organisaton & drought preparedness plans, linkage to external networks of support	Descriptive
iii.	To evaluate strategic options for enhancing community resilience to drought in Kitui County	Assessments, household perceptions, financing, drought response measures by DRR actors and their impacts over	Evaluation

Source: Author, 2022

3.6 Sampling Strategy

In this study, conducted in Kitui County, Kenya, the 47 counties were divided into two strata—ASALs and Non-ASALs—each characterized by similar internal features but differing from the other stratum (Mugenda & Mugenda, 2003). Utilizing purposive sampling, Kitui County was selected from the ASAL category, consisting of eight homogeneous Sub-Counties.

Among these, Mwingi North and Mwingi West Sub-Counties were chosen for their representativeness based on investigated characteristics. Purposeful sampling was employed due to the prior knowledge from secondary data that these Sub-Counties contained pertinent information (Mugenda & Mugenda, 2003).

To mitigate potential bias, the study incorporated simple random sampling for the remaining Sub-Counties, providing an equitable chance for selection. From each of the chosen Sub-Counties, Ngomeni and Kyuo from Mwingi North and Nguutani and Thaana Nzau from Mwingi West, four Wards were selected via simple random sampling (Saleemi, 1997). According to Mugenda and Mugenda (2003), purposeful sampling aids in selecting cases with necessary information for the study's objectives, while simple random sampling ensures unbiased representation from the remaining Sub-Counties. This sampling approach ensured a comprehensive and unbiased representation of the population in the study as shown in Table 3.4.

Table 3.4: Summary of Sampling Methods and Sample Sizes for the Study Population for Kitui County, Kenya

Study Population Units	Sampling Method	Sample Size	Data Collection Instruments
Sub-Counties	Purposive	2	Observation
Household heads	and simple random sampling	385	Structured Questionnaires
NGOs, FBOs & CBOs	Purposive/convenient sampling	6	KII Guides
NDMA staff	Purposive sampling/Convenient	2	KII Guides
8 County Ministries of Agriculture, water, and Livestock; Education, ICT and Youth Development; Environment and Natural Resources; Health and Sanitation; Lands, Infrastructure, and Housing and Urban Development; Tourism, Sports and Culture: Trade, Cooperatives and Investment & Office of the Governor.	Purposive sampling/convenient	8	KII Guides
Focus Group Discussion (FGDs) For Self Help Groups and Youth Group	Quota	4 FGDs of 10-12 members each	FGD Guides
Observation Units	Purposive	2 Sub-Counties	Observation Checklists

Source: Author, 2022

3.6.1 Qualitative Methods

This study employed a combination of purposive, simple random, and convenience sampling methods to select participants for key informant interviews (KIIs) and Focus Group Discussions (FGD) conducted during the research. Purposive and convenience sampling were used to identify representatives from I/NGOs, FBOs, CBOs, as well as County and national government officials for KIIs. Quota sampling was employed to choose participants for the FGDs, ensuring diverse groups, including youth, women, and men, were represented.

For the qualitative data collection, the research team purposively selected experienced senior officials from governmental and non-governmental organizations (NGOs) working in the study areas, as they possessed essential knowledge relevant to the study's objectives. A pre-compiled list of relevant agencies involved in addressing drought challenges was used to determine the key KII participants. These individuals were systematically chosen using purpose sampling, with appointments scheduled in advance and interviews conducted at their workplaces using KII guides.

The FGD participants were drawn from various groups in two selected Wards within each Sub-County, representing the youth, women, and men. The FGD sessions were facilitated by the Lead Researcher during household surveys, while the KIIs took place at the conclusion of the data collection process. Participants included individuals working in drought management, resilience building projects, agriculture, water and livestock production, water and sanitation, environmental and natural resource management, weather forecasting, and drought preparedness processes. Importantly, all participants volunteered their time for these activities.

3.6.2 Quantitative Methods

The sample size for quantitative data employed both probability and non-probability sampling techniques. It aimed for optimality, striking a balance between being neither too large nor too small, to meet criteria like efficiency, representativeness, reliability, and adaptability (Kothari, 1984). Primary quantitative data primarily came from household representatives, focusing on Mwingi North and Mwingi West sub-counties, chosen purposefully for their representativeness and relevant data.

The study concentrated on household representatives and residents in villages with persistent drought conditions, encompassing men and women above 18 years old. A two-level, multi-stage sampling approach was executed. The first level used a simple random sampling technique to select at least 10% of two villages from each ward in each sub-county (Mugenda & Mugenda, 2003). The second level, detailed in Table 3.3, utilized a basic random sampling method to select the remaining villages in each ward. The sample size was determined by estimating household populations in the four study wards, using 2019 household survey data (KNBS, 2019). Distribution to wards and villages considered proportional sampling based on population differences in the sample frame. A simple random selection method identified households as the unit of analysis, with household heads serving as units of observation during data collection.

3.6.3 Sample Size

"In determining the distribution of the study sample size of 385, the formula by Fischer *et al* (1983):

$$n = \frac{pq\,z^2}{e^2} \qquad (3.1)$$

where: n = the desired sample size if the target population is greater than 10,000.

z = the standard normal variate at a required confidence level and to be worked out from the table showing area under normal distribution curve p = the proportion in the study population estimate to have the characteristics being measured q = 1- p and e = the level of statistical significance set.

If there is no estimate available of the proportion in the study population to have the characteristics of interest, then p = 50% should be used as recommended by Fischer *et al* (1983) quoted in Mugenda & Mugenda (2003). Since there is no estimate available of the proportion in the proposed study population assumed to have the characteristic of interest, p = 50% was used. At a 95% level of confidence which was our desired accuracy, the z statistic is 1.96 and e = 5% hence;

$$n = \frac{0.5x0.5x1.96^2}{0.05^2} \approx 385$$

However, if the target population is less than 10,000, the required sample will be smaller. In such cases, a final sample estimate is calculated using the following formula:

$$nf = \frac{n}{1+n/N} \qquad (3.2)$$

$$= \frac{Nn}{N+n}$$

Where nf = the desired sample size (if the target population is greater than 10,000)

n = the desired sample size (when the target population is greater than 10,000)

N = the estimate of the population size (Mugenda & Mugenda, 2003). Further, a cluster sample of 385 household heads was randomly obtained from the two selected Sub-Counties as shown in Table 3.5

Table 3. 5: Sample Size Distribution of Household Respondents

Sub-County	Ward	Estimated HH Population	Proportionate Sample Size
Mwingi North	Ngomeni	4290	65
	Kyuso	9390	143
Mwingi West	Nguutani	6341	97
	Thaana Nzau	5219	80
Total		**25240**	**385**

Source: Author, 2022

The study utilized data collected from 385 household heads from Ngomeni, Kyuso, Nguutani and Thaana Nzau Wards in Mwingi North and Mwingi West Sub-counties respectively. Proportionate sampling was used to select the number of households interviewed in each Ward which formed the units of analysis. Moreover, the study further benefited from the purposively sampled key informants, representatives of the national and county governments, and non-governmental organizations including: 6 representatives from I/NGOs, CBOs, FBOs, 2 from NDMA and 8 from County Ministries of Agriculture, water and Livestock; Education, ICT and Youth Development; Environment and Natural Resources; Health and Sanitation; Lands, Infrastructure, Housing and Urban Development; Tourism, Sports and Culture: Trade, Cooperatives and Investment & Office of the Governor.

The purpose of the information gathered from the KIIs was to triangulate information gathered from the household respondents through survey techniques. Further 4 focus groups that comprised of 10-12 members were selected through quota sampling technique and were interviewed through focus group discussions.

In each of the two Wards in each Sub-County, two focus groups one representing youth and another representing women and men were selected using the quota technique and interviewed. Table 3.4 presents a summary of the sampling methods, sample sizes and data collection instruments for this study (Mugenda & Mugenda, 2003).

3.7 Data Collection Instruments

In this study, various data collection instruments were utilized in accordance with the various activities undertaken which were aimed at addressing each study objective. This study utilized both primary data collected from the field from 3rd to 16th April 2018 and a 10-year secondary data drawn from archival sources from 2018 ranging back to 2008. The primary data was that was collected afresh from the field for the first time (Kothari, 1990: 95). A variety of research instruments comprised of structured household questionnaire, focus group discussion guides, key informant interview guides and observation forms were developed and used to collect data from the field. The study employed data collection methods ranging from questionnaire-based interviews, FGDs, KIIs, direct observation and informal dialogues.

3.7.1 Household Questionnaires

Structured household questionnaires were developed and administered to a total of 385 household representatives via interviews, combining closed and open-ended questions, as well as attitudinal queries on a Likert scale as shown Appendix II. Unlike binary 'yes or no' questions, the Likert scale offers deeper insights into respondents' thoughts and feelings.

The questionnaires, after pre-testing, were used to collect data on the study's three objectives: diversity of solutions, existing community capacities, community networks, support mechanisms, attitudes, and perceptions. Demographic characteristics like social, economic, and environmental variables were used to analyse the relationship between dependent and independent variables. Six Research Assistants were trained for face-to-face interviews on April 2, 2018, at Nguutani Catholic Meeting Hall. The study sample consisted of 385 household respondents. While the questionnaire was in English, it was translated into the local language during administration to ensure full understanding. Serial numbers were added to protect respondent identities, and data protection measures were implemented.

Consent was sought before interviews, and respondents were assured of confidentiality. A total of 385 questionnaires were administered in Mwingi North and Mwingi West Sub-Counties in April 2018. The household questionnaires were administered in two purposively selected Sub-Counties of Mwingi North and Mwingi West in Kitui County during the month of April 2018. Table 3.6 shows the distribution of household respondents per Sub-County. The number of respondents per sub-county was determined using a stratified simple random sampling technique. The household questionnaires were administered to 54% (208) respondents from Mwingi North while 46% (177) were from Mwingi West as reflected in Table 3.6. The advantages of using household questionnaires in data collection in social research and surveys are numerous. Structured questionnaires provided consistency, allowing all respondents to be asked the same questions in the same way.

They are efficient for large samples, saving time and resources. They are cost-effective and promoted honest responses on sensitive topics. Standardization reduced interviewer bias, and were ideal for collecting quantitative data. Comparisons across households and regions were easy, enabling trend identification. However, household questionnaires have limitations, including potential non-response bias, limited depth on complex topics, and a lack of probing for clarifications. To address these challenges, the questionnaires were thoughtfully designed, pilot-tested, and data selection was carefully considered for each research objective.

Table 3. 6 Distribution of household respondents per Sub-County

Sub county	Target Population	Sample size	Percent
Mwingi North	139,902	208	54
Mwingi West	103,726	177	46
Total	**243,628**	**385**	**100**

Source: Author, 2022

3.7.2 Key Informant Interview Guides

Key Informant Interview Guides were developed as shown in Appendix III and individually administered to 16 Key Informants drawn from FBOs, INGOs, NGOs, CBOs, NDMA and selected from the County government ministries through interview methods. The Key Informant Interview guides contained structured sets of questions designed to guide the conversation during the KIIs during the research process. Key Informant Interviews (KIIs) were conducted informally by the Principal Researcher, who followed the established interview guides.

These guides comprised a series of predetermined questions designed to facilitate meaningful conversations during the research process. The summary of the responses from the KIIs were organised and presented in a tabular form as shown in Appendix X. There were compelling reasons for employing this method. First and foremost, the interview guides ensured uniformity in the questions posed to each Key Informant. This standardized approach enhanced the systematic collection of data, minimizing the risk of overlooking crucial information. Furthermore, the guides served as a compass, keeping the interviewers on course by aligning their focus with the research objectives. This alignment ensured that the gathered information directly addressed the research objectives.

In addition, the interview guides encouraged consistency in data collection across diverse Key Informants, simplifying the process of comparing responses, identifying patterns, and drawing meaningful conclusions. This consistency also facilitated a comprehensive exploration of the research topics, leaving no aspect of the subject under investigation unaddressed. Moreover, these guides offered flexibility, allowing for adaptability as interviews unfolded. This adaptability enabled the exploration of specific details and follow-up on intriguing points raised by Key Informants. It also played a role in building rapport with the participants, fostering an environment where their expertise could be openly shared, and sensitive questions could be asked respectfully and ethically. The use of interview guides promoted research transparency, enabling other researchers to comprehend the data collection process and reinforcing the study's rigor and credibility.

To ensure the effectiveness of the guides, they underwent a pilot testing phase, which helped identify to rectify any potential issues or ambiguities in the questions. Furthermore, these guides were invaluable in training research assistants, ensuring their readiness to conduct interviews consistently.Despite the benefits offered by interview guides, it is important to highlight their flexibility. The approach was adaptable, allowing for deviations from the guide when deemed necessary to explore unexpected insights and follow the conversation in a natural and productive manner. This flexibility was crucial in extracting the maximum benefit from the interview process.

3.7.3 Focus Group Discussion Guides

Focus Group Discussion Guides were developed as shown in Appendix IV and were used to facilitate informal discussions. The Focus Group Discussion Guides play a pivotal role in qualitative research, as they offer a structured framework for in-depth discussions among various groups. In our study, we employed these guides to engage in informal conversations with four Focus Group Discussions (FGDs), each representing a distinct demographic group. Specifically, two FGDs were drawn from each of the two Sub-Counties under investigation. Within each Sub-County, one FGD comprised men and women, while the other included youth participants. In line with rigorous research practices, each FGD consisted of ten to twelve members, meticulously selected through a simple random sampling technique. Consent was diligently sought from all participants and recorded before commencing the discussions, ensuring ethical research conduct.

The Principal Researcher took on the role of facilitating these FGDs, maintaining a conducive environment for open and candid dialogues. These discussions were not confined to traditional settings but were conducted in the chosen meeting places of the groups, promoting a natural and comfortable atmosphere. Data collected was organised and presented in a tabular form as shown in Appendix XI. The focus group discussion guides employed because they are rooted in their multifaceted utility in qualitative research. The guides served as a cornerstone for structuring and directing discussions within the FGDs. They established a standardized framework for all sessions, ensuring that each group addressed the same topics and questions. This uniformity streamlined data analysis, allowing for meaningful comparisons between the different groups.

Further, the guides were meticulously tailored to align with our research objectives and questions, serving as a compass to keep the discussions focused and on track. This precision ensured consistency across all FGDs, a critical element in fostering coherent in data analysis. The guides were instrumental in probing topics in-depth and exploring a wide array of related issues, encouraging participants to share their unique perspectives, experiences, and insights.

3.7.4 Observation Checklists

Observation checklists were developed and used to record information drawn from directly observing the general environment and recording the observation findings in the observation forms in the two study Sub-Counties as shown in Appendix V supported by photographic documentation.

Observation checklists play a crucial role in research which offer a structured and standardized approach to data collection. This reduces subjectivity, enhancing data reliability. Checklists help observers concentrate on specific criteria, minimizing bias and personal interpretation. Observation checklists enabled systematic data recording, making data organization and analysis more manageable. In our study, the checklists facilitated the capture of data on various aspects, including the environment, crops, household structures, sanitation, hygiene practices, water structures, livestock, and human body conditions.

Information on the biophysical environment was comprehensively documented to achieve our study objectives. Data collected was organised and presented in tabular form as shown in Appendix XII. in In summary, observation checklists are indispensable tools for structured and systematic data collection, offering benefits such as objectivity, efficiency, and the capacity to support decision-making and quality improvement efforts.

3.8 Validity and Reliability of the Research Instruments

Validity is the precision and significance of conclusions drawn from research results. It is the degree to which the results of data analysis effectively represent the study's variables (Mugenda & Mugenda, 2003: 99). Therefore, validity relates to how accurately the data obtained in the study represents the study's variables. If such data accurately reflects the variables, then the conclusions drawn from such data are accurate and meaningful. (Mugenda & Mugenda, 2003)

Reliability is the degree to which a research instrument generates stable and consistent data or results after repeated trials. The concepts of validity and reliability are interdependent. Thus, an instrument that produces valid data must also produce reliable data, whereas an instrument that produces unreliable data need not necessarily produce valid information (Mugenda & Mugenda, 2003).To ensure the reliability and validity of the data, the study employed methods of data collection that yielded information pertinent to the research questions. Relevance and accuracy are measured by reliability and validity (Mugenda & Mugenda, 2003). To assure the validity of data collection instruments, a pre-testing study was conducted in Machakos County by administering structured household questionnaires to an appropriate random sample of 10% (39) of the study sample of 385 household heads.

The household questionnaires were distributed to arbitrarily selected household representatives in the study area who had benefited from drought resilience building initiatives. To ensure the validity, reliability, and sensitivity of the quantitative and qualitative data collection instruments, a preliminary test was conducted. After pre-testing the data collection instruments, they were modified, printed, and used to collect data from the study areas regarding the three objectives. The presence or absence of systematic or non-random error in the data largely determines validity. Content validity (Mugenda & Mugenda, 2003) is a measure of the extent to which data collected using a particular instrument represents a specific set of indicators or the content of a particular concept.

This technique was used to ensure the validity of this study. For the purpose of minimizing non-random error, the data collection instruments were designed to yield content pertinent to answering the four primary research questions. In addition, two research experts reviewed the study instruments. One expert evaluated what concept the instrument was attempting to measure, while the other evaluated whether the set of items or enumeration accurately reflected the concept under investigation. The reliability of the study was also ensured by employing a competent moderator to examine personal bias and expectations. The moderator insured that the reports were authentic and not influenced by what we wish to hear.

In addition, triangulation of information ensured the use of multiple data sources, such as a literature review, survey instruments, KIIs, FGDs, and observation techniques. Random error influences the reliability of research; it is the deviation from the true measurement due to factors that have not been adequately addressed by the research. Two data components are generated by research instruments: the true value or score and an error component. This data error component reflects the instrument's limitations (Mugenda & Mugenda, 2003). The co-efficient of reliability, which is a correlation co-efficient, ranges from -1 to 1 and tells the magnitude of the relationship between the two variables under study. The higher the co-efficient (absolute value) the stronger is the association between the two variables. High co-efficient of reliability implies the instrument yields data that have a high test-retest reliability implying consistency among the items in measuring the concept of interest and vice versa.

The correlation co-efficient also tells the direction of the relationship between the two variables. If the correlation co-efficient is positive, it means there is a positive relationship between the two variables. A positive relationship means that as variable X increases, variable Y increases as well or as variable X decreases, variable Y decreases. Thus, X and Y vary together in the same direction. A negative relationship means that as variable X decreases, variable Y increases and vice versa. Thus, X and Y vary together in opposite directions (Mugenda & Mugenda, 2003). To test the reliability of the data collection instruments, the research used the test-retest methods.

The data collection instruments were pre-tested in Machakos County which is not within the study area. Machakos County was randomly selected from among 46 Counties in Kenya of which Kitui county was excluded. In Machakos County, an appropriate random sample of 10% of the 385 household heads was subjected to a pre-testing study through administering the structured questionnaires. Keeping all the initial conditions constant, the exercise was repeated after two weeks to the same subjects. The scores from both testing periods were correlated in order to compare the results and ascertain consistency before administering the structured questions for the final study. Data reliability can be evaluated in various ways, one of which is by looking at internal consistency (Mugenda & Mugenda, 2003). Researchers evaluate the reliability of their findings by comparing scores from the same test given to multiple people. With this method, we compare the score you got on one item to the scores you got on the rest of the instruments.

If you want to know how well the items in your survey agree with one another, you can use Cronbach's Coefficient Alpha (Mugenda & Mugenda, 2003). Cronbach's Alpha was used as the internal consistency test in this research to determine the degree of item reliability across all pilot survey groups. Indicators of strong internal consistency and thus generalizability to the target population, such as an alpha value of 0.70 or above, are recommended by Zinbarg *et al*., (2005). Cronbach's alpha is considered reliable if it has a value of at least 0.7, and closer to 1 is even better (Sekaran & Bougie, 2010). 10% (385 total) of randomly selected Machakos County household heads participated in a pre-testing study using the structured questionnaires. Since Machakos County is outside the primary study's location, it was chosen for pre-testing the research equipment to ensure the results or data are consistent. Cronbach's alpha was calculated to be 0.763 in this study. The value was greater than the 0.70 threshold suggested by Zinbarg *et al*., (2005), indicating that the obtained data had reached a relatively high level of consistency in measuring the concept of interest and could be used for further research.

3.9 Secondary data

The study made use of the secondary data drawn from official publications by the national government of Kenya and County government of Kitui, relevant institutions, research institutions or universities, individuals or private research works, journals and periodicals, semi-official publications, published books, relevant annual reports, Maps and media reports. The data covered a ten-year period from 2018 to 2008.

3.10 Data analysis

According to Hatch (2002), analysing data entails a methodical quest for explanation. The term analysis refers to the process of arranging and questioning material in a way that facilitates the identification of patterns, themes, correlations, explanations, interpretations, critiques, and theory generation (Hatch, 2002). Synthesizing information requires the ability to classify data, form hypotheses, make comparisons, and recognize patterns (Leech & Onwuegbuzie, 2007). The research questions informed the data analysis. Both quantitative and qualitative information was examined independently.

Frequency distribution, descriptive statistics and inferential statistics were applied in data analysis. Frequency distribution is a series formed when the statistical data are grouped according to size or magnitude. Descriptive analysis included mean, standard deviation, percentages, correlation, and regression analysis. Inferential statistics involved the use of ANOVA tables, Fisher's and Chi-Square distributions. All these levels of analysis were provided using statistical package for social scientists' software (SPSS) Version 28.

3.10.1 Descriptive Data Analysis Approach

This study utilized descriptive statistics to summarize data in an organized manner by describing the relationship between variables in a sample. These were comprised of variables as well as measures of central tendency, dispersion/variation, and position. The data mainly contained information related to demographic characteristics; household income levels; levels of household diversification of income sources;

farming systems and community resilience; food availability and community resilience; access to water and sanitation systems; existing drought coping mechanisms; drought occurrence, frequency and effects; drought mitigation support by government, I/NGOs and FBOs; social, economic and environmental factors affecting community resilience to drought; agencies supporting drought risk reduction work in Kitui county; existing drought mitigation measures and their impact; impact of humanitarian aid to drought and strategic options for enhancing community resilience to drought in Kitui county among others. Quantitative data was analysed using SPSS version 28 (Statistical Package for the Social Sciences) and Microsoft office excel. Percentages, tables, charts, graphs, and figures were used to summarize and show the data.

3.10.2 Qualitative Data Analysis Approach

This approach was used to analyse the trends, characteristics, processes, and pathways of drought management process and their actual status as far as community resilience building to drought was concerned. These included variables that assessed the existing levels of community resilience to drought; social, economic and environmental factors affecting efforts for building community resilience to drought; common sources of water for household and livestock use; trends of drought occurrence and their impact; existing drought coping mechanisms; support being provided by the government, the I/NGOs and FBO to drought affected communities; types of drought management structures at community level; whether the DRM measures were yielding any dividends as far as community resilience building was concerned;

strategic options for enhancing community resilience to drought among others. The questionnaire, KIIs, FGDs, and observation forms all featured both open-ended and Likert scale items to collect the qualitative data. Further the qualitative data was analysed and presented on pre-determined objectives and themes, content analysis, categorization, contextualization, verbatim, semiotics, manifest analysis and plates and determination of similarities and trends on community resilience to drought.

3.10.3 Inferential Data Analysis

Cross-tabulation was used to compare the relationship between variables in order to draw conclusions and ensure generalizability. Bivariate analysis was used to determine the association and level of significance between the dependent and independent variables using quantitative data. Statistical Package for the Social Sciences (SPSS) version 28 was utilized to analyse quantitative data. Categorical variables for quantitative data were ranked ordered, and measures of central tendency and variation were then computed. Chi-square tests and ANOVA tables were used to examine the statistical significance of relationships between categorical variables such as the level of association between the family size and the level of education; household respondent's income, education, and resilience; the association of gender and income levels; and the relationship between humanitarian aid and community resilience to drought. Regression analysis was used to assess the strengthen and the direction of the relationship between social factors and community resilience to drought; economic factors and community resilience to drought; and environmental factors and community resilience to drought.

Results were presented in form of tables, charts, and graphs. Table 3.7 summarizes data analyses methods with reference to specific study objectives.

Table 3. 7: Data Analysis Methods based on Research Objectives and Research Designs

Research Objective		Research Design	Research Instruments	Methods of Data Analysis
i.	To examine the types of humanitarian aid implemented in response to drought disaster in Kitui County.	Descriptive and Correlation	Observation forms Structured questionnaires KII Schedules FGD Discussion Guides	Frequency distribution, inferential statistics correlation, regression
ii.	To determine the level of community resilience to drought in Kitui County	Descriptive and Correlations	Observation checklists Structured questionnaires KII checklists FGD Discussion Guides	Frequency distribution, inferential statistics regression
iii.	To evaluate strategic options for enhancing community resilience to drought in Kitui County	Evaluation	Structured questionnaires KII Schedules FGDs Discussion Guides	Frequency Distribution Correlation

Source: Author, 2022

3.11 Data Management and Quality Standards

Quantitative data from the field was cleaned to yield accurate information that could easily be used for analysis and report writing. Quantitative data from the field was collected using household questionnaires by well-trained Enumerators. The Enumerators had been trained by the Principal Researcher on how to conduct the household interviews and record responses in the questionnaire.

Each Enumerator was allocated a target per day. Each Ward had been allocated a target of household interviews to be collected. All the Enumerators collected data from one village at the same time until they met the set target before moving to the next Ward. At the end of each day, the Principal Researcher reviewed the entries in the household questionnaires to check for accuracy and consistency and ensure high level quality control of the quantitative data before handing over the questionnaires to the Data Clerk for entry into the SPSS. The Principal Researcher also supervised the data collection process for data quality assurance. After the entry of the data into the SPSS Version 28, the Principal Researcher reviewed the data entry to ensure that it was accurately done before generating the data output. This process ensured that the requirements of validity and reliability of the data were met throughout the data collection and management process.

3.12 Measurement, Data Analysis, and Interpretations

There was no statistical measurement for qualitative data. Analysis was done for each thematic areas with an aim of triangulating data with quantitative data to rest for coherency in results. Quantitative data was analysed using the SPSS Version 28, STATA Version 15 and Excel Spreadsheet. Frequencies were run using all the variables to check for missing cases if any as well as for explanations.

3.13 Limitations and Delimitations of the Study

Study limitations refer to aspects of a study's design or methodology that prevent or limit one's ability to draw firm conclusions from the results.

Limitations on generalizability, applicability, and/or practicality arise from the researcher's initial study design decisions and the approach taken to ensure internal and external validity (Prince & Murnan, 2004). Just like all other studies, this study faced the following limitations:

i) Respondents were reluctant in providing answers to questions that they perceived to be too personal. This limitation was addressed by assuring confidentiality on the information provided by the respondent in the beginning of the interview and also by explaining how the information will be used and offering an opportunity to the respondent to choose to participate in the interview or not to participate.

ii) Despite convincing evidence that women and people with disability often experience drought stresses and hardships differently, this study did not endeavour to treat them differently. Instead, the study only focused on the resilience building at the community and household levels which could benefit community members as a whole. This limitation was addressed through ensuring there was no deliberate effort to exclude people with disabilities especially through FGDs and KII interviews. Instead, people with disabilities were consulted alongside with other people.

iii) This study did not cover large geographical areas. This may have limited the scope of application of the resilience conceptual framework. This limitation was addressed through selecting study areas that were representative on the Kitui County.

iv) This study was conducted during the long rain season April to May and anticipated low response rate (Johnston, 2014). To address this challenge, Area Administrative officers were utilized to mobilize household representatives to participate in the study. As a result, the study achieved its study sample of 385.

3.14 Ethical Considerations

All participants were free to stop participating whenever they felt like it. As part of the research process, the researcher made sure everyone engaged knew exactly what was going on and why. To ensure accurate and efficient data collecting, we used established procedures (Mugenda, 2008). Consent was sought for any information acquired from the organisations and individuals. Such consent was made in the language which was well understood by the individual/s and organisations providing the information. The administration of the questionnaires, KIIs and FGDs followed that order. The study ensured that the rights and safety of participants were respected. Confidentiality and anonymity on information shared was maintained at all levels of this study. The data collection exercise ensured objectivity by avoiding bias.

The protocol of the study was followed through the scientific processes set by the University Directorate of Postgraduate Studies research requirements. A research approval letter was sought from the Directorate of Postgraduate Studies (DPS) of Masinde Muliro University of Science and Technology (MMUST). This was used to apply for a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI).

The research permit was then presented to the County Director of Education, County Commissioner and County Secretary before being presented to the Sub-County Officers. The Director of Education was briefed on the research objectives and process. The research team also reported to the Kitui County Government offices as an entry point before commencement of the study. Stakeholders working in the study areas were also briefed on the purpose of the study.

CHAPTER FOUR
TYPES OF HUMANITARIAN AID IMPLEMENTED IN RESPONSE TO DROUGHT DISASTER IN KITUI COUNTY

4.1 Introduction

This chapter presents and discusses the quantitative and the qualitative findings based on the information gathered using a household questionnaire, community focus groups discussions key informant interviews and observation. Information was gathered on various variables that assess and measure community resilience. In addition, this chapter covers the first specific objective of the study whose objective was to examine the types of humanitarian aid implemented in response to drought disaster in Kitui County.

4.2. Socio-demographic Characteristics

4.2.1 Response Rate

A total of 385 household questionnaires were used for the analysis and this translated to a response rate of 100%. Response rate refers to the number of questionnaires administered in the field compared to the number which was responded to. This level of response rate was considered an appropriate response rate as supported by Bryman and Bell *et al*., (2011) who contends that a response rate of 50% is adequate, 60% good and above 70% as excellent. Household interview questionnaires were administered by both the Principal Researcher and a team of Research Assistants during the month of April 2018. The research team ensured the interviewees were aware of their rights regarding data collection and ensured information gathered from the household respondents was kept confidential.

4.2.2 Gender Distribution of Household Respondents

Figure 4.1 shows the distribution of household respondents in terms of gender where 40% (154) were males and 60% (231) were females.

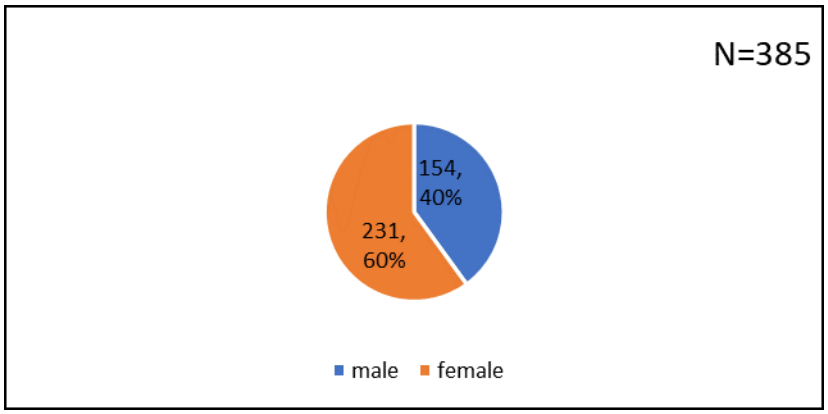


Figure 4. 1: Gender Distribution of Household Respondents

Source: Field Data, 2022

According to KNBS (2019), the male population accounted for 48% of the total county population and female population 52%. Previous studies indicates that Gender characterize diverse livelihood strategies, which evolve by enriching social relationships and extending networks (Otsuki *et al*., 2014; Adger, 2010). For instance cropping and commercial activities are carried out differently by men and women. The attention given to the social differences, roles and responsibilities and the needs accorded to women and men in the community is one of the key indicators of community resilience (Masson, 2016). Moreover, the ability to address both practical and strategic gender needs is a means of enabling communities to improve their absorptive, anticipatory, and adaptive capacities in order to build their resilience to drought disasters Caroline Moser (1993) quoted in (Masson, 2016).

4.2.3 Age Distribution of Household Respondents

The study aimed to encompass individuals from all age groups aged 18 and above, as depicted in Figure 4.2. The largest portion of household respondents, comprising 24.7% (95), fell within the age range of 35-44 years. Following closely, 21.3% (82) were between the ages of 45-54, and 19.5% (75) belonged to the 25-34 age group. The oldest participants, aged over 75 years, constituted 3.4% (13) of the total respondents.

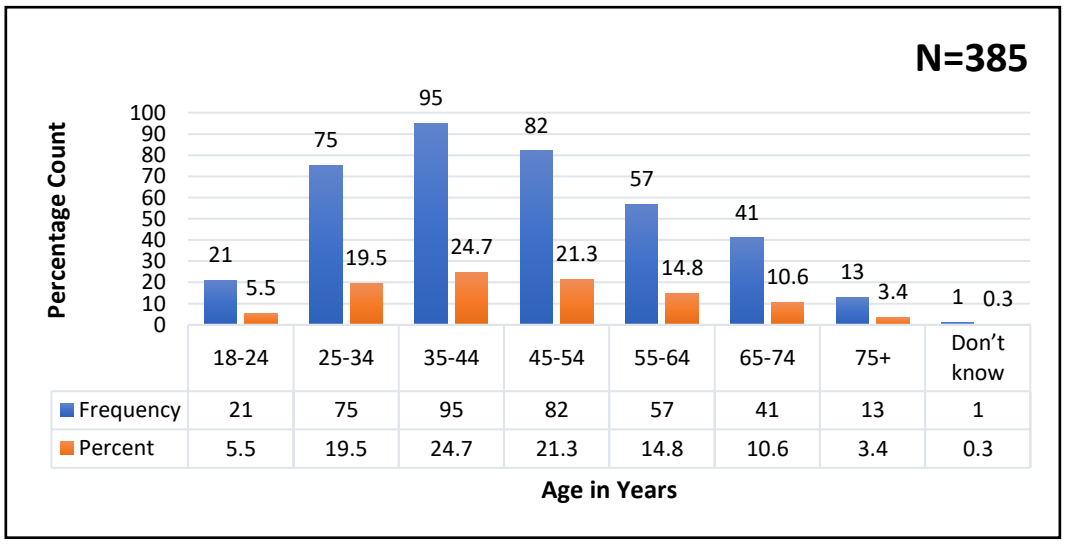


Figure 4. 2: Age Distribution of Household Respondents in Kitui County
Source: Field Data, 2022

Previous studies have demonstrated that advanced age is marked by a delicate balance between losses, often linked to vulnerability and resource limitations, and potential gains stemming from wisdom, accumulated life experiences, autonomy, and support systems, which create a distinctive environment for the manifestation of resilience (Hayman *et al*., 2017). Research indicates that social connections play a crucial role in promoting resilience among older individuals (Fuller-Iglesias *et al*., 2008), primarily due to the heightened social protection challenges faced by the elderly.

4.2.4 Duration of Household Respondents in Study Areas

The household questionnaires were administered to 385 household respondents in Mwingi West and Mwingi North, Kitui County, Kenya, aiming to determine their duration of residence in the study areas. This information was crucial in assessing respondents' awareness of drought disasters. The study revealed that 82% (317) of respondents had lived in the areas for over 11 years (see Figure 4.3). This indicates that they possessed a deep understanding of the local context, making them valuable sources of information on the impact of humanitarian aid in the community. Local knowledge, community networks, and relationships are fundamental to community resilience (Patel *et al*., 2017). The extended residency in these areas facilitated residents in getting to know one another, fostering bonds, bridging connections, and creating strong social capital, enhancing their overall resilience (Béné *et al*., 2012).

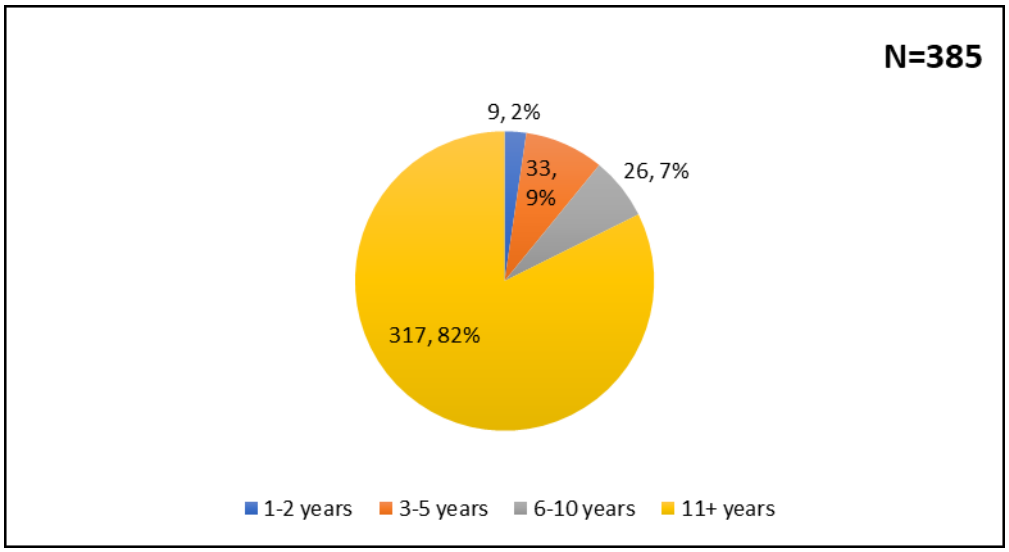


Figure 4. 3: Duration of Residence Household Respondents in the Study Areas

Source: Field Data, 2022

Connections and relationships play a pivotal role in helping communities withstand drought disasters and external shocks (Cheshire et al., 2015). Community resilience relies on the presence of "networked resources" and "adaptive capacities" that can be mobilized in emergencies (Béné *et al*., 2012). These relationships give rise to three types of social capital: bonding, bridging, and linking (Aldrich, 2012). Bonding social capital forms through emotionally close connections, like friends and family, fostering strong group affiliations. Such high levels of social capital cultivate trust and shared norms among community members (Adger, 2010; Raniga, 2017). This strong social capital is essential for collective action, cooperation, and self-organization (Aldrich, 2012), enabling communities to prepare for, endure, and recover from various disruptions and stressors (Pfefferbaum *et al*., 2017). Aldrich (2012) asserts that communities possessing all three forms of social capital are inherently more resilient than those lacking any category.

4.2.5 Marital Status of Household Respondents

The study revealed that a significant proportion of household respondents, comprising 74.8% (288), were married. In contrast, 14% (54) were single, 8.1% (31) were widowed, and 3.1% (12) were either divorced or separated as illustrated in Figure 4.4.

This indicates that households living in the study areas had strong family ties. Strong family ties and social networks play a crucial role in strengthening community resilience, particularly in the context of drought-related challenges. Married couples can collaboratively enhance household preparedness to drought impacts.

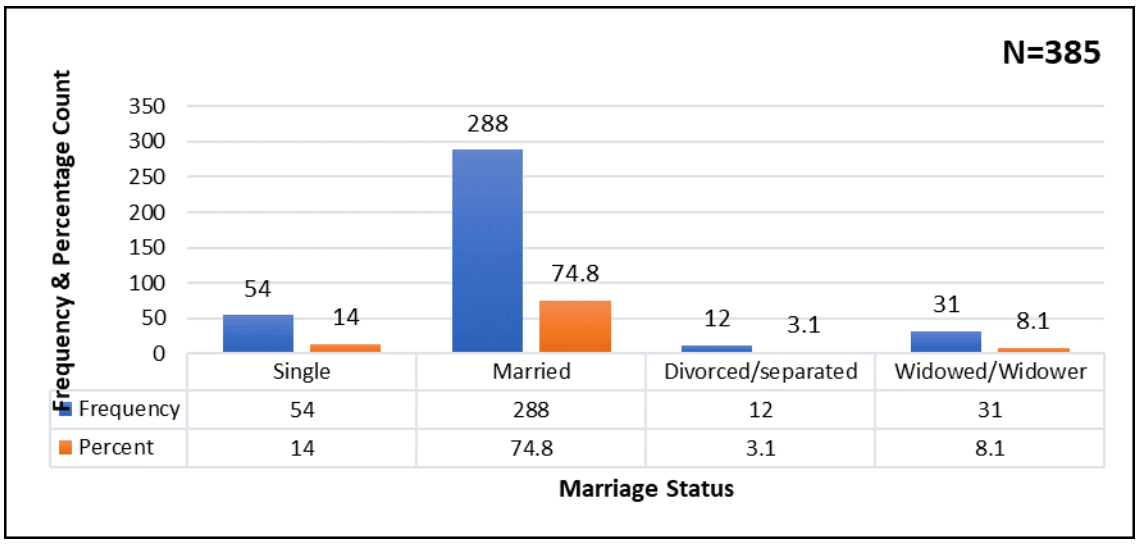


Figure 4. 4 Marital Status of Household Respondents

Source: Field Data, 2018

Previous research has shown that family ties and social networks mutually reinforce community resilience (Aldrich, 2012). Married couples, for instance, can make informed decisions together regarding disaster preparedness and resilience by leveraging their shared insights into three key dimensions: exposure to drought risks, sensitivity to droughts, and coping capacity to mitigate drought-related impacts (Walker *et al.*, 2010). Social capital is a well-recognized pillar of community resilience, fostering collective action, collaboration, and self-organization to prepare for and recover from various shocks and stresses (Raniga, 2017). Marriage relationships enhance support between spouses, unlike single, separated, divorced, or widowed individuals who lack the advantage of a close partner during drought disasters. Other sources of support during such crises may include parents, children, and siblings.

Bonding social capital has the potential to diminish the need for emergent social action during drought disasters. As a result, family ties play a pivotal role in bolstering household resilience to drought (Norris *et al*., 2008). Furthermore, social capital is an essential component of collective action and self-organization for communities dealing with various shocks and stresses (Frankenberger *et al*., 2013).

4.2.6 Education Status and Resilience of Household Respondents

The study sought to explore the educational attainment in Kitui County. The findings, outlined in Figure 4.5, reveal that among household respondents, 53% (204) had completed Primary education, 26% (102) had attained secondary education, 12% (46) had pursued college education and only 5% (18) had achieved University education, and 4% (15) had not received formal schooling. In addition, findings from FGDs indicate that challenges of drought were disrupting learning in schools. For instance, in a FGD, a male participant said:

> "poor learning and drop out from school due to lack of school fees is one of the major setbacks during drought situation in our areas".

According to KNBS (2019), just 6% (63,071) of the individuals enrolled in schools in Kitui County have achieved tertiary education or higher qualifications. Additionally, a recent survey conducted by UNICEF (2017b) in Kitui County, focusing on Maternal Infant and Young Child Nutrition (MIYCN) Knowledge, Attitudes, Beliefs, and Practices (KABP), found that a substantial 97.3% of the respondents, predominantly women, had received some level of formal education. Within this group, the majority (60.9%) had completed their primary education.

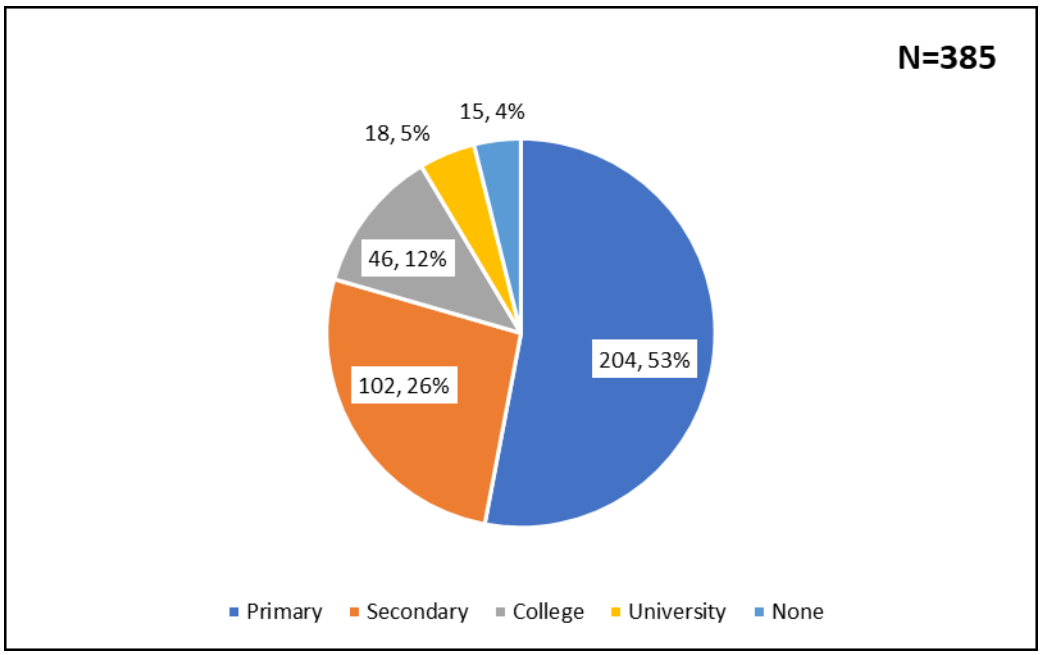


Figure 4. 5: Education Level of Household Respondents

Source: Field Data, 2022

In Kenya, available evidence highlights a strong correlation between poverty rates and the education level of household heads. Data KNBS (2018) revealed that poverty rates are highest in households where the primary breadwinner has not completed high school and lowest in those where the breadwinner has completed college. Homes with uneducated breadwinners are particularly susceptible to financial hardship. Even in areas lacking basic services like sanitation, clean water, and food, children of educated mothers have shown higher survival rates compared to those with illiterate mothers, as indicated by KNBS (2015). Furthermore, education plays a vital role in enhancing local knowledge and community resilience to drought disasters.

Studies by Patel *et al*. (2017) and Frankenberg *et al*. (2013) suggest that education empowers individuals with disaster-related knowledge, vulnerability assessment, preparedness actions, and long-term resilience.

Access to quality education also leads to better employment prospects, higher income, and improved living conditions, enabling households to meet their nutritional needs. Families with educated and employed members have greater survival prospects during drought conditions due to alternative livelihoods, access to insurance, healthcare, and social support, as noted by Lutz and Samir (2011) and Strauss and Thomas (2008). Educated individuals tend to be less vulnerable to natural disasters and have higher income-earning potential, as observed by various researchers. However, it is important to acknowledge that education can perpetuate social inequalities and stratification. Inequalities in education access and quality often result in disparities in employment, income, residence, and social status, further affecting community cohesiveness. Equal access to a functional education system is crucial for reducing inequalities and fostering community resilience to drought.

Recognizing the significance of individual knowledge and awareness, especially in drought-prone areas, is central to preparing for and responding to drought-related challenges, as emphasized by studies by Frankenberger *et al*. (2013) and Adiger (2010).

4.2.7 Household Income Levels and Community Resilience

Economic security stands as a critical indicator of community resilience (Frankenberger *et al*., 2013). This study aimed to evaluate the economic security within Kitui County, employing a household questionnaire administered by trained Research Assistants. The findings indicated that a significant majority of household respondents, constituting 67% (258 individuals), earn less than Ksh.5,700 per month, as depicted in Figure 4.6. This income level translates to less than Kshs.190 per day per person, which is equivalent to approximately USD 1.90 per day person based on the international poverty line. Consequently, it is evident that 67% (258) of the household respondents are living below the international poverty threshold of USD 1.90 per day per person, as defined by the World Bank in 2022. The international poverty line is a benchmark used to measure and compare poverty levels across different countries and regions (World Bank , 2022). It represents the minimum income or consumption level required to meet basic human needs, such as food, shelter, and clothing. The World Bank sets and periodically updates this poverty line to reflect the cost of living in various parts of the world.

This means that individuals living on less than USD 1.90 per day are considered to be in extreme poverty. Such high poverty rates serve as a notable indicator of diminished community resilience (Frankenberger *et al*., 2013; Kwasinski *et al*., 2016). Economic security is a crucial factor for community resilience drought (Frankenberger *et al*., 2013). To assess economic security in Kitui County, a household questionnaire was administered by trained Research Assistants.

The respondents were asked to state their levels of income and the levels were matched with various categories of income provided in the questionnaire as shown in Figure 4.6. The results revealed that 67% (258) of household respondents earn less than Ksh.5,700 per month. This income equates to less than Kshs.190 per day per person or approximately USD 1.89 per day which is less international poverty line of USD.1.90 per day per person. Consequently, 67% of respondents live below the World Bank's 2022 international poverty threshold of USD 1.90 per day per person which is the minimum income needed for basic human needs (World Bank, 2022). Living on less than USD 1.90 per day per person is considered extreme poverty. Such high poverty rates are indicative of reduced community resilience to drought (Frankenberger *et al*., 2013; Kwasinski *et al*., 2016).

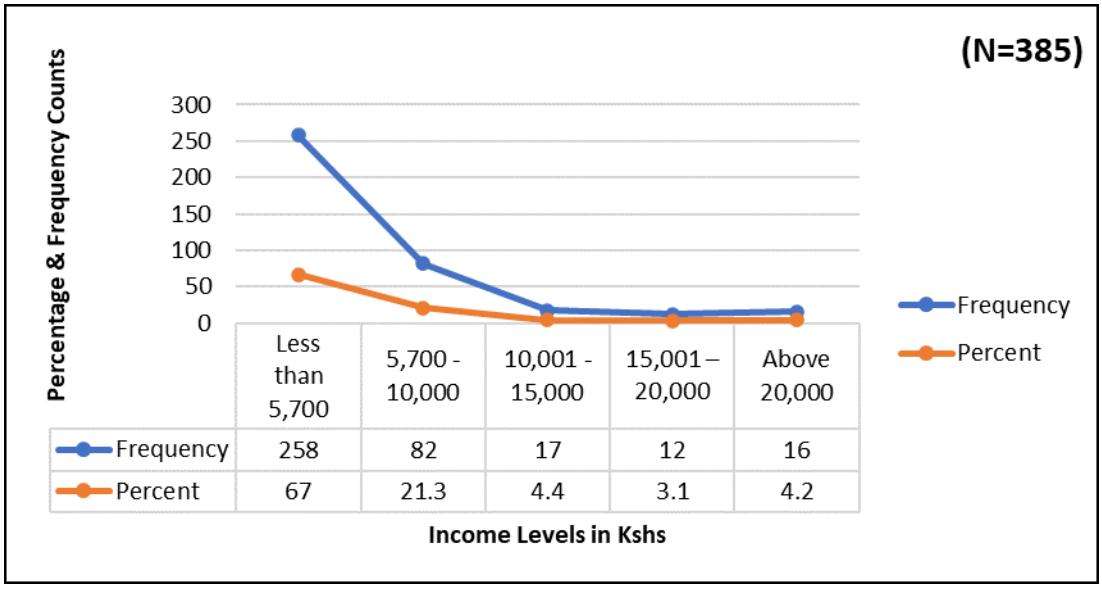


Figure 4. 6: Household income per month in Ksh

Source: Field Data, 2022

Despite its huge agricultural potential, poverty in Kitui County remains high. A total of 47.5% of the population in the county is considered poor compared to the national rate of 36.1% while 12.5% live in absolute poverty (KNBS, 2019). Kenya's poverty gap shows that poor households in rural areas are further to the poverty line compared to households in urban areas while distribution of poverty is also more severe in rural areas where majority of poorest population live (Diwakar & Shepherd, 2018). People are poor in the sense that they have limited opportunities and choices, they lack power and voice, and have limited human security (SIDA, 2017: Jagtap, 2019).

The Kitui County's economy is dependent on agriculture, which contributes to rural employment, food production and rural incomes. Kitui is highly exposed to drought disaster (Nyandiko *et al*., 2015). According to World Bank (2015), recurrent droughts could cause communities to move in and out of poverty over time. High poverty levels increases exposure and sensitivity of communities to drought risks. This is because poverty not only increases a community's exposure and sensitivity to drought disaster but also lowers a community's coping capacity to drought disaster (World Bank, 2015).Having the ability to gain employment is crucial in the fight against poverty and inequality. A lack of access to productive work limits people's ability to adapt to drought challenges and deprives them of the means to meet their own and their families' basic needs in the face of disasters brought on by drought. (Ndung'u et al., 2021). Employment and pay levels and trends are also important indicators of poverty and inequality (KNBS, 2013).

In Kitui County about 18,228 people are wage earners and 388,431 are self-employed (County Government of Kitui, 2018). The interplay of absorptive, adaptive and transformative capacities for vulnerable households living in poverty is core in resilience building to drought conditions (Béné *et al*., 2014). Moreover, coping capacities contribute to the reduction of drought disaster risks and hence build community resilience to the impact of drought. Frequent and prolonged droughts result in asset depletion, environmental degradation, impoverishment, and unemployment, thereby undermining a community's capacity to cope with drought risks (Hellmuth *et al*., 2007).

This kind of a situation exacerbates vulnerabilities of households and community economies, therefore undermining any efforts made in community resilience building (Hellmuth *et al*., 2007). Economic investment is a key characteristic of a resilience community. Economic activities refer to a diverse range of employment opportunities, incomes, and financial services, as well as flexible resources and have capacity to accept uncertainty and to respond proactively to change (IFRC, 2012). Drought's societal and economic effects are a barometer of a country's resilience and progress. Countries with a larger economy and more economic diversity are more likely to weather economic storms. Consecutive droughts caused by global warming may reduce household income (Verner, 2012).

4.2.8 Household Diversification of Income Sources

This study investigates household diversification as a crucial aspect of community resilience. An overwhelming majority of the surveyed households, specifically 89.4% (344), obtained their income from crop and livestock production, while only 40% (154) derived their earnings from small-scale businesses, 30% (116) from casual labour, 3% (11) from brick making, a mere 9% (35) from beekeeping, and just 1% (3) from the sale of tree seedlings, among other sources as depicted in Figure 4.7. It is worth noting that the study highlights the vulnerability of the predominant income sources of these households to drought conditions. These findings align with earlier research, such as Nyandiko (2015), which observed that residents in Kitui County rely on income sources that are highly susceptible to weather fluctuations, thus exposing them to significant drought-related risks.

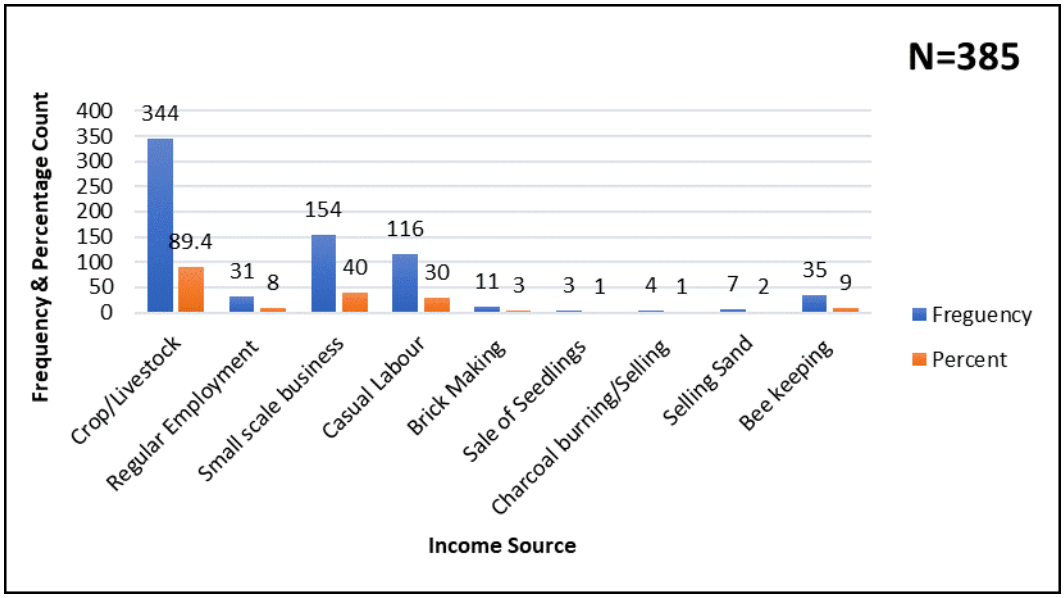


Figure 4. 7: Household Income Sources

Source: Field Data, 2022

Observation methods reveal that diversifying income sources is a crucial coping strategy against drought. One such income-generating activity, as depicted in Plate 4.1, involves sewing and selling weaving products like ropes and baskets.

Plates 4. 1(a and b): Weaving Products (Sisal made baskets & ropes)

Source: Field Data, 2022

The study garnered valuable insights through a series of focus group discussions (FGDs) that delved into the diverse sources of household income. In one notable FGD session, a female respondent highlighted the community's innovative income-generating strategies. She stated:

> "In our community, we employ various alternative income-generating methods, such as marketing crop residue and animal manure to enhance soil fertility in our farms. Additionally, we engage in selling livestock, crafting and selling sisal products, and utilizing the earnings to purchase food, cover school fees, and meet various household needs."

Sisal cultivation serves a dual purpose in drought-prone areas, offering improved soil and water retention while providing a source of income through basket and rope production. This income becomes vital in mitigating food insecurity for households during drought situations. Diversifying income sources is recognized as a strategy to enhance community resilience to drought (Hallegatte *et al*., 2017). Income diversification helps households cope with drought shocks and stresses. Communities suffer less from drought disasters when some income sources are located outside the hazard-prone area, either through government support, remittances, or income sources less exposed to drought risks (Hallegatte *et al*., 2017). Diversification of income sources is critical in bolstering community resilience to drought in Kitui County, providing alternative livelihoods less vulnerable to drought (Hallegatte *et al*., 2017). Despite the majority of households (89.8%) relying on drought-sensitive crop and livestock production, some (39.5%) have started diversifying their income sources through small-scale businesses, beekeeping, weaving, selling ropes and baskets, brickmaking. Over-reliance on climate-sensitive income sources signifies low community resilience, as stated by a female participant during an FGD when she stated:

> "lack of jobs, high food prices and shortage of money were major challenges experienced by many households during drought disaster situations".

A study by Steiner and Atterton (2014) examined the role of private sector businesses in enhancing resilience in rural Scotland. The research showcased how these businesses contribute to economic and social development in rural areas, thereby strengthening overall resilience.

Private businesses play an increasingly vital role in the rural labor market and can diversify local economies, ultimately improving residents' quality of life and environmental resilience. Financial inclusion can aid impoverished individuals in Kitui County by facilitating less vulnerable forms of saving, enabling diversification through access to credit for absorbing, coping with, and recovering from drought shocks (Gatto & Sadik-Zada, 2022). Drought's socio-economic impact reflects a community's coping capacity and development level, with wealthier and economically diverse communities generally expected to be more resilient (Verner, 2012). Enhancing community resilience not only reduces drought risks but also contributes to poverty reduction and sustainable development. Efforts to mitigate disaster risks and reduce poverty are interdependent, fostering sustainable development (Hallegatte *et al*., 2017). Suda (2000) highlights the need for sustainable solutions in drought resilience building, as past efforts have been primarily reactive (ARC, 2014).

However, Clarvis *et al*. (2015) point out that improving access to financial instruments for drought-affected communities is a long-term development action often neglected by current humanitarian aid, which typically focuses on immediate relief. Cochrane and Cater (2017) argue that certain forms of diversification can be maladaptive and may not reduce resilience and diversification opportunities may not be equally accessible to all groups. Nonetheless, overall, income source diversification is crucial for enhancing community resilience to drought by strengthening the adaptive, and absorptive capacities of affected communities and improving their well-being (Béné *et al*., 2012).

4.2.9 Household Housing Standards and Community Resilience to Drought

The results depicted in Figure 4.8 reveal that a significant majority of the household respondents indicated that they were residing in permanent housing. Specifically, 67.8% (261) reported living in permanent houses constructed with brick walls and iron sheets, while 5.2% (20) resided in houses with stone walls and iron sheets. In contrast, a portion of the respondents inhabited temporary or semi-permanent housing, such as mud-walled houses with iron sheets 22.6% (87) or mud-walled houses with grass thatched roofs 4.2% (16). Although this study observed that the majority of the households were living in permanent houses, it is crucial to note that a significant number were residing in temporary and semi-permanent structures. This is significant because those dwelling in less durable housing face challenges in progressing toward building resilience to drought.

In Kitui County, as of 2019, 93.1% of houses feature corrugated iron sheet roofs. Earth/sand (52.1%) and cement (42.1%) are common flooring materials. The primary walling materials include bricks (46.4%), mud/cow dung (11.6%), and concrete/concrete blocks (10.6%) (KNBS, 2019). Existing studies emphasize the pivotal role of housing in shaping occupants' quality of life and community resilience to drought (Béné *et al*., 2012; Kwasinski *et al*., 2016). Deshkar & Adane (2016) asserts that housing infrastructure is a key factor in community resilience to drought disasters while Deshkar & Adane (2016) emphasize that community resilience is closely tied to access to essential services and robust housing infrastructure.

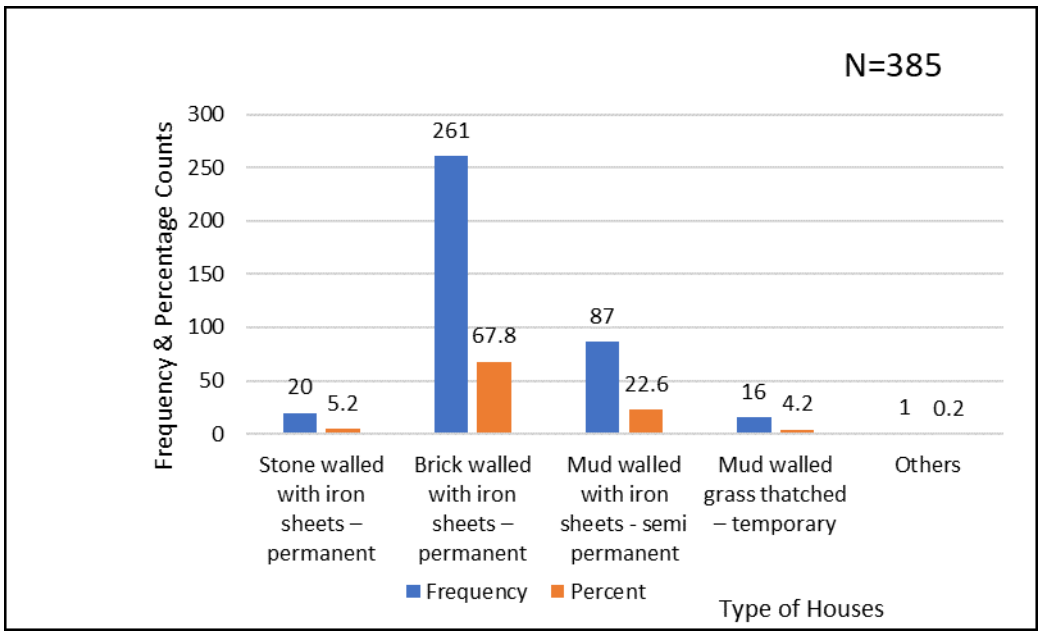


Figure 4. 8: Types of Housing for household respondents

Source: Field data, 2022

Modern infrastructure, including housing, plays a vital role in the well-being and functionality of society (van der Merwe *et al*., 2018; Patel *et al*., 2017). The type of housing individuals inhabit significantly influences their quality of life. The construction materials used for floors, roofs, and walls indicate their ability to protect against hazards and environmental risks. Housing quality also impacts access to utilities such as water, power, and garbage disposal, which in turn affects residents' health, safety, and overall well-being. Inadequate provision of these essential services undermines community resilience, resulting in higher illness rates, limited commercial opportunities, and an unfavorable environment for education.

4.2.10 Household Access to Health Care Services and Community Resilience to Drought

This study assessed access to health services. The study found that among the household respondents, the majority, accounting for 41.8% (161), travel a distance of less than 2 km to access the nearest treatment centre. A significant portion, 34.5% (133), cover a distance between 3 km and 5 km, while 18.4% (71) travel a range of 6 km to 10 km. In contrast, a smaller percentage, 5.2% (20), have to journey more than 11 km, as illustrated in Figure 4.9.

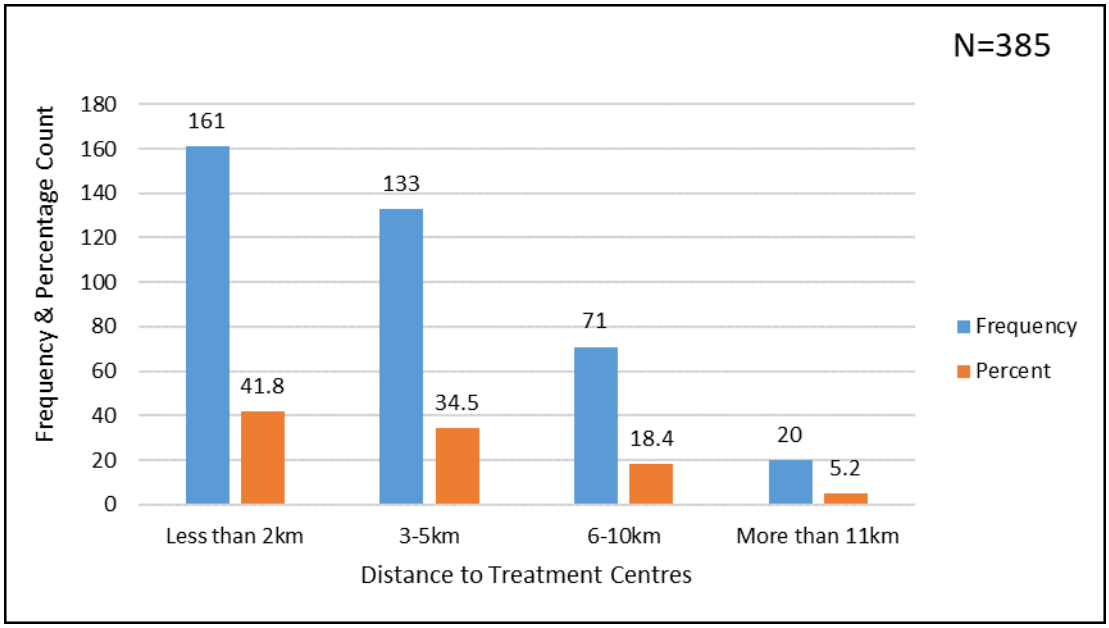


Figure 4. 9: Distance to Nearest Treatment Centres

Source: Field Data, 2022

Kitui County boasts a total of 240 operational public health facilities, which represent 6% of the country's 4,000 public health facilities (County Government of Kitui, 2018). This exceeds the national average of 85 health facilities per county by 145 (63%) facilities (KNBS, 2015).

However, the distribution of these health facilities is notably uneven and inequitable (County Government of Kitui, 2018). For example, in Kitui Central, Kitui West, and Mwingi West Sub-Counties, over 95% of residents have a health facility within an average 5-kilometer distance from their homes, with less than 30 minutes of travel time, meeting the World Health Organization's recommendations (WHO, 2001). In contrast, underserved Sub-Counties require people to travel between 15-25 kilometers to access existing health facilities (County Government of Kitui, 2018). This disparity in healthcare accessibility, with long travel distances to treatment centres, significantly impacts the well-being of Kitui County's residents and undermines their resilience to drought. According to Béné *et al*. (2014), distant health facilities struggle to respond rapidly to emergency health needs at the community or household level, increasing the risk of drought-related diseases.

Furthermore, research highlights the importance of community health both before and after a drought disaster in building resilience (Patel *et al*., 2017). Understanding and addressing health vulnerabilities can enhance community resilience and mitigate long-term health issues following drought disasters. Notably, Figure 4.10 illustrates that malaria affects most household respondents at 40% (155), followed by cold and fever at 15% (59), and Typhoid at 13% (48).

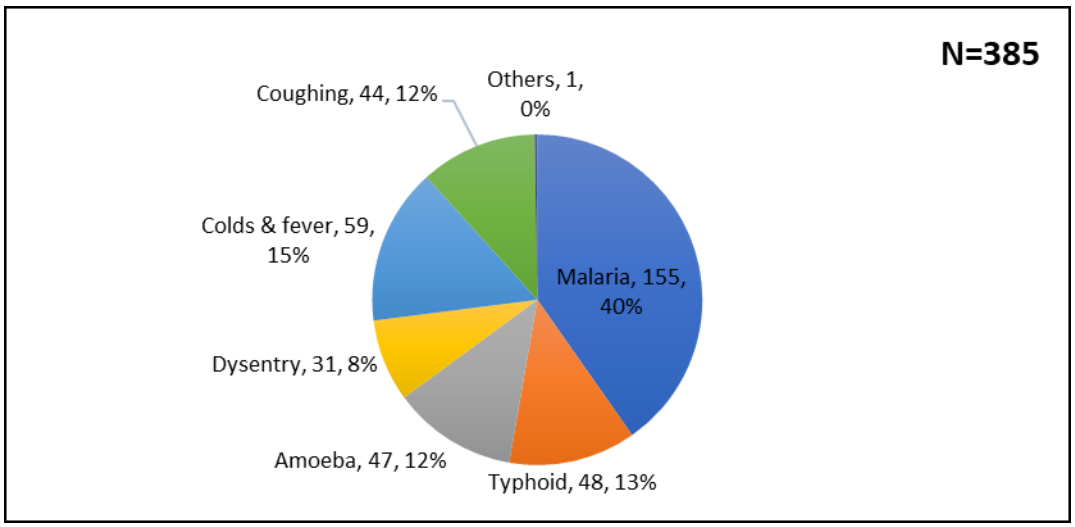


Figure 4. 10: Disease Prevalence in the Study Areas

Source: Field Data, 2022

This validates the findings of the Kitui County Government (2018), which highlights that malaria is the predominant health issue in Kitui County. Available evidence further demonstrates that both human and livestock diseases become more prevalent during periods of drought (Stanke *et al*., 2015). In accordance with IFRC (2014), the state of public health stands as a vital component of a resilient community. This characteristic underscores the significance of human well-being and health.

The necessity to cover extensive distances to access healthcare, inadequate healthcare facilities, and a high prevalence of diseases are clear indicators of a community's low resilience levels (Béné *et al*., 2014). Moreover, the limited access to health services and drought are intricately intertwined, with drought conditions frequently compounding the difficulties associated with healthcare accessibility. Drought conditions give rise to an array of health hazards, such as dehydration, heat-related

ailments, respiratory issues caused by dust and smoke, and diseases related to contaminated food and water sources. Scarce access to healthcare may lead to delayed or insufficient treatment for these afflictions, potentially resulting in more severe health consequences. Drought intensifies the existing health challenges, and the constrained availability of healthcare impedes the capacity of impacted communities to effectively address the health risks arising from drought.

4.3 Humanitarian Aid Implemented in response to Drought Disaster

4.3.1 Types of Humanitarian Aid Implemented in response to Drought Disaster

Data was collected through household questionnaires administered by Research Enumerators. Each respondent was queried about the types of humanitarian aid supported by humanitarian agencies operating in Kitui County. The findings have been summarized in Figure 4.11. The results reveal that 20% (77) of household respondents ranked access to food support as the primary form of humanitarian aid provided by these agencies during drought disasters. This was followed by planting of drought-resilient crops at 11.7% (45), awareness creation on drought mitigation at 9.6% (37), establishment of drought early warning information systems at 8.3% (32), and the conduct of drought risk assessments at 7.5% (29), among others. Results from key KIIs shown in Appendix X detailed the extensive support provided by various government agencies, Faith-Based Organizations (FBOs), and International NGOs in response to drought in the study areas. The government agencies involved included the Office of the Governor, the Ministry of Education, and the Ministry of Agriculture.

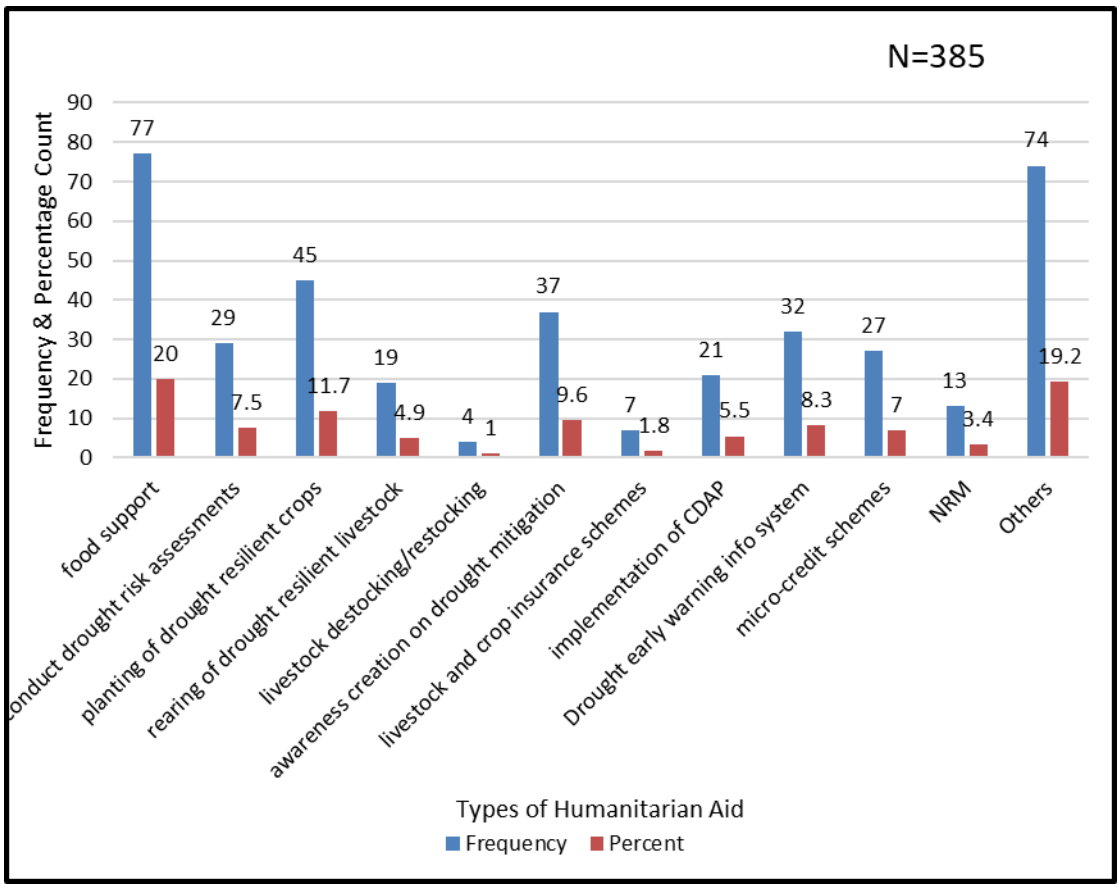


Figure 4. 11: Types of Drought Response Strategies Implemented in Kitui County

Source: Field Data, 2022

The Office of the Governor supported initiatives such as water tracking, pro-poor student bursaries, drought-tolerant certified seeds, cash-for-work programs, mechanized farming, and market linkages for farmers. The Ministry of Education contributed to the effort by funding bursaries for impoverished students, tree planting in Polytechnics, and distributing plastic water tanks for rainwater harvesting in schools.

Meanwhile, the Ministry of Agriculture played a crucial role in promoting conservation agriculture, agroforestry, forest establishment, water tracking, livestock vaccination and treatment, cash transfers for labour, drought-tolerant seeds, and water resource construction, all aimed at bolstering agriculture and addressing drought-related challenges. Action Aid Kenya played its part by supporting initiatives such as income diversification, training in agronomic practices, small-scale businesses, table banking, provision of low-interest loans, pasture production training, and distribution of drought-tolerant crops. They also assisted in various water projects for households and livestock, soil and water conservation, tree nurseries, shade net utilization, and capacity building programs. Care International provided critical aid to drought-affected households, offering monthly consumption stipends, seed capital for small businesses, and training in Village Savings and Lending Associations (VSLAs), table banking, and restocking of goats.

They also supported the registration and payment of National Health Insurance Fund (NHIF) contributions for affected households to ensure access to healthcare services and foster community capacity building, irrigation, and food security planning. FBOs, including African Development Services - Supports and Caritas Kitui, played a vital role in drought response efforts in Mwingi North and Mwingi West. These organizations focused on a range of activities to address the challenges brought about by drought. African Development Services - Supports engaged in participatory vulnerability and capacity assessments, water projects, efficient water usage promotion, the establishment of Ward Climate Change Planning Committees, tree

planting, small-scale irrigation through farm pods, cultivation of drought-tolerant crops, village savings and lending initiatives, climate change training, and advocacy. Caritas Kitui, on the other hand, supported farmers by introducing improved farming technologies like the Zai pit method, constructing water structures, implementing small-scale irrigation systems, and enhancing livestock production with high-breed goats and chickens.

They also encouraged the use of donkeys for economic purposes, provided capacity-building in farming and climate change adaptation, facilitated early warning information sharing, and promoted the cultivation of drought-resistant crops. Moreover, Caritas Kitui established community linkages to access valuable information and market connections for poultry keepers. In addition to the efforts of these FBOs, the National Drought Management Authority (NDMA) contributed by disseminating crucial early warning information to the local communities and coordinating drought response initiatives in the County. This information was vital in helping residents prepare for and mitigate the effects of drought. When asked which activities you support in Mwingi North and Mwingi West, the Director of Caritas Kitui said:

> "We support zai technology which enhances retention of water and soil moisture in the farms, permanent water sources, rearing of chicken, donkeys and improved goat varieties and promote growing of drought tolerant crops to help farmers adapt to the changing climate".

These result show collaborative efforts of the government and humanitarian aid agencies have encompassed a wide array of drought mitigation measures aimed at

enhancing water conservation, agriculture, livestock production, and community resilience in the face of changing climate conditions. These initiatives collectively support drought-affected communities and enhance their resilience. The Kenyan government, in conjunction with County Governments, has played a proactive role in addressing drought emergencies in ASALs through the Ending Drought Emergencies (EDE) Program (Republic of Kenya, 2023).

From 2014 to 2018, substantial funding was allocated to mitigate the impact of drought in ASAL communities, focusing on key areas such as peace and security, climate-resilient infrastructure, human capital development, sustainable livelihoods, drought risk management, and institutional development, as well as knowledge management (Republic of Kenya, 2018). Government reports highlight the significant contribution of funding channelled through EDE, an initiative of IGAD, in building the resilience of communities in ASAL areas against drought risks (Republic of Kenya, 2023). Successes include nutrition intervention systems, education management information systems, and secure land titles, all contributing to sustainable livelihoods across ASAL counties. The availability of funds through NDEF has ensured continuous support for drought risk management through regular cash transfers to vulnerable households (Republic of Kenya, 2023). However, challenges and funding constraints hinder progress on some planned projects, such as water infrastructure (Republic of Kenya, 2023). In dealing with drought in Kitui County, community-level adaptation measures are crucial and include shifting from crop farming to livestock keeping, adopting drought-tolerant crop varieties and

livestock breeds, and implementing soil and water conservation practices, conservation agriculture, and water harvesting structures (MoALFC, 2021; Mwangi *et al*., 2020; Mutunga *et al*., 2018).

Actions aimed at addressing poverty have proven effective in accelerating socioeconomic development, stimulating microeconomic opportunities, promoting job opportunities, and reducing drought risks in rural areas (Khisa *et al*., 2017; Kamara *et al*., 2020). Studies in Eswatini and Lesotho have shown positive outcomes from engaging local communities in various actions, such as soil improvement, environmental management, sustainable management of natural resources, economic development, food aid support, promotion of drought-tolerant crop varieties, strengthening drought early-warning systems, and the promotion of agroforestry and intercropping for improved productivity (Kamara *et al*., 2020).

Access to intermediaries, contextualized data, flexible finance, and protection measures can empower communities to proactively adapt to drought and enhance community resilience (Arielle *et al*., 2018). Resilience-building efforts should incorporate pre- and post-disaster preventive actions to reduce the severity of drought impacts (Cutter et al., 2008). Developing and implementing drought preparedness and mitigation strategies can help mitigate drought's adverse effects and enhance community resilience (Wilhite *et al*., 2014; Suda, 2000). It is essential to focus on long-term development initiatives addressing the root causes of vulnerability to drought hazards and prioritize community resilience over short-term reactive measures (Clarvis *et al*., 2015).

Enhancing community resilience to drought requires continued efforts, coordination, community-level adaptation, and long-term development-focused actions, contributing to sustainable development and improved community resilience against drought (Republic of Kenya, 2023).

4.3.2 Humanitarian Aid Agencies Supporting Drought Mitigation Measures

The study sought to identify the humanitarian agencies supporting drought mitigation in Kitui County. The results indicate that the humanitarian aid agencies supporting disaster risk reduction (DRR) efforts in Kitui County include the county and national governments mentioned by 56% (216) of the household respondents, Faith Based Organizations (FBOs) 13% (51), and Community Based Organizations (CBO) 8% (29). Notably, 12% (47) of the household respondents are not aware of any agency that supports DRR work in their area while 11% (42) are aware of other agencies supporting DRR work. The above findings are summarized in Figure 4.12.

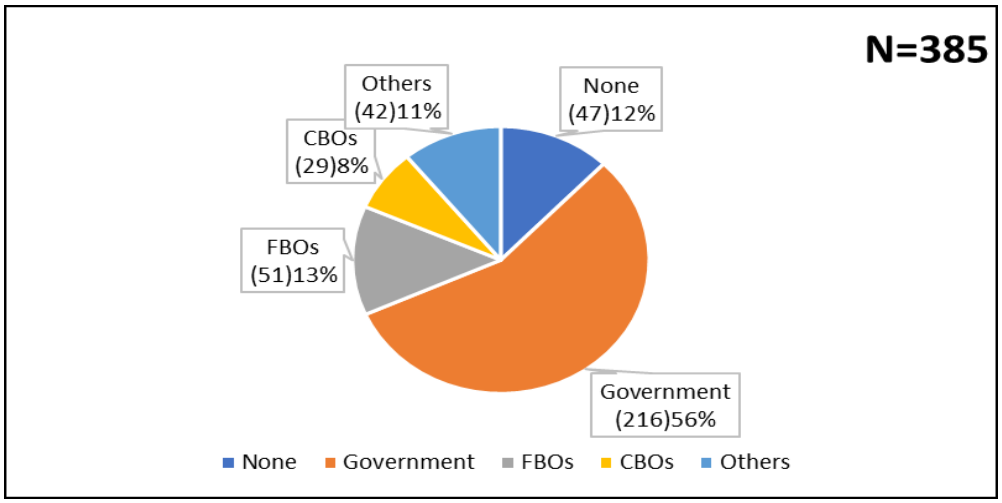


Figure 4. 12: Agencies Supporting Drought Risk Reduction Work

Source: Field Data, 2022

Findings from KIIs interviews as shown in Appendix X revealed various humanitarian aid agencies have been supporting drought risk reduction work in Kitui County. These include the Governor's Office and the County Ministries of Education, Agriculture and Action Aid, Care International, The Anglican Development Services, and Caritas Kitui.

Other agencies supporting humanitarian aid work in response to drought challenges in Kitui County as per the results of KIIs as shown in Appendix X include: the RED Cross which was supporting the Governor of Kitui *Ndengu* revolution, World Vision, World Food Programme (WFP), Foreign Commonwealth Development Organisation (FCDO) and European Union (EU) who were supporting the NDMA activities; CAFOD, Misereor and Trocaire were supporting the work of Caritas Kitui, Australian Board of Mission, Compassion, Sustainable Land Management (SLIM) funded by UNDP. German Agro-Action, Farm Africa among others.

According to the County Government of Kitui (2018), there are several humanitarian aid actors supporting drought mitigation measures in Kitui County. These are comprised of USAID, World Bank, WFP, FAO, UNDP, World Vision, Caritas Kitui, DANIDA, CEFA, AMREF, Red Cross, Water Tower Agency, UNICEF, Hand in Hand, Compassion International, Farm Africa, KUMEA, APHIA PLUS, ADS, GOAL, ADRA, CCS, APHIA Halisi, EU, among others. These NGOs contribute considerably towards social and development work which is critical in drought risk reduction.

These agencies are working closely with organised community groups and CBOs and provide diverse funding, technical assistance and capacity building for communities and government agencies to implement social and development programmes aimed at building the capacity of local communities to withstand drought shocks and stresses.

A good example is the National Government supports cash transfer programmes for older people, orphans and vulnerable children and persons with severe disabilities in the county through financial support from some of those agencies. Previous studies have established that the presence of many organizations in Kitui County, including government, research institutions, non-governmental organizations, faith-based organizations, community-based organizations, and the private sector which are engaged in the promotion of climate-smart agricultural interventions (MoALFC, 2021).

Additionally, the presence of several humanitarian aid agencies in the study area is a clear indication that local communities are well connected and are having relationships with external actors who could provide them with wider supportive environment and supply them with essential goods and services during drought disaster (Frankenberger *et al*., 2013). The services offered by humanitarian aid agencies are critical in cushioning the target communities against drought risks. It may therefore be agreeable with Cheshire et al., (2015) that it is unrealistic to expect a community to respond effectively to a large-scale drought disaster since effective disaster management requires a collaborative and coordinated approach to drought disaster management.

On the other hand, it is the responsibility of communities, individuals to respond to drought early warming information being provided before, during and after drought disaster events. According to Aldrich (2012), social networks and connections form the core engine of recovery after disaster events and therefore are a core foundation of disaster risk reduction. While increased connectivity can help things get back to normal after an interruption, other researchers say it also makes it more likely that an event like a disease will spread throughout the system and affect everything in it. Thus, the resilience of social-ecological systems and the environmental services they generate can be increased or decreased, depending on the level of connectivity present (Clarvis *et al.*, 2015).

4.3.3 Effectiveness of Types of Humanitarian Aid in Drought Risk Reduction

The study assessed the effectiveness of the types of humanitarian aid implemented in Kitui County. This was done through use of household questionnaires administered by Research Assistants where each of the household respondent was asked what changes have been brought by drought mitigation measures supported by humanitarian aid agencies in the study areas. The study found that there have been some changes attributable to the types of humanitarian aid implemented by I/NGOs, CBOs, and FBOs in Kitui County which include reduced drought losses as confirmed by 24.2% (93) of the household respondents, growing of drought tolerant crops and keeping of drought resilient livestock 13% (50), and better understanding of drought risk 9.9% (38) while17.4% (67) had not observed any change and 3.4% (13) had no knowledge about any change as shown in Figure 4.13.

These parameters had been informed by previous studies (Mwangi *et al*., 2020; MoALFC, 2021; Mutunga, *et al*., 2018). Previous studies indicate that adoption of drought adaptation measures is critical in reducing existing and future drought risks (Wens *et al*., 2021). The low percentage contribution to change attributed to the types of humanitarian aid implemented in Kitui County was due the shared percentage contribution by each of type of humanitarian aid to drought risk reduction. These findings were triangulated and confirmed through information gathered through KIIs as shown in Appendix X activities supported by humanitarian aid agencies have enhanced water availability at community level during drought situations, enabled students to remain in school, reduced crop losses and improved farming and marketing systems, reduced environmental degradation through soil and water conservation, reduced livestock diseases and enhanced livestock and crop survival rates during drought situations, resulted in diversification of income sources and thereby reduced drought risks, enhanced skill sets, enhanced protection of drought-stricken households against the impact of drought disaster, increased household income, enhanced access to health services and drought preparedness at the community level, enhanced community understanding on drought risks and climate change, improved drought preparedness, increased access to credit facilities, strengthened local community capacities, improved farming techniques, increased access to water, increased access to early warning information and drought preparedness and adaptation to climate change.

During KIIs when asked whether the types of humanitarian aid implemented by I/NGOs, FBOs, CBOs and other actors in Kitui County over the last 10 years had reduced drought risks, one of the female respondents answered:

> "the types of humanitarian aid implemented by the government and the I/NGOs, FBOs and CBOs in Kitui County have reduced drought risks as people are now planting drought tolerant crops and keeping drought tolerant livestock and these have reduced crop and livestock losses" .

However, during a FGD, a participant female stated:

> "I am afraid to say drought risk reduction has not been realized because humanitarian aid reaches only a few households".

This response shows that humanitarian aid was not reaching all the vulnerable groups and therefore not all drought prone households were benefiting from it. The results show that humanitarian aid agencies have play a pivotal role in mitigating the impact of drought on vulnerable communities. Their multifaceted efforts, spanning water availability, education, agriculture, environmental conservation, livestock management, income diversification, skill development, health services, and community resilience, collectively contribute to reducing the vulnerabilities and risks associated with drought. The positive effects of humanitarian aid are not only immediate but also contribute to long-term adaptation and preparedness for future drought situations and the challenges posed by climate change. Responsive drought risk reduction efforts necessitate adequate investment of financial and material resources (Clarvis, *et al*., 2015). Existing studies indicate that despite the increasing volume of international humanitarian aid (Urguhart & Girling, 2022), humanitarian funding has failed to counteract the increasing scale of humanitarian needs (Urguhart & Girling, 2022; Ahmed, 2021).

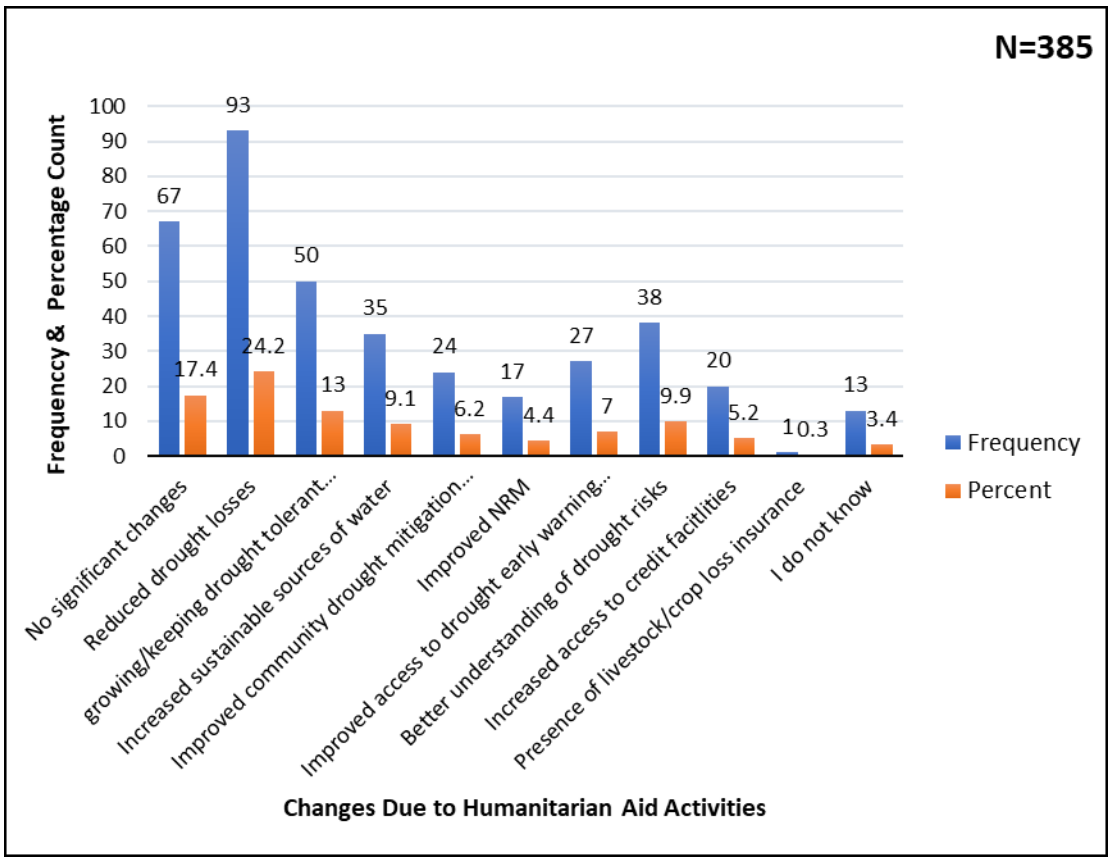


Figure 4. 13 Changes Due to Humanitarian Aid Activities

Source: Field Data, 2022

Household respondents were surveyed by Research Assistants to assess their opinions regarding the effectiveness of humanitarian aid provided by government entities, I/NGOs, CBOs, and FBOs in reducing drought risks in Kitui County. The summarized responses in Figure 4.14 reveal that 78% (301) of the respondents agreed, and 9% (34) strongly agreed that the humanitarian aid interventions implemented by these entities in Kitui County have indeed mitigated drought risks. In contrast, 6% (23) expressed disagreement, and 7% (27) strongly disagreed with this notion.

In summary, the data suggests that the types of humanitarian aid programs implemented in Kitui County have contributed to a reduction in drought risks within the study areas. These findings corroborate the earlier insights obtained from Key Informant Interviews (KIIs), which also indicated a positive impact of humanitarian aid efforts in minimizing drought-related losses in the study areas.

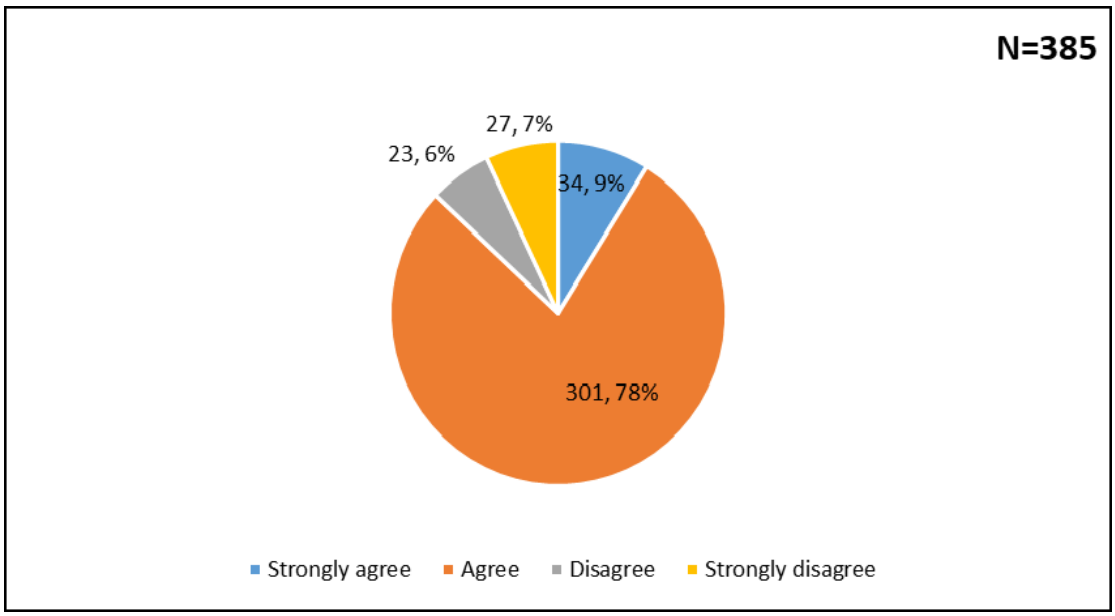


Figure 4.14: Household's Perception on Effectiveness of humanitarian aid in Drought Risk Reduction

Source: Field Data, 2022

Results from the KIIs resonated with these findings as some KIIs agreed they had observed changes and some level of community resilience had been built more effort was needed. For instance, when asked whether the work supported by humanitarian aid agencies in Kitui County had built community resilience to drought, the Action Aid Project Coordinator for Asset Creation Project implemented as part of the

Protracted Relief and Recovery Project (PRRO) responded:

> "to some extent yes, but we are yet to get there. Some level of community resilience has been built but not to the desired level".

This means that the efforts supported by humanitarian aid agencies in Kitui County to respond to drought have contributed to reducing drought risk and subsequently enhancing community resilience to drought. However, further efforts are required to improve community resilience to drought to a level where communities and households will not lose their assets due to drought hazards.

Government reports indicate significant progress in ending drought emergencies in ASALs Counties, including Kitui (Republic of Kenya, 2022). Access to clean and safe water for domestic use has increased from 62% in 2018 to 65.3% in 2020, and access to sanitary services has risen from 45% in 2018 to 57% in 2020. The number of kilometers (km) of completed annual road infrastructure has increased from 285 in 2018 to 374 in 2020, according to the EDE progress reports. Additionally, irrigated lands are expected to reach 216,000 hectares in 2020, up from 203,871 hectares in 2018. The Gross Enrolment Rate in primary schools in ASAL counties stands at 90.4%, compared to the national average of 99.6%, and in secondary schools, it is 58.6%, compared to the national average of 71.6%. The installed capacity of power has increased from 1,768 MW in 2013 to 2,712 MW in 2020, among other improvements.

EDE has supported numerous activities in Kitui County, including the provision of food, cash, water, livestock, agriculture, education, public service, natural resources, drought and coordination assessments, health, and peace and security (Republic of Kenya, 2022). Kitui County is expected to receive a total of USD$17,235,802.22 in investment between 2011 and 2024 (NDMA, 2022). Contributing organizations include USAID, IFAD, the European Union, the Danish Embassy, the German Embassy, and the Government of Kenya.

Arielle *et al*. (2018) found that humanitarian aid enhances drought readiness. In contrast, Muricho *et al*. (2019) note that aid in Kenya prioritizes risk mitigation over community development. Levine (2014) contends that resilience hinges on factors such as power access, social organization, and governance, refuting the belief that aid programs for household assets bolster community resilience (Arielle *et al*., 2018; Muricho *et al*., 2019; Levine, 2014; Republic of Kenya, 2022; NDMA, 2022).

4.4 Humanitarian Aid Factors against Community Resilience to Drought Factors in Kitui County

Data on humanitarian aid factors were correlated and regressed with community resilience to drought factors which included social, economic, and environmental factors influencing community resilience to drought were correlated with data related to humanitarian aid factors which included data on types of humanitarian aid implemented in response to drought disasters Kitui County.

Social community resilience factors include food availability, access and management of water and sanitation services, existing drought coping mechanisms, community organisation and drought preparedness and access to health services. Economic factors included farming systems, existing irrigation services and household access to transport services while environmental factors included household land management systems and household main sources of cooking fuel. Data on social, economic and environmental factors was drawn from Chapter five.

4.4.1 Normality Test for Humanitarian Aid Factors against Community Resilience to Drought Factors

Analysis of results of tests of normality between humanitarian aid factors (independent variable) and community resilience to drought factors (dependent variable) as shown in Table 4.2 shows that the data set humanitarian aid factors against community resilience to drought factors were non-normally distributed, a violation of normality assumption. This is because the Kolmogorov - Smirnov and the Shapiro - Wilk tests, performed on the data sets for the two variables gave p - values less than 0.05 at 5% level of significance, implying that the data values for the dependent variable were skewed. Therefore, a decision to choose between parametric and non-parametric methods for use was made. A non-parametric test, however, only provides a p - value, a quantity that is often misinterpreted. Since a parametric method like the t - test have a direct link with regression models as they often provide an effect estimate that is adjusted for other variables which differ between the groups, it was adopted. Linear models make inferences about means, thus if the means are normally distributed, the inferences will be valid.

Fortunately, means tend to follow a normal distribution even when the variable itself does not. The larger the sample size, the more extreme the distribution of the observations can be without compromising the validity of the t - test. This is because of the Central Limit Theorem (CLT), which states that the distribution of the means approximates to the normal distribution when the sample size increases, regardless of the distribution of the original observations under some regularity conditions. Thus, even when the underlying aspect follows a highly skewed distribution, the means approach a bell curve as the sample size increases.

Table 4. 1: A Test of Normality between Humanitarian Aid and Community Resilience to Drought

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Community resilience to drought	.262	384	.000	.858	384	.000
Humanitarian Aid	.276	384	.000	.830	384	.000

a. Lilliefors Significance Correction
Source: Field Data, 2022

4.4.2 Linearity Test for Humanitarian Aid Factors against Community Resilience to drought

The Karl Pearson's coefficient of correlation for testing the relationship between humanitarian aid and community resilience is based on the assumption that there is linear relationship between the two variables (Saleemi, 1997). A linearity test was conducted to establish the relationship between humanitarian aid and community resilience to drought.

The results of the scatter plot of humanitarian aid versus community resilience to drought showed a linear relationship between the two variables as reflected in Figure 4.15. Therefore, the linearity test was satisfied. By looking to the scatter of the various points we note that humanitarian aid and community resilience to drought factors are positively related with the line of the best fit showing a rising trend. Thus, the linearity test shows that there is a cause-and-effect relationship between the forces affecting the distribution of the items in the humanitarian aid factors and community resilience to drought factors.

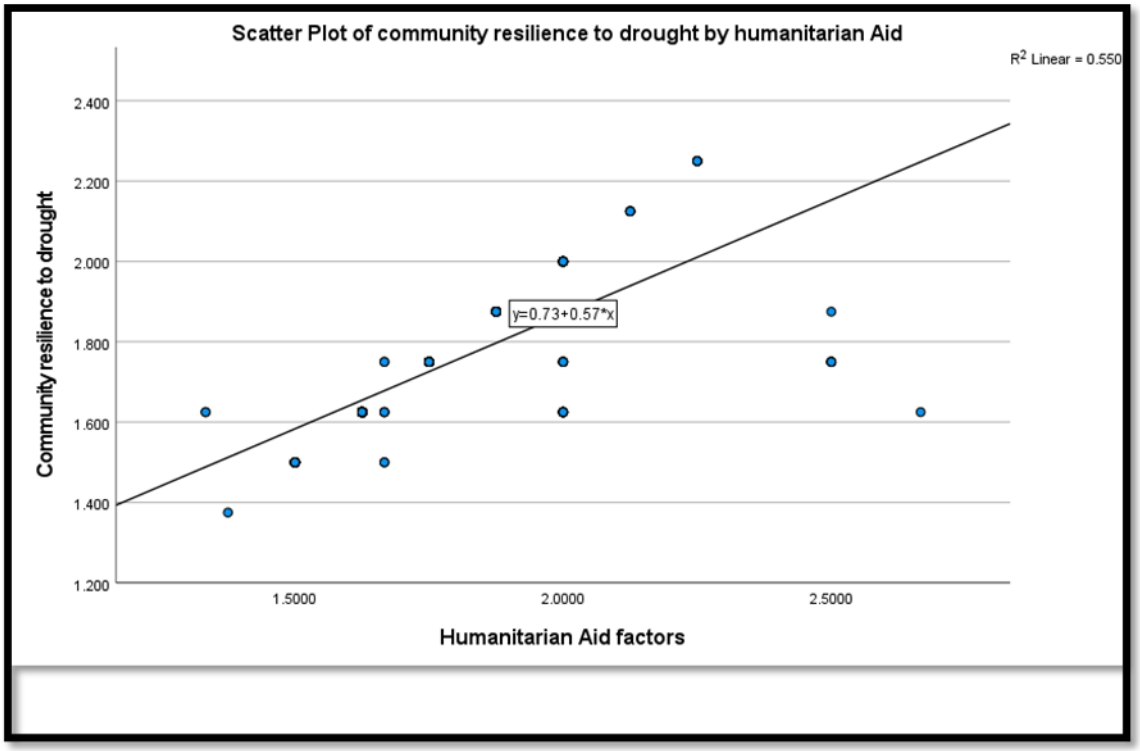


Figure 4. 15:Test Result for Linearity of Humanitarian Aid and Community Resilience

Source: Field Data, 2022

4.4.3 The Correlation between Humanitarian Aid Factors and Community Resilience to Drought Factors

The correlation between humanitarian aid in building community resilience to drought was found to be statistically significant ($p = 0.000 < 0.05$) at 0.05 significance level and a strong positive correlation coefficient $R= 0.742$ as shown in Table 4.3. This implies that that community resilience to drought increases with increase in humanitarian aid factors.

Table 4. 2: The correlation between Humanitarian Aid Factors against Community Resilience to Drought Factors

Correlations

		Community resilience to drought	Humanitarian Aid
Community resilience to drought	Pearson Correlation	1	.742**
	Sig. (2-tailed)		.000
	N	384	384
Humanitarian Aid	Pearson Correlation	.742**	1
	Sig. (2-tailed)	.000	
	N	385	385

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field Data, 2022

4.4.4 Regression Analysis for Humanitarian Aid Factors and Community Resilience to Drought Factors in Kitui County

The study sought to establish the effect of humanitarian aid in building community resilience to drought using regression analysis.

The regression results in Table 4.4 shows that the effect of humanitarian aid on community resilience to drought was significant (F (1, 383) = 704.253, p = 0.000 < 0.05). With R = 0.805 and the coefficient of determination R^2 = 0.648, the model implies that about 64.8% of community resilience to drought was accounted for by humanitarian aid. The F test was significant with a p value = 0.000 which was less than the standard p value of 0.05 and this meant that the model was significant. From ANOVA, since p value p = 0.000 and was lower than p = 0.05 (p value 0.000 < 0.05), then the contribution of humanitarian aid to community resilience to drought was significant, and the conclusion is that humanitarian aid has caused community resilience to drought to increase. The equation that was fitted for the model was:

$$D = 0.569 + 0.664\text{H} \tag{4.1}$$

Where D is the response variable representing community resilience to drought and H is the regressor variable denoting humanitarian aid factors. The coefficient for humanitarian aid (β) was also significant (β = 0.569, t = 26.538, p = 0.000 < 0.05) indicating that for every unit increase in community resilience to drought (0.569) there is predicted increase of (0.664) units in log odds of humanitarian aid. Since p-value = 0.000 < 0.05, the null hypothesis was rejected and concluded that there was a statistically significant relationship between humanitarian aid and community resilience to drought. In Kitui County, humanitarian aid interventions implemented in response to drought have tended to be very effective in saving lives, but they are not designed to address underlying causes of vulnerability that characterize the ASALs

(IGAD, 2013) and therefore their contribution to resilience building have been minimal. Humanitarian aid system need to support projects aimed at protecting livelihoods, this would contribute to both saving lives and to building resilience through addressing underlying vulnerability (Blaike *et al*., 1994).

Table 4. 3: Regression Analysis of humanitarian Aid factors on Community Resilience to Drought

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.805a	0.648	0.647	0.83323

a Predictors: (Constant), humanitarian Aid

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4.889	1	4.889	704.253	.000b
	Residual	2.652	382	0.007		
	Total	7.542	383			

Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.569	0.044		12.935	0.000
	Humanitarian Aid	0.664	0.025	0.805	26.538	0.000

Source: Field Data, 2022

In drought prone Kitui County, humanitarian agencies offer aid for disaster risk reduction (DRR) and social protection. Yet, limited DRR funding hampers effective drought risk reduction amid frequent and severe droughts. (Development Initiative, 2017). Further, in Kitui County like the rest of Kenya, disaster response initiatives tend to be ad-hoc, uncoordinated and short-term response measures, which are undertaken in most instances in form of emergency relief services to the drought affected communities.

There are limited efforts and investments in strategic drought preparedness and planning processes. Humanitarian aid actors have made limited efforts in integrating strategic disaster preparedness and early recovery measures into the ongoing humanitarian and development initiatives (Suda, 2000). Additionally, lack of flexible, holistic risk management strategy and adequate and flexible funding options affects community building efforts in Kitui County. Although it is increasingly difficult to cut to zero drought risks in the context of constantly changing climate (Khisa *et al*., 2014), having flexible and holistic risk management strategy coupled with a flexible funding mechanism will enhance community resilience to drought through reducing exposure and vulnerability to drought risks by enabling the drought affected communities to improve their ability to cope with unavoidable shocks from recurrent droughts (Hallegatte *et al.*, 2017: Clarvis *et al*., 2015).

Households in drought-prone Kitui can reduce their vulnerability by diversifying income sources beyond drought-exposed areas, as advocated by Hallegatte *et al*. (2017). Diversification enhances resilience, enabling communities to better cope with drought shocks. Unfortunately, inadequate financial inclusion hinders these efforts. Access to financial services and social safety nets plays a pivotal role in aiding households affected by drought. These measures facilitate absorption, coping, and recovery from drought-related damages, as highlighted by Hallegatte *et al*. (2017) and Mavhura (2017). Regrettably, expanding access to financial instruments in Kitui County is a long-term development endeavor, often overlooked by current humanitarian aid efforts, as noted by Clarvis *et al*. (2015).

CHAPTER FIVE

THE LEVEL OF COMMUNITY RESILIENCE TO DROUGHT IN KITUI COUNTY

5.1 Introduction

This chapter presents and discusses the quantitative and the qualitative findings based on the information gathered using a household questionnaire, community focus groups discussions key informant interviews and observation checklists. Information gathered on various variables that assess and measure community resilience. Such variables economic security, farming systems, food availability, land management systems, energy sources and access to services in order to assess and determine the level of community resilience. The chapter covers the second objective of the study whose objectives was to determine the level of community resilience to drought in Kitui County. The chapter starts by presenting data on economic security, farming and irrigation systems, land management systems, sources of energy and community services including access to water and sanitation and transport systems, and social, economic, and environmental factors.

5.2 Community Resilience to Drought and how it was measured

This study defines community resilience as the transformative process of strengthening the capacities of people, households, communities, governments, and the environment to improve living standards, transform livelihood systems and the general human well-being to be able to anticipate, prepare for, adapt and flourish in the context of drought shocks and stresses.

As communities continue to experience protracted drought events driven by climate change, the need to enhance their resilience and be able to prepare, adapt and cope with shocks and stresses in a manner that enables them to maintain essential functions and not only to bounce back better but also to bounce forward towards an improved social, economic, environmental, and general well-being is paramount.

The conceptual research approach for this study is based on prior work by Frankenberger *et al*. (2013), the United Nations Development Programme (2013), and Kwasinski *et al*. (2016). Environment, politics, society, history, demographics, religion, conflict, and policy all play a role in the resilience of a community in the face of a drought crisis, as shown by the framework. Therefore, different indicators are used to gauge a community's resilience, such as its absorptive, adaptive, and transformative capacities for collective action, as well as its tangible and intangible assets that enable its members to meet their most fundamental needs. Financial, material, political, human, social, and natural capitals make up the bulk of these. Community social dimensions include things like people's readiness, responsiveness, connection, learning and creativity, self-organization, diversity, inclusion, social cohesion, aspirations, perceptions, attitudes, the kind and quality of their interactions, and other factors.

Community resilience can also be measured by the extent to which residents are able to self-organize and collaborate strategically in order to preserve and restore vital community institutions, structures, and related environments in the face of or in

preparation for disaster shocks and stresses. Management of communal assets including roads, community water systems, hygiene, health, and education services are all examples of things that fall under the purview of collective action. Communities that have the assets, social dimensions, and collective actions to manage the shocks and stresses to which they are exposed, and thereby gradually reduce their vulnerability, are said to be on a resilience pathway, whereas communities that lack these capacities are more likely to follow a vulnerability pathway. Communities that are resilient are those in which its members are less likely to go hungry, who have access to healthy food and a safe living space, who have stable sources of income and health care, who can afford to send their children to school and who are actively engaged in the political and economic systems that shape their lives.

The other critical indicator of a resilient community is the ability to undertake assessments in order to understand the realities that exist in a community due to its history, natural environment, culture and other factors in order to develop a deeper understanding of the most fundamental dimensions of a community including sustenance, health, housing and shelter, security and safety, education and personal development, culture and identity, belonging and relationships.5.3 Level of Community Resilience to Drought in Kitui County

5.3.1 Farming Systems and Community Resilience to Drought

The analysis in this sub-section focuses on the interplay of farming systems and community resilience building against drought in Kitui County.

5.3.1.1 Types of Crops Grown

This sub-section provides an analysis of the types of crops cultivated in Kitui County and their contribution to enhancing community resilience against drought. The data for this analysis was collected through the administration of questionnaires by research assistants. Each household respondent was asked about the types of crops they cultivate. It is important to note that the majority of the household respondents reported cultivating more than one type of crop. The summarized results are presented in Figure 5.1. The findings reveal that 93.5% (360) of the household respondents cultivate green grams, while 72.7% (280) grow maize, and 71.7% cultivate cowpeas, among other drought-resilient crops. In contrast, only 8.8% (34) of respondents grow pumpkins, and 8.3% (32) cultivate fruits.

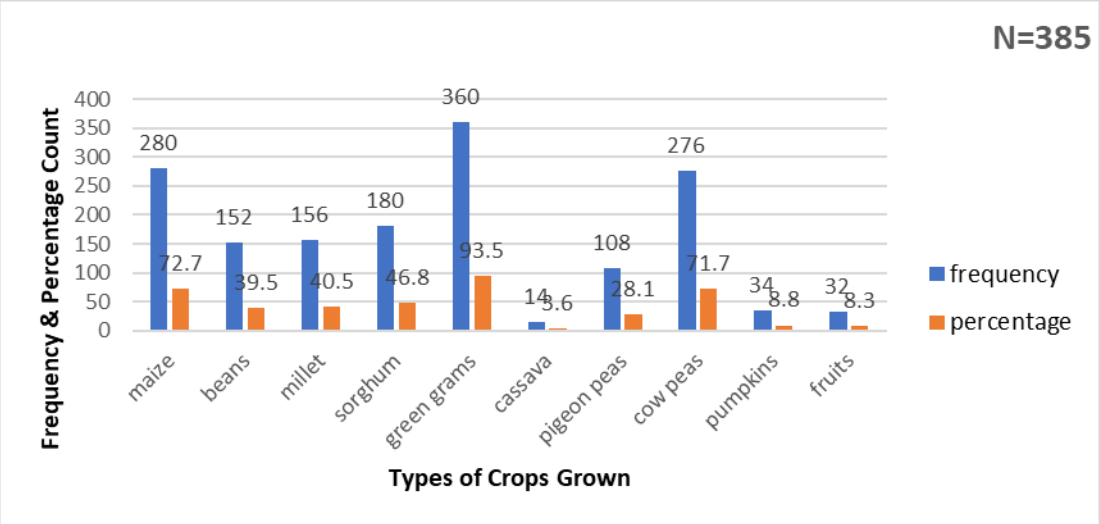


Figure 5. 1: Types of Crops Grown

Source: Field Data, 2022

The study area witnessed a significant increase in the cultivation of green grams, which was primarily attributed to the "*Ndengu Revolution*" launched on October 9, 2017, by the Kenya Red Cross Society in collaboration with the Kitui County Government. This initiative, known as the *'Inua Mkulima'* food security project, aimed to benefit approximately 200,000 smallholder farmers in Kitui County. The project's overarching objectives were to enhance food security, alleviate poverty, foster rural development, offer agricultural training to small-scale farmers, and provide them with essential financial services to promote self-sufficiency and community resilience to drought (The Red Cross, 2017).

Focused on the short rainy season of October-November-December 2017, the *Ndengu Revolution* provided participating communities with high-quality, high-yield certified green gram seeds and comprehensive training in green gram farming. Each household received a 2Kg packet of green gram KS20 and N26 seed varieties, sufficient for half-acre plots, suited to the local climate. The project's total budget amounted to approximately Ksh100 million, and the Kenya Red Cross Society pledged to collaborate with the Kitui County Government to facilitate the formation of farmer cooperatives and secure bulk markets for their produce (The Red Cross, 2017). As a result of this initiative, green gram cultivation, commonly referred to as "*ndengu,*" flourished in the study area, as illustrated in Plate 5.1. This agricultural boost contributed to enhanced food security and economic well-being in the region, showcasing the positive impact of the Ndengu Revolution in enhancing community resilience to drought conditions (The Red Cross, 2017).

Plate 5. 1 Green Grams crop

Source: Field Data, 2022

Moreover, the above findings were also confirmed through the key informant interviews. During the KIIs one of the male respondents stated:

> "People in Kitui County are growing crops such as green grams, early maturing sorghum, millet, cowpeas, white beans, short maturing black beans, *Katumani* millet, pigeon peas and mangoes. These types of crops are doing very well in the county".

These findings indicate that farming systems in Kitui County, are gradually adapting to the challenges posed by drought conditions. Previous studies conducted in the area have highlighted the adoption of various adaptation strategies by farmers in response to drought. Mutunga *et al*. (2018) found that 76% and 88% of respondents in Kaveta and Mikuyuni villages, respectively, had implemented drought adaptation measures.

These strategies included transitioning from crop farming to livestock keeping, planting drought-tolerant and early-maturing crops, practicing irrigation, and adjusting planting timelines to cope with declining rainfall and unpredictable rainy seasons. Oremo (2013) also noted that farmers in Mutomo and Yatta districts had begun implementing soil conservation measures, changing crop varieties, reducing livestock numbers, diversifying crop varieties, and exploring income diversification and water harvesting schemes.

Furthermore, research among farming communities in Sebakwe, Zimbabwe, highlighted the importance of local knowledge in preserving traditional food crops and agricultural practices as a source of community resilience (Shara *et al*., 2009). This local wisdom allowed residents to sustain their livelihoods, maintain cultural practices, and enhance their resilience in a changing environment. Kitui County heavily relies on agriculture for food security and rural household income, with the sector employing over 35% of the population (KNBS, 2019). The predominant agricultural activities in the county encompass farming, animal production, aquaculture, and fishing. The primary food crops cultivated include maize, sorghum, millet, green grams, cowpeas, beans, pigeon peas, cassava, sweet potatoes, arrowroots, cotton, sisal, sunflower, mangoes, pawpaws, watermelons, citrus fruits, bananas, cabbages, tomatoes, kales, onions, sugarcane, and bullet chilies (KNBS, 2019).

However, the agricultural systems in Kitui County face significant vulnerability to climate change, mainly due to their reliance on inconsistent and insufficient rainfall (Nyandiko *et al*., 2015; Khisa , 2017). Vulnerability to climate change is determined by exposure to climate stress, sensitivity to these stressors, and adaptive capabilities (Mwangi *et al*., 2020). A recent study by Mwangi *et al*. (2020) observed a west-to-east vulnerability gradient in the county, with western and central regions showing lower vulnerability compared to the eastern and northern areas. The eastern regions practice marginal mixed farming, whereas the western regions engage in superior mixed farming. The most vulnerable areas in Kitui County are situated in the east, characterized by dryer lowlands extending from the north to the south. These regions experience erratic rainfall patterns and heightened vulnerability to climate-related threats. Additionally, their capacity to adapt to these challenges is limited, exacerbated by frequent conflicts along their borders with Tana River County.

In summary, Kitui County's farming communities are making efforts to adapt to the drought challenges by implementing various strategies. However, the vulnerability of the county's agricultural systems is influenced by the region's exposure to climate stress, sensitivity to these stressors, and adaptive capabilities. The eastern and northern regions of the county face more significant challenges, compounded by their limited ability to adapt to drought conditions which have become part of the climate system.

5.3.1.2 Types of Livestock Kept

Data was gathered through household questionnaires administered by Research Assistants. Each household respondent was asked to state the types of livestock they kept. Majority of the household respondents stated they kept more than one type of livestock. The findings are presented in Figure 5.2, illustrating that a significant proportion of the household respondents, 86% (331 individuals), raised sheep/goat, 81% (312 individuals) kept local breed chickens, and 60.3% (232 individuals) had local indigenous cattle. In contrast, a mere 2.1% (8 individuals) reported keeping improved chickens, and only 0.8% (3 individuals) were engaged in dairy cattle farming.

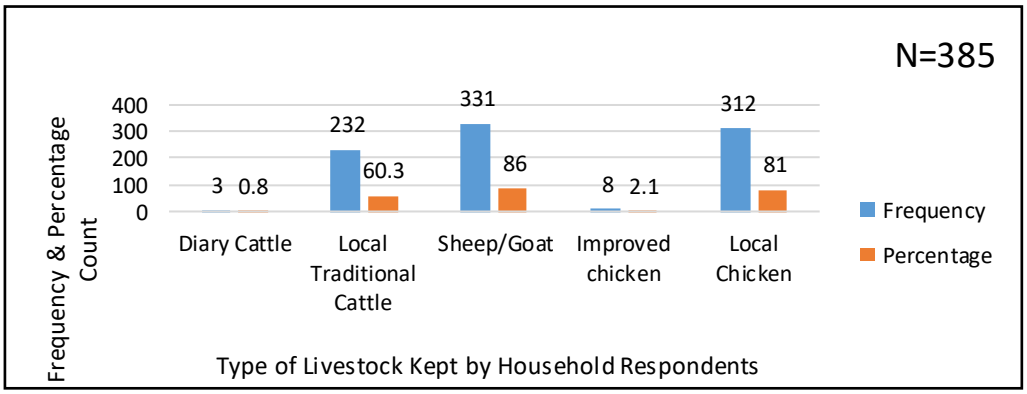


Figure 5. 2: Types Livestock Kept

Source: Field Data, 2022

The above findings were confirmed through triangulation wit information gathered through FGDs. During the FGDs, participants were asked what type of livestock do you keep?

One of the male respondents answered:

> "the main livestock we keep are cattle, goats, sheep, donkey, and chicken. We prefer keeping traditional livestock that are more tolerant to drought conditions experienced in this area".

Previous studies indicates that livestock rearing is widely practiced throughout the county. Indigenous breeds are the most common choice, valued for their resilience in ASAL conditions. Specifically, the Zebu breed comprises 97% of the cattle population, with Boran and Sahiwal breeds making up the remaining 3%. In Kitui County, indigenous chickens are the predominant poultry breed, with over 90% of households engaging in their rearing. Additionally, other poultry types, such as geese, turkeys, fowl, quails, ducks, and guinea fowl, are also kept (MoALFC, 2021).

According to Chanamuto & Hall (2015), raising local livestock breeds enhances the survival rates of young animals due to their adaptability to local conditions and their increased resilience to the impacts of climate change. Moreover, there is a gender dimension to the preference for local breeds, as local communities perceive them as more suitable for women's husbandry. Nevertheless, livestock keeping in Kitui County remains highly vulnerable to drought. Recurrent drought events lead to the depletion of pasture and water resources, resulting in livestock losses through death and reduced market prices (MoALFC, 2021). According to Chanamuto & Hall (2015), despite the recognition by development agencies of the significance of livestock keeping in rural economies, this sector has often delivered mixed and disappointing outcomes in recent years. Its effects on food supply, security, and poverty alleviation have not consistently met expectations.

5.3.1.3 Challenges in crop and livestock Farming Systems

The data was collected through household questionnaires administered by Research Assistants. Each household respondent was asked to articulate the challenges encountered in both livestock and crop farming. Multiple responses were provided by the household respondents. The summarized findings, presented in Figure 5.3, reveal that households in Kitui County primarily face challenges such as drought 93.8% (361), pest infestation 87.3% (336), forage scarcity 87% (335), water shortage 85.7% (330), crop and livestock losses 75.8% (292), low prices for agricultural produce 61.3% (236), inadequate agricultural services 31.4% (121), and others.

Furthermore, these findings were corroborated by information obtained through FGDs. Participants in the FGDs were asked to share the challenges they confront in crop and livestock farming. One participant expressed:

> "We consistently encounter challenges related to water and pasture shortages during drought situations, insufficient agricultural extension services, weevil infestations, inadequate land availability, and poor storage facilities."

As per MoALFC (2021), it is noted that Kitui County has the potential to produce sufficient food for its residents, with surplus production available for sale to neighbouring counties and beyond. Kitui County's quest for food self-sufficiency faces significant challenges. These obstacles include low adoption of agricultural inputs in both crop and livestock sectors, exacerbated by high poverty levels. Consequently, the county's food production self-sufficiency stands at just 51%. Farmers in Kitui County employ fewer inputs due to factors like high input prices, distant markets, inadequate access, inefficiency, adulteration, and unavailability.

The loss or degradation of forest cover in the region has a detrimental impact on agricultural production, as trees play a vital role in the rain cycle and act as carbon sinks. Prolonged droughts linked to climate change further burden the agricultural sector, leading to drastic reductions in crop yields due to the inadequate replenishment of water sources. Livestock losses, coupled with high poverty rates, negatively impact agriculture (MoALFC, 2021).

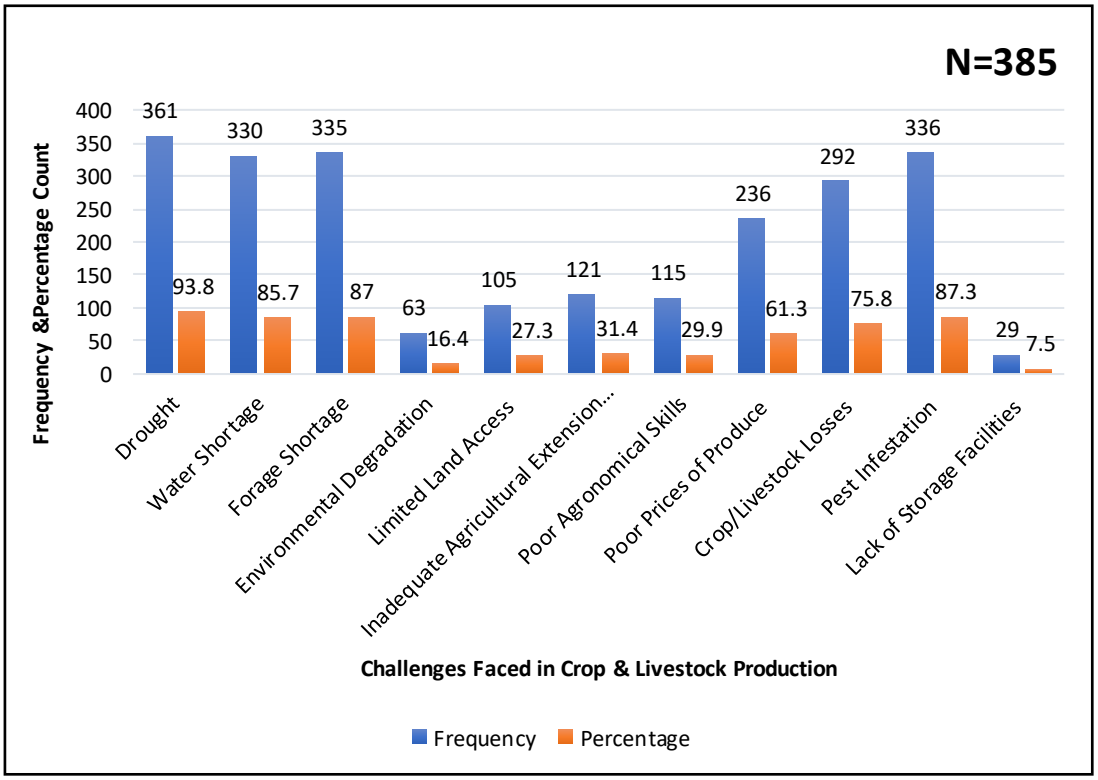


Figure 5. 3: Main challenges Faced in crop and livestock farming.

Source: Field Data, 2022

Inadequate financial investments in purchasing agricultural inputs, extending services, health management, vaccination, irrigation infrastructure, transportation of agricultural produce, off-farm activities, post-harvest processes, and marketing activities contribute to reduced agricultural productivity. Additionally, the lack of essential infrastructure, such as roads, hinders service delivery and farmers' access to markets. Dry and dusty roads during the dry season pose a contamination risk to agricultural produce (MoALFC, 2021). Agricultural production is further hindered by the use of poor farming techniques and equipment, as highlighted by Asena et al. (2017). These factors impede the achievement of optimal farming outcomes and, consequently, food security.

While prior studies have demonstrated the high sensitivity of farming systems in Kitui County to drought conditions, with many crops negatively affected (Nyandiko et al., 2015), this study reveals that households are adapting to the changing climate. They are cultivating more drought-resistant, quick-maturing crops like green grams, cow peas, pigeon peas, and millet, alongside raising drought-tolerant livestock. These adaptations are gradually enhancing resilience to drought conditions.

5.3.2 Existing Irrigation Systems

The study assessed the prevalence of crop irrigation among households. Data collection involved the utilization of household questionnaires, which were administered by Research Assistants.

The study revealed that among the 385 households surveyed, a mere 4% (17 households) reported that they practiced crop irrigation. The remaining 96% (368 households) affirmed that they did not engage in any form of irrigation for their farms, as depicted in Figure 5.4. For those who said they did not irrigate their crops, when asked why they did not irrigate their crops and majority 57.4% (221) said lack of sustainable sources of water was the main challenge hindering them from irrigating their farms followed by lack of irrigation services 34% (131) while 2.1% (8) perceived rain-fed agriculture benefits their agricultural activities sufficiently among other reasons as reflected in Figure 5.5.

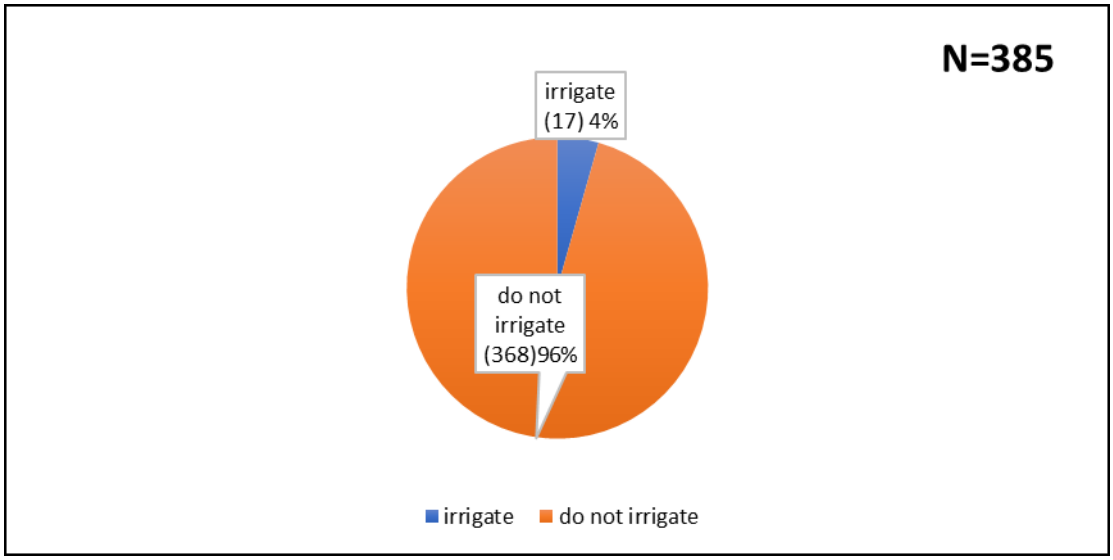


Figure 5. 4: Household Respondents who irrigate their Farms.

Source: Field Data, 2022

This information was confirmed using information gathered through FGDs. During one of the FGDs, participants were asked why they don't irrigate their farms.

A male participant said:

> "During drought situations we experience severe shortage of water. The wells dries and we are left with limited water which is not adequate to irrigate our farms".

Despite Kitui County having a huge potential for developing irrigation infrastructure due to the suitable topography and presence of rivers, earth dams, sand dams and water pans well spread across the county, there are only 5 irrigation schemes in the County comprised of Yatta/Kwavonza, Tseikuru, Zombe/Mwitika, Kitui Rural and Kyangwithya West wards, and 31 irrigation clusters which cover a total of 40.6 hectares (County Government of Kitui, 2018). Only 6,716 households in Kitui County have access to irrigation services compared to the national figure of 369,679 (Republic of Kenya, 2019). The irrigation potential of Kitui County is estimated to be 11,095 ha, of which only 1,850 ha have been utilized (MoALFC, 2021).

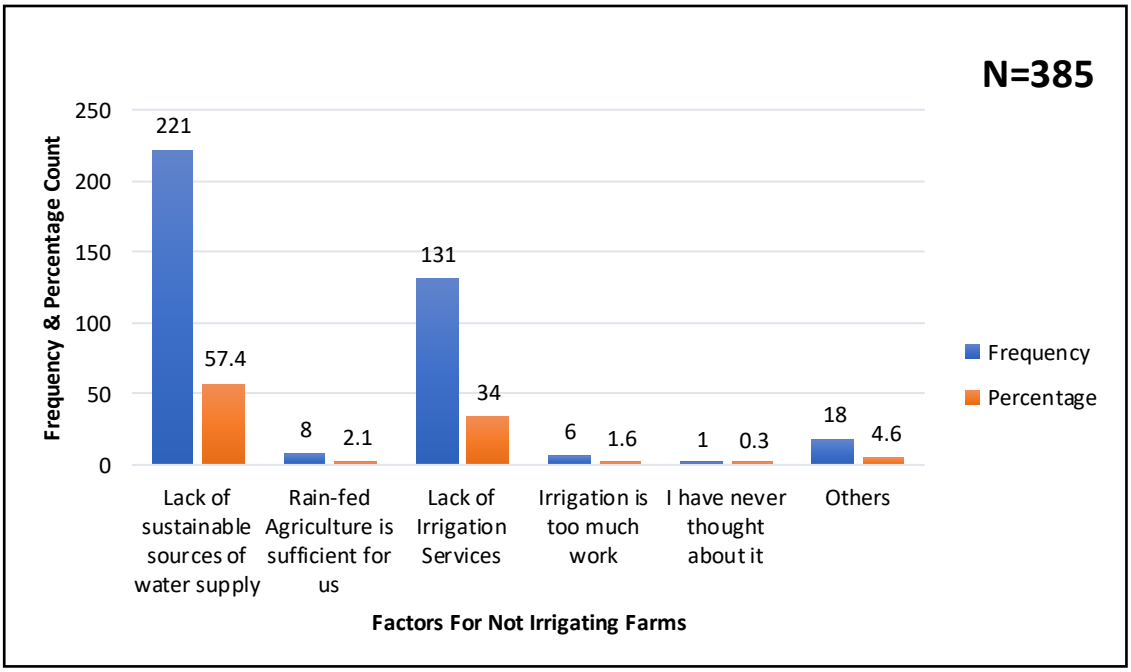


Figure 5. 5: Factors Affecting Irrigation Practices

Source: Field Data, 2022

Due to inadequate irrigation services, as water resources are not fully recharged when rainfall amounts are low; by high start-up capital requirements; and high operational costs, households in Kitui county are forced to rely heavily on rain-fed agriculture (MoALFC, 2021), a farming system which is highly sensitive to drought disaster (Nyandiko *et al*., 2015). Irrigation infrastructure offers good opportunities for coping with agricultural drought by the farming communities (Kamara *et al*., 2020). Irrigation services are critical in mitigating agricultural drought impacts by supplementing low rains due to low precipitation. If well-managed, irrigation schemes are critical in enhancing agricultural production and ensuring improved food security, thereby enhancing community resilience in Kitui County.

Low presence of irrigation services in Kitui County is a socio-economic factor that affects community resilience building efforts against drought risks on food security in Kitui County. Irrigation infrastructure offer suitable opportunities for coping with agricultural drought by the farming communities in Kitui County. Limited irrigation services are among the key indicators of limited community resilience to drought disaster. This fact was confirmed by a study conducted by Makau *et al.,* (2014) in Kitui county who found that limited irrigation services coupled with poor farming techniques, limited agricultural extension and training services and inadequate storage facilities are major bottlenecks to achieving optimum farming outcomes in Kitui County.

Modern infrastructure and essential services such as access to water and irrigation services as well as ability to maintain, repair and renovate them are critical to human wellbeing and effective functioning of a modern society (van dere Merwe, *et al*., 2018; Patel *et al*., 2017).

5.3.3 Food Availability and Community Resilience

The study sought to establish the status of food availability in the County. Data was collected using household questionnaires which were administered by Research Assistants. The household respondents were asked how long the food they had in store could last. The results were summarized in Figure 5.6 which shows majority of the household respondents 62.6% (241) indicated that they had no food in store and only 4.2% (16) had enough food to last for 1 year. Further, the study sought to understand the periods (seasons) when household respondents sell their crop produce. The results are summarized in Figure 5.7 which indicates that majority of household respondents 53% (177) sell their produce immediately after harvest and only 21% (70) sell their produce when the markets are favourable and 1% (4) in the beginning of the rain season.

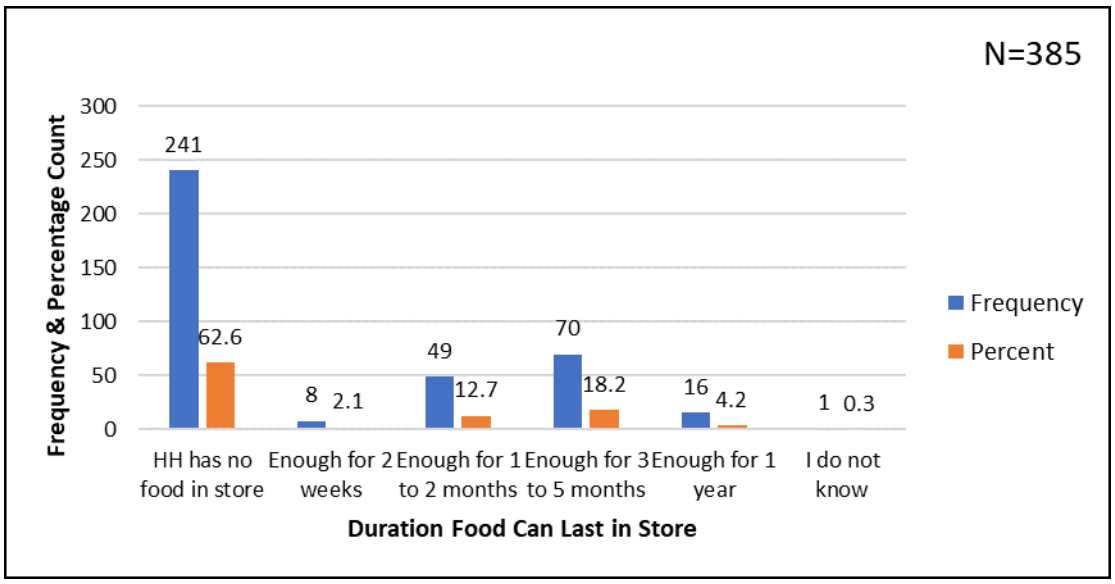


Figure 5. 6: Duration Food can last in Store

Source: Field Data, 2022

The findings indicate that selling crop produce right after harvest often leads to limited financial gains for households. This is primarily because crop prices tend to be relatively low during and immediately after the harvest period. Consequently, many households find themselves lacking sufficient food reserves to sustain them throughout the year. This scarcity of stored food was prevalent among the households surveyed during the study. When questioned about their reasons for immediately selling their crop produce after harvest, the household respondents' responses were summarized in Figure 5.8. A majority of the respondents, accounting for 48% (85), stated that they do so to cover school fees expenses. Additionally, 37.85% (67) sell their harvest to meet various household needs, while 3.95% (7) lack proper storage facilities, compelling them to sell.

Furthermore, 9.04% (16) cited the fear of weevil infestation as a motivating factor for selling immediately after harvest, and a small portion, 1.13% (2), indicated other reasons for their choice to sell at that time. This finding affirms an earlier report by KNBS (2016) which had reported that the level of food poverty in Kitui County stood at 39.4% compared to national average of 32%. This high level of food poverty is closely linked with the high rate of malnutrition in the county. For instance, stunting occurs in 38.2% of children below five years of age while wasting occurs in 4.2% of children below five years (KNBS, 2016). These high rates of nutritional deficit are as result of prolonged periods of food scarcity due to drought situations (less than 20 mm of rainfall) in the county (MoALFC, 2021) as well as high poverty levels.

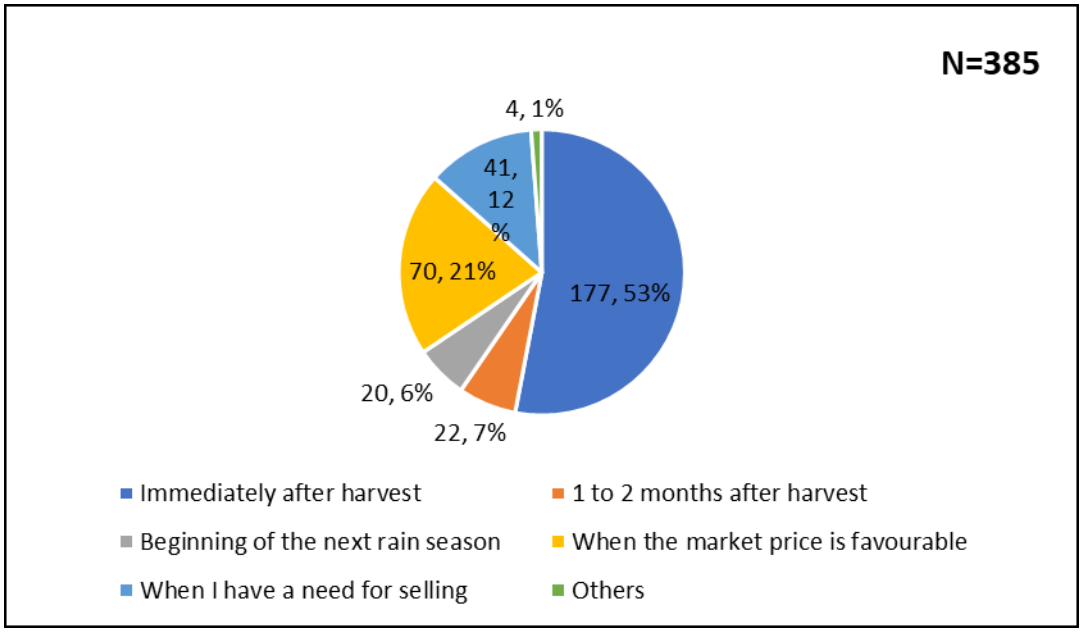


Figure 5. 7: Period When Households Sell Their Crop Produce

Source: Field Data, 2022

In Kitui County, a total of 48% of the population is considered poor; this is higher than the national rate of 36%, accounting for 3.2% of the poor in Kenya while 60.4% of people are living below the poverty line (US$ 1.90 a day) (KNBS, 2016). This finding is a confirmation of the high level of food insecurity in Kitui County. According to a study conducted by Munene *et al*., (2022), as a result of recurrent drought, food availability declines at the household-level and people are forced to purchase basic commodities in the market, using dwindling cash reserves in the absence of viable income generating opportunities. According to the study, in April 2011, 86% of the population in Kitui County was purchasing all of their household food needs in the market. High poverty levels, inadequate financial resources and inadequate storage facilities are the key driving factors for high food insecurity levels in Kitui County (MoALFC, 2021; Wens, *et al*., 2021).

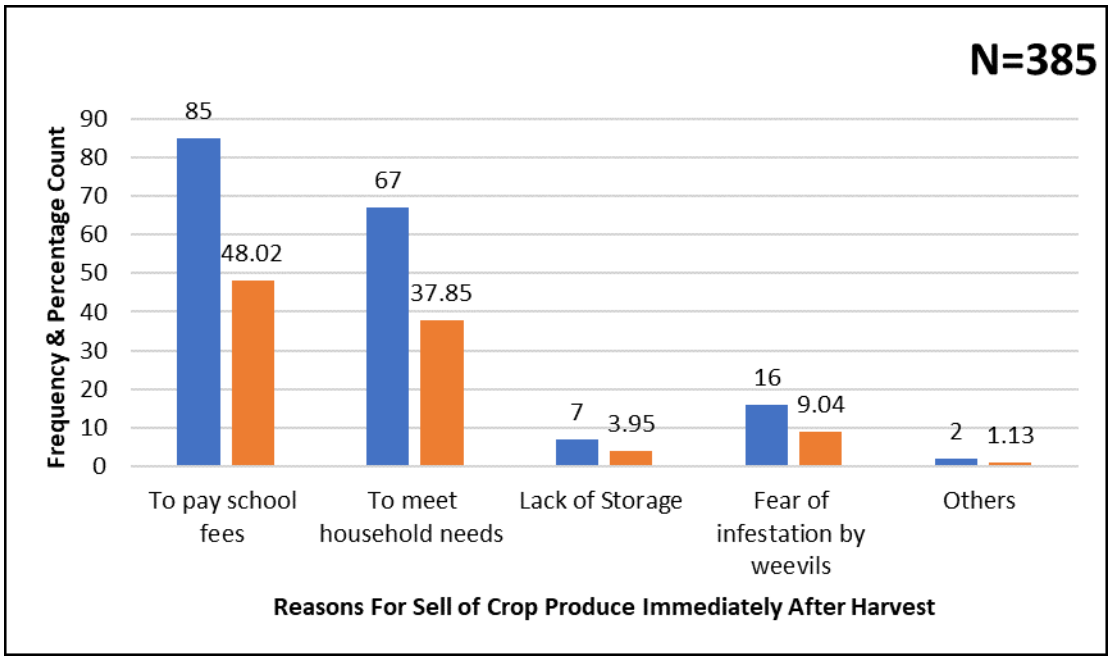


Figure 5. 8: Why Households Sell Produce Immediately After harvest.

Source: Field Data, 2022

Food insecurity within households is a risk to people's livelihoods and therefore an indicator of low community resilience (Wabwoba, 2017). The inability to obtain nutritionally adequate and safe foods in socially acceptable ways is the root cause of food insecurity (Quandt, 2021). However, food security exists when everyone always has access to the food they need to maintain an active and healthy lifestyle, regardless of where they are or how much money they have (FAO, 2003). Food security can be broken down into four categories: 1) Availability 2) Accessibility, 3) Utilization and 4) Stability. For complete food security, all four of these factors must be in place (Peng & Berry, 2019).

A study by Nyandiko *et al*. (2015), had established that the county suffers from significant climate variability which has huge ramifications on crop yield and food security levels. Moreover, recurrent droughts result in long-term devastating impact on food security (Huho & Mugalavai, 2010; Asena *et al*., 2017) and erodes the local coping capacities, giving way for chronic food insecurity and reliance on famine relief among the drought prone communities (Blackwell, 2010). According to Frankenbergeret *et al*, (2013), resilient communities are able to meet the food security needs of its members and ensure access to adequate food while vulnerable communities experience deficits or a high risk of deficits in these aspects. This study found that the food security situation in Kitui County was worrying and was one of the elements that was responsible for low community and household resilience level.

5.3.4 Household Land Management Systems

Data was collected using household questionnaires which were administered by Research Assistants. Household respondents were asked what soil and water conservation methods they practice on their farms. Their responses were summarized in Table 5.1 which indicates that majority 83.9% (323) of the household respondents construct terraces in their farms, 62.9% (242) apply animal manure while 10.4% (40) did not practice any form of soil and water conservation methods.

Table 5. 1: Soil and Water conservation methods applied

Conservation Methods	Frequency	Percent
None	40	10.4
Terraces	323	83.9
Animal Manure	242	62.9
Grass lines	15	3.9
Contour bunds	4	1.1
Mulching	4	1.1
Compost Manure	4	1.1
Others	11	2.9

Source: Field Data, 2022

Inability for some household respondents to apply soil and water conservation measures in their farms is a clear causal factor of land degradation in the study areas. Soil and water conservation measures have been proven suitable for adapting to drought conditions (Haile *et al*., 2019). According to Kioli *et al*. (2017), Kitui County is faced by a major problem of land degradation due to soil erosion and other unsustainable land management practices such as uncontrolled sand harvesting in most rivers, overgrazing, reduction of forest cover, high rates of deforestation for wood fuel and for domestic use, charcoal, and firewood production.

According to MoALFC (2021), environmental degradation in Kitui County has resulted in deforestation and destruction of watershed areas, decline in soil fertility

and resultant low farm yields, loss of biodiversity, reduced productivity, outbreak of pests and diseases, riverbank erosion due to poor farming practices, seasonality of rivers and emergency of dry riverbeds. Environmental degradation negatively impacts agriculture due to increased reduction in pasture and vegetable cover, soil erosion and food insecurity and deepens poverty levels in the county (Nyandiko *et al*., 2015). Although some efforts have been put in place to ensure effective management of the natural resources, some gaps still exist. For instance, the Kitui County Assembly created an ACT to regulate and manage the production, use, and trade of charcoal. However, this legislation is yet to be widely adopted and strictly enforced (MoALFC, 2021).

Effective management of natural resources and the environment is an indicator of community resilience (Frankenberger *et al*., 2013). According to Béné *et al*., (2012), the resilience of a community is intricately intertwined with the condition of the environment and the status of natural resources. Frankenberger *et al*., (2013) contends that resilient communities are able to ensure their environment is protected. This study found that although some environmental management practices are in place in Kitui County, more effort is still needed to improve the level of environmental protection and enhance environmental resilience in Kitui county.

5.3.5 Household Main Sources of Cooking Fuel

The study sought to understand the household main source of cooking fuel in the study area. Data was gathered using household questionnaires which were administered by Research Assistants.

Household respondents were asked to state their main source of cooking fuel. The results were summarized in Figure 5.9 which shows majority 84% (322) of household respondents stated that they use wood fuel, 12% (47), 1% (5) kerosene while only 3% (11) use gas. This finding was confirmed through triangulation using FGD. Participants were asked what the main cooking fuel in their villages. A female respondent from Mivukoni Village responded:

> "the main cooking fuel in this village is wood fuel. It is the same fuel used in the Mivukoni Market where I normally sell wood fuel to earn an income to buy food for my household especially during the dry period like this one when food is very scare".

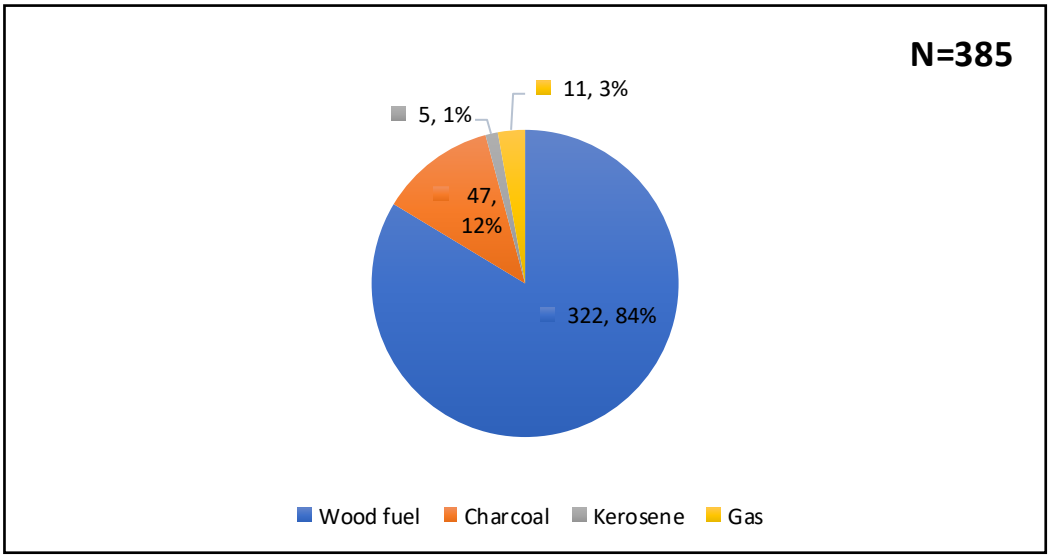


Figure 5. 9: Main Source of Cooking Fuel

Source: Field data, 2022

Also, the participants were asked what is the impact of environmental degradation in Kitui County? A male participant stated:

> "Failure to practice conservation agriculture, cutting and burning of trees for firewood and charcoal, harvesting and selling of sand and brick making are a major cause of environmental degradation and causes food insecurity in Kitui County".

The findings confirm the findings of KNBS (2019), which shows that the main sources of cooking fuel for majority of people in Kitui County is firewood used by 81.3% of the households compared to the national average of 55.1%. Other sources include charcoal used by 9% of the households and only 0.2% of people in the county use electricity for cooking, while 0.3% use biogas, and 0.2% use solar energy. At the County, 76.4% of the households use traditional stone fire as a primary cooking appliance, compared to a national average of 46.4% (County Government of Kitui, 2018). Reliance on firewood for cooking stems from various factors including a highly rural population, high poverty rates, and the consideration of forest land as a public good.

According to Kioli *et al*., (2017), overreliance on biomass for supply of wood energy poses a threat to the national forest cover and is key causal factors for high deforestation and land degradation in the county. Ultimately, deforestation negatively impacts agriculture since forests are key components of the rain cycle and act as carbon sinks (MoALFC, 2021). Although the Kitui County Assembly created an ACT to regulate and manage the production, use, and trade of charcoal, the legislation was yet to be widely adopted due to lack of stringent enforcement measures (MoALFC, 2021). There is no current data on the forest cover in Kitui County. However, according to the KNBS (2013), there were 16 gazetted forests totalling to 37,750 hectares in the County with a total forest cover standing at 7% (KNBS, 2013). Unsustainable patterns of production and consumption without replacement depletes renewable sources of energy (Kioli & Ngare, 2019).

Such a trend quite often results in the loss of a productive base needed for sustainable well-being of any given community, deteriorating living standards and increased vulnerability to drought disasters (Population Action International, 2015; Suda, 2000) and thereby undermines community resilience in any given community (Béné *et al*., 2012). Moreover, excessive environmental degradation is increasingly being recognized as a growing causal factor for recurrent droughts, particularly in ASALs (Suda, 2000).

According to Scott & Pickard, (2018), consumption of energy is closely linked to human development. The type of cooking fuel or lighting fuel used by households is related to the socio-economic status of households. Promoting affordable and sustainable energy access for all is one of the focus areas of the UN SDGs (UN, 2015). Inherent of this goal is the principle 'leave no-one behind' which means that even the poorest and the most disadvantaged people in the world should have access to affordable modern energy systems. Energy access is a state where all households have unlimited access to reliable and affordable energy supply (Karanja *et al*., 2017). Despite having set ambitious targets to achieve universal access to modern energy in line with SDG7 commitments by 2030 (UN, 2015), Kenya has remained an energy deficient nation (Karanja *et al*., 2017). According to the 2019 Energy Act, the government has the obligation of facilitating the provision of affordable energy services to all persons in Kenya (EED Advisory, 2020). A resilient community has capacity to manage its natural assets by recognizing their value and the ability to protect, enhance and maintain them (IFRC, 2015; IFRC, 2014).

Environmental degradation undermines community drought resilience building efforts in Kitui County (IFRC, 2015).

5.3.6 Access and Management of Water and Sanitation Facilities

This study attempted to determine the level of access to water and sanitation services in Kitui. Data was collected by Research Assistants using household questionnaires. The household respondents were asked state the main sources of drinking water in their household. Results were summarized in Figure 5.10 which indicates that majority 30.4% (117) of household respondents rely on boreholes to access drinking water, 15.3% (59) shallow wells, 12.7% (49) tap water while 13.2% (51) rely on earth dams, 11.7% (45) sand dams, 11.2% (43) unprotected shall wells, 2.1% (8) perennial rivers among others.

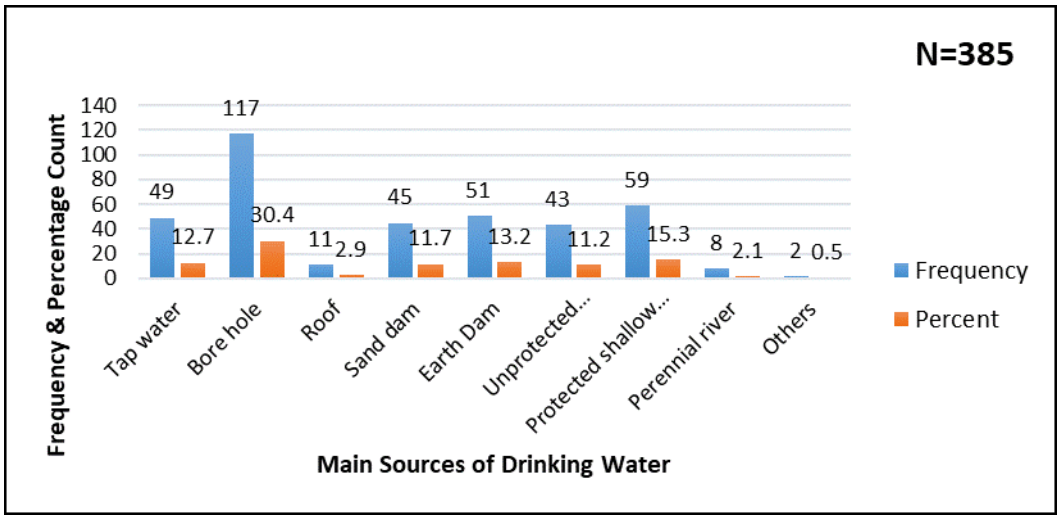


Figure 5.10: Main Sources of Drinking Water

Source: Field Data, 2022

Existing research indicate that water availability is a serious issue in the area. Ponds, lakes, streams, protected springs, protected wells, boreholes, water piped into plots or houses, bottled water, gathered rainfall, purchase from water vendors, and public taps are the main sources of drinking water in Kenya (KNBS, 2019). Kitui County Government (2018) reports that just 53% of residents have access to piped water. The typical distance to the closest water source is 7 Kilometers. However, in times of drought, when water sources are further apart, 58% of households spend thirty minutes or more traveling there just to fill up their water containers. Lack of adaptive capacities as far as water access is concerned is one of the low adaptive capacity gaps in Kitui County (Wens *et al*., 2021; Mwangi *et al*., 2020).

According to Mwangi, *et al*., (2020), locations with low adaptive capacity in Kitui county as far as access to safe water is concerned are in the drier lowlands of Tseikuru, Ngomeni, Endau, parts of Kyuso and parts of Tharaka. According to Wen *et al*., (2021) water sources in Kitui County are scarce, unevenly distributed, and often unpredictable. The county receives approximately 1000 mm of rainfall per year, of which almost all falls erratically during two rainy seasons: March–May, and October–December. These findings were confirmed during the FGDs where participants were asked what the source of water for livestock was and what was the source of drinking in their villages. One of the male respondents stated:

> "Majority of the water sources for drinking water are boreholes and shallow wells, roof harvesting structures, water taps while for livestock we use earth dams, boreholes and shallow wells".

The study also sought to establish the distance travelled by households in the study areas to get water for livestock. Data was collected by Research Assistants using household questionnaires. Household respondents were asked to state the distances they cover when access water for livestock. Results are summarised in Figure 5.11 which indicates majority of the household respondents 46% (177) travel less than 2kms to get water for livestock, while 13.5% (52) travels 4-5 km and 13.8% (53) more than 6 km.

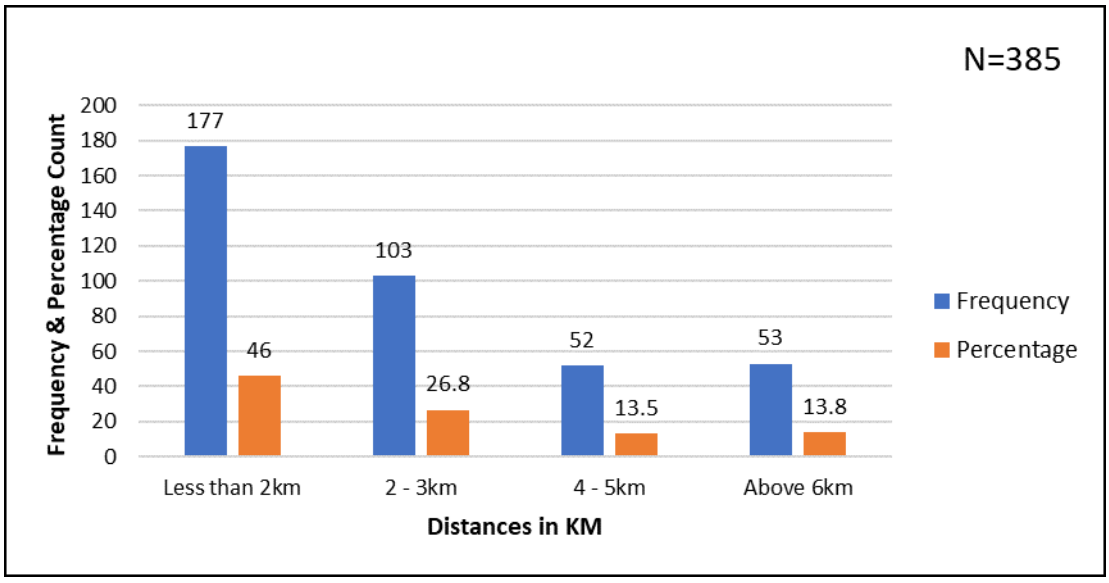


Figure 5. 11: Distance to water source for the Livestock

Source: Field Data, 2022

Existing studies indicates that drought is a key stressor that contributes to water insecurity (Jepson *et al.*, 2017). Warming temperatures due to drought conditions reduce water storage in reservoirs and lead to depletion of ground water. As result, water may become chronically unreliable, inadequate, undrinkable, or unaffortable for millions of people around the world.

Deteriorating physical infrastructure and financial capacity to adapt to the changig conditions may heighten vulnerability to drought, pushing the drought affected communities to brink of their water supplies (Mullin, 2020). Ensuring availability and sustainable management of water for all is one of the universal sustainable development goals (SDG) number 6 (UNDP, 2015). Adequate access to clean water for drinking is critical in promoting human and community well-being and effective functioning of any modern society (Bisung & Elliott, 2016). Access to adequate quality water drastically declines during the drought situations resulting to inadequate access to quality water by the drought affected communities which adversely impacts on human health and general well (Stanke *et al*., 2015). Additonally, previous studies present a gloom picture on the status of water access in Kitui County.

According to Population Actional International (2015), communities living in Kitui County are faced with chronic water scarcity challenges due to protracted drought. A study conducted by Makau *et al*. (2014), in Kitui West, Lower Yatta and Matinyani districts, established that water pans are the main sources of water in the study area with only 67.2% able to access it. Only 55.2% of the respondent households could access water of above 200 litres daily. Further, according to the Kenya's population and housing census report (2019), about 55.5% of the population in Kitui County have no access to improved sources of water. Only 5.1% of households have water available in their premises against the national average of 24.2%. Moreover, the County Government of Kitui (2018) indicates that only 35.1% of households in Kitui county use less than 30 minutes to fetch water compared to the national average of 63.4% and the average distance to the nearest water points is about 7 kms which is

way below the international Standards on access to water of not more than 200 meters from dwelling points (UNHRC, 2023).

Furthermore, the study sought to understand how the community organises itself in managing the water resources. Data was collected by Research Assistants using household questionnaires. The household respondents were asked to state how maintain their water sources. Results were summarized in Figure 5.12 which shows that a great majority of the household respondent's 45% (172) indicated that the local community maintains the water sources, 23% (89) by government, 11% (44) by NGOs/CBOs/FBOs while 21% (80) indicated their water sources are not maintained.

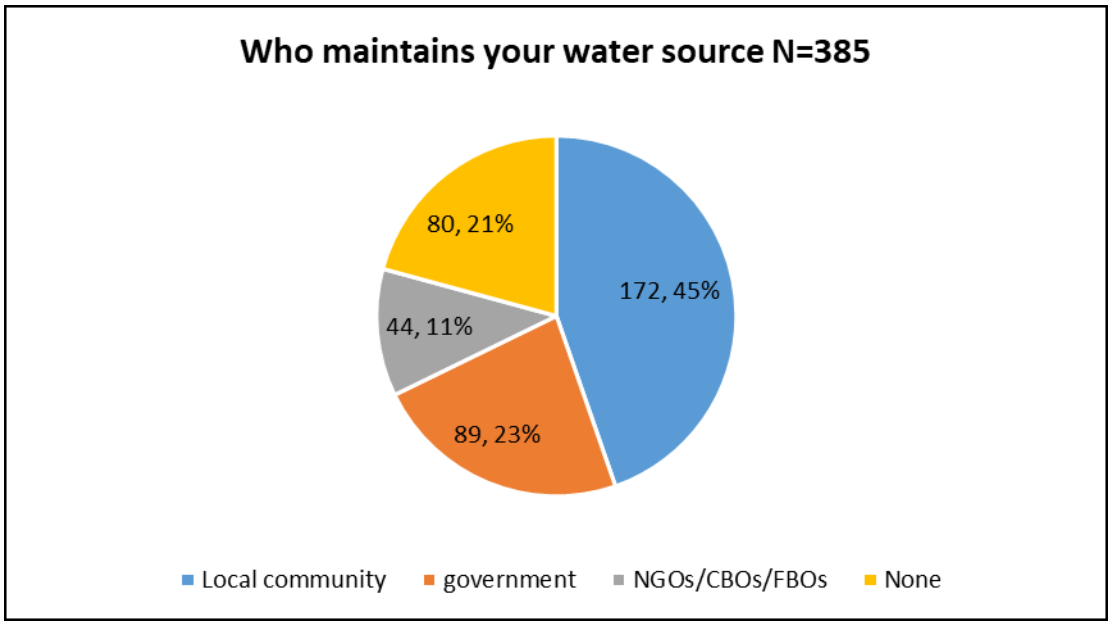


Figure 5. 12: Who Maintains Water Sources

Source: Field Data, 2022

This indicates that the local community has some degree of self-organising with respect to the maintenance and management of their water sources. This level of community organising is quite useful in ensuring sustainability in the management of the water assets and therefore demonstrates some level of community organising. Existing studies indicate that the ability by drought prone communities to access water infrastructure and maintain them through repair and renovation is critical to human wellbeing and effective functioning of a modern society (van dere Merwe *et al*., 2018; Patel *et al*., 2017). According to Frankenberger *et al*. (2013), areas of collective action involve management of public goods such as physical assets, community water pumps and physical infrastructure. The ability for self-organisation of any community for collective action is a critical indicator of community resilience (Adiger, 2010) and helps communities to prepare for, cope with, and recover from drought shocks and stresses (Pfefferbaum *et al*., 2017). Bukachi *et al*., (2021), notes that the bonding and bridging elements of social capital utilized by the community to tackle water insecurity is a critical asset in promoting community-level organization and collectivism.

However, they also notes that, whereas the social capital is significant to rural water access, it does not operate in isolation. There are a range of actors, from formal and informal institutions; internal and external to the community that influence water access patterns and their influence in decision-making needs to considered alongside social capital in rural water provision. This study tried to assess the level of hygiene and sanitation situation in Kitui County by assessing the quality of water used for

drinking and access to sanitation facilities. The study did this by trying to determine the number of households that boil water for drinking. Data was gathered by Research Assistants using household questionnaires.

The household respondents were asked whether they boil or treat their water. Results are summarised in Figure 5.15 shows 50.6% (195) of household respondents said that they do not boil or treat water for drinking while 49.4% (190) said they boil or treat water for drinking.

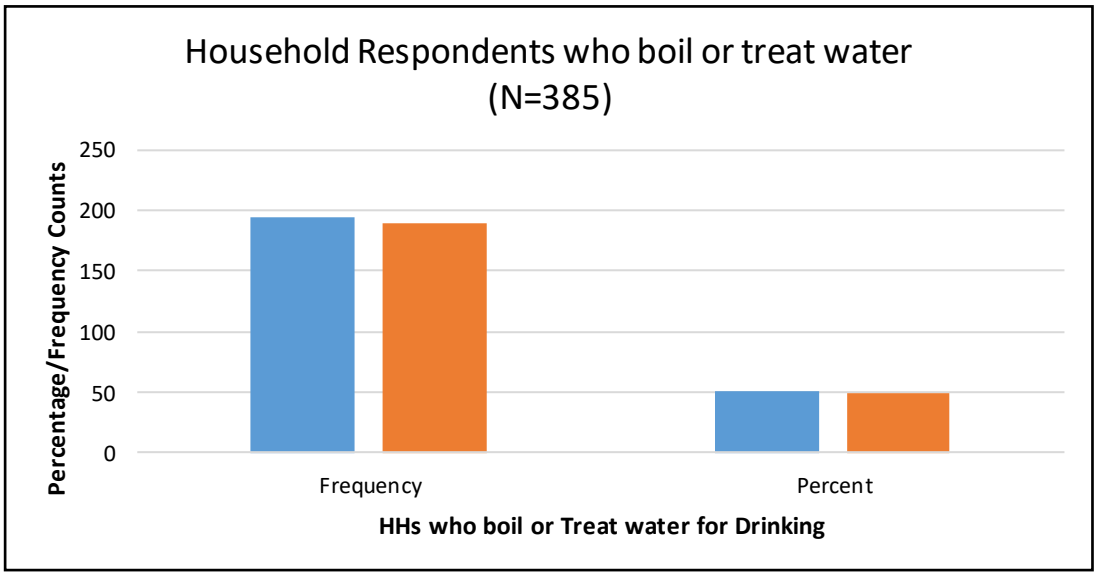


Figure 5. 13: Practice of boiling water for Drinking

Source: Field Data, 2022

When asked why they did not boil water they provided reasons which are summarized in Figure 5.14 where majority of the household respondents 54.5% (210) indicated they did not boil water because they perceived the water they were using to be safe for

drinking since it was drawn from safe sources, 22.3% (86) indicated boiling/treating water is too much work among other reasons. Inability to boil water exposes the community to a risk of water borne diseases and therefore is a sign of low level of community resilience.

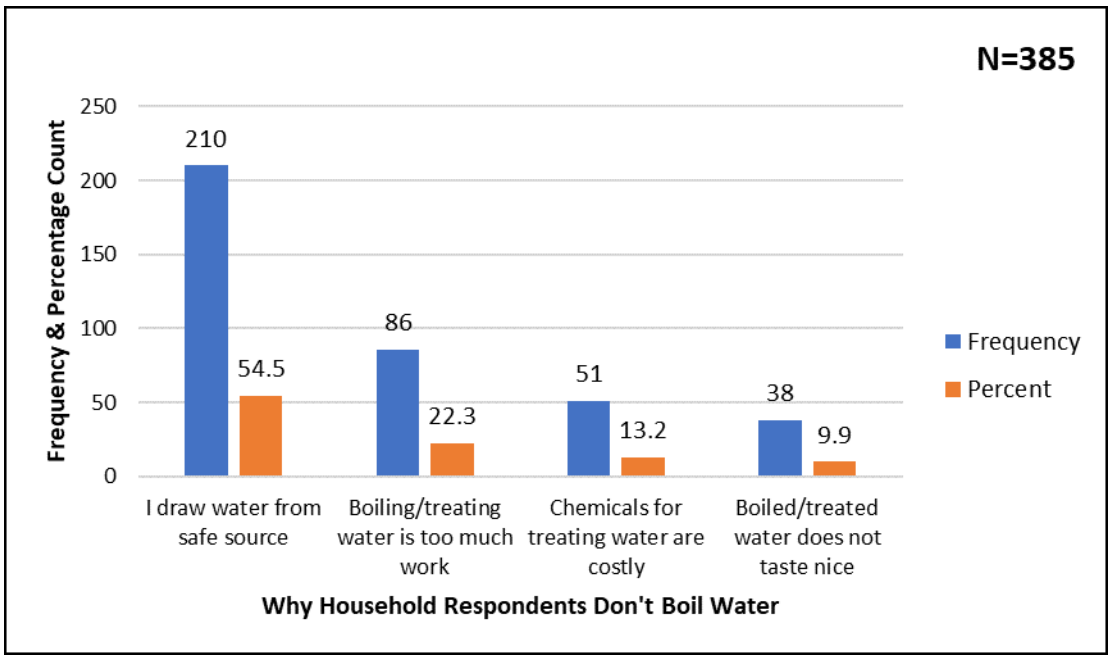


Figure 5. 14: Factors Affecting Consumption of Clean Drinking Water

Source: Field Data, 2022

The study also sought to establish the level of access to sanitation services in the study areas. Data was collected by Research Assistants using household questionnaires. The household respondents were asked what types of toilets they use. Results are summarised in Figure 5.15 which shows that majority of household respondents 93.8% (361) use pit latrines for disposal of household human waste while 4.2% (16) use nearby bush among others.

According to IFRC (2012), a resilient community has infrastructure and services that include services as well the ability to maintain, repair and renovate them. Inclusive management of water sources have the potential of reducing inequalities, spurring economic growth, and increasing social cohesion. Sustainable access to adequate quantities of water is critical in achieving sustainable livelihoods, human well-being and socio-economic development and thereby building community resilience (Bukachi, *et al*., 2021; Béné *et al*., 2014).

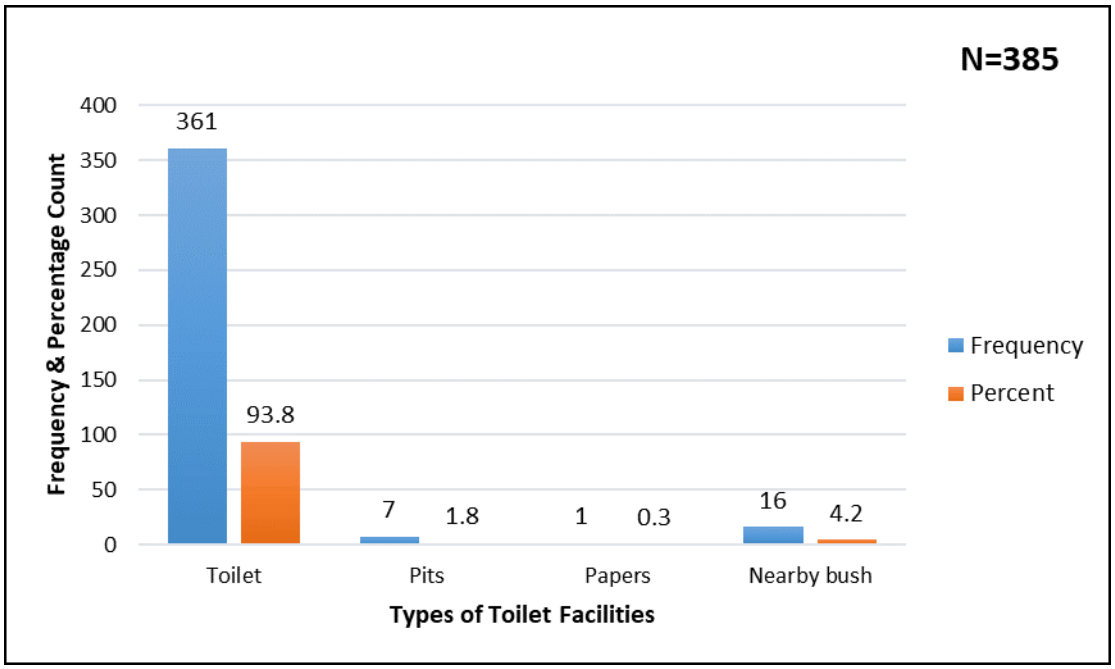


Figure 5. 15: Types of Toilet Facilities Used in Study Areas

Source: Field Data, 2022

Sanitation refers to the principles and practices pertaining to the collection, removal, and disposal of human excreta, household waste, water, and detritus as they affect people and the environment (KNBS, 2013).

Sustainable, accessible, and reliable sanitation services are essential to preventing the spread of disease and improving people's quality of life. Pollution of rivers and ground water as well as an increase in the prevalence of air and waterborne diseases are just some of the consequences of a lack of access to appropriate human waste disposal facilities.

According to the recent population and housing census by the KNBS (2019), 9.2% of the total population in Kitui defecates in the open bush compared to the national average of 7.4% and only 3.9% of the households residing in Kitui County have improved methods of solid waste disposal compared to the national average of 13.2%. A recent report by USAID (2020), indicates that 63% of the population in Kitui County has access to a basic latrine and 17% has access to an improved latrine. Recurrent drought situations are known to present numerous challenges in water management (Mullin, 2020). When water is scarce, it becomes more difficult for families to provide for their basic water needs. Also, water quality suffers when droughts occur frequently.

This includes the proliferation of microbes, the accumulation of organic matter, the intrusion of salt water, and the leaching of both natural and man-made pollutants. The quality of treated water may be impacted by drought because of pipe damage, older water in distribution systems, and alterations to the source mix (Jepson *et al*., 2017). In this case, failure to boil water by assuming that the water is from a safe source exposes the households to disease and endagers their health status.

This lack of access to safe water poses significant health challenges for drought prone communities (Bisung & Elliott, 2016) and thereby undermines community resilience to drought (Béné *et al*., 2014). According to USAID (2020), 179,350 people have access to basic and improved water because of USAID support; 450 service provider staff from the Kitui Water and Sewerage Company (KITWASCO), Kiambere-Mwingi and Sanitation Company (KIMSCO), and 25 small and medium water projects have been trained on how to provide better service; and 6,565 people who have access to basic and improved sanitation in 55 villages have been verified as open defecation free (ODF) Adaptation and development goals might mutually benefit from public service investments in water supply and wastewater treatment (Hansen *et al*., 2010).

In conclusion, this study found some progress has been made in increasing the level of community resilience in Kitui Country with respect to access to water for drinking and sanitation services. However, access to water to support crop production through small scale irrigation systems remains a major challenge. Adequate access to water is critical in achieving improved food security, sanitation, industrialization, wealth creation and improved health (Sinyolo *et al*., 2014).

5.3.7 Household Access to Transport Systems and Resilience

The study sought to establish the type of transport systems in Kitui County. Data was collected by Research Assistants using household questionnaires. Household respondents were asked what types of means of transport they use. Results are summarized in Figure 5.16 shows 33% (128) of household respondents use *boda boda*

(motor bikes) as the main means of transport, 29% (110) buses and *Matatus* (mini-buses) while 24% (94) use donkeys among others.

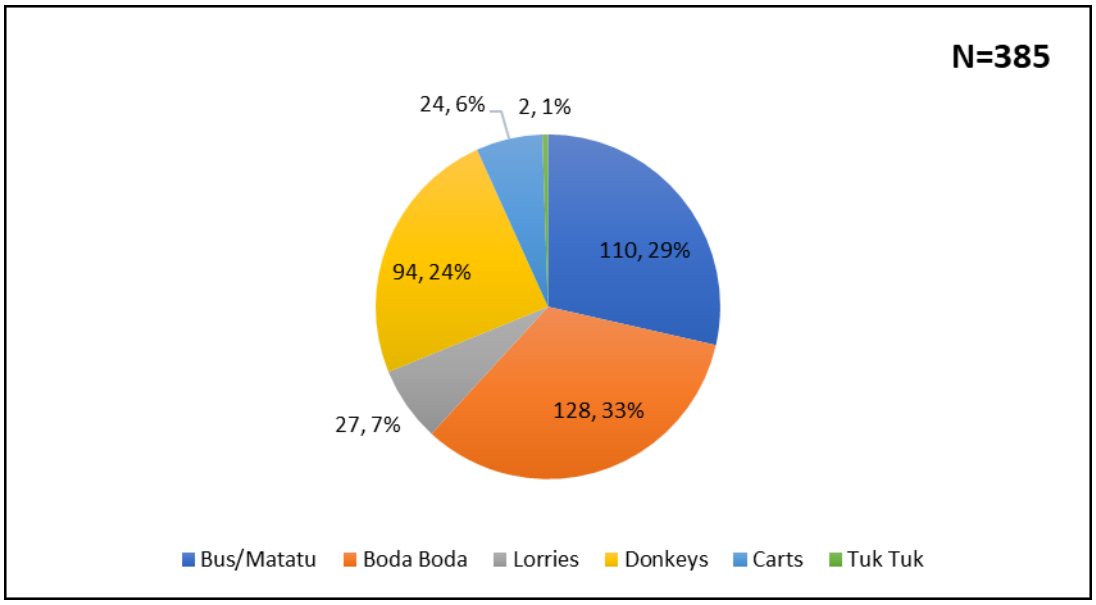


Figure 5. 16: The Main means of Transport

Source: Field data, 2022

Road and transport infrastructure facilities are critical in ensuring quick and timely access to essential supplies and services during disaster situations. Kitui County has one Class A road, the A3 Thika-Garissa Road. The Kibwezi Kitui-Mwingi Road is being upgraded and is yet to be completed. There are other roads proposed in the Road Sub-Sector Investment Programme (RISP) 2010-2024 including: D478-Kola to A3-Nguni; B6-Kitui to A3-Ngooni; D507-Nuu to A3-Nguni; D507-Voo to B7-Ikutha; B7-Chuluni to D507-Mwitika; and E731-Miambani to D509-Mikuyuni.

The County has Class E earth road network covering about 1,172.20 Kms (County Government of Kitui, 2018). The Kenya Rural Roads Authority (KeRRA) (2022) classifies International Trunk Roads as Class 'A' and National Trunk Roads as Class 'B', Class C or Primary Roads are roads that link provincially important centres to each other or to higher class roads, Class D roads is a road that links locally important centres to each other or to more important centres, or to a higher-class road while class E road is the one that link to a minor centre, market or local centre. Majority of the Earth Road network in Kitui County are in deplorable conditions. This state of road conditions hinders accessibility and businesses and economic opportunities. There are three airstrips in the County that include Ithookwe, Tseikuru and Mutomo airstrips (County Government of Kitui, 2018).

A lack of improved road infrastructure in Kitui County affects service delivery and the transportation of produce to markets. Poor secondary and tertiary roads in the county reduce rural farmers' access to markets and leads to contamination of supplies transported through the roads during the dry periods due to dust from the earth roads (MoALFC, 2021). Transport system is critical to the welfare of modern societies. Good road and transport infrastructure are critical in ensuring effective access to relief supplies during drought disasters and therefore are critical dimensions of drought resilient communities. Poor state of the road and transport systems is a major factor that demonstrates low economic investment and therefore low level of community resilience in Kitui County (Patel *et al*., 2017).

5.3.8 Existing Community Drought Coping Mechanisms

This study sought to identify the coping mechanisms undertaken by household respondents to cope with drought disaster in Kitui County. The findings are summarised in Figure 5.17 that a vast majority of the household respondents 32.7% (126) cope with drought disaster through selling of livestock, 20.5% (79) food rationing, 16.9% (65) through support from relatives and friends and 15.8% (61) through buying food among others.

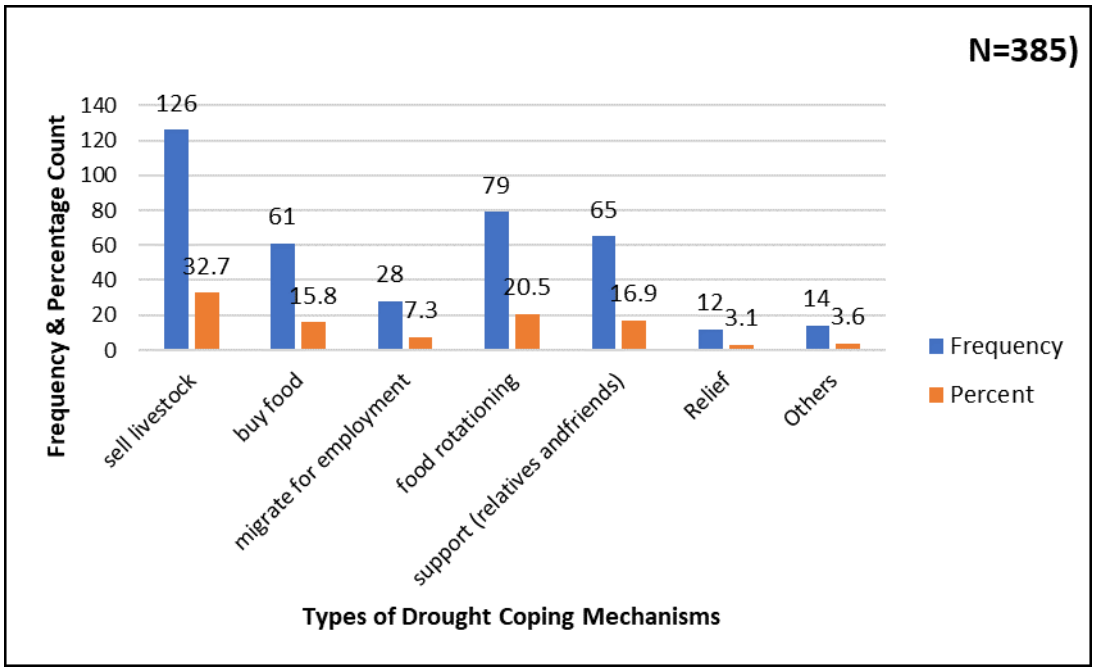


Figure 5. 17: Drought Coping Mechanisms

Source: Field Data, 2022

These findings were triangulated using information gathered through FGDs which revealed several positive and negative coping mechanisms adapted by the households to cope with drought situations.

During a FGD a female participant said:

> "During prolonged drought situations, we cope through selling our livestock in order to get money to buy food and water and engage in casual labour to get additional income to sustain our families and rely on government and NGOs'.

While a female participants stated:

> "households also cope with drought through burning and selling of charcoal, harvesting and selling sand, children dropping out school, stealing and selling stolen goods such as chicken, donkeys and goats".

Existing studies suggest that Kitui County's communities face continuous drought risk (Wens *et al*., 2021). Exposure to severe and recurrent drought events depletes household assets excessively and weakens ex-post adaptation strategies, resulting in recurring crop damage, livestock losses, income reductions, and food insecurity for rural farmers reliant on rain-fed agriculture (Ayanlade *et al*., 2018; Mutu *et al*., 2017). Particularly affected are impoverished farming communities with limited livelihood options and economic alternatives (Zhan *et al*., 2016).

Moreover, Ndungu *et al*. (2021) reported that households in Kitui County employ various coping strategies to deal with drought disasters, including off-farm income generation, selling livestock for food purchases, liquidating family assets, seeking off-farm employment in urban areas, engaging in bush-meat hunting, home-brewing, charcoal production, prostitution, forest resource utilization, and resorting to theft. This burden of drought impact is disproportionately borne by women and children. It is important to note that low drought coping capacities serve as an indicator of limited capacity to adapt to drought challenges (Frankenberger *et al*., 2013).

5.3.9 Community Organisation and Drought Preparedness

This study attempted to establish the level of community organization and preparedness to drought disaster in Kitui County through seeking to establish the proportion of household respondents that were aware of the existence of community drought management committees in the study areas.

Data was obtained using a household questionnaire. Each household respondent was asked to state the existing drought whether there were drought management committees in their villages. The results are summarized in Figure 5.18 which shows that majority of the household respondents 82% (315) indicated that there were no community drought management committees in their villages while only 18% (70) knew of the existence of drought management committee/structures in their study areas.

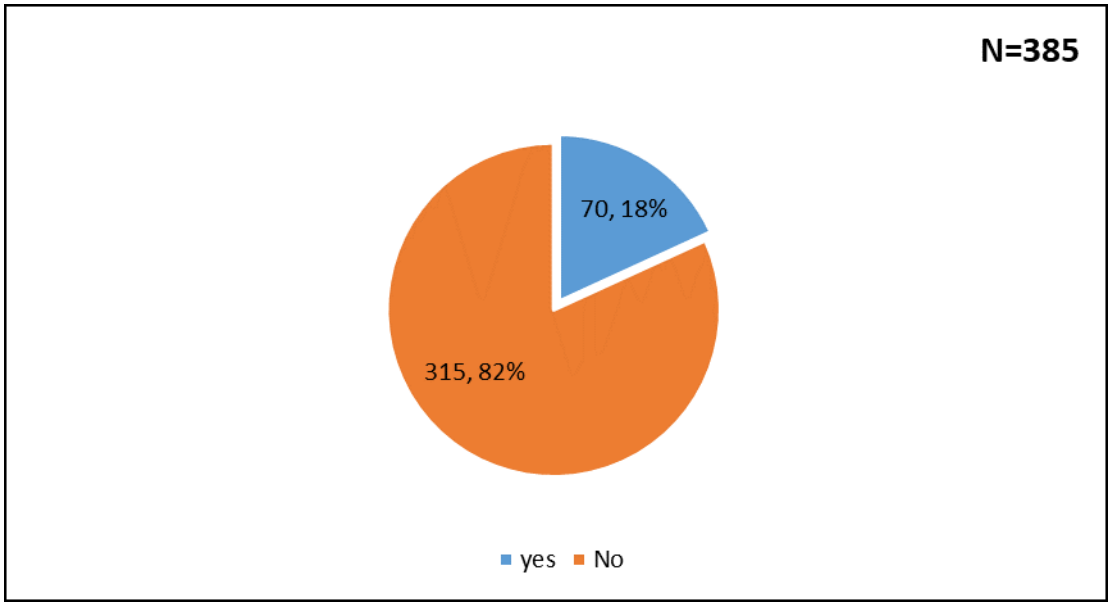


Figure 5. 18: Presence of Drought Management Committees.

Source: Field Data, 2020

Drought management committees at the community level are critical in developing and implementing drought management plans. Low presence of drought management structures (committees) in the study area is a clear indication of weak social capital depicting; low community collective action, collaboration, and self-organising which is a critical asset in helping drought prone communities to prepare, cope with, and recover from numerous shocks and stresses (Pfefferbaum *et al*., 2017; Carmen *et al*., 2022). Low level of community organising is a key indicator of low level of community preparedness to drought disasters and thereby an indicator of low community resilience to drought. According to Bukachi *et al*., (2021), communities in resource-scare settings can leverage on informal groupings already cemented by bonding and bridging social capital to tackle community challenges such as water security. The bonding and bridging elements of social capital offer important trajectories on community-level organization and collectivism.

The findings in Figure 5.19 shows that 6.2% (24) of the household respondents who indicated they were aware of the existence of DMC/S in the study area, stated that the main activities of the DMC/S were financial resource mobilization, 5.2% (20) drought risk assessment, 4.2% (16) development and implementation of community drought action plans (CDAP) and other responsibilities. According to Patel *et al*., (2017) and Twigg (2007), local knowledge, governance and local leadership, preparedness, risk assessment, risk management and vulnerability reduction and disaster preparedness are constituent elements of a resilient community.

This information was confirmed through triangulation with information gathered using KIIs. According to one of the KIIs:

> "There are several DMC/S including Ward Climate Change Planning Committees, County Technical Committee, Wealth Creation Group, Irrigation Groups, Sub-County Drought Steering Group, Ward Disaster Committees and Village Disaster Committees."

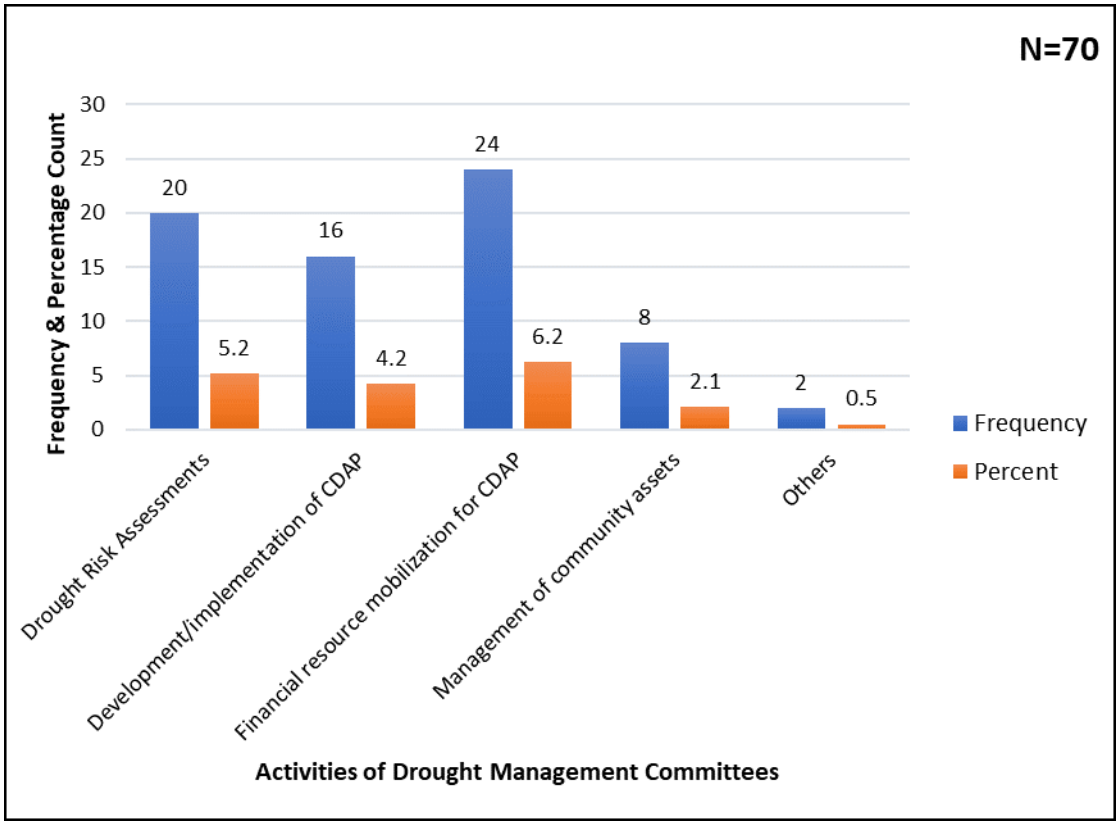


Figure 5. 19: Activities of Drought Management Committees

Source: Field Data, 2022

However, none of the FGDs indicated community drought risk assessments had been undertaken in the study area nor developed and implemented any community-based drought action plans based on the findings of the risk assessments and were there

community risk reduction committees in their villages or Wards. Undertaking community risk awareness assessments enhances knowledgeability about drought risks while development and implementation of community action plans enhances community resilience and adaption to drought hazards (Kamara *et al*., 2020). Inability to undertake drought risks assessments is a clear indication of low levels of knowledgeability about droughts and absence of community actions for addressing such risks is a clear indication of low community resilience in the study areas. According to IFRC (2012), the ability to assess, manage and monitor risk is a key characteristic of a resilient community. Better understanding of the causes and impacts of droughts and development of community action plans are essential for building community resilience to drought (Haile *et al*., 2019).

5.4 Factors Affecting Building of Community resilience to drought.

The findings from FGDs revealed several social, economic, and environmental factors that significantly impact the current level of community resilience to drought. Social factors encompassed issues such as a high crime rate, a lack of access to seeds, moral degradation leading to increased illness and decreased labour force, insufficient self-help initiatives, limited assistance from humanitarian aid agencies, restricted agricultural services, inadequate agronomic skills, the absence of farming cooperatives to negotiate fair prices for local produce, and a failure to undertake risk assessments and planning, resulting in weakened community engagement. On the economic front, challenges included low prices for drought-tolerant crops like cowpeas, limited available land for expanding agricultural activities, overstocking of

livestock, an absence of sustainable water sources for crop farming, poor transportation infrastructure and road networks, and limited access to markets.

Environmental factors involved the absence of conservation agriculture practices, the widespread cutting and burning of trees for charcoal and firewood, unsustainable sand harvesting and brick-making activities. In one of the FGD sessions, a male participant responded to a question about the underlying social, economic, and environmental factors affecting the development of community resilience to drought in Kitui County:

> "We encounter significant obstacles as the support provided by humanitarian aid agencies only reaches a few households, leaving the remaining households unsupported. Additionally, we face challenges related to unsustainable water supply that cannot adequately support crop production, insufficient land, and the unsustainable harvesting of sand and deforestation for cooking and charcoal production."

The KII analysis identified various social, economic, and environmental factors contributing to the challenges that undermine efforts to build community resilience to drought in Kitui County. These factors include high poverty rates, underdeveloped water sources, limited access to viable markets, heavy reliance on rain-fed agriculture, suboptimal land use and management practices, weak coordination, political exclusion, recurring droughts leading to heightened drought risks, the practice of selling produce immediately after harvest, and the absence of proper food storage facilities, among others.

During one of the KIIs, the Crop Development Officer from the County Ministry of Agriculture highlighted the following:

> "Kitui County faces significant resilience challenges in the context of drought, primarily due to factors such as dependency on rainfed agriculture, inadequate water supply, inadequate land use and management practices among smallholder farmers, and the immediate sale of produce after harvest due to the absence of storage facilities, coupled with concerns about crop damage by the weevil humpers community."

5.4.1 Community Resilience to Drought and Social Factors

5.4.1.1 Normality Test between Community Resilience to Drought and Social Factors

The analysis of the test results on community resilience to drought (dependent variable) and social factors (independent variable) displayed in Table 5.2 revealed a departure from normality assumptions. The data for both these variables exhibited non-normal distribution, indicated by the p-values below 0.05 in the Kolmogorov-Smirnov and Shapiro-Wilk tests at a 5% significance level. This skewness in the data led to a choice between parametric and non-parametric methods. While non-parametric tests provide only p-values, often requiring careful interpretation, a parametric method such as the t-test was preferred due to its direct link with regression models, offering adjusted effect estimates for variables differing between groups. Parametric methods rely on the assumption of normality in means for valid inferences. Fortunately, means tend to follow a normal distribution even when the underlying variable does not.

This phenomenon is governed by the Central Limit Theorem (CLT), which states that with increasing sample size, the distribution of means approximates a normal distribution, regardless of the original observations' distribution under specific conditions. Therefore, as the sample size grows, the means tend to conform to a bell curve, even when the original data distribution is highly skewed. In summary, despite the non-normal distribution of the data on community resilience to drought and social factors, the adoption of parametric methods like the t-test was justified by the application of the CLT, which ensures the validity of inferences when sample sizes are sufficiently large.

Table 5. 2: A Normality Test between Social Factors and Community Resilience to Drought

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Community resilience to drought	.262	384	.000	.858	384	.000
Socio factors	.341	384	.000	.692	384	.000

a. Lilliefors Significance Correction

Source: Field Data, 2022

5.4.1.2 Linearity Test between Community Resilience to Drought and Social Factors

The Karl Pearson's coefficient of correlations for testing the relationship between social factors and community resilience to drought is based on the assumption that there is linear relationship between the two variables (Saleemi, 1997). A linearity test was conducted to establish the relationship between social factors and community resilience to drought.

The results of the plot of social factors versus community resilience to drought showed a linear relationship between the two variables as reflected in Figure 5.20. By looking to the scatter of the various points we note that community resilience to drought and social factors are positively related with the line of the best fit showing a rising trend. Thus, the linearity test shows that there is a cause-and-effect relationship between the forces affecting the distribution of the items in the social factors and community resilience to drought.

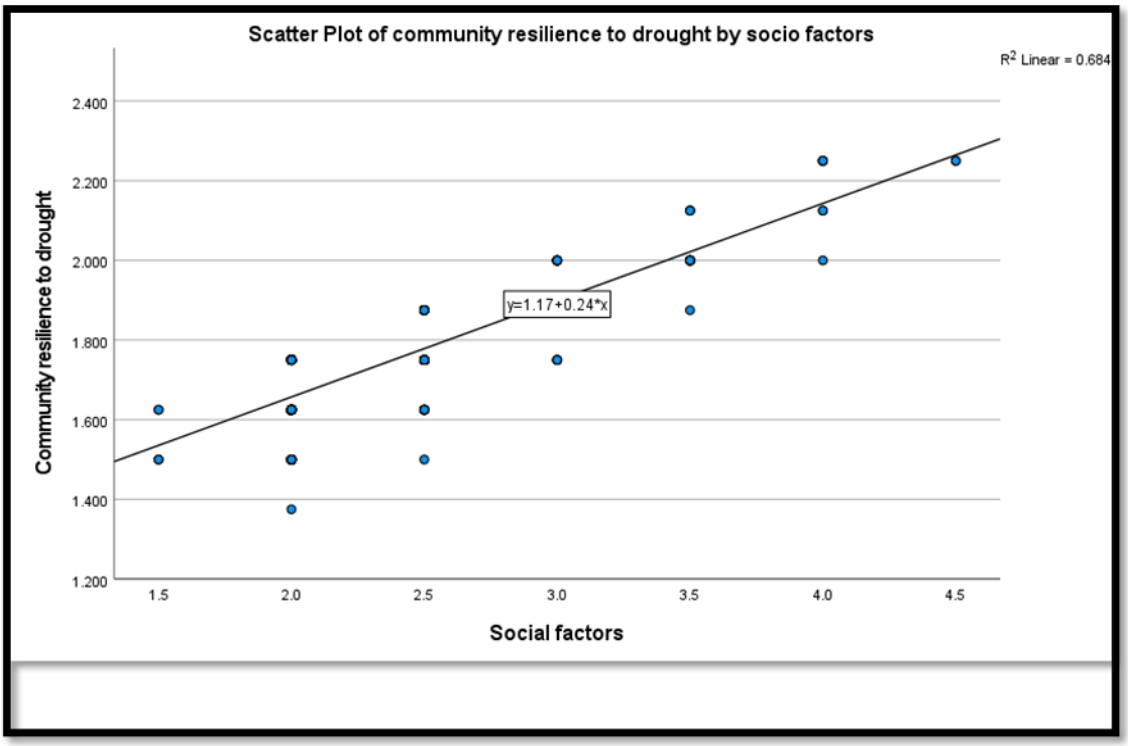


Figure 5. 20: Test for Linearity of Social factors and Community Resilience to Drought

Source: Field Data, 2022

5.4.1.3 Regression Analysis between Community Resilience to Drought and Social Factors

Analysis of regression results in Appendix XIII shows that the effect of social factors on building community resilience to drought was significant (F (866.290) =383, p = 0.000 < 0.05). With R = 0.833 and the coefficient determination R^2 = 0.694, the model implies that about 69.4% of community resilience to drought was accounted for by social factors, while a variation of 68.4% in community resilience to drought was brought about by social factors.

The F test was significant with a p value =0.000 which was less than the standard p value of 0.05 and this meant that the model was significant, and it fits our data well. From ANOVA, since p value p = 0.000 and was lower than p=0.05 (p value 0.000 < 0.05), then the contribution of social factors to community resilience to drought was significant, and the conclusion is that social factors had a positive impact on community resilience. The equation that was fitted for the model was:

$$D=1.173+0.243SF \quad (5.1)$$

Where D is the response variable representing community resilience to drought and SF is the regressor variable denoting social factors. The coefficient equation showed that for every unit increase in community resilience to drought (1.173) there is predicted increase of (0.243) log odds of social factor. The coefficient for social factors (β) was also significant (β = 0.243, t = 29.433, p = 0.000 < 0.05) indicating that social factors have an impact on community resilience to drought. Since p-value =0.000< 0.05, the null hypothesis was rejected and concluded that there was a

statistically significant relationship between social factors and community resilience to drought

5.4.2 Community Resilience to drought and Economic Factors

5.4.2.1 Normality Test between and community Resilience to drought and Economic Factors

Analysis of results of tests of normality between community resilience to drought (dependent variable) and economic factors (independent variable) as shown in Table 5.3 shows that the data set on community resilience to drought against that of economic factors were non-normally distributed, a violation of normality assumption. This is because the Kolmogorov - Smirnov and the Shapiro - Wilk tests, performed on the data sets for the two variables gave p - values less than 0.05 at 5% level of significance, implying that the data values for the dependent variable were skewed. Therefore, a decision to choose between parametric and non-parametric methods for use was made.

A non-parametric test, however, only provides a p - value, a quantity that is often misinterpreted. Since a parametric method like the t - test have a direct link with regression models as they often provide an effect estimate that is adjusted for other variables which differ between the groups, it was adopted. Linear models make inferences about means, thus if the means are normally distributed, the inferences will be valid. Fortunately, means tend to follow a normal distribution even when the variable itself does not. The larger the sample size, the more extreme the distribution of the observations can be without compromising the validity of the t - test.

This is because of the Central Limit Theorem (CLT), which states that the distribution of the means approximates to the normal distribution when the sample size increases, regardless of the distribution of the original observations under some regularity conditions. Thus, even when the underlying aspect follows a highly skewed distribution, the means approach a bell curve as the sample size increases.

Table 5. 3: Normality Test between Community Resilience to Drought and Economic Factors

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Community resilience to drought	.262	384	.000	.858	384	.000
Economic factors	.240	384	.000	.895	384	.000

a. Lilliefors Significance Correction

Source: Field Data, 2022

5.4.2.2: Linearity Test between Community Resilience to Drought and Economic Factors

The Karl Pearson's coefficient of correlations for testing the relationship between community resilience to drought and economic factors is based on the assumption that there is linear relationship between the two variables (Saleemi, 1997). A linearity test was carried out to establish the relationship between community resilience to drought and economic factors. The results of the plot of economic factors versus community resilience to drought showed a linear relationship between the two variables as reflected in Figure 5.21. By looking to the scatter of the various points we note that community resilience to drought and economic factors are positively related with the line of the best fit showing a rising trend.

Thus, the linearity test shows that there is a cause-and-effect relationship between the forces affecting the distribution of the items in the economic factors and community resilience to drought.

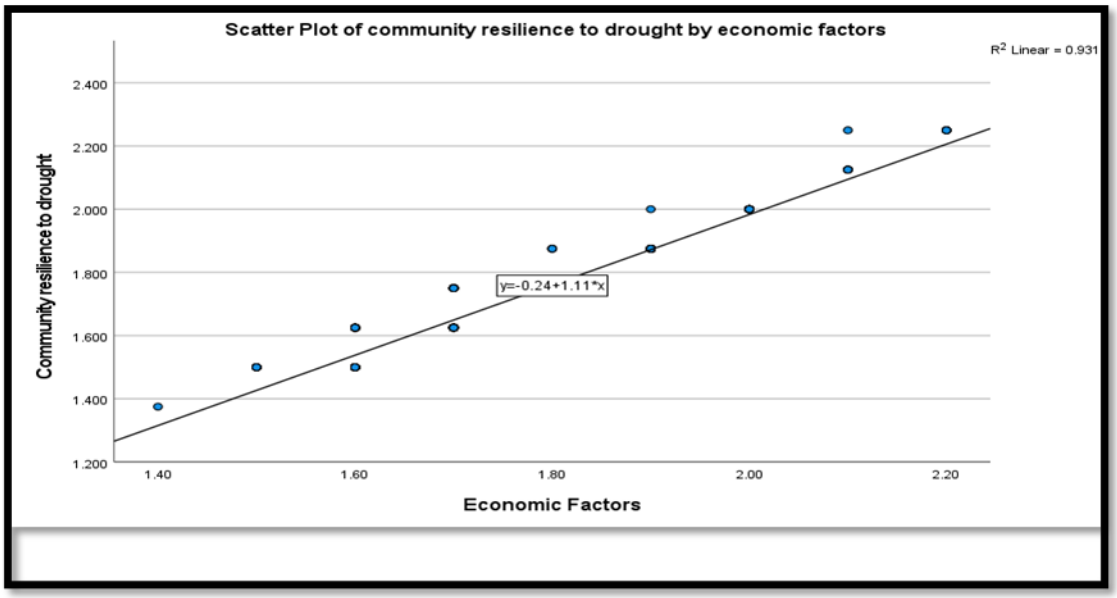


Figure 5. 21: Test for Linearity of Community Resilience to Drought and Economic Factors

Source: Field Data, 2022

5.4.2.3: Regression between Ccommunity Resilience to drought and economic factors

The regression results in Appendix XIII show that the effect of economic factors on building community resilience to drought was significant (F (5657.229) = 383, p = 0.000 < 0.05). With R = 0.968 and the coefficient of determination R^2 = 0.937, the model implies that about 93.7% of community resilience to drought were accounted for by economic factors, while a variation of 93.7% in community resilience to

drought was brought about by economic factors. From ANOVA, since p value p = 0.000 and was lower than p = 0.05 (p value 0.000 < 0.05), then the contribution of economic factors to community resilience to drought was significant, and the conclusion is that economic factors had a positive impact on community resilience. The equation that was fitted for the model was:

$$D = -.270+1.128EcF \quad (5.2)$$

Where D is the response variable representing community resilience to drought and EF is the regressor variable denoting economic factors. The coefficient equation showed that for every unit increase in community resilience to drought (-270) there is predicted increase of (1.128) log odds of economic factors. The coefficient for economic factors (β) was also significant (β = 0.968, t = 75.215, p = 0.000 < 0.05) indicating that economic factors have an impact on community resilience to drought. Since p-value =0.000< 0.05, the null hypothesis was rejected and concluded that there was a statistically significant relationship between economic factors and community resilience to drought.

5.4.3 Community Resilience to Drought and Environmental Factors

5.4.3.1 Normality Test between community Resilience to Drought and Environmental Factors

Analysis of results of tests of normality between community resilience to drought (dependent variable) and environmental (independent variable) as shown in Table 5.4 shows that the data set on community resilience to drought against that of environmental factors were non-normally distributed, a violation of normality

assumption. This is because the Kolmogorov - Smirnov and the Shapiro - Wilk tests, performed on the data sets for the two variables gave p - values less than 0.05 at 5% level of significance, implying that the data values for the dependent variable were skewed. Therefore, a decision to choose between parametric and non-parametric methods for use was made.

A non-parametric test, however, only provides a p - value, a quantity that is often misinterpreted. Since a parametric method like the t - test have a direct link with regression models as they often provide an effect estimate that is adjusted for other variables which differ between the groups, it was adopted. Linear models make inferences about means, thus if the means are normally distributed, the inferences will be valid. Fortunately, means tend to follow a normal distribution even when the variable itself does not. The larger the sample size, the more extreme the distribution of the observations can be without compromising the validity of the t - test. This is because of the Central Limit Theorem (CLT), which states that the distribution of the means approximates to the normal distribution when the sample size increases, regardless of the distribution of the original observations under some regularity conditions. Thus, even when the underlying aspect follows a highly skewed distribution, the means approach a bell curve as the sample size increases. The Karl Pearson's coefficient of correlation for testing the relationship between community resilience to drought and environmental factors is based on the assumption that there is a linear relationship between the two variables (Saleemi, 1997).

Table 5.4:Normality Test between Community Resilience to Drought and Environmental Factors

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Community resilience to drought	.262	384	.000	.858	384	.000
Environmental factors	.142	384	.000	.944	384	.000

a. Lilliefors Significance Correction

Source: Field Data, 2022

5.4.3.2: Linearity Test between Community Resilience to Drought and Environmental Factors

A linearity test was conducted to establish the relationship between community resilience to drought and environmental factors. Surprisingly, the results of the plot of environmental factors versus community resilience to drought showed exceptionally low linear relationship between the two variables as shown in Figure 5.22. By looking to the scatter, we note that the plotted points scatter over the chart implying a lesser degree of relationship between community resilience to drought and environmental factors. The line of the best fit shows a rising trend with a small positive slope indicating a weak positive relationship between community resilience to drought and environmental factors. Thus, the linearity test shows that there is a cause-and-effect relationship between the forces affecting the distribution of the items in the environmental factors and community resilience to drought.

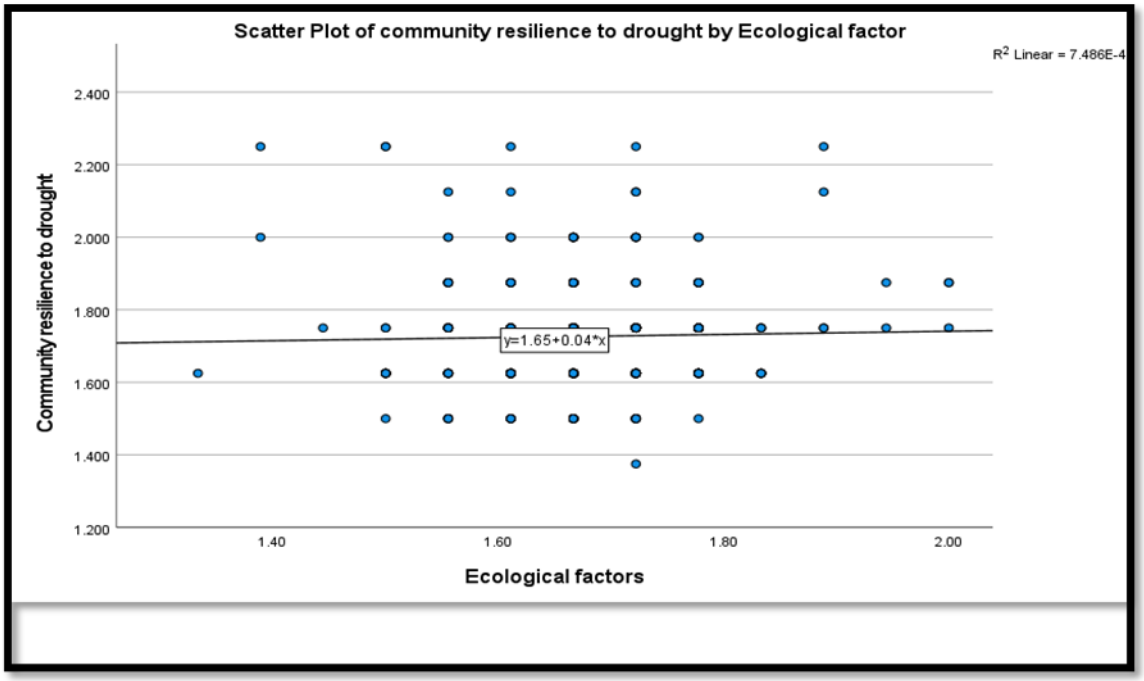


Figure 5. 22 Test for Linearity of Environmental Factors and Community Resilience to Drought

Source: Field Data, 2022

Existing studies indicate that environmental factors may trigger episodes of forest mortality, cause declines in tree growth, reduce net primary production, cause pasture loss, or even alter the biological diversity of vegetation communities and thereby result in reduced community resilience to drought (Vincent-Serrano *et al*., 2020). However, according to Vincent-Serrano *et al*., (2022), structural effects of environmental droughts tend to only occur in areas that are perturbed or in communities near their distribution limits. There are few studies examining the impact of environmental factors on community resilience to drought. Further a recent study by Ekiru, (2020) which attempted to determine the extent to which environmental factors influence performance of food security projects in Loima Sub County in

Turkana found that environmental factors have a significant influence on the performance of food security projects. Thus, environmental factors influences the level of community resilience (Frankenberg, 2013).

Additionally, a recent study by Hoover *et al.*, (2021), investigated the effects of drought seasonality and plant community composition on two dominant perenial grasses, *Achnatherum hymenoides* and *Pleuraphis jamesii*, in a dryland ecosystem. The experiment consisted of three precipitation treatments: control (ambient precipitation), cool-season drought (−66% ambient precipitation November–April) and warm-season drought (−66% ambient precipitation May–October), applied in two plant communities (perennial grasses with or without a large shrub, Ephedra viridis) over a 3-year period. The study examined the concurrent and legacy effects of seasonal drought on soil moisture, phenology and biomass.

The results from the study showed how abiotic and biotic legacies can develop and influence a community's resistance and resilience to subsequent droughts. When the frequency of repeated extreme events, such as recurring seasonal droughts, exceeds the capacity of organisms or ecosystems to recover (i.e., resilience), persistent drought legacies can reduce the resistance to subsequent drought events. This study revealed how drought legacies are a product of ecological resistance and resilience to past drought and can influence ecosystem vulnerability to future droughts. In conclusion mixed findings exist on the association between environmental factors and community resilience to drought.

5.4.3.3 Regression Analysis Results on Community Resilience to Drought and Environmental Factors

Surprisingly, the regression results in Appendix XIII showed that the effect of environmental factors on building community resilience to drought was insignificant (F (0.28) = 383, p = 0.591 > 0.05). With R = 0.028 and the Coefficient determination R^2 = 0.001, the model implies that about 0.1% of community resilience to drought was accounted for by environmental factors, thus a variation of 0.1% in community resilience to drought was brought about by environmental factors.

The F test was insignificant with a p value =0.591 which was greater than the standard p value of 0.05 and this meant that the model was insignificant and did not fit the data well. From ANOVA, since p value p=0.591 and was greater than p=0.05 (p value 0.591 > 0.05), then the contribution of environmental factors to community resilience to drought was insignificant, and the conclusion is that environmental factors had an exceptionally minimal impact on community resilience. The equation that was fitted for the model was:

D = 1.656+0.0.044Env-F (5.3)

Where D is the response variable representing community resilience to drought and Env-F is the regressor variable denoting environmental factors. The coefficient equation showed that for a small unit increase of community resilience to drought (1.656) there is predicted increase of (.044) log odds of environmental factors.

The coefficient for environmental factors (β) was also insignificant (β = 1.656, t = 0.538, p = 0.591>0.05) indicating that environmental factors have no impact on community resilience to drought. Since p-value =0.591> 0.05, the null hypothesis was not rejected and concluded that there was no statistically significant relationship between environmental factors and community resilience to drought.

5.5 Other Factors Influencing the Level of Community Resilience to Drought in Kitui County

Several other factors influence the current level of community resilience in Kitui County. In Kitui County like the rest of Kenya, disaster response initiatives tend to be ad-hoc, uncoordinated and short-term response measures, which are undertaken in most instances in form of emergency relief services to the drought affected communities. There are limited efforts and investments in strategic drought preparedness and planning processes. There is limited efforts in integrating strategic disaster preparedness and early recovery measures into the ongoing humanitarian and development initiatives (Suda, 2000). Lack of market insurance is another factor affecting building of community resilience to drought in Kitui County. Market insurance has the potential for protecting drought affected households against large asset losses (Hallegatte *et al*., 2017; ARC, 2014). However, efforts to provide universal access to insurance services has been faced with multiple obstacles including weak institutional and legal capacity, affordability issues and high transactions costs mainly for the poor people. Further, Kitui County does not have a disaster management plan.

This lack of disaster preparedness plan increases the level of vulnerability to drought and affects the well-being of the current and future generations and thereby undermining resilience building capacities of drought affected communities. Effective resilience building initiatives requires a systematic shift from emergency relief and any related short-term drought response measures to a long-term, integrated and multisectoral approach which integrates recovery response strategies into existing development programmes (Suda, 2000) as well as long term financing mechanism. This lack of legistative and policy frameworks has been a challenge in Kitui County. Kenya now has national policy for disaster management (Republic of Kenya, 2017).

The national policy indicates that drought is one of the dominant disasters in Kenya's disaster profile that impacts on people's livelihoods, diverts planned use of resources, interupts economic activities and retards development. The policy emphasizes preparedness on the part of the government, communities and other stakeholders in DRR activities. Kitui County has an opportunity of domesticating the policy in order to build a strong leglative foundation for integrated and coordinated approach to DRM, resource allocation decicion plans and well coordinated public service delivery well aligned with the international quality standards and conducive to effective development and adaptation action (Verner, 2012). In the absence of a disaster management policy, the county will contuntinue to rely on costly ad hoc measures when handling unexpected disasters, including drought (Suda, 2000). The 2010 National Climate Change Response Strategy (NCCRS) recognizes the importance of climate change impacts for development (Republic of Kenya, 2010) while the 2012

National Climate Change Action Plan aims at enabling Kenya to reduce vulnerability to climate change and to improve the country's ability to take advantage of the opportunities that climate change offers (Republc of Kenya, 2013). A number of climate change adaptation (CCA) options prevail. These include: agricultural technologies; and NRM practices such as selection of appropriate crop varieties and soil conservation practices and improving irrigation. However, despite the existence of of these options, households of Kitui County are yet to benefit optimumly from these services so as to significantly adapt to the changing climate and reduce drought risks.

Inadequate technological capacity, lack of access to credit facilities, lack of access to extension services and high cost of adaptation, lack of access to irrigation services, unreliable weather forecasts, inadequate land and financial resources are some of the major constraints inhibiting farmers from adapting to climate change and thereby building community resilience to drought in Kitui County (Mutunga *et al*., 2018). Inadequate investment in social safety net such as public services in the areas of water supply and wastewater treatment, housing, and infrastructure make the people living in Kitui County more prone to the changing climate. Finally, inadequate adaptation planning, lack of strong and sound partnerships involving the national government, the County governemnt and the INGOs, CBOs and the local communities is another factor inhiting community resilience to drought in Kitui County. County adaptation strategies are important for prioritizing adaptation activities that respond to urgent and immediate needs, and for providing guidelines in the effort to cope with the changing climate.

This study revealed that communities living in Kitui county are faced with various social, economic, and environmental factors that affect their efforts in building community resilience to drought. The threat from these factors usually intensifies with recurrent droughts due to the influence of climate change. Previous studies undertaken in South Sikkim, in the Indian Eastern Himalaya whose purpose was to get community's perception on the kind of interventions that they consider important to lift them out of poverty and enhance their resilience to manage climate risk through use of FGDs and household survey revealed that the vulnerability of the study region to climate change is not concentrated to physical or geographical factors alone but mostly to the socio-economic factors like access to education, health care, limited livelihood opportunities, limited resources among others (Barua *et al*., 2014). These socio-economic factors function as barriers to poverty reduction efforts and contribute to weak community resilience.

The study confirms previous findings by Shiferaw *et al*., (2014), that the overall impact of drought in each region and the communities' ability to recover from the resulting social, economic, and environmental impacts depends on several factors. These are comprised of economic, social, and environmental impacts in terms of national costs and losses which threaten to undermine the wider economic and development gains made in the past decades. This study contends with the previous findings that the resilience of a given community to drought impacts depends on the community's ability to meet the food security needs of its members and ensure access to adequate nutrition; protect the environment; achieve income and health security;

educate their children; and participate in broader socioeconomic processes that affect the lives of their members while vulnerable communities experience deficits or a high risk of deficits in these aspects (Frankenberger *et al*., 2013; Shiferaw *et al*., 2014).

CHAPTER SIX
STRATEGIC OPTIONS FOR ENHANCING COMMUNITY RESILIENCE TO DROUGHT IN KITUI COUNTY

6.1 Introduction

This chapter presents research findings and discussions of the results as set out in the research methodology. It specifically presents and discusses the quantitative and the qualitative findings based on the information gathered using a household questionnaire, community focus groups discussions and key informant interviews. The chapter covers the third objective of the study whose objective was to evaluate strategic options for enhancing community resilience to drought in Kitui County. Information gathered on various variables that contribute to enhanced resilience to drought at the community level. Such variables include access to sustainable supplies of water, access to credit facilities, insurances services, food banking facilities, early warning information systems, community participation in DRR planning processes, diversification from farming to non-farming livelihood options and risk assessments. The chapter starts by presenting data on the strategic options for enhancing community resilience to drought.

6.2 Types of Humanitarian Aid Implemented in Response to Drought

Data was obtained using household questionnaires which were administered by the Research Enumerators. Each respondent was asked to state the types of humanitarian aid supported by humanitarian aid agencies working in Kitui County. The results were summarized in Figure 6.1.

The results indicate 20% (74) of household respondents ranked access to food support as the main humanitarian aid supported by humanitarian aid agencies during drought disasters while community resilient building action scored low such as support for drought resilient crops was confirmed by 11.7% (45), awareness creation on drought mitigation 9.6% (37), drought early warning information systems by 8.3% (32) conducting drought risk assessments by 7.5% (29), implementation of community drought actions by 5.5% (21), implementation and crop and livestock insurance by 1.8% (7) among others.

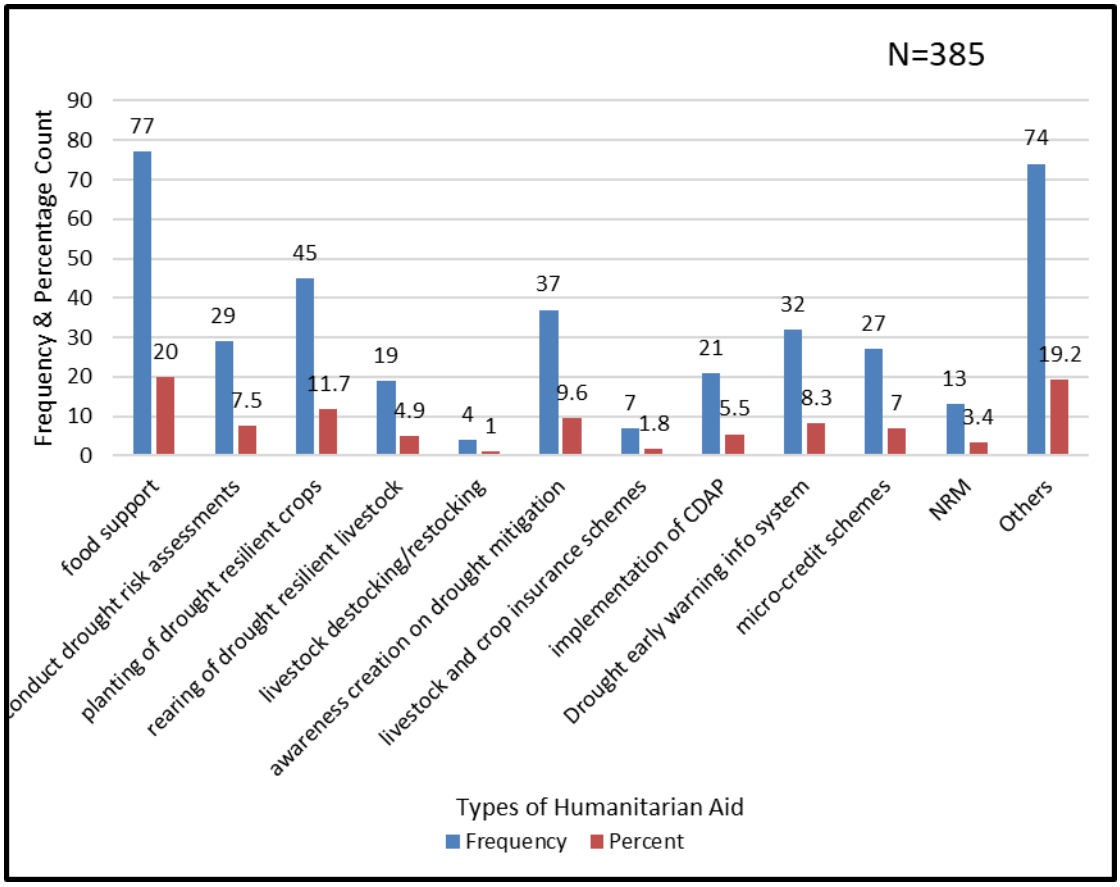


Figure 6. 1: Drought Response Strategies Implemented in Kitui County

Source: Field Data, 2022

Existing studies reveal that communities in Kitui County have adapted various community drought resilience enhancing measures through the support of various humanitarian aid agencies (MoALFC, 2021; Mwangi *et al.*, 2020). Such adaptation measures include planting drought tolerant and early maturing crop varieties, adopting drought-tolerant livestock breeds, preservation of fodder and crop residue, soil and water conservation practices, engaging in conservation measures, construction of water structures among others (MoALFC, 2021; Mwangi *et al.*, 2020). EDE reports shows good progress have been made on implementing planned activities for ending drought disasters in ASALs in Kenya including Kitui County.

However, over the years the bulk of humanitarian aid has remaied focused more on food support compared to building community resilience against drought. According to IGAD (2013), although several drought mitigation measures have been deployed over the past decades, substantial number of these measures have tended to be ad-hoc, uncoordinated and short-term response measures characterised by reactive tendancies mainly in form of emergency relief services to the drought affected communities. Further, Munene *et al*., (2022), asserts that although resilience building efforts are helping in mitigating drought crisis, one of the critical challenges facing these efforts has been ensuring that they are providing sustainable solutions to ongoing drought crisis. Additionally, Clarvis *et al*., (2015) observes that there is a challenge that the global humanitarian aid funds reactive actions as opposed to funding long-term development focused actions which are critical in addressing the underlying causes of

community vulnerability to drought hazards and consequently building community resilience and contributing to sustainable development.

6.3 Strategic Options for enhancing Community Resilience to Drought

This study sought to identify strategic options which can be undertaken to enhance community resilience to drought in Kitui County by the humanitarian aid actors. The strategic options were randomly selected from a list of indicators for community resilience drawn from a recent study on community resilience conceptual frameworks Frankenberger *et al*., (2013), UNDP, (2013) and Kwasinski *et al*., (2016) and from the views gathered from community members. These included timely and reliable sharing of early warning information system, support for sustainable water sources, more community engagement in DRR planning, increased credit facilities, diversification from farming to non-farming livelihoods options, more engagement in drought risk assessment, support for food banking and storage facilities and livestock and crop insurance schemes. The strategic options were subjected to a household survey administered by Research Assistants and the survey results were ranked using Spearman's correlation weighting by cases approach. The ranks in percentages were presented in descending order as shown in Table 6.1. The ranks informed that some of the respondents gave more than one answer on one variable, hence resulting in a final of 2,172 as the total responses. The ranking revealed that support for more sustainable water sources had the highest rank as confirmed by 34.4% (747) responses; followed by increased access to credit facilities 15.1% (328); livestock/crop insurance schemes 11.9% (259) and support for food banking/storage facilities 11% (240) among others.

Table 6. 1 Strategic options for enhancing community resilient to drought

Strategic Options for enhancing community Resilience to drought	Frequency	Percent
a) Support for more sustainable water sources	747	34.4
b) Increased access to credit facilities	328	15.1
c) Livestock/crop insurance schemes	259	11.9
d) Support for food banking/storage facilities	240	11.0
e) Timely & reliable sharing of early warning information system	180	8.3
f) More community engagement in DRR planning	162	7.5
g) Diversification from farming to non-farming livelihoods options	136	6.3
h) More community engagement in drought risk assessments	120	5.5
Total	**2172**	**100.0**

Source: Field Data, 2022

The above findings were validated through triangulation involving KIIs and FGDs. The results obtained from the KIIs, detailed in Appendix XI, reveal that participants exhibited a clear preference for strategic options designed to mitigate the risks associated with drought. These options include community involvement in drought risk reduction planning, initiatives related to water access, micro-credit support, promotion of alternative energy sources, soil and water conservation projects, the formation of farmers' cooperatives, crop and livestock insurance, assistance for irrigated agriculture, rangeland management, apiary development, and the coordination of humanitarian responses to drought. For instance, during one of the KIIs, a male participant emphasized the importance of these strategies by stating,

> "Strategies like increasing access to water projects, expanding credit facilities, and supporting crop and livestock insurance are crucial for bolstering community resilience against drought in Kitui County."

Results from the Focus Group Discussions (FGDs) as presented in Appendix XI reveal several strategic options for enhancing resilience to drought.

These options include support for sustainable water sources, irrigation services, tree planting, reduction of herd sizes, establishment of self-help groups, investment in crop and livestock insurance, and credit facilities to facilitate income diversification initiatives, among others. For example, during one of the FGDs, a male participant expressed the following viewpoint:

> "Strategies such a shift from rain-fed agriculture to irrigated agriculture, increased support for water projects, sustainable water sources, credit facilities, and crop and livestock insurance represent viable approaches to bolstering our community's resilience against drought."

Studies reveal that Kitui County faces significant water insecurity, hindering access to this fundamental human rights. Residents experience acute shortages of clean, safe, and affordable water (Bukachi *et al*., 2021). Drinking water sources in the county include ponds, lakes, streams, protected springs, wells, boreholes, piped water, bottled water, rainwater, purchases from vendors, and public taps (KNBS, 2019). Alarming statistics from the County Government of Kitui (2018) indicate that only 53% of residents use improved water sources. On average, the nearest water point is 7 km away, which increases during dry spells. During such times, 58% of households spend over 30 minutes fetching drinking water, highlighting the pressing need for improved water infrastructure.

Ensuring availability and sustainable management of water for all is one of the universal sustainable development goals (SDG) number 6 (UNDP, 2015) which seeks to have all communities with access to safe and affordable drinking water. Further, Target 4 of the SDG aims at ensuring sustainable withdrawals and supply of freshwater to tackle the challenge of water scarcity.

Adequate access to water includes the capacity of the people to safeguard sustainable access to adequate quantities of, and acceptable quality water for, sustaining livelihoods, human well-being, and socio-economic development. According to Bisung & Elliott (2016), adequate access to clean water for drinking is very critical in promoting human and community well-being and for effective functioning of any modern society. Improved well-being is an indicator of a resilient community (Béné, 2014). Bukachi *et al*., (2021), contends that resilience is the ability to cope with water-related uncertainties and risks arising from drought. This study found that Kitui County experiences acute deficiencies in water supply due to protracted drought which adversely affects livelihoods and progressively undermines community resilience building efforts. As result, the study contends that providing more support for sustainable water sources by humanitarian aid system would be a suitable strategic option for improving community resilience to drought disaster in Kitui County since provision of adequate water supply would result in improved food and nutrition security, health security and environmental security the people.

Previous studies undertaken in Kitui County indicate that limited financial capital is a main constraint in resilience building efforts against drought (MoALFC, 2021). According to Wens *et al*., (2021) poverty and limited financial capacity is a limiting factor for smallholder farmers in adapting to drought challenges in Kitui County. Access to diverse incomes resources are critical in enhancing the community capacity to overcome drought related shocks and long-term stresses (Carmen, *et al*., 2022; Hallegatte *et al*., 2017). Further, MoALFC (2021), contends that provision of

financial services including credit facilities is one of the key adaptation strategies for addressing the challenges of climate change including drought in Kitui County. Such services helps the poor people in reducing vulnerability to drought shocks, promoting adaptation, and enhancing community resilience to drought conditions through enabling them to quickly absorb, cope with, and recover from the damages caused by drought shocks (Hallegatte *et al*., 2017; Carmen, *et al*., 2022).

Further previous studies have demonstrated that credit schemes are particularly beneficial for initiatives with high upfront investment costs (Wens *et al*., 2022). On the other hand, early warning systems have proven to be more effective in climates characterized by infrequent droughts. When multiple interventions are combined, they exhibit a synergistic effect, leading to reduced food insecurity, lowered poverty rates, and a significant decrease in the necessity for emergency aid during drought conditions. This underscores the importance of adopting a holistic perspective to enhance the resilience of communities residing in ASALs against the challenges of drought (Wens *et al*., 2022). Drought-related livestock losses can push households into a poverty trap and chronic destitution. When drought disaster strikes, in most instances affected communities experience delayed response from humanitarian aid system which results in loss of livelihoods and undermines recovery efforts (Francesco *et al*., 2021). Support for livestock insurance plays a critical role in the reduction of potential livelihood losses (Hallegatte *et al*., 2017; ARC, 2014).

However, recent studies conducted in Kenya on the performance of pilot livestock insurance programmes indicates that, livestock insurance initiatives have struggled to realise their dreams (Johnson, *et al*., 2019). According to Francesco *et al*., (2021), low awareness and capacity, inadequate resources, weak partnerships with the private sector and absence of clearly defined roles and incentives are the main challenges for these approaches. Undertaking drought risks assessments enables communities to improve their understanding of the drought hazard and the factors that influence vulnerability in order to make progress in drought risk management (Twigg, 2007). Drought risk assessment is a process of understanding drought hazard and its influence on vulnerability. Undertaking drought risk assessments enhances community knowledgeability about drought risks while development and implementation of community action plans enhances community resilience and adaption to drought hazards (Kamara *et al*., 2020).

Further, low support by humanitarian aid actors in Kitui county for disaster risk assessments undermines community capacity in developing deeper understanding the vulnerability of disaster-prone people and hinders progression towards drought disaster preparedness (Hallegatte *et al*., 2017). According to IFRC (2012; Haile *et al*., 2019), the ability to assess, manage and monitor risk and develop community action plans is a key characteristic of a resilient community. Further undertaking drought risk assessment and development of community action plans forms a strong foundation for development of drought policies and preparedness plans with a strong focus on drought risk reduction.

Such policies enables drought-prone communities to shift from the current traditional focus on reactive emergency management characterised by community high dependency on external handouts which undermines community resilience building efforts to a long-term planning process which builds community resilience (Wilhite *et al*., 2014). This study found that the current humanitarian aid have invested very little in drought risk assessment and development of community action plans as only 7.5% (29) and 5.5% (21) confirmed their support in that order.

This study found that lack of storage facilities is one of the reasons given by 9% (16) household respondents who sell their food produce immediately after harvest. Immediate disposal of food items immediately after harvest is a key driving factor for high levels of food insecurity in Kitui County. High level of food insecurity is a key indicator of low community resilience (Frankenberger *et al*., 2013). Support for food banking and storage facilties is therefore a viable strategic options for enabling communities in Kitui County cope with drought risks (MoALFC, 2021). According to Frankenberger *et al*., (2013), resilient communities should be able to manage community- based assets in an equitable and sustainable way. Further, the current early warning systems in Kitui County are highly unreliable (Wens *et al*., 2021). A recent study conducted in Kitui County found that mistrust among the local smallholders in forecasting is a key barrier to adaptation. The study also confirmed that improved early warning systems, tailored extension services and ex-ante cash aid and low interest schemes increase the capacity to adapt to the changing climate (Wens *et al*., 2021).

Timely and reliable sharing of early warning information strengthens risk reduction and community coping capacity for community organisation and collective action (Frankenberger *et al*., 2013; Arielle *et al*., 2018).

This study revealed that majority of the household respondents 89.4% (344) earned their income from crop and livestock production, income sources which are highly sensitive to drought disaster. Diversification of income sources and adoption of entrepreneurship strategies have been identified as a crucial strategic option for reducing vulnerability and effectively mitigating and reducing risks associated with harsh drought events and building back better (Mohan & Joy, 2020). According to Hallegatte *et al*., (2017) people suffer less from disasters if some of their income sources are located outside the area exposed to hazard through government transfer or through remittances or through reliance on income sources that are not exposed to drought risks. Diversification entails reduction of income shorfalls by engaging in livelihoods options that have negatively or weakly correlated returns including crop and livestock, spatial diversification of farms and diversification from farm to non-farm activities (Mutunga, *et al*., 2018).

These strategic options strengthen livelihoods through improved agricultural production and diversification of household income sources to mitigate drought-induced shocks in consumption. According to Ahmadalipour *et al*., (2019) strategic options, implemented in an integrated manner and responding to specific needs, have high probability of reducing drought vulnerability through reducing exposure to drought risks, adapting to the changing climate, and enhancing community resilience.

Further, with adequate awareness of future drought risks, flawless early warning systems, and without socio-economic limitations, people in Kitui County would be able to make proactive, rational decisions and achieve optimal drought risk reduction (Wens *et al*., 2021). According to Frankenberger *et al*., (2013), resilient communities have dynamic qualities that enables them to manage community- based assets in an equitable and sustainable way. They include preparedness, responsiveness, connectivity, learning and innovation, self-organization, diversity, inclusion, social cohesion, and aspirations. This study found low investment by humanitarian aid actors on community resilience building processes compared to food aid which has limited impact on building community resilience to drought.

6.3.1 Normality Test between Community Resilience to Drought Factors and Strategic Options Factors

Analysis of results of tests of normality between community resilience to drought (dependent variable) and strategic options factors (independent variable) as shown in Table 6.2 shows that the data set on community resilience to drought against that of strategic options factors were non-normally distributed, a violation of normality assumption. This is because the Kolmogorov - Smirnov and the Shapiro - Wilk tests, performed on the data sets for the two variables gave p - values less than 0.05 at 5% level of significance, implying that the data values for the dependent variable were skewed. Therefore, a decision to choose between parametric and non-parametric methods for use was made.

A non-parametric test, however, only provides a p - value, a quantity that is often misinterpreted. Since a parametric method like the t - test have a direct link with regression models as they often provide an effect estimate that is adjusted for other variables which differ between the groups, it was adopted. Linear models make inferences about means, thus if the means are normally distributed, the inferences will be valid.

Fortunately, means tend to follow a normal distribution even when the variable itself does not. The larger the sample size, the more extreme the distribution of the observations can be without compromising the validity of the t - test. This is because of the Central Limit Theorem (CLT), which states that the distribution of the means approximates to the normal distribution when the sample size increases, regardless of the distribution of the original observations under some regularity conditions. Thus, even when the underlying aspect follows a highly skewed distribution, the means approach a bell curve as the sample size increases.

Table 6.2: Normality Test between Community Resilience to Drought and Strategic Options

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Community resilience to drought	.262	384	.000	.858	384	.000
Strategic options	.332	384	.000	.728	384	.000

a. Lilliefors Significance Correction

Source: Field Data, 2018

6.3.2: Linearity Test between community resilience to drought and strategic options factors

The Karl Pearson's coefficient of correlations for testing the relationship between strategic options and community resilience to drought is based on the assumption that there is an average linear relationship between the two variables (Saleemi, 1997). A linearity test was carried out to establish the relationship between strategic options to drought and community resilience. The results show that there is an average to strong linear relationship between community resilience to drought and strategic options factors as reflected in the Figure 6.2. By looking to the scatter of the various points we note that community resilience to drought and strategic options factors are positively related with the line of the best fit showing a rising trend. Thus, the linearity test shows that there is a cause-and-effect relationship between the forces affecting the distribution of the items in the strategic options factors and community resilience to drought.

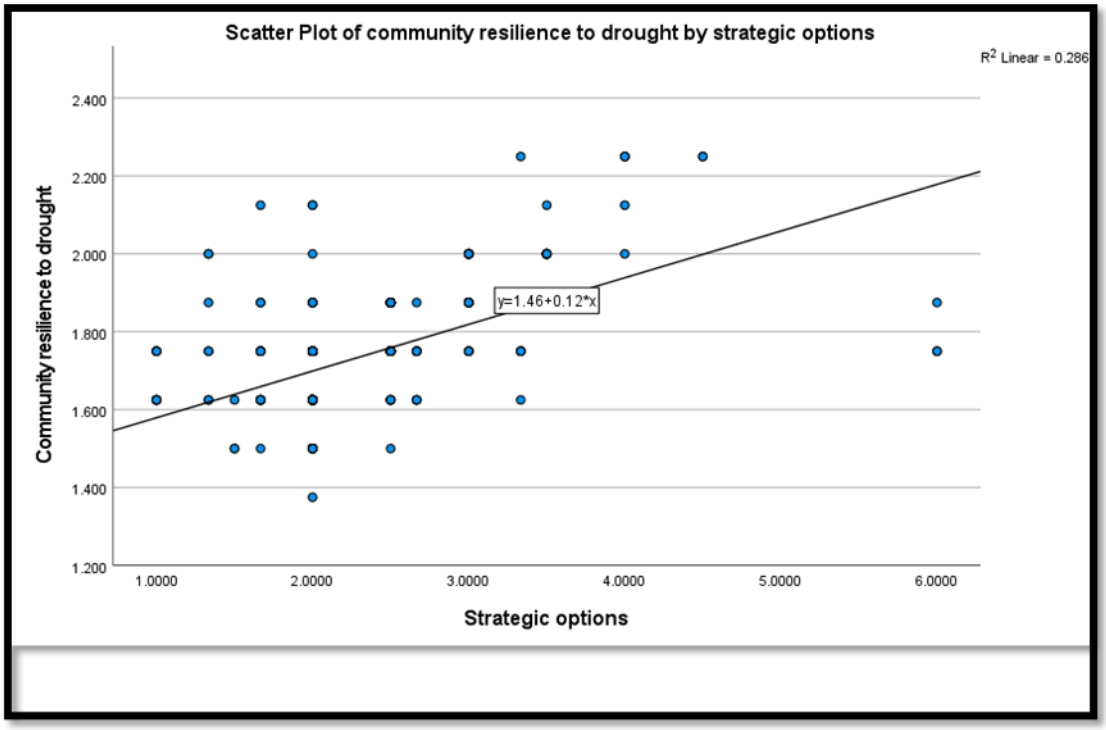


Figure 6. 2: Test for Linearity of Community Resilience to Drought and Strategic Option Factors

Source: Field Data, 2022

6.3.3: Regression Analysis Results on Community Resilience to Drought and Strategic Option Factors

To ascertain the effect of strategic options on community resilience to drought, regression analysis was conducted, and the results are shown in Table 6.3. The effect of strategic options adopted by the community on enhancing resilience to drought was found to be significant ($F(1, 382) = 155.87$, $p = 0.000 < 0.05$). With $R = 0.538$ and $R^2 = 0.29$, the model implies that about 53.8% of community resilience to drought were accounted for by strategic options, while a variation of 29% in community resilience to drought was brought about by strategic options adopted by the community.

The F test was significant with a p value = 0.000 which was less than the standard p value of 0.05 and this meant that the model was significant. From ANOVA, since p value p = 0.000 and was lower than p = 0.05 (p value 0.000 < 0.05), then the contribution of strategic options to community resilience to drought was significant, and the conclusion is that strategic options have significantly made the community more resilient to drought. The following equation was fitted for the model:

$$D = 0.538 + 0.29\text{SO} \quad (6.1)$$

Where D is the response variable representing community resilience to drought and SO is the response regressor variable denoting strategic options.The coefficient for strategic options (β) was also significant (β = 0.538, t = 12.485, p = 0.000 < 0.05) indicating that for every unit increase in community resilience to drought (1.462) there is small, predicted increase of (0.119) units in log odds of strategic options adopted by the community. Since p-value =0.000 < 0.05, the null hypothesis was rejected and concluded that there was a statistically significant relationship between strategic options and community resilience to drought.

Table 6. 3: Regression Analysis between Strategic Options and Community Resilience to Drought

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.538a	0.290	0.288	0.118412

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.185	1	2.185	158.870	.000b
	Residual	5.356	382	0.014		
	Total	7.542	383			

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.462	0.022		65.696	0
	Strategic. Options	0.19	0.10	0.538	12.485	0

Source: Field Data, 2022

6.3.4: Pearson's Correlation Test between Strategic options and community resilience to drought

Pearson Correlation between strategic options and community resilience to drought were found to be significant at $p = 0.000 < 0.05$ at 0.05 significance level and have a strong correlation coefficient of $R = 0.538$ as shown in Table 6.4.

Table 6. 4: Correlation Analysis for Strategic Options on Community Resilience to Drought

Correlations

		Strategic. Options	Community resilience to drought
Strategic. Options	Pearson Correlation	1	.538**
	Sig. (2-tailed)		.000
	N	384	384
Community resilience to drought	Pearson Correlation	.538**	1
	Sig. (2-tailed)	.000	
	N	385	385

**. Correlation is significant at the 0.01 level (2-tailed).

Source: Field Data, 2018

6.4 Other Proposed Strategies for Improving Community resilience to Drought

The impact of drought can be both ex post and ex ante (Hansen *et al*., 2010). Although it is exceedingly difficult to cut to zero drought risks in the context of constantly changing climate, (Khisa *et al*., 2017), enhancing community resilience to drought in Kitui County can be achieved through undertaking a raft of other strategic options that have been proven by previous studies as suitable for enhancing community resilience to drought.

Such strategic options have potential in reducing household's exposure to drought risks and making their assets less vulnerable to drought hazards and thereby improving community's ability to cope with unavoidable shocks from recurrent droughts. According to Shiferaw *et al*., (2014), the ex ante strategic options are aimed at reducing drought risk exposure through diversification and adapting flexible decision making strategic options while the ex post strategic options are aimed at reducing income fluctuations and consumption smoothing.

Some of the strategic options which may be strengthened to reduce drought risks in Kitui country include undertaking adaptation strategies aimed at enhancing efficient and sustainable usage of resources by farmers to achieve longer-term livelihood security throught maintaining flexibility in decision-making and enabling farmers to shift from one form of economic activity to another as the situation accommodates to scale up adoption of diversified crops varieties such drought tolerant and short maturing crop varieties; adopting drought-tolerant livestock breeds; conserving fodder; engaging 'green' initiatives such as conservation agriculture through use of zai pits, reforestation, adjustment of croping and planting seasons, changing of weeding and fertilizer application practices, switching from crop farming to livestock keeping (MoALFC, 2021). Other options include promoting better access to market information systems, improved infrastructure and improving irrigation services (Mutunga *et al*., 2018; Khisa, 2017), as well as adoption of integrated technological, institutional and policy strategic options (Blaike *et al*., 1994).

Adoption of integrated technological, institutional and policy strategic options has a direct positive impact in reducing the risk and vulnerability causal factors and thereby increasing livelihood resilience of drought-prone communities (Blaike *et al*., 1994). Additionally, enhancing support by humanitarian aid actor for social capital, social values and social structures among vulnerable people living in poverty are essential in building community resilience through cooperation in a community. According to Adger, (2010) and Béné *et al*., (2012), Cooperation has potential to contribute to more equitable access to natural resources, lowers transaction cost within a community because of increased levels of compliance on agreements pertaining to common actions on resilience building.

Further, effective disaster management, requires a well informed and engaged public, relies on social networks to connect and support individuals, families, groups, and organizations within the community and to link the community with the disaster system of care. (Pfefferbaum, *et al*., 2017; Berkes & Ross, 2013). However, Ganapati, (2013), notes that promotion of social capital need to be done while being aware of its potential downdownsides of perpetuating gender-based assumptions that could put women into conflict with the state authorities.

Additionally, sound adaptation planning, strong and sound partnerships involving national government and county government agenices, INGOs, CBOs and local communities and increasing financial resources by humanitarian aid actors are critical in enhancing community resilience to drought (Suda, 2000).

Further Development of County adaptation strategies and policies are important for prioritizing adaptation activities that respond to urgent and immediate needs, and for setting forth guiding principals in the effort to cope with climate change. The County Governments have a key role in developing these strategies and as a result play an important role in promoting and brokering partnerships for key players involved in supportting drought response measures. Such key players may include humanitarian aid actors including the national government, civil society organisations, the private sector, and international institutions (Verner, 2012). Within the national and County governments, inter-ministerial collaboration and co-ordination is imperative (UNDRR, 2019). Since the impact of disasters are felt immediately and intensely by the local communities and local actors are the first responders, it is important that the core functions of drought management and regulatory governance are concentrated at the local level where governments and communities are to engage and work collaborately (Graveline & Germain, 2022).

Furthermore, to ensure effectiveness in implementing strategic options aimed at enhancing community resilience, ensuring access to adequate, sustainable and flexible funding that adequately meets local needs, local capacity strengthening needs as well drought risk reduction efforts (Suda, 2000). However, a great percentage of the humanitarian aid funds reactive actions, ad-hoc, uncoordinated and short-term response measures, mainly in form of emergency relief services to the drought affected communities, initiatives that are incapable of yielding durable long-term solutions and addressing community vulnerability as opposed to funding long-term

development focused and disaster risk reduction actions actions which have the capacity to address the underlying causes of community vulnerability and consequently building community resilience (Clarvis *et al*., 2015; Hallegatte *et al.*, 2017). However, Béné *et al*., (2014), warns that, resilience has important limitations. In particular, it is not a pro-poor concept in the sense that it does not exclusively apply to or benefit the poor. As such reliance on resilience building only helps in fostering an integrated approach but cannot replace poverty reduction efforts.

Moreover, controlling population has been proven effective in mitigating drought risk in Africa, even more effective than mitigating climate change due to its high potential in improving socio-economic vulnerability and reducing potential exposure to drought risks (Ahmadalipour *et al*., 2019). Previous studies indicate that Kitui County has adopted several national policies geared toward adapting to climate change and its associated risks. Such policies provide information to farmers and enable them to plan, make feasible decisions, and adapt to the anticipated climate risks (MoALFC, 2021). However, developing adaptive capacities of farmers to engage in climate-smart agricultural practices and the ability of institutions to identify climate risks and take advantage of climate opportunities would be suitable strategies for improving community resilience to drought.

For instance, Kenya has a national policy for disaster management that indicates that drought is one of the dominant disasters in Kenya's disaster profile that quite often than not disrupts people's livelihoods, diverts planned use of resources, interupts

economic activities and retards development (Republic of Kenya, 2017). The policy emphasizes preparedness on the part of the government and communities in implementing DRR activities. However, is yet to be domesticated in Kitui County which implies that there is lack of an integrated and coordinated approach to DRM and this exposes the country to a casual approach that relies on costly ad hoc measures to handle unexpected disasters, including drought (Suda, 2000). A policy for disaster management in the County would be beneficial in informing decision making and resource allocation for drought response actions. Mainstreaming the policy into the county development policies would be a suitable strategic option that would provide an enabling environment for effective development, such as the rule of law, transparency and accountability, participatory decision-making structures, and reliable public service delivery well aligned with the international quality standards and is conducive to effective development and adaptation actions (Verner, 2012).

Vision 2030 is one of Kenya's national policy blueprint that seeks to transform Kenya into a newly middle-income country that provides a high quality of life in a clean and secure environment to all its citizens by 2030. The agriculture sector is one of the sectors that have been identified as key contributor to Kenya national economic growth. However, the realization of this vision has been constrained by inadequate access to quality inputs, declining soil fertility, land fragmentation, marketing ineffeciencies, low mechanization, inadequate conducive environment for investment and most importantly, climate change.

Prioritization of supporting implementation of the activities of the agricultural sectors would bear huge dividends in enhancing community resilience to drought. Other national polices which have been developed include the Kenya National Climate Change Response Strategy (NCCRS) developed in 2010 (Republic of Kenya, 2010) and the National Climate Action Plan (NCCAP) developed in 2012 (Republic of Kenya, 2012). The NCCRS recognizes the importance of climate change impacts on a country's development while the NCCAP provides a means for implementing the NCCRS and priorities adaptation strategies.

NCCAP is a measure for enabling Kenya to reduce vulnerability to climate change and to improve the country's ability to take advantage of the opportunities that climate change offers. Supporting mainsteaming of these policies into the country-level policies, strategies and development plans by the humanitarian aid actors would be beneficial in ensuring that locally relevant and viable integrated adaptation programmes are developed through an active engagement of local stakeholders so as to address climate related challenges including drought.

According to Frankenberger *et al*., (2012), community resilience building can be enhanced through three interconnected approaches that include first, governance and enabling conditions for achieving scale. This is comprised of initiatives aimed at supporting government ownership of resilience strategies, promoting responsive social and economic policies that support resilience, strengthening administrative and technical capacity among key institutions to promote resilience programming,

providing basic social services such as health, education and rule of law, supporting climate change adaptation, promoting peacebuilding and conflict resolution initiatives, advocating for long-term funding for resilience initiatives, promoting responsive social and economic policies that support resilience, advocating for formal social protection mechanisms and promoting multi-sector partnerships across agencies. Secondly, supporting household and community adaptive capacities through promoting diverse livelihood strategies such as promoting asset accumulation and diversification, improving human capital (health, education, nutrition), supporting smallholder market linkages and thirdly, improving access to technologies and potential for innovation, strengthening diverse social networks, promoting gender empowerment, and supporting healthy ecosystems (land, water, biodiversity).

CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This chapter outlines the summary of the study findings based on the three specific study objectives. Based on the findings, this chapter also gives conclusions and recommendations for each study objective and provides suggestions for further areas of research.

7.2 Summary of Findings on the Impact of Humanitarian Aid on Community Resilience in Kitui County, Kenya

The overall objective of this study was to examine the impact of humanitarian aid in building community resilience to drought in Kitui County. The findings are presented under each specific objective.

First, the study examined the types of humanitarian aid implemented in response to drought disaster in Kitui County and found that food support was the main type of humanitarian aid as confirmed by 32.2% (124) while community resilience building related actions scored low such as planting of drought resilient crops mentioned by 11.7% (45) of household respondents, awareness creation on drought mitigation 9.6 (37) and drought early warning information systems 8.3% (32) conducting drought risks assessments 7.5% (29); implementation of community drought action plans 5.5% (21); rearing of drought resilience livestock 4.9 (19) among others. Further, the study found that several humanitarian aid agencies were supporting DRR efforts in

Kitui county that include the county and national governments as stated by 56% (216) of the household respondents, Faith Based Organizations 13% (51), and Community Based Organizations 8% (29) while 12% (47) of the household respondents were not aware of any agency that was supporting DRR work in their areas. These findings were confirmed through KIIs and FGDs which indicated that Action Aid, CARE International, Anglican Development Services, Caritas Kitui, NDMA, WFP, World Vision, German Agro Action, Action Aid, Trocaire, DFID, Break of the World, Australian Board Mission, Compassion, FARM Africa, SLIM, UNDP, SASSD and the County's Governor's office, Ministry of Education and Ministry of Agriculture were supporting drought response and mitigation measures aimed at enhancing community resilience to drought.

Moreover, the study revealed there were positive changes attributable to the types of humanitarian aid implemented in Kitui County which include reduced drought losses as confirmed by 24.2% (93) of the household respondents, growing of drought tolerant crops and keeping of drought resilient livestock 13% (50), and better understanding of drought risk 9.9% (38) while17.4% (67) had not observed any change and 3.4% (13) had no knowledge about any change. The findings were also confirmed through KIIs and FGDs. Overally, majority of the household respondents 78% (301) agreed that the types of humanitarian aid work implemented in Kitui County had increased community resilience to drought in the County. These findings were confirmed through FGDs and KIIs.

Through correlation analysis between humanitarian aid factors and building community resilience to drought factors, the study found a statistically significant relationship at $p = 0.000$ and a strong positive correlation coefficient of $R = 0.742$. Through regression analysis the study found that the effect of humanitarian aid on community resilience to drought was significant ($F(1, 397) = 485.18$, $p = 0.000 < 0.05$). With $R = 0.742$ and the coefficient of determination $R^2 = 0.55$, the model implies that about 55% of community resilience to drought was accounted for by humanitarian aid. This shows there was a positive effect of humanitarian aid on community resilience to drought in Kitui County.

Secondly, the study tried to find out what is the level of community resilience to drought in Kitui County. The study found out that majority of the household respondents 67% (258) earn less than Ksh.5, 700 per month. This amount is less than USD.1.89 a day, implying that 67% (258) of the household respondents were living below the international poverty line of USD.1.90 a day. On diversification of income sources, the study revealed that majority of the household respondents 89.4% (344) earned their income from crop and livestock production systems, income sources which are highly sensitive to weather fluctuations and are highly exposed to drought risks while 30% (116) rely on casual labour and only 9% (35) earn their income through bee keeping and 1% (3) through sale of tree seedlings.

The study found that majority of the household respondents 93.5% (360) grew green grams, 72.7% (280) maize, 71.7% (276) cow peas, and interestingly, pumpkins, fruits, and cassava were grown by only 8.8% (34), 8.3% (32) and 3.6% (14) respectively by the household respondents despite being very good sources of nutrients. On the type of livestock kept majority of the household respondents 86% (331) kept sheep/goat, 81% (312) local breed chickens and 60.3% (232) local indigenous cattle while only 2.1% (8) kept improved chickens and 0.8% (3) dairy cattle. These findings were also confirmed through FGDs, KIIs and observation. Overall, majority of the household respondents had made good progress in adapting drought tolerant crops and livestock.

Furthermore, the study found that the challenges faced by household respondents in livestock and crop farming are mainly drought 93.8% (361), pest infestation 87.3% (336), forage 87% (335), water shortage 85.7% (330), crop and livestock losses 75.8% (292), poor prices of produce 61.3% (236) and inadequate agricultural services 314% (121) among others. Moreover, the study established that only 4% (17) of household respondents irrigate their farms while the rest 96% (368) did not irrigate their farms due to lack of sustainable sources of water as stated by majority of household respondents 57.4% (221) and lack of irrigation services with 34% (131) while 2.1% (8) perceived rain-fed agriculture benefits their agricultural activities sufficiently among other reasons. On household food availability the study found that majority of the household respondents 62.6% (241) had no food in store and only 4.2% (16) had enough food to last for 1 year.

Majority of household respondents 53% (177) sell their produce immediately after harvest and only 21% (70) sell their produce when the markets are favourable and 1% (4) in the beginning of the rain season. The main reason why majority of household respondents 48% (85) sell their food immediately after harvest is to pay school fees 37.86% (67) to meet household needs, 3.95% (7) due to lack of storage facilities and 9% (16) due to fear of infestation by weevils. Further, the study found out that majority 83.9% (323) of the household respondents construct terraces in their farms, 62.9% (242) apply animal manure while 10.4% (40) did not practice any form of soil and water conservation methods. Additionally, majority 84% (322) use wood fuel and only 3% (11) use gas for cooking.

Further, the study revealed that majority 30.4% (117) of household respondents rely on boreholes to access drinking water, 15.3% (59) protected shallow wells, 12.7% (49) tap water, 2.9% (11) roof catchment water among other sources while 13.2% (51) rely on earth dams, 11.7% (45) sand dams,11.2% (43) unprotected shallow wells and 2.1% (8) perennial rivers among others. Majority of the household respondents 46% (177) travel less than 2kms to get water for livestock, while 13.5% (52) travel 4-5 km and 13.8% (53) more than 6 km. The study also found that a great majority of the household respondent's 45% (172) said that the local community maintains the water sources, 23% (89) the government, 11% (44) by NGOs/CBOs/FBOs while 21% (80) stated that their water sources are not maintained.

On the level of hygiene and sanitation situation, the study found that 50.6% (195) of household respondents do not boil water for drinking while 49.4% (190) said they boil or treat water for drinking and the reason given by majority of the household respondents who do not boil or treat drinking 54.5% (210) was that they perceived the water they were using to be safe for drinking since it is drawn from safe sources 22.3% (86) boiling/treating water is too much work, 13.2% (51) the chemicals for treating water are costly while 9.9% (38) said boiled or treated water does not taste nice. On access to sanitation facilities the study found out that majority of household respondents 93.8% (361) use pit latrines for disposal of human waste while 4.2% (16) use nearby bush.

Also, on access to transport services, the study found out that 33% (128) of household respondents use *boda boda* (motor bikes) as the main means of transport, 29% (110) buses and Matatus while 24% (94) use donkeys, 7% (27) lorries among others. On existing community coping capacities, the study found that a vast majority of the household respondents 32.7% (126) cope with drought disaster through selling of livestock, 20.5% (79) food rationing, 16.9% (65) through support from relatives and friends and 15.8% (61) through buying food among others. Further on community self-organising the study reveals that majority of the household respondents 82% (315) indicated that there were no community drought management committees in their villages while only 18% (70) knew of the existence of drought management committee/structures in their study areas.

The study also found that a number of social and economic factors influence the level of community resilience to drought in Kitui county while environmental factors have insignificant influence on the level of community resilience to drought. More specifically, the effect of social factors on building community resilience to drought was significant at $p = 0.000 < 0.05$. With $R = 0.827$ and $R^2 = 0.684$, the model implies that 68.4% of community resilience to drought was accounted for by social factors. Also, economic factors had a significant effect on building community resilience to drought at a significant level of $p = 0.000 < 0.05$. With $R= 0.965$ and $R^{2 =} 0.931$, the model implies that 93.1% of community resilience to drought were accounted for by economic factors. Surprisingly, the study found that environmental factors had insignificant effect on building community resilience to drought at $p = 0.586 > 0.05$. With $R = 0.027$ and $R^{2 =} 0.001$, the model implies that 0.1% of community resilience to drought was accounted for by environmental factors. Thus, economic factors had the strongest effect on community resilience to drought followed by social factors while environmental factors had the least effect.

Thirdly, the study sought to identify the strategic options for enhancing community resilience to drought in Kitui County. Using ranking by weighting by cases, the study found that majority 34.4% (747) of the household respondents preferred 1) support for more sustainable water sources, 2) 15.1% (328) increased access to credit facilities, 3) 11.9% (259) livestock/crop insurance, 4) 11% (240) support for food banking/storage facilities, 5) 8.3% (180) timely and reliable sharing of early warning information, 6) 7.5% (162) more engagement in DRR planning, 7) 6.3% (136) diversification from

farming to non-farming livelihood options and 8) 5.5% (120) more disaster community engagement in drought risk assessments. Moreover, analysis of results of a test of normality between strategic options factors and community resilience to drought showed that community resilience to drought and strategic option factors were non-normally distributed. This is because the p-value of the Kolmogorov-Smirnov and the Shapiro-Wilk tests were less than 0.05 at 5% level of significance. The variables were considered less significant. A linearity test was carried out to establish the nature of the relationship between community resilience to drought and strategic options.

The results showed that there is an average to strong linear relationship between community resilience to drought and strategic options factors. Pearson's Correlation test between strategic options and community resilience to drought was found to be significant at $p = 0.000 < 0.05$ at 0.05 with a positive correlation coefficient of $R = 0.534$. Finally, to ascertain the effect of strategic options on community resilience to drought, regression analysis revealed that the effect of strategic options for enhancing community resilience to drought as proposed by the household respondents was found to be significant at $p = 0.000 < 0.05$. With $r = 0.534$ and $r^2 = 0.286$, the model implies that about 28.6% of community resilience to drought were accounted for by strategic options. Overally, support for more sustainable water sources emerged as the leading strategic option for enhancing community resilience to drought in Kitui County.

However, existing studies indicate that an integration of various relevant strategic options has a higher impact in mitigating multivariate drought risks and enhancing community resilience drought compared to just implementing one strategic option.

7.3 Conclusions

Overall, the study revealed that humanitarian aid has made limited impact in building the level of community resilience to drought in Kitui County. However, a major strategic shift is still needed in enhancing community resilience in Kitui County.

Specifically, the study concludes that:

i. Based on the findings, the types of humanitarian aids implemented in response to drought disaster in Kitui County include food aid, planting of drought resilient crops, awareness creation on drought mitigation, early warning systems among others with food aid being the most prominent.
ii. There is low to medium level of community resilience to drought in Kitui County as the majority of the households are living below the international poverty line; rely on income sources that are highly sensitive to drought and are faced with high levels of food insecurity among other challenges. On the other hand, community resilience is evident in the adoption of drought-resistant farming systems, among others.
iii. The strategic options that are suitable for enhancing community resilience to drought in Kitui County are support for more sustainable water sources, increased access to credit facilities, livestock/crop insurance, support for food

storage facilities, timely & reliable sharing of early warning information system among others with support for sustainable water sources being the most preferred.

In conclusion, the influence of humanitarian aid on strengthening community resilience to drought in Kitui County appears to have been relatively modest. Nonetheless, our study reveals that this impact can be significantly bolstered by the implementation of diverse strategic measures aimed at fortifying community resilience to drought. These measures encompass the establishment of sustainable water sources, facilitating access to credit, constructing food storage facilities, enhancing early warning information systems, fostering risk planning, and promoting livelihood diversification, among other interventions. By adopting these approaches, we can contribute substantially to the realization of the objectives set forth in the Sendai Framework for Disaster Risk Reduction 2015-2030 and the Sustainable Development Goals.

7.4 Recommendations

The study recommends that there is need for increased humanitarian aid in Kitui County by the humanitarian aid system. More specifically:

i. There is need for ensuring adequate allocation of humanitarian aid through hastening the process of shifting from supporting short-term and reactive efforts into supporting more long-term efforts while addressing the underlying causes

of vulnerability, protecting livelihood assets, saving lives and reducing drought risks in order to enhance community resilience to drought.

ii. That the future humanitarian aid interventions should be planned in a way that addresses the multidimensional features of poverty through wealth creation, asset building, diversification of income sources for purposes of reducing income inequalities and investing more in supporting the the local communities in establishing local drought management committees, conducting drought risk assesmsents and funding development and implementation of drought community action plans in order to enhance drought preparedness and build community resilience.

iii. There is need for adoption of various technological, institutional and policy strategic options such as support for more sustainable water sources, increased access to credit facilities, livestock and crop insurance, support for food storage facilities, timely and reliable sharing of early warning information, more engagement in DRR planning, diversification from farming to non-farming livelihood options and more engagement in community drought risk assessments and ensuring these are well integrated to effectively manage both drought ex ante and reduce the ex post negative effects of drought on vulnerable communities in order to enhance community resilience to drought.

7.5 Suggestions for Further Study

From the study findings its worth to recommend the following further studies:

i. Further research is needed to determine the barriers within the humanitarian aid system in allocating adequate funding for long-term resilience building programmes in Kitui County.

ii. A further study is recommended on the association of environmental factors and community resilience to drought in Kitui County.

iii. The study also recommends further study to determine the level of resilience to drought within market systems in Kitui County.

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APPENDICES

APPENDIX I: INFORMED CONSENT/INTRODUCTORY LETTER

Dear Respondent,

I am a post graduate student in the School of Disaster Management and Humanitarian Assistance at Masinde Muliro University of Science and Technology.

I am conducting research on the impact of humanitarian aid in building community resilience to drought in Kitui County, Kenya. The research will be undertaken in Mwingi North and Mwingi West Sub-Counties. This research is purely for academic purposes. The research findings may be utilized in developing strategies and approaches for improving drought risk management in Kitui County. This questionnaire is aimed at collecting information on the research.

You have been identified as one of the key stakeholders in drought risk management in Kitui County and your participation in the interview will be highly appreciated. All your responses will be **STRICTLY CONFIDENTIAL**. You have the freedom not to respond to all the questions and you can choose to withdraw from the interview at any time if you feel uncomfortable.

Thanking you in advance,

Yours Sincerely,

Agnes Kalekye Kithikii

Researcher

APPENDIX II: HOUSEHOLD QUESTIONAIRE

THE IMPACT OF HUMANITARIAN AID IN BUILDING COMMUNITY RESILIENCE TO DROUGHT IN KITUI COUNTY, KENYA

QUESTIONNAIRE SERIAL NUMBER
_____

Name of Enumerator	

Introduction and Seeking Respondent's Consent		**Enter Code**
Hello in order to evaluate the impact of humanitarian aid in building community resilience to drought in Kitui County, we would like to interview you on your experience in mitigating the impact of drought in your community. This research is purely for academic purposes. All your answers will be **STRICTLY CONFIDENTIAL**. Your participation in this interview will not affect your future services. You do not need to answer all the questions and you can withdraw from the interview at any time if you feel uncomfortable. Are you willing to participate in this interview?	01 = Yes 02 = No	

Household Number	
Name of Sub-County	
Name of Ward	
Name of Village	

Date of the Interview	

Socio- Demographic Information			
			Enter Code
1. Sex of the Respondent	01 = Male 02 = Female		
2. How old are you	01 = 18-24 02 = 25-34 03 = 35-44 04 = 45-54	05 = 55-64 06 = 65-74 07 = 75+ 98 = Don't know	
3. How long have you lived in this community?	01 = 1-2 years 02 = 3-5 years	03 = 6-10 years 04 = 11+ years	
4. What is your marital status?	01 = Single 02 = Married 03 = Divorced/separated 04 = Widowed/Widower 98 = No answer		
Access to Education Services			
5. What is your highest level of education?	01= Primary 02 = Secondary 03 = College	05= University 06 = None	
6. How many children do you have?	01 = None 02 = 1-4	03 = 5-6 04 = 7+	
Economic Opportunities			
7. What is your level of income per month?	01 = Less than Ksh. 5,700 02 = Kshs. 5,700 - 10,000 03 = Kshs. 10,001 - 15,000 04 = Kshs. 15,001 – 20,000 05 = Above Ksh. 20,000		

8. What is your main sources of income? (Tick all that applies)	01= Crop/livestock keeping 02 = Regular employment 03 = Small scale business 04= Casual labour 05 = Brick making 06 = Selling of tree seedlings 07 = Charcoal burning/selling 08 = Selling of sand 09 = Bee keeping 97 = Others (Specify) _____	
9. What main crops do you grow? (For those who grow crops - tick all that applies)	01 = Maize 02 = Beans 03 = Millet 04 = Sorghum 05 = Green grams 06 = Cassava 07 = pigeon peas 08 = Cow peas 09 = pumpkins 10= fruits 97 = Others (Specify) _____	
10. What livestock do you keep? (For those who keep livestock - tick all that applies)	01 = Diary cattle 02 = Local traditional cattle 03 = Shoats (goats/Sheep) 04 = improved chicken 05 = Local breed chicken 06 = Pigs 97 = Others (Specify) _____	
11. What main challenges do you face in crop & livestock farming? (tick all that applies)	01 = Drought 02 = shortage of water and forage 03 = environmental degradation 04 = limited access to land 05 = Inadequate agricultural extension services 06 = Poor agronomical skills	

	07 = poor prices of produce/livestock 08 = crop/livestock losses 09 = pest's infestation 10 = lack of enough storage for cereals 97 = Others (Specify)	
12. When do you sell your produce?	01 = Immediately after harvest 02 = In 1-2 months After harvest 03= In the beginning of the next rain season 04= When market prices are favourable 05 = When I have a need for selling 97 = Others (Specify) _____	
13. (To those who sell immediately after harvest) Why do you sell your produce immediately after harvest? (tick all that applies)	01 = To pay school fees 02 = To meet household needs 03 = Lack of Storage 04 = Fear of weevils infestations 97 = Others (specify) _____	
14. How long can the food your household have in store last?	01 = We don't have food in store 02 = Enough to last 2 weeks 03 = Enough to last 1-2 months 04 = Enough to last for 3-5 months 05= Enough to last one year 98 = I don't know	
15. Which soil and water conservation methods do you use? (observe/interview and tick all that applies)	01 = None 02 = Terraces 03 = Animal manure 04 = Grass lines 05 = Contour bunds 06 = Mulching 07 = Compost manure 97 = Others (Specify) _____	

16. Do you irrigate your farm?	01 = No 02 = Yes	
17. If Not (16); what prevents you from irrigating your farm? (for all that applies)	01 = lack of sustainable sources of water supply 02 = rain-fed agriculture is sufficient for us 03 = lack of irrigation services in our area 04 = It is too much work 05 = I have never thought about it 97 = Others (specific) _____	
Infrastructure and basic Services		
18. What is your main sources of fuel for cooking? (tick all that applies, also observe if at the household)	01 = Wood fuel 02 = Charcoal 03 = Kerosene 04= Electricity 05 = Gas 97 = Others (Specify)_____	
19. What is your main source of lighting	01 = Electricity 02 = Solar 03 = Gas 04= Kerosene lump 05 = Diesel generator 97 = Others (Specify) _____	
20. What type of housing do you have? (observe and confirm with the respondent which house belongs to him/her)	01 = Stone walled with iron sheets – Permanent 02 = Brick walled with iron sheets– Permanent 03 = Mud walled with iron sheets- semi permanent 04 = Mud walled grass thatched - temporary 97 = Others (Specify)	

21. What is your source of drinking water?	01 = taped water 02 = borehole 03 = roof 04= Sand-dam 05= Earth-dam	06 = Unprotected shallow well 07 = Protected shallow well 08 = Perennial River 97 = Others (Specify) _____	
22. Do you boil or treat water for drinking?	01= No 02= Yes		
23. If NO above (22), why?	01 = Because I draw water from a safe source 02 = It is too much work to boil/treat water 03 = water treatment chemicals are costly 04 = Boiled/treated water does not test nice 97 = Others (Specify) _____		
24. What is your source of water for livestock?	01 = Borehole 02= Perennial River 03 = earth-dams	04 = Sand dam 05 = shallow wells 97 = Others (Specify)	
25. What is the distance to livestock water source?	01 = Less than 2 Km 02 = 2-3 Km 03 = 4-5 Km	04 = Above 6 Km 98 = Don't know	
26. What challenges do you face in accessing water during prolonged dry seasons? (tick all that applies)	01 = poor water quality (Muddy) 02 = Long distances to water points 03 = Drying of water sources due to drought 04 = breakdown of water pumping systems 05 = lack of maintenance of water sources 97 = Others (Specify)_____		

27. Who maintains your water sources?	01 = local community 02 = Government 03 = NGOs/CBOs/FBOs	04 = None 97 = Others (Specify) - _____	
28. What is your main means of transport? (tick all that applies)	01 = Bus/Matatu 02 = boda boda 03 = Lorries 04 = Donkeys	05 = Cats 06 = Tuk tuk 97 = Others (Specify) _____	
29. What types of roads do you use in your area? (Observe)	01 = Tarmac 02 = Marram 03 = Earth Road		
30. What common diseases does your household suffer from? (tick all that applies)	01 = Malaria 02= Typhoid 03 = Amoeba 04 = Dysentery 05 = Cholera	06 = Colds & fever 07 = Coughing 97 = Others (specify) - _____	
31. Where do you go for your treatment?	01 = District Hospital 02 = Private hospital 03 = Health Centres/Stations	04 = Traditional doctor 05 = Herbalist 97 = Others (Specify) _____	
32. What is the distance to treatment centres?	01 = Less than 2 Km 02 = 3-5 Km 03 = 6-10 Km	04 = More than 11Km 98 = Don’t know	
33. What toilet facilities do you use? (Observe)	01 = Toilet 02 = pits 03 = papers	04 = Nearby bush 98 = No Answer	

The Impact of Humanitarian Aid in Building Community Resilience to Drought			
34. When did you last experience drought in your area?	01= This year 02 = last one year 03 = last two years	04 = last three years 98 = I don't know	
35. How often do you experience drought in your area?	01 = every 1 year 02 = every 2 years 03 = every 3 years	04 = every 4 years 05 = Every 5-10 years 98 = Don't Know	
36. What was the frequency of drought occurrence before the last 10 years (before 2008)?	01 = every 1 year 02 = every 2 years 03 = every 3-4 years	04 = every 5 years & above 98 = Don't Know	
37. How did the drought you experienced recently affect you? (only those who have suffered drought & tick all that applies).	01 =We were not affected 02 = Crop losses 03 = Livestock losses 04 = Water shortage 05 = Decline in livestock prices 06 = Food crisis/shortage 07 = child malnutrition & poor health 08 = Outbreak of human & livestock diseases 09 = Children dropped out of school 97 = Others (Specify)_____		
38. How did you cope with drought challenges? (tick all that applies)	01 = Selling livestock to buy food 02 = Food rationing 03 = Support from relatives and friends 04 = Buying food 05 = Migration to urban centres in search of jobs		

	06 = reliance on relief handouts 97 = Others (Specify) _____	
39. Which agencies supported drought risk reduction in your area? (tick all that applies & name the agencies)	01 = None 02 = Government_____ 03 = FBOs _____ 04 = CBOs _____ 97 = Others (Specify)_____	
40. Which drought mitigation measures were supported by these agencies? (Tick all that applies)	01 = Food support 02= Conducting drought risk assessments 03 = Planting of drought resilient crops 04 = Rearing of drought resilient livestock 05 = livestock destocking/restocking 06 = Awareness creation on drought mitigation 07 = Livestock & crop insurance schemes 08 = Implementation of community drought action plans 09 = Drought early warning information systems 10 = micro-credit schemes 11= Natural resource management 97 = Others (Specify)	
41. Does your community have a Drought Management	01 = Yes 02 = No 98 = Don't know	

Committee/Structure?		
42. If Yes 41, what activities has your Drought Management Committee been involved in?	01 = Drought risk assessments 02 = Development & implementation of community drought action plans 03 = Mobilisation of financial resources to implement community drought action plans 04 = Management of community assets 97 = Others (specify) _____	
43. What changes have occurred in your community over the last 10 years (2008-2018) as a result of these drought mitigation measures? (tick all that applies)	01 = No significant changes 02 = reduced drought losses 03 = growing/keeping drought tolerant crops & livestock 04 = increased sustainable sources of water 05 = improved involvement of local community in drought mitigation measures 06 = improved management of natural resources 07 = improved access to drought early warning information 08 = Presence of drought management committee in my village 09= increased access to credit facilities 10= presence of livestock & crop loss insurance 98 = Don't know	
44. Drought mitigation support by the government & I/NGOs/FBOs over the	01= Strongly agree 02 = Agree 03 = Disagree 04 = Strongly Disagree	

past 10 years has resulted in improved community resilience to drought in your locality. Do you agree?	98 = I don't know	
45. What else can be done to make your community more resilient to drought? (tick all that applies)	01 = Nothing 02 = More engagement of local community in drought risk assessments 03= More engagement of local community in drought risk reduction planning 04 = Diversification from farming to non-farming livelihood options 05 = Timely & reliable early warning information sharing 06 = Support for food banking/storage facilities 07 = compensation for drought related losses 08 = increased access to credit facilities 97 = Other reasons (Specify)_____	
THE END	**THANK YOU FOR YOUR PARTICIPATION**	

APPENDIX III: KEY INFORMANT INTERVIEW GUIDE

Introduction

This schedule aims at collecting data that will form part of the study on "**The Impact of Humanitarian Aid in building community resilience to drought in Kitui County, Kenya**" by Agnes Kalekye Kithikii, a post graduate student in the Centre for Disaster Management and Humanitarian Assistance at Masinde Muliro University of Science and Technology. The research is purely for academic purposes and may be used for the purposes of improving drought risk management strategies in your County.

You have been identified as one of the key stakeholders in drought risk management in Kitui County and your co-operation in completing this questionnaire will be highly appreciated. All your responses will be **STRICTLY CONFIDENTIAL**. You have the freedom not to respond to all the questions and you can choose to withdraw from the interview at any time if you feel uncomfortable. Are you willing to proceed with the interview?

Thank you for your availability,

Agnes Kalekye Kithikii

1. Name of Organisation……
2. Contact Details ……..
3. Position of the Respondent……
4. Sex: (Female/Male) ……
5. What sector/Department do you work in?

   ……..
6. How often have droughts been occurring in the past 10 years (2008 – 2018)?

   ……
7. When was the last time you experienced drought in Kitui County?

   ……..
8. What impact did the drought have on the people, livelihoods and environment? (Any drought assessment reports you can share?)

   ……

   ……

   ……
9. The impact of drought has been increasing in the past 10 years (2008-2018). Do you agree or disagree?

   ……

   Give reasons.

   ……

   ……

   ……
10. Which Sub-Counties have you been working in?

    ……

    ……
11. What drought risk reduction measures has your organisation been supporting in these areas over the past 10 years (2008-2018)?.....

    ……

    ……

12. In the areas where you work, have communities been involved in conducting drought risk assessments?.....
13. If so; have communities developed & implemented drought risk reduction action plans?

    ……
14. If so; has the implementation of community drought risk reduction action plans yielded significant outcomes in reducing drought risks and building local capacities? ……

    Please explain…….

    ……
15. Do communities in these areas have access to timely, accurate & reliable early warning information to drought?.....
16. In which medium is the drought early warning information communicated to the local communities?

    ……

    …….
17. In what language is the drought early warning information communicated to the people?

    …….
18. Does the Kitui County Government have a county drought risk reduction policy?

    ……
19. If yes, who is involved in monitoring and coordination of the implementation of the policy and how?

    .....
20. Does the County Government of Kitui have a drought contingency?

    ……

If yes; who is involved in the coordination the implementation of the contingency plan?

.....

.....

21. Who has been funding drought risk mitigation measures for Kitui County in the last 10 years (2008 – 2018)?

    .....

    ……

22. What specific drought mitigation actions are funded?

    ……

    ……

23. In your view, have the drought risk reduction measures implemented over the last 10 years (2008 – 2018) by the government and I/NGO/FBOs/CBOa in Kitui County resulted in building community resilience to drought? ……..

24. If yes; which indicators demonstrate that community resilience to drought has been built?

    .....

    ……

25. In your view what underlying social, economic and environmental factors have been hindering progression towards building of community resilience to drought in Kitui County?

    ……

    ……

26. What alternative strategies would you recommend for achieving enhanced community resilience to drought in Kitui County in the future?

    ……

    ……

APPENDIX IV: FOCUS GROUP DISCUSSION GUIDE

Introduction

This schedule aims at collecting data that will form part of the study on "**The Impact of Humanitarian Aid in Building Community Resilience to Drought in Kitui County, Kenya**" by Agnes Kalekye Kithikii, a post graduate student in the Centre for Disaster Management and Humanitarian Assistance at Masinde Muliro University of Science and Technology. This information will be for academic purposes only and may be used for the purposes of improving drought risk management strategies in your County.

You have been identified as one of the key stakeholders in drought risk management in Kitui County and your co-operation in completing this questionnaire will be highly appreciated. All your responses will be **STRICTLY CONFIDENTIAL**. You have the freedom not to respond to all the questions and you can choose to withdraw from the interview at any time if you feel uncomfortable. Are you willing to proceed with the interview?

Thank you for your availability,

Agnes Kalekye Kithikii
Researcher

At least 10-12 members per group with at least a third representation from either gender

Group

Category……..

Membership:

Female…….Male……..

Sub-County……Ward……Village……

1. What impact has drought had in your community in the past 10 years (2008-2018)?

   ……

   ……

2. When did you lastly experience drought?

   ……..

3. Drought frequency has been decreasing in the last 10 years. Do you agree or disagree? Give reasons

   ……

   ……

4. What have you been doing to prepare and mitigate drought?

   ……

   ……

5. How do you cope with the drought after it occurs?

   .....……

   ……

6. Which agencies have been supporting you to mitigate the impact of drought?

   ……

   ……

7. What drought mitigation measures have these agencies been supporting?

   ……

   ……

8. How have you been involved in the development, implementation and monitoring these drought mitigation measures?

   .....

   ……

9. What positive changes have these drought risk reduction interventions had in building your community resilience to drought over the past 10 years (2008-2018)?

   ……

   …...……

10. Have you undertaken any drought hazard, vulnerability and capacity assessments in your community?

    ……

    ……

11. Have you developed any community-based drought action plans? If yes; what are some of the activities included in the plans?

    ……

    ……

12. Have you formed a community drought risk reduction committee in your village/Ward?

    ……

    ……

13. Have you changed the types of crop varieties you have been growing over the last 10 years? If so; what crop varieties were you growing before and what crops varieties are you growing currently?

    Before:……

    ……

    ……

    Currently:……

    ……

    ……

14. Have you changed the type and the number of livestock you keep over the last 10 years? If so; what type and number of livestock are you keeping currently and what were you keeping before?

    ……..

    Before:……

    ……

    ……

    Currently:……

    ……

15. In your view, do you think, the drought risk reduction interventions implemented by the agencies that have been supporting you in the last 10 years have built your community resilience to drought? ……

    If yes, how?

    ……..……

    …….

16. If not; what are the key underlying social, economic and environmental factors affecting building of drought resilience to drought?

    ……

    ……

17. What should be done differently in future to enhance community resilience to drought?

    .....

    .....

APPENDIX V: OBSERVATION CHECKLIST

The enumerator to observe and record the following: (One may seek clarifications)

Observations	**Remarks**
1. The physical status of the main (Permanent, semi-permanent or mud walled grass thatched houses), rain water harvesting structures at the homestead	
2. Type of livestock kept (health status, body conditions, resistant to drought & numbers)	
3. Crop types and farming systems	
4. Farming methods and state of farms – soil and water conservation structures	
5. Water source (protected or unprotected, water turbidity, different source for watering animal and for drawing water for household use, level of sustainability) etc	
6. Physical infrastructure – state of roads, school buildings, health facilities, observe and record distances	
7. Environmental status – status of ground cover, vegetation, status of environmental vegetation, cooking facilities etc	
8. Health and hygiene status of community members	

APPENDIX VI: DESCRIPTIVE STATISTICS

Descriptive Statistics

	Mean	Std. Deviation
Sex of the respondent	1.60	.492
How old are you?	3.91	4.961
How long have you lived in this community?	3.68	.748
What is your marital status?	2.05	.697
What is your highest level of education?	1.67	.911
How many children do you have?	2.59	.972
What is your level of income per month?	1.55	1.000
What is your main source of income?	1.10	.304
What crops do you grow?	1.92	.268
What livestock do you keep?	1.61	.489
What main challenges do you face in crop and livestock farming?	1.69	.463
When do you sell your produce?	1.97	.184
(to those who sell immediately after harvest) why do you sell your produce immediately after harvest?	1.99	.086
How long can the food your household has in store last?	1.99	.111
Which soil and water conservation methods do you use?	1.06	.238
Do you irrigate your farm?	1.17	.643
if not, what prevents you from irrigating your farm?	1.13	.334
What is your main source of fuel for cooking?	1.82	.383
What is your main source of lighting?	1.72	.448
What type of housing do you have?	1.74	1.115
What is your source of drinking water?	1.69	.462
Do you boil or treat water for drinking	1.38	.485
if no (above), why?	1.24	.426
What is your source of water for livestock?	1.13	.334
What is the distance to livestock water source?	3.46	8.193
What challenges do you face in accessing water during prolonged dry seasons?	1.61	.489
Who maintains your water sources?	1.90	.902
What is your main means of transport?	1.14	.583
What types of roads do you use in your area?	2.00	.260
What common diseases does your household suffer from?	1.69	.930
Where do you go for your treatment?	2.95	.801

	Mean	Std. Deviation
What is the distance to treatment centers?	1.69	.463
What toilet facilities do you use?	1.97	.184
When did you last experience drought in your area?	2.36	.965
How often do you experience drought in your area?	1.28	.451
What was the frequency of drought occurrence before the last 10 years (before 2008)?	1.62	.487
How did the drought you experienced recently affect you?	1.59	.498
How did you cope with drought challenges?	1.52	.505
Which agencies supported drought risk reduction in your area?	1.07	.257
Which drought mitigation measures were supported by these agencies?	1.97	.191
does your community have a drought management committee/structure	1.72	.451
If yes; what activities has your drought management committee been involved in?	1.28	.448
What changes have occurred in your community over the last 10 years (2008-2018) as a result of drought mitigation measures supported by government /NGOs/CBOs/FBOs in improving community resilience to drought in your locality?	1.91	.283
Do you agree that drought mitigation support by the government /NGOs/CBOs/FBOs over the past 10 years has resulted in improved community resilience to drought in your locality?	1.92	.279
What else can be done to make your community more resilient to drought?	3.67	.764
Access	1.67	.911
Strategic Options	1.66	.258
Community Resilience	1.67	.470
Social, Economic and Environmental factors	1.75	.147
Humanitarian Aid	1.72	.276
Community Resilience to Drought	1.57	.153
Valid N (listwise)		

APPENDIX VII: FREQUENCY TABLES

Sex of Household Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	153	39.7	39.7	39.7
	Female	232	60.3	60.3	100.0
	Total	385	100.0	100.0	

Age of Household Respondent

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-24	21	5.5	5.5	5.5
	25-34	75	19.5	19.5	24.9
	35-44	95	24.7	24.7	49.6
	45-54	82	21.3	21.3	70.9
	55-64	57	14.8	14.8	85.7
	65-74	41	10.6	10.6	96.4
	75+	13	3.4	3.4	99.7
	Don't know	1	.3	.3	100.0
	Total	385	100.0	100.0	

Years lived in this community

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1-2 years	9	2.3	2.3	2.3
	3-5 years	33	8.6	8.6	10.9
	6-10 years	26	6.8	6.8	17.7
	11+ years	317	82.3	82.3	100.0
	Total	385	100.0	100.0	

Marital status

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Single	54	14.0	14.0	14.0
	Married	288	74.8	74.8	88.8
	Divorced/separated	12	3.1	3.1	91.9
	Widowed/Widower	31	8.1	8.1	100.0
	Total	385	100.0	100.0	

Highest education * Respondent's children Crosstabulation

Count

		Respondent's children				Total
		None	1- 4	5-6	7+	
Highest education	Primary	16	90	42	56	204
	Secondary	14	51	18	19	102
	College	6	27	4	9	46
	University	2	4	3	9	18
	None	2	6	3	4	15
Total		40	178	70	97	385

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.376[a]	12	.136
Likelihood Ratio	17.523	12	.131
Linear-by-Linear Association	.352	1	.553
N of Valid Cases	385		

a. 7 cells (35.0%) have expected count less than 5. The minimum expected count is 1.56.

Income per month in Kes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5,700	258	67.0	67.2	67.2
	5,700 - 10,000	81	21.0	21.1	88.3
	10,001 - 15,000	17	4.4	4.4	92.7
	15,001 – 20,000	12	3.1	3.1	95.8
	Above 20,000	17	4.5	4.5	100.0
	Total	385	100	100.0	

Main source of income: Crops/livestock

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	344	89.4	89.4	89.4
	No	41	10.6	10.6	100.0
	Total	385	100.0	100.0	

Main source of income: Regular employment

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	31	8.1	8.1	8.1
	No	354	91.9	91.9	100.0
	Total	385	100.0	100.0	

Main source of income: Small scale business

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	154	40.0	40.0	40.0
	No	231	60.0	60.0	100.0
	Total	385	100.0	100.0	

Main source of income: Casual labour

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	116	30.1	30.1	30.1
	No	269	69.9	69.9	100.0
	Total	385	100.0	100.0	

Main source of income: Brick making

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	2.9	2.9	2.9
	No	374	97.1	97.1	100.0
	Total	385	100.0	100.0	

Main source of income: Sale of seedlings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	.8	.8	.8
	No	382	99.2	99.2	100.0
	Total	385	100.0	100.0	

Main source of income: Selling sand

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	7	1.8	1.8	1.8
	No	378	98.2	98.2	100.0
	Total	385	100.0	100.0	

Main source of income: Charcoal burning/selling

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	1.0	1.0	1.0
	No	381	99.0	99.0	100.0
	Total	385	100.0	100.0	

Main source of income: Beekeeping

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	35	9.1	9.1	9.1
	No	350	90.9	90.9	100.0
	Total	385	100.0	100.0	

Highest education * Income per month in Ksh Crosstabulation

Count

		Income per month in Kes					Total
		Less than 5,700	5,700 - 10,000	10,001 - 15,000	15,001 – 20,000	Above 20,000	
Highest education	Primary	148	39	7	6	4	204
	Secondary	65	25	4	4	3	101
	College	19	14	5	2	6	46
	University	16	2	0	0	0	18
	None	10	1	1	0	3	15
Total		258	81	17	12	16	384

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	40.583[a]	16	.001
Likelihood Ratio	36.041	16	.003
Linear-by-Linear Association	7.719	1	.005
N of Valid Cases	384		

a. 14 cells (56.0%) have expected count less than 5. The minimum expected count is .47.

Main crops grown - maize

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	280	72.7	72.7	72.7
	No	105	27.3	27.3	100.0
	Total	385	100.0	100.0	

Main crops grown - beans

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	152	39.5	39.5	39.5
	No	233	60.5	60.5	100.0
	Total	385	100.0	100.0	

Main crops grown - millet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	156	40.5	40.5	40.5
	No	229	59.5	59.5	100.0
					100.0
	Total	385	100.0	100.0	

Main crops grown - sorghum

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	180	46.8	46.8	46.8
	No	205	53.2	53.2	100.0
					100.0
	Total	385	100.0	100.0	

Main crops grown - green grams

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	360	93.5	93.5	93.5
	No	25	6.5	6.5	100.0
					100.0
	Total	385	100.0	100.0	

Main crops grown - cassava

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	14	3.6	3.6	3.6
	No	371	96.4	96.4	100.0
					100.0
	Total	385	100.0	100.0	

Main crops grown - pigeon peas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	108	28.1	28.1	28.1
	No	277	71.9	71.9	100.0
	Total	385	100.0	100.0	

Main crops grown - cow peas

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	276	71.7	71.7	71.7
	No	109	28.3	28.3	100.0
	Total	385	100.0	100.0	

Main crops grown - pumpkins

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	34	8.8	8.8	8.8
	No	351	91.2	91.2	100.0
	Total	385	100.0	100.0	

Main crops grown - fruits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	8.3	8.3	8.3
	No	353	91.7	91.7	100.0
	Total	385	100.0	100.0	

Livestock kept - Dairy cattle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	.8	.8	.8
	No	382	99.2	99.2	100.0
	Total	385	100.0	100.0	

.Livestock kept - Local traditional cattle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	232	60.3	60.3	60.3
	No	153	39.7	39.7	100.0
	Total	385	100.0	100.0	

Livestock kept - Sheep and goat

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	331	86.0	86.0	86.0
	No	54	14.0	14.0	100.0
	Total	385	100.0	100.0	

Livestock kept - Improved chicken

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	2.1	2.1	2.1
	No	377	97.9	97.9	100.0
	Total	385	100.0	100.0	

Livestock kept - Local breed chicken

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	312	81.0	81.0	81.0
	No	73	19.0	19.0	100.0
	Total	385	100.0	100.0	

If you Keep other Livestock specify

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid		1	.3	.3	.3
	1	1	.3	.3	.5
	1(donkey)	36	9.4	9.4	9.9
	1(Donkey)	5	1.3	1.3	11.2
	1(donkeys)	25	6.5	6.5	17.7
	1(none)	4	1.0	1.0	18.7
	1(rabbits)	1	.3	.3	19.0
	2	312	81.0	81.0	100.0
	Total	385	100.0	100.0	

Livestock kept - Dairy cattle * Livestock kept - Local traditional cattle Cross tabulation

		Livestock kept - Local traditional cattle		Total
		Yes	No	
Livestock kept - Dairy cattle	Yes	0	3	3
	No	232	150	382
Total		232	153	385

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	4.585[a]	1	.032		
Continuity Correction	2.399	1	.121		
Likelihood Ratio	5.573	1	.018		
Fisher's Exact Test				.062	.062
Linear-by-Linear Association	4.573	1	.032		
N of Valid Cases	385				

a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.19.
b. Computed only for a 2x2 table

Challenges in crop/livestock farming - Drought

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	361	93.8	93.8	93.8
	No	24	6.2	6.2	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Water shortage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	330	85.7	85.7	85.7
	No	55	14.3	14.3	100
	Total	385	100.0	100.0	100.0

Challenges in crop/livestock farming - Forage shortage

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	335	87.0	87.0	87.0
	No	50	13.0	13.0	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Environmental degradation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	63	16.4	16.4	16.4
	No	322	83.6	83.6	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Limited land access

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	105	27.3	27.3	27.3
	No	280	72.7	72.7	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Inadequate agri extension services

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	121	31.4	31.4	31.4
	No	263	68.3	68.3	99.7
	22.00	1	.3	.3	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Poor agronomical skills

	Frequency	Percent	Valid Percent	Cumulative Percent

	Yes	115	29.9	29.9	29.9
Valid	No	270	70.1	70.1	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Poor prices of produce & livestock

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	236	61.3	61.3	61.3
Valid	No	149	38.7	38.7	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Crop & livestock loss

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	292	75.8	75.8	75.8
Valid	No	93	24.2	24.2	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Pest's infestation

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	336	87.3	87.3	87.3
Valid	No	49	12.7	12.7	100.0
	Total	385	100.0	100.0	

Challenges in crop/livestock farming - Lack of storage for produce/crops

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	29	7.5	7.5	7.5
Valid	No	356	92.5	92.5	100.0
	Total	385	100.0	100.0	

How long can food in store for HH last?

		Frequency	Percent	Valid Percent	Cumulative Percent
	HH has no food in store	241	62.6	62.6	62.6
	Enough for 2 weeks	8	2.1	2.1	64.7
	Enough for 1 to 2 months	49	12.7	12.7	77.4
Valid	Enough for 3 to 5 months	70	18.2	18.2	95.6
	Enough for 1 year	16	4.2	4.2	99.7
	I do not know	1	.3	.3	100.0
	Total	385	100.0	100.0	

When do you sell your food?

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Immediately after harvest	177	45.97	45.97	45.97
	1 to 2 months after harvest	22	5.71	5.71	51.68
	Beginning of the next rain season	20	5.19	5.19	56.87
	When the market price is favorable	70	18.18	18.18	75.05
	When I have a need for	51	13.65	13.65	88.70
	I do not sell	41	10.65	10.65	99.35
	Others	4	1.04	1.04	100.0
	Total	177	100.0	100.0	

Why do you sell your immediately after harvest?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	To pay school fees	85	48.02	48.02	48.02
	To meet household needs	67	37.85	37.85	85.87
	Lack of storage facilities	7	3.95	3.95	89.82
	Fear of infestation by weevils	16	9.05	9.05	98.87
	Others	2	1.13	1.13	100.0
	Total	177	100.0	100.0	

Sources of Drinking water source

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tap water	49	12.7	12.7	12.7
	Bore hole	117	30.4	30.4	43.1
	Roof	11	2.9	2.9	46.0
	Sand dam	45	11.7	11.7	57.7
	Earth Dam	51	13.2	13.2	70.9
	Unprotected shallow well	43	11.2	11.2	82.1
	Protected shallow well	59	15.3	15.3	97.4
	Perennial river	8	2.1	2.1	99.5
	Others	2	.5	.5	100.0
	Total	385	100.0	100.0	

Your source of water for livestock

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Borehole	103	26.8	28.1	28.1
	Perennial river	10	2.6	2.7	30.8
	Earth dam	109	28.3	29.7	60.5
	Sand dam	43	11.2	11.7	72.2
	Shallow wells	90	23.4	24.5	96.7
	Others	30	7.7	7.9	100.0
	Total	385	95.3	100.0	
Total		385	100.0		

Distance to livestock water source

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 2km	177	46.0	46.0	46.0
	2 - 3km	103	26.8	26.8	72.7
	4 - 5km	52	13.5	13.5	86.2
	Above 6km	53	13.8	13.8	100.0
	Total	385	100.0	100.0	

Challenges accessing water

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Poor water quality (muddy water)	77	20.0	20.0	20.0
	Long distance to water points	116	30.1	30.1	50.1
	Drying of water sources due to drought	133	34.5	34.5	84.7
	Breakdown of water pumping system	33	8.6	8.6	93.2
	Lack of maintenance of water sources	26	6.8	6.8	100.0
	Total	385	100.0	100.0	

Do you boil or treat water for drinking?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	195	50.6	50.6	50.6
	Yes	190	49.4	49.4	100.0
	Total	385	100.0	100.0	

If you do not boil water for drinking (if no above) why?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	I draw water from safe source	139	71.3	71.3	71.3
	Boiling/treating water is too much work	26	13.3	13.3	84.6
	Chemicals for treating water are costly	18	9.2	9.2	93.8
	Boiled/treated water does not taste nice	12	6.2	6.2	100.0
	Total	195	100.0	100.0	

Type of Toilet facility you use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Toilet	361	93.8	93.8	93.8
	Pits	7	1.8	1.8	95.6
	Papers	1	.3	.3	95.8
	Nearby bush	16	4.2	4.2	100.0
	Total	385	100.0	100.0	

Who maintains your water source?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Local community	172	44.7	44.7	44.7
	Government	89	23.1	23.1	67.8
	NGOs/CBOs/FBOs	44	11.4	11.4	79.2
	None	80	20.8	20.8	100.0
	Total	385	100.0	100.0	

Sex of respondent * Income per month in Ksh Crosstabulation

Count

		Income per month in Kes					Total
		Less than 5,700	5,700 - 10,000	10,001 - 15,000	15,001 – 20,000	Above 20,000	
Sex of respondent	Male	83	41	10	8	11	153
	Female	175	40	7	4	5	231
Total		258	81	17	12	16	384

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	21.995[a]	4	.000
Likelihood Ratio	21.795	4	.000
Linear-by-Linear Association	19.904	1	.000
N of Valid Cases	384		

a. 1 cells (10.0%) have expected count less than 5. The minimum expected count is 4.78.

Sex of respondent * Highest education Crosstabulation

Count

		Highest education					Total
		Primary	Secondary	College	University	None	
Sex of respondent	Male	75	49	20	3	6	153
	Female	129	53	26	15	9	232
Total		204	102	46	18	15	385

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	7.958[a]	4	.093
Likelihood Ratio	8.419	4	.077
Linear-by-Linear Association	.002	1	.969
N of Valid Cases	385		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.96.

What type of housing do you have?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Stone walled with iron sheets – permanent	20	5.2	5.2	5.2

	Brick walled with iron sheets – permanent	261	67.8	67.8	73.0
	Mud walled with iron sheets - semi permanent	87	22.6	22.6	95.6
	Mud walled grass thatched – temporary	16	4.2	4.2	99.7
	Others	1	.2	.2	100.0
	Total	385	100.0	100.0	

Distance to treatment centers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 2km	161	41.8	41.8	41.8
	3-5km	133	34.5	34.5	76.4
	6-10km	71	18.4	18.4	94.8
	More than 11km	20	5.2	5.2	100.0
	Total	385	100.0	100.0	

Treated- District Hospital

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	District Hospital	35	9.1	9.1	9.1
	Private Hospital	28	7.3	7.3	16.4
	Health Center/Station	316	82.1	82.1	98.4
	Traditional Doctor	1	.3	.3	98.7
	Herbalist	5	1.3	1.3	100.0
	Total	385	100.0	100.0	

Common disease- Malaria

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Malaria	155	40.3	40.3	40.3
	Typhoid	48	12.5	12.5	52.7
	Amoeba	47	12.2	12.2	64.9
	Dysentery	31	8.1	8.1	73.0
	Colds & fever	59	15.3	15.3	88.3
	Coughing	44	11.4	11.4	99.7

	Others	1	.3	.3	100.0
	Total	385	100.0	100.0	

Income per month in Kes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Less than 5,700	258	67.0	67.0	67.0
	5,700 - 10,000	82	21.3	21.3	88.3
	10,001 - 15,000	17	4.4	4.4	92.7
	15,001 – 20,000	12	3.1	3.1	95.8
	Above 20,000	16	4.2	4.2	100.0
	Total	385	100.0	100.0	

Main crops grown - maize

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	280	72.7	72.7	72.7
	No	105	27.3	27.3	100.0
	Total	385	100.0	100.0	

Main crops grown - beans

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	152	39.5	39.5	39.5
	No	233	60.5	60.5	100.0
	Total	385	100.0	100.0	

Main crops grown - millet

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	156	40.5	40.5	40.5
	No	229	59.5	59.5	100.0
	Total	385	100.0	100.0	

Main crops grown - sorghum

	Frequency	Percent	Valid Percent	Cumulative Percent

	Yes	180	46.8	46.8	46.8
Valid	No	205	53.2	53.2	100.0
	Total	385	100.0	100.0	

Main crops grown - green grams

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	360	93.5	93.5	93.5
Valid	No	25	6.5	6.5	100.0
	Total	385	100.0	100.0	

Main crops grown - cassava

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	14	3.6	3.6	3.6
Valid	No	371	96.4	96.4	100.0
	Total	385	100.0	100.0	

Main crops grown - pigeon peas

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	108	28.1	28.1	28.1
Valid	No	277	71.9	71.9	100.0
	Total	385	100.0	100.0	

Main crops grown - cow peas

		Frequency	Percent	Valid Percent	Cumulative Percent
	Yes	276	71.7	71.7	71.7
Valid	No	109	28.3	28.3	100.0
	Total	385	100.0	100.0	

Main crops grown - pumpkins

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Yes	34	8.8	8.8	8.8
	No	351	91.2	91.2	100.0
	Total	385	100.0	100.0	

Main crops grown - fruits

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	32	8.3	8.3	8.3
	No	353	91.7	91.7	100.0
	Total	385	100.0	100.0	

Do you irrigate your farm?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	17	4.4	4.4	4.4
	No	368	95.6	95.6	100.0
	Total	385	100.0	100.0	

If you do not irrigate your farm, why?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Lack of sustainable sources of water supply	220	59.8	59.8	59.8
	Rain fed agriculture is sufficient for us	11	2.9	3.0	62.8
	Lack of irrigation services	130	35.3	35.3	98.1
	Irrigating is too much work	6	1.6	1.6	99.7
	I have never thought about it	1	.3	.3	100.0
	Total	368	100.0	100.0	

If other reason why you do not irrigate, why (specify)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Does not farm due to old age	1	.3	.3	99.5

	Has no energy due to poor health	1	.3	.3	99.7
	Requires a lot of water	1	.3	.3	100.0
	Total	3	100.0	100.0	

Type of Livestock kept - Dairy cattle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	3	.8	.8	.8
	No	382	99.2	99.2	100.0
	Total	385	100.0	100.0	

Type of Livestock kept - Local traditional cattle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	232	60.3	60.3	60.3
	No	153	39.7	39.7	100.0
	Total	385	100.0	100.0	

Type of Livestock kept - Sheep and goat

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	331	86.0	86.0	86.0
	No	54	14.0	14.0	100.0
	Total	385	100.0	100.0	

Type of Livestock kept - Improved chicken

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	8	2.1	2.1	2.1
	No	377	97.9	97.9	100.0
	Total	385	100.0	100.0	

Type of Livestock kept - Local breed chicken

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	312	81.0	81.0	81.0
	No	73	19.0	19.0	100.0
	Total	385	100.0	100.0	

Main source of income: Crops/livestock * When do you sell your produce? Crosstabulation

Count

	When do you sell your produce?						Total
	After harvest	1 to 2 months after harvest	Beginning of next rain season	When market prices are favourable	When I have need for selling	I do not sell	
Main source of income:Crops/livestock	161	21	20	61	48	33	344
	16	1	0	9	3	8	37
Total	177	22	20	70	51	41	381

Main transport means- bus/matatu

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Bus/Matatu	110	28.6	28.6	28.6
	Boda Boda	128	33.2	33.2	61.8
	Lorries	27	7.0	7.0	68.8
	Donkeys	94	24.4	24.4	93.2
	Carts	24	6.2	6.2	99.5
	Tuk Tuk	2	.5	.5	100.0
	Total	385	100.0	100.0	

Do you practice Soil and water conservation in your farm?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	40	10.4	10.4	10.4

	No	345	89.6	89.6	100.0
	Total	385	100.0	100.0	

Terraces

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	323	83.9	83.9	83.9
	No	62	16.1	16.1	100.0
	Total	385	100.0	100.0	

What is your main source of fuel for cooking

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Wood fuel	322	83.6	83.6	83.6
	Charcoal	47	12.2	12.2	95.8
	Kerosene	5	1.3	1.3	97.1
	Gas	11	2.9	2.9	100.0
	Total	385	100.0	100.0	

When did you last experience drought in your area?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	This year	9	2.3	2.3	2.3
	Last 1 year	360	93.5	93.5	95.8
	Last 2 years	12	3.1	3.1	99.0
	Last 3 years	4	1.0	1.0	100.0
	Total	385	100.0	100.0	

How often do you experience drought in your area?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	In every 1 year	212	55.1	55.1	55.1
	In every 2 years	106	27.5	27.5	82.6
	In every 3 years	54	14.0	14.0	96.6
	Every 4 years	10	2.6	2.6	99.2

	Every 5 to 10 years	3	.8	.8	100.0
	Total	385	100.0	100.0	

Frequency of drought occurrence before the last 10 years (before 2008)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	In every 1 year	23	6.0	6.0	6.0
	In every 2 years	87	22.6	22.6	28.6
	In every 3 to 4 years	187	48.6	48.6	77.1
	In every 5 years & above	88	22.9	22.9	100.0
	Total	385	100.0	100.0	

How did the recent drought affect you?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	we were not affected	1	.3	.3	.3
	crop losses	83	21.6	21.6	21.8
	livestock losses	24	6.2	6.2	28.1
	water shortage	76	19.7	19.7	47.8
	decline in livestock prices	32	8.3	8.3	56.1
	food crisis/shortage	80	20.8	20.8	76.9
	child malnutrition & poor health	48	12.5	12.5	89.4
	outbreak of human & livestock diseases	3	.8	.8	90.1

	children dropped out of school	21	5.5	5.5	95.6
	Others	17	4.4	4.4	100.0
	Total	385	100.0	100.0	

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.134[a]	.018	.015	.38400	.018	6.950	1	381	.009

a. Predictors: (Constant), How did the recent drought affect you?

How did you cope with drought challenges?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	sell livestock	126	32.7	32.7	32.7
	buy food	61	15.8	15.8	48.6
	migrate for employment	28	7.3	7.3	55.8
	food rationing	79	20.5	20.5	76.4
	support (relatives and friends)	65	16.9	16.9	93.2
	Relief	12	3.1	3.1	96.4
	Others	14	3.6	3.6	100.0
	Total	385	100.0	100.0	

Which agencies supported DRR in your area

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	47	12.2	12.2	12.2
	Government	216	56.1	56.1	68.3
	FBOs	51	13.2	13.2	81.6
	CBOs	29	7.5	7.5	89.1
	Others	42	10.9	10.9	100.0
	Total	385	100.0	100.0	

Does your community have Drought Management Committee/structure?

	Frequency	Percent	Valid Percent	Cumulative Percent

Valid	Yes	70	18.2	18.2	18.2
	No	315	81.8	81.8	100.0
	Total	385	100.0	100.0	

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.025	1	1.025	6.950	.009[b]
	Residual	56.181	381	.147		
	Total	57.206	382			

a. Dependent Variable: Does your community have Drought Management Committee/structure?

b. Predictors: (Constant), How did the recent drought affect you?

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.930	.047		40.916	.000
	How did the recent drought affect you?	-.023	.009	-.134	-2.636	.009

a. Dependent Variable: Does your community have Drought Management Committee/structure?

If community has DMC/S, what activities have DMC/S been involved in?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Drought Risk Assessments	20	5.2	28.6	28.6
	Development/implementation of CDAP	16	4.2	22.9	51.4
	Financial resource mobilization for CDAP	24	6.2	34.3	85.7
	Management of community assets	8	2.1	11.4	97.1
	Others	2	.5	2.9	100.0
	Total	70	18.2	100.0	
Missing	System	315	81.8		
Total		385	100.0		

DM support by govt/I/NGOs/CBOs/FBOs (2008-2018) increased community resilience. Do you agree?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly agree	34	8.8	8.8	8.8
	Agree	301	78.2	78.2	87.0
	Disagree	23	6.0	6.0	93.0
	Strongly disagree	27	7.0	7.0	100.0
	Total	385	100.0	100.0	

Changes due to I/NGO, CBO, FBOs supported mitigation (2008-2018)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No significant changes	67	17.4	17.4	17.4
	Reduced drought losses	93	24.2	24.2	41.6
	growing/keeping drought tolerant crops/livestock	50	13.0	13.0	54.5
	Increased sustainable sources of water	35	9.1	9.1	63.6
	Improved community drought mitigation measures	24	6.2	6.2	69.9
	Improved NRM	17	4.4	4.4	74.3
	Improved access to drought early warning info	27	7.0	7.0	81.3
	Better understanding of drought risks	38	9.9	9.9	91.2
	Increased access to credit facilities	20	5.2	5.2	96.4
	Presence of livestock/crop loss insurance	1	.3	.3	96.6
	I do not know	13	3.4	3.4	100.0
	Total	385	100.0	100.0	

Descriptive Statistics

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
Income per month in Kes	385	1	5	1.56	.052	1.011
Main crops grown - maize	385	1	2	1.27	.023	.446
Livestock kept - Dairy cattle	385	1	2	1.99	.004	.088
Challenges in crop/livestock farming - Drought	385	1.00	2.00	1.0623	.01234	.24208
How long food can food in store for HH last?	385	1.00	98.00	2.2390	.25888	5.07958
SCW- None	385	1.00	2.00	1.8961	.01557	.30552
Terraces	385	1.00	2.00	1.1610	.01876	.36805
Do you irrigate your farm?	385	1.00	2.00	1.9558	.01048	.20571
If you do not irrigate your farm, why?	385	1.00	5.00	1.8026	.05090	.99869
What is your main source of fuel for cooking	385	1.00	5.00	1.2623	.03827	.75087
What is your main source of lighting?	385	1.00	97.00	9.0052	1.15902	22.74164
Drinking water source	385	1.00	97.00	4.3636	.35896	7.04322
Do you boil or treat water for drinking?	385	1.00	2.00	1.4935	.02551	.50061
If you do not boil water for drinking (if no above) why?	385	1.00	4.00	1.7844	.05170	1.01436
Your source of water for livestock	367	1.00	97.00	6.0926	.87715	16.80382
Distance to livestock water source	385	1.00	4.00	1.9506	.05456	1.07051
Challenges accessing water	385	1.00	5.00	2.5195	.05651	1.10880
Who maintains your water source?	385	1.00	4.00	2.0831	.06006	1.17852
Main transport means-bus/matatu	385	1.00	6.00	2.4805	.06743	1.32298
Road types in your area	383	1.00	4.00	2.2898	.03955	.77397
Treated- District Hospital	385	1.00	5.00	2.7740	.03384	.66407
Distance to treatment centers	385	1.00	4.00	1.8701	.04546	.89196
Toilet facility you use	385	1.00	4.00	1.1481	.03149	.61779

	N	Minimum	Maximum	Mean		Std. Deviation
	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic
When did you last experience drought in your area?	385	1.00	4.00	2.0286	.01575	.30909
How often do you experience drought in your area?	385	1.00	5.00	1.6649	.04427	.86869
Frequency of drought occurrence before the last 10 years (before 2008)	385	1.00	4.00	2.8831	.04208	.82560
How did the recent drought affect you?	385	1	10	4.94	.116	2.279
How did you cope with drought challenges?	385	1	7	2.97	.091	1.794
Does your community have Drought Management Committee/structure?	385	1.00	2.00	1.8182	.01968	.38620
If community has DMC/S, what activities does DMC/S been involved in?	70	1.00	97.00	5.0000	1.90325	15.92373
Changes due to I/NGO, CBO, FBOs supported mitigation (2009-2018)	385	1.00	98.00	7.0701	.87714	17.21064
DM support by govt/I/NGOs/CBOs/FBOs (2008-2018) increased community resilience. Do you agree?	385	1.00	4.00	2.1117	.03292	.64590
What else can be done to make your community more resilient to drought?	385	2.00	9.00	5.6416	.13047	2.55998
Valid N (listwise)	69					

What else can be done to make your community more resilient to drought? (Two different responses, which one is correct?

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Nothing	1	.3	.3	.3
	More community engagement in drought risk assessments	59	15.3	15.3	15.6
	More community engagement in DRR planning	54	14.0	14.0	29.6
	Diversification from farming to non-farming livelihood options	34	8.8	8.8	38.4
	Timely & reliable sharing of early warning info	36	9.4	9.4	47.8
	Support for food banking/storage facilities	40	10.4	10.4	58.2
	Livestock/crop insurance schemes	37	9.6	9.6	67.8
	Increased access to credit facilities	41	10.6	10.6	78.4
	Support for more sustainable water sources	83	21.6	21.6	100.0
	Total	385	100.0	100.0	

APPENDIX VIII: NORMALITY TEST

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Community resilience to drought	.262	384	.000	.858	384	.000
Socio factors	.341	384	.000	.692	384	.000
Humanitarian Aid	.276	384	.000	.830	384	.000
Strategic options	.332	384	.000	.728	384	.000
Economic factors	.240	384	.000	.895	384	.000
Ecological factors	.142	384	.000	.944	384	.000

a. Lilliefors Significance Correction

APPENDIX IX: SUMMARY OF KEY INFORMANT INTERVIEWEES

Interviewee	Organisation	Position	Dept	Gender		Date of Interview
				F	M	
No.1	Anglican Development Services	Programme Officer	Climate Change & Environment	√		18/4/2018
No.2	Care International	Project Field Officer	Financial Inclusion	√		18/4/2018
No.3	County Govt of Kitui	Crop Development Officer	County Ministry of Agriculture, Water & Livestock		√	17/4/2018
No.4	County Govt of Kitui	Minister	County Ministry of Agriculture, Water & Livestock		√	17/4/2018
No.5	Action Aid	Project Coordinator Asset Creation Project	Protracted Relief & Recovery Operation (PRRO)	√		18/4/2018
No.6	County Govt of Kitui	Policy Advisor	Office of the Governor		√	17/4/2018
No.7	County Govt of Kitui	Director of Education	Ministry of Education		√	16/4/2018
No.8	Diocese of Kitui	Director	Caritas Kitui	√		16/4/2018
No.9	County Govt of Kitui	Value Chain Officer	Office of the Governor		√	17/4/2018
No.10	NDMA	Asset Creation Programme Coordinator			√	16/4/2018
No.11	NDMA	County Drought Information Officer			√	16/4/2018

APPENDIX X: SUMMARY OF RESPONSES FROM KEY INFORMANT INTERVIEWS

Question Response	Response
1. How have droughts been occurring in the last 10 years?	In every year
2. What was the last time you experienced drought in Kitui County?	2017
	2016
3. What impact did the drought have on the people, livelihoods, and environment?	Inadequate food, high food prices and malnutrition due to poor feeding
	Crop failure
	Livestock losses (deaths)
	Reduced incomes
	School Dropouts
	Stalled development
	Shortage of forage
	Reduced livestock prices
	Drying of trees
	High temperatures and heat stress
	Drying of water sources, water shortage and long distances to water points
	Household conflicts
	Resource based conflicts (water & pasture)
	Loss of lives
	High demand for bursaries
	Increased work stress for women
	Gender based violence (rape)
	Increased poverty
	Migration to towns
	Massive destruction of forests due to charcoal burning
4. Which counties were most affected?	Mwingi West
	Kitui West
	Mwingi North
	Mwingi Central
	Kitui Rural
	Kitui East
	Kitui South
5. The impact of drought in Kitui County has been increasing in the past 10 years. Do you agree or disagree	Yes 1. Increased negative coping mechanism e.g., charcoal burning and selling (2), sand harvesting and selling (2) 2. Depletion of land (2) 3. Drying of water sources that used to dry and increased environmental degradation. 4. Reduced livestock population 5. Every drought makes people poorer (1)

Question Response	Response
	6. The impact has been getting 7. More people are becoming dependant on assistance 8. In 2017 the rains failed everywhere and all crops including drought resistant crops and Zai pit technology (DOK) 9. Donors are getting fatigued due to failure to achieve the desired outcome of drought resilience (DOK)
	The situation has remained the same
	No
	I don't have the full statistics. However, people have developed coping mechanisms, drought has become a perennial thing. Recurrent drought depletes development investments & community resources. increased livestock losses dependency on casual labour for survival Failure of consecutive rain seasons
6. Which Sub-counties have you been working in?	Kitui West
	Kitui South
	Kitui Rural
	Kitui Central
	Kitui East
	Mwingi West
	Mwingi North
	Mwingi Central
7. What drought Mitigation Measures has your organisation been supporting in these areas over the past 10 years (2008-2018)?	Kitui County Ministry of Education has been providing bursary support for secondary, college and university students, supporting planting of trees in Polytechnique's, water tracking and roof water harvesting inn school through support for plastic water storage
	Action Aid has been supporting diversification of income sources, training on good agronomical practices, promoting drought tolerant crops e.g., sorghum, millet, cowpeas and green grams. It has also been supporting economic activities such as small-scale businesses, table banking, proving small loans to beneficiaries who pay with minimal interest. Also supporting pasture production by encouraging beneficiaries to harvest and sell the seeds and also share amongst themselves, training on pasture and browse production, management and presentation of good varieties on pasture seeds, pasture preservation through bailing and storage of hay bags and stores. Supporting improved access to water for human and livestock consumption through construction of water structures e.g., farm pods within the beneficiary farms on rotational basis. Construction of earth pan through mechanised processes for public use

Question Response	Response
	Soil and water conservation through planting of trees, establishment of tree nurseries covered by nets to reduce heat loss and conserve moisture for planting and selling. Capacity building of Action Aid staff and beneficiaries on technical areas of construction of terraces, Zai pits, production, bee keeping, sisal production, exchange tours for farmers for learning and farmer managed natural resource regeneration.
	County Ministry of Agriculture has been promoting conservation agriculture, agro-forestry and forestry establishment, water tracking, vaccination and treatment of livestock and cash transfers through cash for work, promoting drought tolerant crops through seed assistance, building of water resources and promoting irrigated agriculture
	The County Government has been supporting water tracking, proving pro-poor bursaries for students of affected families, distributing drought resistance certified seeds, cash for work for cleaning bushes, mechanised farming and market linkage although this has not been very successful.
	CARE International has been providing monthly consumption stipend to drought stricken households, seed capital for small-scale businesses, training on Village Savings and Lending Associations (VSLAs), supporting table banking and loaning, restocking of goats, diversification of income sources, supporting registration and payment for NHIF contributions for households affected by drought to access health care services, capacity building of communities, family planning, advocacy, irrigation and planning for food needs.
	The Anglican Development Services has been supporting participatory vulnerability and capacity assessments, water focused projects, organization of governance structures e.g., Ward Climate Change Planning Committees, planting of trees, promoting efficient use of water, supplementary irrigation through farm pods, planting drought tolerant crops, village savings and lending schemes, training on climate change and climate change advocacy.
	Caritas Kitui – improved farming technologies e.g., Zai pit technology, Zai Pit irrigation, water harvesting, permanent water sources to support irrigation, livestock production – rearing of high bread goats and chicken, use of donkeys as economic sources, capacity building on farming as on climate change adaptation, early warning signs, change of attitude from growing maize to growing drought tolerant crops such as, building linkages of communities to access information, and market linkages of poultry keepers.
8. What community/village drought mitigation	Ward climate change planning committees
	County climate change planning committees

Question Response	Response
structures exist at the areas affected by drought?	County Technical Committees
	Wealth creation groups (CARE)
	Irrigation groups (CARE)
	County Steering Group
	Sub-County Drought Steering Group
	Ward Disaster Committees
	Village Disaster Committees
	But not very strong (MOA)
	Action Aid works with NDMA on EWS
	Community drought management committees
	None
9. In these areas where you work, have communities been involved in conducting drought risk assessments?	Yes But not deliberate Only for those who get cash transfers (MOA)
	No
	Not aware
10. If so; have communities developed & implemented drought risk reduction actions plans	Yes Financing for risk reduction (CARE) Yes, but the measures are short-term (MOA) Each Ward developed one or two project which are supposed to be funded (County Government) DOK- Donkey risk assessments
	N/A
11. If so; are you aware of any organisation that has been providing funding to support implementation of community drought risk reduction action plans?	Yes
	Action Aid – Not directly – some of the plans are selected and funded but don't support immediate needs e.g., needs
	County Government of Kitui
	Anglican Development Services (ADS)
	Caritas Kitui with support from CAFOD
	Kitui Development Centre
	CARE (but not deliberate community action plans)
	The Kenya Red Cross
	World Vision
	SEKU – Research on green technology
	WFP
	CHS
	NYS – Have been cleaning the environment
	Ministry of Education has been providing school bursaries
	NDMA
12. Do communities in these areas have access to timely, accurate & reliable early warning information?	They receive information but there is need for improvement especially on the dissemination aspect EWS is done by NDMA, but dissemination is a problem
	No Sometimes communities don't know what time to start planting, what crops to grow & extension services are not adequate (CARE)
	There is need for engaging the county government on

Question Response	Response
	dissemination of the EWS
	Development actors need to provide additional support
	NDMA need to ensure that communities receive timely information
	Not very well established but the communities rely more on traditional early warning systems (MOA)
	The information is not timely, and accurate and reliable
13. In which medium is he drought early warning information communicated to the local communities?	Through Volunteers but they are not adequate. They need to summarise and release EWS through SMSs
	Through the bulletins aired through the local media
	Scenario planning workshops
	Print reports
	Radios
	TVs
	community fora
	SMSs
	USAID FEWSNET Bulletin
14. Which language is the drought early warning information communicated to the local communities?	English
	Kikamba (local language) – Syokimau, County FM, Athiani, Mbaitu, Musyi & Thome FMs
15. Does Kitui County Government have a country drought risk reduction policy?	No
	Don't know
	Yes
16. If yes; who is involved in the monitoring and coordination of the implementation of the policy?	N/A
17. Does the County Government of Kitui have a drought contingency plan?	Yes
	No
	Don't know
18. If yes; who is involved in the coordination and the implementation of the contingency plan?	NDMA
	N/A
	The County Government
	Other state and Non-State actors including national agencies
	The Ministry of Agriculture
19. What other agencies have been funding drought mitigation measures for Kitui County in the last 10 years (2008-2018)?	Caritas Kitui
	KDC
	World Vision
	Action Aid
	CARE International
	Anglican Development Services through funding from Swedish Government
	WFP

Question Response	Response
	The Kenya Red Cross
	National Government (Agricultural Devt Support)
	NDMA with EU Funding
	CAFOD
	Misereor
	Trocaire
	DFID (Adaptation Consortium)
	Bread for the World
	Australian Board of Mission
	Compassion
	Sustainable Land Management (SLIM) funded by UNDP
	German Agro Action
	Farm Africa
	SASSD
	None
20. What specific drought mitigation actions have these agencies been funding?	KDC – goat promotion projects & child protection
	Caritas Kitui – Water projects and women economic empowerment
	Red- Cross – Green grams (Ndengu revolutions) & emergency response
	World Vision – Water component and child empowerment
	CARE International beneficiary registration for NHIF & funding water piping & distribution, providing sees support and public toilets for schools & communities
	Seed support for farmers
	Compassion – empowering orphans and their guardians
	County Government of Kitui has established Climate Fund
	Relief food
	Water tracking
	Livestock
	Coordination initiatives
	Small scale irrigation for farmers along the seasonal rivers
	WFP – Food For Work & cash for assets
	German Agro-Action – empowerment of water harvesting structures
	Drought risk reduction action
	Climate adaptation actions through appropriate technologies and supporting communities to plan better
	Livestock production and marketing
	Diversification of livelihoods through savings and lending projects, business focused project eg, poultry keeping and marketing
21. In your view, have the drought risk reduction measures implemented over the last 10 years (2008-2018) by the	To some extent, Yes But not to a great extent We are yet to get there (Action Aid) Some level of resilience has been built but to not to the desired level

Question Response	Response
government and I/NGOs/FBOs/CBOs in Kitui County resulted in building of community resilience to drought?	In a small way
22. If yes; which indicators demonstrate that community resilience to drought has been built?	People are now adapting drought tolerant crops e.g., green grams
	Constructed water structures are functioning
	Post-harvest management is improving, e.g., use of improved cereal storage facilities
	Long-term challenges of water access are being addressed through buying of water storage tanks using VSLAs.
	Some progress has been noted in vegetable growing
	A lot of training has been provided
	Education of children and support for school feeding programmes
	Reduced drought losses – livestock & crop losses have gone down
	Livestock offtake
	Provision of pasture and animal feed supplements
	Improved agronomical skills
	Infrastructure and roads development
	More sustainable actions are needed
	Not all families are affected when drought occurs
	Reduction of school drops outs due to drought impact
	Better understanding of communities on how to keep pasture
	Food security is improving – communities have learnt to use other food stuff other than maize
	New technologies are making the communities not to lose all the crops e.g., kitchen gardens, small scale irrigation for agricultural activities
23. In your view what underlying social, economic & environmental factors have been hindering progression towards building of community resilience to drought in Kitui County>	Negative environmental coping mechanisms e.g., charcoal burning and sand harvesting
	Overgrazing through keeping of large herds of livestock
	Reliance on crop production that is highly sensitive to weather fluctuations
	Dependency on rain-fed agriculture
	Inability for people to demonstrate ownership of land due to lack of title deeds and therefore not able to use the as collateral to acquire financing
	Laziness
	Inadequate security along Tana River areas
	Pest infestations and diseases
	Climate change
	Unemployment
	Lack of viable markets for local produce e.g., mangoes & green grams
	Poor land use and land management practices

Question Response	Response
	Limited funding
	Low literacy levels
	Poor coordination and replication of resources
	Politically linked exclusion
	Mindset on maize and beans attitude visa viz drought tolerant crops
	Low resource base at community, institution & household level
	Increasing population putting pressure on land holding capacity
	Recurrent droughts hinder communities from achieving full recovery
	Some religious groups – Kavonokya advocates against spraying of the crops, livestock and going for treatment in health facilities
	FGM and early marriage
	Lack of saving culture
	Nature of emergency response creates dependency syndrome
	Limited soil conservation – most farms are degraded
	Habit of cutting down trees
	Low adoption to appropriate technology e.g., water harvesting structures, limited use of fertilizers & certified seeds
	Poorly developed water sources
	Poor state of road inhibit access to markets
	High poverty levels
	Movement of the population within the region
	Habit of selling of produce immediately after harvest
	Lack of food banking/storage facilities
	Few alternatives on off-farm income
24. What alternative strategies would you recommend for achieving enhanced community resilience to drought in Kitui County?	Community planning
	Capacity building on maintenance on
	community assets and tracking community action plans
	Community empowerment in demanding for accountability from the government (community engagement)
	Inclusive Governance mechanisms
	Big projects across the entire county
	Provision of alternative sources of energy
	Water projects to support micro-irrigation services for crop and livestock production
	Formation of farmers associations to protect farmers from the brokers (cooperatives)
	Promotion of water & soil conservation initiatives
	Planting of exotic and environmental and economically viable trees
	Subsidizing farm inputs e.g., feeds, pesticides and mechanized farming
	Increased acreage in farming

Question Response	Response
	Build up water resources
	Post-harvest management
	Crop and livestock insurance
	To shift from rain-fed to irrigated agriculture
	Range land development/rehabilitation to produce pastures for livestock
	Beekeeping (protect trees to sustain bee keeping)
	Education support
	Diversification of income sources – exploring options for off-farm livelihoods options
	Integrated development programming
	Support for livestock production
	Mainstream conservation agriculture in the farming systems
	Improved community education on environmental protection and natural resource management and climate change
	More responsible asset management
	Introducing school feeding programmes in schools (each school to feed its own pupils/students)
	Enhanced agricultural extension services
	Building more partnerships and working more closely with government agencies
	Avoid duplication of efforts and ensure effective coordination

APPENDIX XI: SUMMARY OF RESPONSES FROM FGDs

Research on the impact of humanitarian Aid on Community Resilience in Kitui County

Sub-County	Ward	Village	Group Category	Date of Interview	No of Participants	F	M
Mwingi West	Kiome/Thaana	Thaana	Women & Men Group	06/04/2018	12	7	5
Mwingi West	Nguutani	Nguutani	Youth Group	04/04/2018	12	8	4
Mwingi North	Ngomeni	Kimela	Women & Men Group	09/04/2018	10	8	2
Mwingi North	Kyuso	Kyuso	Women & Men Group	12/04/2018	12	7	5
Totals					46	30	16

Summary of FGD Responses

Question	Response
1. What impact has drought had in your community in the past 10 years (2008-2018)?	Food crisis/Poor feeding for children & the elderly due to food shortage & death
	Shortage of water/long distances to water points/drawing water in deep wells
	Shortage of forage/animal feeds
	Livestock loses
	Poor learning and drop out from schools due to lack of school fees
	Increased sicknesses and poor health for people
	Lack of jobs e.g., casual labour
	Poor livestock prices
	High food prices & shortage of money
	Outbreak of livestock diseases and poor health and body conditions
	Cutting of trees while burning charcoal
	High rate of birth rates due to prostitution
	Lack of seeds for planting
	Poor medication due to lack of money
2. When did you lastly	November – December 2017

Question	Response
experience drought?	
3. Drought frequency has been decreasing in the last 10 years. Do you agree or disagree? Give reasons	Yes - Rains have been failing frequently. - Weaving and selling of handcrafts - Cutting down of trees and burning and selling of charcoal - Frequency of crop losses due inadequate rains - Protracted periods of rain failure - Drought occurring every year
4. What have you been doing to prepare and mitigate drought?	- Vegetable growing & selling
	- Poultry keeping
	- Casual labour to boost local incomes
	- Construction water sources - shallow wells & earth dams
	- Migration towns
	- Planting of trees
	- Storage animal feeds (farm residue)
	- Construction of terraces for soil and water conservation
	- Formation of self-help groups for Merry-go rounds
	- Buying and storing of food
	- Preservation of grazing lands
	- Selling of livestock to buy seeds and food
5. How do you cope with the drought after it occurs?	- Selling of seeds to buy food
	- Burning and selling of charcoal
	- Sand harvesting and selling
	- Reliance on friends and relatives
	- Self-help groups
	- Weaving and selling of handcraft e.g., baskets, robes etc
	- Search for animal feeds e.g., fleshy roots for animals (mathunzu)
	- Selling of animal to buy food and water
	- Reliance on casual labour
	- Selling of stones, wood fuel, water etc
	- Reliance of cash for work activities
	- Migration to urban centres
	- Food rationing
	- Drop out of school
	- Making and selling of bricks
	- Stealing and selling of stolen good e.g., chicken, donkeys, goats
6. Which agencies have	- County Government

Question	Response
been supporting you to mitigate the impact of drought?	- National Government
	- Compassion
	- Diocese of Kitui
	- Action Aid Kenya
	- World Food Programme
	- Care International
7. What drought mitigation measures have these agencies been supporting?	- sponsorship of children through CDF for bursaries
	- Food Support by Caritas Kitui, WFP
	- Provision of drought tolerant seeds e.g., green grams, millet, sorghum & cowpeas County Government, Caritas Kitui
	- Employment of the youth
	- Construction of houses for the needy
	- Water projects e.g., boreholes WFP
	- establishment of cattle deeps
	- support for drought tolerant animals e.g., goats
	- support for improved chicken
	- support for beehives for bee keeping
	- Education on good farming methods
	- Cash for work to engage on terracing by WFP
	- Support for small scale businesses e.g., of cereals by Care International
	- Unconditional cash grants by Care International
	- Support for seeds by County Government, Caritas Kitui
	- Support for fertilizers and pesticides by County Government and Caritas Kitui
	- Education on conservation agriculture and planting of trees by Action Aid, Caritas Kitui
	- Market linkage by County Government t of Kitui
8. What positive changes have these drought risk reduction interventions had in building your community resilience to drought over the past 10 years (2008-2018)	- Access to education of needy children
	- Reduction of street children
	- Employment
	- Reduced drought losses
	- Increased access to water and reduced distances to water points
	- Growing of fruits is improving health
	- Education on table banking and small-scale credit facilities
	- Restocking and multiplication of herds
	- Reduced environmental damage through and water conservation and planting of trees (practicing conservation agriculture)
	- Improved chicken bread and multiplication

Question	Response
	- Increased access to food and cash resources
	- Reduced school dropout rates
	- Planting of drought tolerant crops and short maturing crops
9. Have you undertaken any community drought risk assessments in your village?	No
10. Have you developed and implemented any community-based drought action plans based on the findings of these risk assessments?	No
11. If yes; what are some of the changes you have seen in your village as a result of implementing these drought action plans?	N/A
12. Have you formed a community drought risk reduction committee in your village/Ward?	No
13. Have you changed the types of crops varieties you have been growing over the past 10 years? If so; what crop varieties were you growing before and what crop varieties are growing currently?	Yes
Before	Maize
	Beans
	Millet (mwanza)
	sorghum
	Finger millet
	Cotton
	Paw paws
	bananas
	Sweat potatoes
	cassava
	Mangoes

Question	Response
	Black beans
	Cow peas
	Ordinary green grams
Currently (drought resistant crops)	cow peas
	Makueni and KS20 Green grams
	Maize
	Beans
	Pigeon peas
	While beans
	Short maturing black beans
	Katumani Millet
	Early maturing Sorghum
14. Have you changed the type and the number of livestock you keep over the last 10 years? If so; what type and number of livestock, you are keeping currently and what were you keeping before?	Yes
Before	Free range livestock keeping
	Keeping traditional livestock
	Large herds of livestock
	Keeping any bread
Currently	Few livestock
	Restricted livestock keeping
	Limited space for keeping free range livestock
	Keeping selected and improved bread
	Keeping oxen for ploughing
15. In you view, do you think, the drought risk reduction interventions implemented by the government and I/NGOs that have been supporting you in the last 10 years have built your community resilience to drought? If yes; how?	Yes - Reduced drought losses - Have developed a good understanding on planting materials - Planting high yielding /high value crops
	No - Increased support is still needed to reduce the impact of drought on drought prone communities - They have supported but have not built resilience to drought - The support has been limited to a few households
16. If not; what are the key underlying social, economic and	

Question	Response
environmental factors affecting building of drought resilience to drought?	
Social Factors	Crime Rate
	Lack of seeds
	Immorality leading to sickness and reduced labour force
	Limited self-help arrangements
	Agencies supporting a few affected households and sometimes duplicating efforts and leaving out majority of the affected households experiencing major challenges
	The support given by the supporting agencies is too little to make any impact
	Lack of consistence support from agencies and failure to fulfil promises
	Limited agricultural extension services
	Inadequate agronomical skills
	Lack of farmers cooperatives to negotiate prices for farming products
	Lack of community-based risk assessments and planning resulting in weak community engagement
Economic Factors	Low prices of drought resistant crops e.g., cow peas
	Limited land
	Keeping excess livestock
	Lack of financial facilities
	Lack of sustainable sources of water supply to support crop farming
	Poor transport services
	Limited access to markets
Environmental Factors	Failure to practice conservation agriculture
	Cutting trees and burning of charcoal
	Harvesting and selling of sand
	Brick making leading to environmental degradation
17. What should be done differently in future to enhance community resilience to drought?	- Provide more support for sustainable sources of water e.g., earth dams that may be used for irrigation, harvesting of runoff water
	- Support irrigation services
	- Growing of vegetables and improvement in feeding habits
	- Preparation of tree seedlings and planting of trees and fruit trees
	- Planting of animal feeds through irrigation

Question	Response
	initiatives e.g., grass as well as stocking of crop residue
	- Reduction of sizes of herds
	- Support for establishment of more self-help groups
	- Establishment of fruit juice processing plants and processing of fruit juice e.g., mangoes
	- Support for vegetable growing
	- Putting in place crop and livestock insurance facilities
	- Support provision of credit facilities also involving youth
	- Supporting education of children
	- Initiatives aimed at job creation for youth e.g., rehabilitation of rural access roads
	- Support diversification of income sources e.g., establishment of small-scale businesses such as poultry keeping also involving youth
	- Agencies to avoid duplication of support through better coordination in order to reach more needy households
	- Establishment of drought management committees
	- Support for soil and water conservation initiatives e.g., construction of terraces
	- Support for polytechnics to provide trade courses
	- Support for games and sports for youth

APPENDIX XII: SUMAMARY OF OBSERVATION CHECKLISTS

Sub-County	Ward	Village
Mwingi West	Nguutani	Nzawa
Mwingi West	Nguutani	Nguutani
Mwingi West	Kyome/Thaana	Thitani
Mwingi West	Thaana/Kyome	Kanyaa
Mwingi North	Kyuso	Ngaaie
Mwingi North	Kyuso	Twimyua
Mwingi North	Kyuso	Kyuso
Mwingi North	Kyuso	Mivukoni
Mwingi North	Ngomeni	Mitamisyi
Mwingi North	Ngomeni	Kimela

Summary of information in Observation Checklists

Observation area	**Information Gathered**
1. The physical status of the main (permanent, semi-permanent or walled grass thatched houses), rainwater harvesting structures at the homestead	Semi-permanent houses with iron roofs and mud walls
	Houses had water harvesting
	- House with no water harvesting structures
	- permanent houses with bricks or stone walls
	- Houses with ground water harvesting structures
2. Type of livestock kept (health status, body conditions, resistant to drought and numbers)	- Moderately healthy-looking livestock just survived the Nov-Dec 2017 failed rains
	- Cattle were looking moderately healthy
	- Goats, cattle, sheep and chicken
	- Drought resistant traditional animals
	- Poor body conditions of the cattle
	- Healthy looking livestock
	- Goats and chicken were looking healthy
	- Chicken were infested by flees
3. Crop types and farming systems	- Drought resistant crops
	- Maize
	- Green grams, sorghum, millet, cow peas and pigeon peas
	- Mangoes
	- Oxen ploughing
	- Some farms had soil and water conservation structures
	- Some crops were not drought tolerant crops e.g., maize
	- Use of tractors
4. Farming methods and state	- Oxen ploughing

Observation area	Information Gathered
of farms - soil and water conservation structures	- Conservation agriculture – terracing, grass lines
	- Tractor farming
	- Planting of trees
	- No terraces in some farms
5. Water sources (protected or unprotected, water turbidity, different source of water source for animals and for drawing water for household use, level of sustainability) etc	- Protected water sources e.g., boreholes and shallow wells, roof harvesting structures, water taps
	- Unprotected water sources e.g., earth dams/pans and shallow wells
	- Livestock and human used different water sources
	- Open water sources were used by livestock
	- Turbidity of earth dam water sources was not good
	- Boreholes were more sustainable
6. Physical infrastructure - state of the roads, school buildings, health facilities, observe and record distances	- Main roads used were earth roads which were in poor conditions, and some had flooded e.g., Kalwa, Mitamisyi, Kimela, Kyuso to Ngaae, Twimyua, Mivukoni
	- Earth roads were in good conditions and accessible e.g., in Nzawa, Nguutani
	- Good tarmac road e.g., Nguutani
	- Accessing Murram roads e.g., Nguutani, Thitani
	- No durable roads
	- Buildings were on good conditions e.g., in Kanyaa
	- Some bridges and roads e.g., in Kalwa had been washed away flashy waters
7. Environmental status – status of ground cover, vegetation, status of environmental vegetation, cooking facilities etc	- Good vegetation cover with plenty of acacia trees with shrubs especially in Kalwa, Kimela, Mitamisyi
	- Vegetation was highly depleted due to massive clearance of land to give room for human settlement (limited vegetation cover) e.g., Kanyaa, Nzawa, Nguutani, Thitani, Ngaae, Twimyua, Kyuso
	- Moderate vegetation cover e.g., Mivukoni
	- School buildings were in good conditions e.g., in Nzawa
	- Wood fuel was used for cooking
	- Charcoal was used for cooking e.g., Nzawa, Nguutani
	- Gas was used for cooking e.g., Nguutani

Observation area	Information Gathered
	- Big trees had been cut down for charcoal burning e.g., in Kalwa, Mivukoni, Kimela, Mitamisyi
8. Health and hygiene status of community members	- Community members were generally health looking and clean
	- Community members were looking moderately healthy e.g., Twimyua, Kyuso, Mivukoni, Kimela, Mitamisyi
	- Good standards of hygiene with clean sanitation facilities (pit latrines) e.g., Nzawa , Nguutani, Thitani, Ngaae, Twimyua, Kyuso, Mivukoni. Kimela and Mitamisyi
	- Community members were seen engaged in drinking illicit brew during the day in Ngaae

APPENDIX XIII: INFERENTIAL STATISTICS

Social Factors

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.833a	0.694	0.693	0.077728

a Predictors: (Constant), social factors

ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	5.234	1	5.234	866.290	.000b
	Residual	2.308	382	0.006		
	Total	7.542	383			

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.173	0.019		60.686	0.000
	socio.factors	0.243	0.008	0.833	29.433	0.000

Economic Factors

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.968a	0.937	0.937	0.035338

a Predictors: (Constant), community.resilience.to.drought

ANOVAa

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	7.065	1	7.065	5657.	.0

					229	0 0 b
	Residual	0.477	382	0.001		
	Total	7.542	383			

a Dependent Variable: economic

b Predictors: (Constant), community.resilience.to.drought

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.270	0.027		-10.146	0
	community.resilience.to.drought	1.128	0.015	0.968	75.215	0

a Dependent Variable: economic

Environmental Factors

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.028a	0.001	-.002	.140455

a Predictors: (Constant), community.resilience.to.drought

ANOVAa

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	0.006	1	0.006	.290	.591 b
	Residual	7.536	382	0.20		
	Total	7.542	383			

a Dependent Variable: economic

b Predictors: (Constant), community.resilience.to.drought

Coefficientsa

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.656	0.137		12.117	0
	community.resilience.to.drought	0.044	0.081	0.028	0.538	.591

a Dependent Variable: economic

Correlations

		community.resilience.to.drought	strategic.options
community.resilience.to.drought	Pearson Correlation	1	.538**
	Sig. (2-tailed)		.000
	N	384	384
strategic.options	Pearson Correlation	.538**	1
	Sig. (2-tailed)	.000	
	N	385	385

**. Correlation is significant at the 0.01 level (2-tailed).

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.538[a]	.290	.288	.118412

a. Predictors: (Constant), strategic.options

b. Dependent Variable: community.resilience.to.drought

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	2.185	1	2.185	155.870	.000[b]
	Residual	5.356	382	.014		
	Total	7.542	383			

a. Dependent Variable: community.resilience.to.drought

b. Predictors: (Constant), strategic.options

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.462	.022		65.696	.000
	strategic.options	.119	.010	.538	12.485	.000

a. Dependent Variable: community.resilience.to.drought

APPENDIX XIV: RESEARCH AUTHORIZATION LETTER

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)
Tel: 0702597360/61
:0733120020/22
E-mail: deansgs@mmust.ac.ke
Website: www.mmust.ac.ke

P.O Box 190

50100 Kakamega

Directorate of Postgraduate Studies

Ref: MMU/COR: 509101 16th March, 2018

Agnes Kalekye Kithikii
MMUST
P.O. Box 190-50100
KAKAMEGA

Dear Ms. Kalekye,

RE: APPROVAL OF PROPOSAL

I am pleased to inform you that the Directorate of Postgraduate Studies has considered and approved your Ph.D. proposal entitled: ***"The Impact of Humanitarian Aid in Building Community Resilience to Drought in Kitui County, Kenya"*** and appointed the following as supervisors:

1. Prof. John Obiri - Department of Disaster Management and Sustainable Development
2. Dr. Edward Mugalavai - Department of Disaster Management and Sustainable Development

You are required to submit through your supervisor(s) progress reports every three months to the Director of Postgraduate Studies. Such reports should be copied to the following: Chairman, School of Disaster Management Graduate Studies Committee and Chairman, Department of Disaster Management and Sustainable Development. Kindly adhere to research ethics consideration in conducting research.

It is the policy and regulations of the University that you observe a deadline of three years from the date of registration to complete your Ph.D. thesis. Do not hesitate to consult this office in case of any problem encountered in the course of your work.

We wish you the best in your research and hope the study will make original contribution to knowledge.

Yours Sincerely,

Prof. John Obiri

DIRECTOR DIRECTORATE OF POSTGRADUATE STUDIES

APPENDIX XV: RESEARCH AUTHORIZATION LETTER

THE PRESIDENCY
MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT

OFFICE OF THE
COUNTY COMMISSIONER
KITUI COUNTY
P.O. BOX 1 - 90200
KITUI

E-mail; *cckitui@gmail.com*
Telephone
Telegram
.....
When replying please quote

REF. K.C.603/II/4

26th March 2018

Agnes Kalekye Kithikii
MMUST
P.O. Box 190-50100
KAKAMEGA

RE: RESEARCH AUTHORIZATION

Reference is made to a letter Ref. MMU/COR:509101 dated 16th March 2018 from the Directorate of Postgraduate Studies on the above subject matter.

You have been authorized to carry out a research on ***"The Impact of Humanitarian Aid in building Community Resilience to Drought in Kitui County"*** for a period ending on 25th February 2019.

ODIDI J. OTIENO
FOR: COUNTY COMMISSIONEER
KITUI COUNTY

APPENDIX XVI: RESEARCH AUTHORIZATION NACOSTI

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone:+254-20-2213471,
2241349,3310571,2219420
Fax:+254-20-318245,318249
Email: dg@nacosti.go.ke
Website : www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref: No. **NACOSTI/P/18/24295/21934**

Date: **28th March, 2018**

Agnes Kalekye Kithikii
Masinde Muliro University of Science
And Technology
P.O. Box 190-50100
KAKAMEGA.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on ***"The impact of humanitarian aid in building community resilience to drought in Kitui County, Kenya,"*** I am pleased to inform you that you have been authorized to undertake research in **Kitui County** for the period ending **28th March, 2019.**

You are advised to report to **the County Commissioner and the County Director of Education, Kitui County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit **a copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

DR. M.K. RUGUTT, PhD, OGW
DIRECTOR GENERAL

Copy to:

The County Commissioner
Kitui County.

The County Director of Education
Kitui County.

APPENDIX XVII: CLEARANCE PERMIT NACOSTI

THIS IS TO CERTIFY THAT:
MS. AGNES KALEKYE KITHIKII
of MASINDE MULIRO UNIVERSITY OF SCIENCE & TECHNOLOGY, 0-100 Nairobi,has been permitted to conduct research in *Kitui County*

on the topic: *THE IMPACT OF HUMANITARIAN AID IN BUILDING COMMUNITY RESILIENCE TO DROUGHT IN KITUI COUNTY, KENYA*

for the period ending:
28th March,2019

Permit No : NACOSTI/P/18/24295/21934
Date Of Issue : 28th March,2018
Fee Recieved :Ksh 2000

.....
Applicant's Signature

.....
Director General
National Commission for Science, Technology & Innovation

CONDITIONS

The License is valid for the proposed research, research site specified period.
Both the Licence and any rights thereunder are non-transferable.
Upon request of the Commission, the Licensee shall submit a progress report.
The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
This Licence does not give authority to transfer research materials.
The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
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REPUBLIC OF KENYA

National Commission for Science, Technology and Innovation

RESEARCH CLEARANCE PERMIT

Serial No.A 18107

CONDITIONS: see back page