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Assessment of The Impact of Disaster on Pastoral Communities and Its Mitigation Mechanisms: The Case of Elidar Woreda, Afar Region State, Ethiopia

MSc Research Thesis

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Department of Geography and Environmental Studies

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By: Ali Oumer Hamedu

A Thesis submitted to College of Social Science and Humanities the Department of Geography and Environmental Studies, School of Graduate Studies, Samara University

In partial fulfillment of the requirement for the Master of Science degree in Disaster Risk Management and Pastoral Development

June, 2025

Semara, Ethiopia

DECLARATION

By my signature below, I declare and affirm that this thesis entitled "**Assessment of Impact of Disaster on Pastoral Communities and its Mitigation Mechanisms: The Case of Elidar Woreda, Afar Region**" is my own work. I have followed all ethical principles of scholarship in the preparation, data collection, data analysis and completion of this thesis. All scholarly matter that is included in the thesis has been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every serious effort has been made to avoid any plagiarism in the preparation of this thesis. This thesis is submitted in partial fulfillment of the requirement for a degree of Disaster Risk Management and Pastoral Development from the School of Graduate Studies at Samara University.

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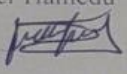
Signature: 

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This is to certify that this thesis entitled "**Assessment of Impact of Disaster on Pastoral Communities and its Mitigation Mechanisms: The Case of ElidarWoreda, Afar Region**", Undertaken by **Ali Oumer**under our guidance for the partial fulfillment of the degree of Masters of Science in Disaster Risk Management and Pastoral Development at Samara University to the best of our knowledge, is an original work and not submitted earlier for any degree either at this University or any other Universities.

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As members of the Examining Board of the Final M.Sc. Open Defense, we certify that we have read and evaluated the thesis prepared by **Ali OumerHamedu**entitled as **Assessment of Impact of Disaster on Pastoral Communities and its Mitigation Mechanisms: The Case of ElidarWoreda, Afar Region**"and recommend that it is accepted as fulfilling the thesis requirement for the Master of Science degree in Disaster Risk Management and Pastoral Development.

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LIST OF ACRONYM AND ABBREVIATION

ASALs - Arid and Semi-Arid Lands

DRM - Disaster Risk Management

GDP - Gross Domestic Product

NDMA - National Drought Management Authority

SDG - Sustainable Development Goals

SIA - Social Impact Assessment

UNFCCC - United Nations Framework Convention on Climate Change

USAID - United States Agency for International Development

WB - World Bank

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ABSTRACT

Both natural and human-induced disasters significantly affect pastoral communities by disrupting socio-economic structures, ecological systems, and livelihoods. *Pastoral communities in Elidar Woreda, located in the arid lowlands of the Afar Region in Ethiopia, are highly vulnerable to climate-induced disasters. This study aimed to assess the impact of disasters and its mitigation strategies in pastoral communities. Using a mixed-methods approach that included key informant interviews, field observations, and quantitative data analysis from 213. The study found that economic devastation and livelihood collapse (46.95%) were the most severe disaster impacts, followed by displacement and social disruption, food and nutrition insecurity, and environmental degradation and resource conflict. The main vulnerabilities identified were resource-based conflicts and insecurity (51.6%), livelihood over-reliance on livestock, and limited access to basic infrastructure and services. Governmental resilience strategies such as drought mitigation programs (35.2%) and water resource development were perceived as relatively effective, while livelihood support initiatives and conflict resolution mechanisms were rated less effective. On the NGO side, emergency relief aid (39.9%) was the most valued intervention, followed by livelihood diversification support and capacity-building programs. The study also revealed that indigenous knowledge systems remain central to disaster risk reduction and adaptation. Seasonal migration (38.5%), water harvesting and conservation, livestock diversification, and indigenous conflict resolution were widely practiced and considered effective by local communities. Overall, 81.2% of respondents reported these practices as either highly or moderately effective, highlighting their importance in enhancing resilience. The findings suggest that sustainable resilience-building efforts must adopt an integrated, context-specific approach that combines formal interventions with locally rooted practice. Recommendations include promoting livelihood diversification, strengthening local governance and conflict mediation systems, investing in sustainable water infrastructure, improving emergency response coordination, and formally integrating indigenous knowledge into national disaster risk reduction frameworks.*

Key Words: Disaster, Disaster Risk Reduction, Elidar Woreda, Mitigation, Pastoral communities, Vulnerability

CHAPTER ONE
1. INTRODUCTION

1.1. Background of the Study

Disasters, both natural and human-induced, significantly affect pastoral communities by disrupting socio-economic structures, ecological systems, and livelihoods. The vulnerability of these communities stems from their dependence on natural resources, mobility, and traditional knowledge systems, which are increasingly challenged by climate change, resource conflicts, and socio-political transformations (IPCC, 2023). Theoretical frameworks like Disaster Risk Reduction (DRR) and the Sustainable Livelihood Framework (SLF) are central to understanding and improving resilience-building, early warning systems, and adaptive strategies for disaster-prone communities. Integrating these frameworks leads to more effective risk management, community empowerment, and sustainable development (Imperiale and Vanclay, 2022; Haque et al., 2024).

Globally, pastoral communities in arid and semi-arid regions face recurring disasters such as droughts, floods, and conflicts over dwindling resources. The United Nations and international humanitarian agencies emphasize proactive disaster risk management strategies, including climate adaptation policies, sustainable land use, and community- based early warning systems (UNDRR, 2023). Case studies from the Sahel and the Horn of Africa highlight the importance of integrated approaches that combine indigenous knowledge with modern technologies to enhance resilience (FAO, 2023).

Regarding National and Regional Context, Ethiopia is particularly vulnerable to climate-induced disasters, with pastoral regions like Afar facing recurrent droughts, erratic rainfall, and land degradation. National policies such as the Ethiopian Climate Resilient Green Economy Strategy (CRGE) and the Disaster Risk Management (DRM) policy emphasize resilience-building and sustainable resource management (FDRE, 2022). CRGE has combining impact in climate change mitigation (reducing emissions) with adaptation (supporting vulnerable populations) (Paul and Weinthal, 2019). DRM help in building climate-resilient pathways, especially in contexts facing recurrent disasters and resource vulnerabilities. However, their effectiveness in pastoral settings remains limited due to infrastructure constraints, mobility issues, and socio-cultural barriers (Gebremeskel et al., 2023).

The Afar region has experienced a clear trend of decreasing seasonal and annual rainfall, with frequent and severe droughts recorded over recent decades. These droughts have led to critical water shortages, high livestock mortality, and reduced milk production, directly threatening pastoral livelihoods (Melese *et al*., 2018; Aytenfisu et al., 2024). Elidar Woreda, situated in northeastern Afar, is home to pastoral communities that primarily depend on livestock. The area experiences recurrent droughts, extreme temperatures, and occasional flash floods, making it one of Ethiopia's most disaster- prone regions. Climatic stress, resource competition, and inadequate institutional responses exacerbate vulnerabilities, necessitating a thorough assessment of disaster impact and mitigation mechanisms.

1.2. Statement of the Problem

Elidar Woreda, a pastoralist-dominated area in Ethiopia's Afar Region, faces recurrent disasters such as droughts, floods, and livestock epidemics, which threaten livelihoods and food security. Studies highlighted critical gaps in understanding the interplay between disaster impacts and the efficacy of mitigation strategies in this specific context: Prolonged droughts, exacerbated by climate change, have caused catastrophic livestock losses (up to 50% herd depletion in some kebeles, Afar region), collapsing pastoral incomes and displacing communities (Food Security Cluster, 2025). These shocks are compounded by a lack of reliable early warning systems and inadequate access to veterinary services, leaving households unable to preempt or manage risks (Melka et al., 2019). Traditional coping strategies, such as livestock mobility and herd diversification, are increasingly insufficient due to shrinking rangelands and market collapse (Helland, 2015; Food Security Cluster, 2025). Government interventions like the Productive Safety Net Program (PSNP) and humanitarian aid remain inconsistent, covering only a fraction of the population and failing to address systemic vulnerabilities (Food Security Cluster, 2025).

Existing studies on Afar's pastoralism often generalize findings across regions, overlooking Elidar's unique socioecological dynamics (Helland, 2015; Melka et al., 2019). While broader assessments emphasize irrigation and livelihood diversification as resilience strategies (Melka et al., 2019), there is limited empirical evidence on how these approaches translate to Elidar's context, where market access is virtually nonexistent and institutional support is fragmented (Food Security Cluster, 2025). Furthermore, power imbalances in community decision-making

and gender disparities in resource access are understudied barriers to equitable disaster response (Melka *et al*., 2019).

This gap in localized, evidence-based analysis hinders the design of targeted policies to strengthen pastoral resilience in Elidar. Rigorous assessment of disaster impacts and its mitigation mechanisms is urgently needed to inform adaptive strategies that align with the woreda's cultural, economic, and environmental realities.

1.3. Objectives of the Study

The study consists of both general objective and specific objectives as indicated below.

1.3.1. General Objective of the Study

The general objective of this study was to assess the impact of Disaster on Pastoral Communities and its Mitigation Mechanisms: The Case of Elidar Woreda, Afar Region, Ethiopia.

1.3.2. Specific Objectives of the Study

The specific objectives of the research are the following:

- To identify the impacts of natural and anthropogenic disasters
- To assess key vulnerabilities on pastoral communities in Elidar Woreda,
- To examine the effectiveness of governmental and non-governmental resilience strategies on pastoral communities in Elidar Woreda.
- To explore the role of indigenous knowledge and local practices in reducing disaster risks and build resilience in pastoral communities

1.4. Research Question

How do natural and anthropogenic disasters, along with key vulnerabilities, impact Pastoral communities in Elidar Woreda and what resilience strategies are employed to mitigate these impacts?

Specific Research Questions:

1. What are the primary impacts of natural and anthropogenic disasters on the livelihoods, social structures, and environment of pastoral communities in Elidar Woreda?

2. What are the key vulnerabilities (e.g., economic, social, environmental, institutional) that exacerbate the impacts of natural and anthropogenic disasters on pastoral communities in Elidar Woreda?
3. To what extent have governmental and non-governmental resilience strategies been effective in reducing disaster risks and enhancing the adaptive capacity of pastoral communities in Elidar Woreda?
4. How do indigenous knowledge and local practices contribute to disaster risk reduction and resilience-building strategies within pastoral communities in Elidar Woreda?
5. What are the perceived strengths and weaknesses of current resilience strategies (governmental, non-governmental, and indigenous) as experienced by pastoral communities in Elidar Woreda?
6. How can the integration of indigenous knowledge and local practices with formal resilience strategies enhance the effectiveness of disaster risk reduction efforts in Elidar Woreda?

1.5. Scope of the Study

This study methodologically employed a mixed-methods approach, integrating both qualitative and quantitative research methodologies. Data were collected through household surveys, key informant interviews, focus group discussions, and field observations.

Secondary data sources, including GO reports, NGO publications, and scholarly articles were complementing the primary data. The research utilized statistical tools to analyze quantitative data, while qualitative data were thematically analyzed to derive insights into the lived experiences of pastoralists. The study focused on the impact of disasters on pastoral livelihoods and the effectiveness of mitigation mechanisms. Key themes include climate-induced disasters, livelihood vulnerability, adaptation strategies, government and community- level interventions, and policy gaps in disaster risk management. Spatial Scope- The research was confined to Elidar Woreda, Afar Region, Ethiopia. This location has been selected due to its high vulnerability to disasters and the predominance of pastoralist communities reliant on natural resources for their livelihoods. The study covered the from 2024 to 2025 cross sectional time to analyze trends in disaster occurrence, response strategies, and resilience-building measures.

1.6. Significance of the Study

This study is crucial for both academic understanding and practical interventions to boost the resilience of vulnerable communities. The research directly tackles the severe exposure of pastoral communities in arid regions like Elidar Woreda to both natural disasters (droughts, floods) and human-caused stressors. By analyzing disaster impacts and existing mitigation strategies, the study provided vital evidence for designing more effective and context-specific disaster risk reduction (DRR) and resilience-building interventions. It uniquely explored the role of local and indigenous practices, revealing sustainable and culturally appropriate strategies that can enhance modern approaches. Findings could directly inform regional and national policies on disaster management, climate change adaptation, and pastoral development, leading to better-tailored interventions. Understanding disaster impacts and effective mitigation can significantly improve the livelihood security of thousands dependent on pastoralism. The study provides a much-needed, in-depth woreda-level analysis of disaster impacts and diverse mitigation approaches, including indigenous ones, in a specific and vulnerable context. By enhancing disaster preparedness and resilience, the research contributes to broader sustainable development goals in fragile ecosystems. The assessment creates a valuable baseline for monitoring and evaluating the effectiveness of future programs and policies in the region.

1.7. Organization of the Paper

This thesis has five chapters. These are chapter one introduction (background of the study, statement of the problem, objectives, research questions, significance of the study, scope, of the study, chapter two literature review, chapter three methodology, chapter four data analysis, interpretation and presentation, and chapter five conclusions and recommendations.

CHAPTER TWO

2. REVIEW OF RELATED LITERATURE

2.1. Review of Conceptual/Theoretical issues

2.1.1. Review of Concepts

This section clarifies key concepts central to the research on the impact of natural and anthropogenic disasters on pastoral communities and the effectiveness of mitigating intervention mechanisms in Elidar Woreda. Definitions and conceptualizations are synthesized from recent literature to establish a theoretical foundation for the study.

Natural disasters are defined as catastrophic events resulting from natural processes of the Earth, including droughts, floods, earthquakes, and other climate-related phenomena (Smith & Petley, 2022). These events often disrupt the livelihoods of vulnerable populations, particularly pastoral communities, which depend heavily on natural resources (Kelman, 2021).

In the context of Elidar Woreda, recurrent droughts and seasonal flooding are key natural disasters, severely impacting grazing land and water availability for livestock and communities. Anthropogenic disasters, also known as human-induced disasters, are disruptions caused by human activities such as environmental degradation, land use conflicts, and socio- political instability (Cutter et al., 2021).

Unlike natural disasters, anthropogenic disasters often result from systemic vulnerabilities, including poor governance, resource mismanagement, and conflict over scarce resources (Adger, 2021). In Elidar Woreda, overgrazing, deforestation, and border conflicts are significant anthropogenic factors exacerbating disaster impacts on pastoral communities. Pastoral communities are defined as societies that rely primarily on livestock herding and mobility to sustain their livelihoods, particularly in arid and semi-arid regions (Krätli *et al*., 2020).

These communities exhibit resilience through adaptive strategies such as mobility, resource-sharing networks, and indigenous knowledge (Bollig, 2022). In Elidar Woreda, pastoralists are uniquely vulnerable to environmental and anthropogenic disruptions due to their dependence on fragile ecosystems and limited access to external resources. Resilience refers to the ability of individuals or communities to withstand, adapt to, and recover from adverse events while maintaining essential functions (Walker & Salt, 2020). Resilience strategies include interventions aimed at enhancing the capacity of communities to cope with and recover from disasters. These strategies can be categorized as follows:

Governmental Strategies: Governmental resilience strategies include policies, disaster response frameworks, and infrastructure investments. For instance, drought relief programs and climate adaptation policies in Ethiopia aim to support vulnerable populations (FDRE, 2022). Non-Governmental Strategies**:** NGOs implement resilience strategies such as livelihood diversification, community-based disaster risk management, and capacity-building programs (Sphere Association, 2022). This study evaluates the effectiveness of these strategies in mitigating disaster impacts on pastoral communities in Elidar Woreda.

Indigenous knowledge refers to the cumulative body of knowledge, practices, and beliefs developed by communities over generations through interaction with their environments (Nyong et al., 2021). In disaster risk reduction, indigenous knowledge plays a critical role in early warning systems, sustainable resource management, and conflict resolution (Mercer et al., 2020). In Elidar Woreda, traditional practices such as communal grazing, water-sharing systems, and conflict mediation mechanisms are integral to reducing disaster risks and enhancing resilience.

2.1.2. Review of Theories

This section critically evaluates theories relevant to the study, aligning with the objectives to assess the impact of natural and anthropogenic disaster factors on pastoral communities in Elidar Woreda, Afar Regional State, and explore mitigating intervention mechanisms. By reviewing and synthesizing these theories, this study aims to establish a robust conceptual foundation that justifies the research objectives and highlights gaps addressed by this investigation.

Vulnerability theory examines the extent to which individuals or communities are exposed to risks and their capacity to cope with adverse conditions. It encompasses three key dimensions: exposure, sensitivity, and adaptive capacity (Turner et al., 2022). Vulnerability is influenced by socio-economic, environmental, and political factors that create or exacerbate risks. Relevance**:**

This theory is crucial for understanding how natural and anthropogenic disasters disproportionately affect pastoral communities in Elidar Woreda. Factors such as scarce water resources, erratic rainfall, and land degradation increase their vulnerability (Adger, 2021). Critique and Application**:** Critics argue that vulnerability theory underemphasizes socio- political drivers of risk, such as marginalization and exclusion from decision-making processes (Cutter et al., 2021). This study addresses this limitation by incorporating a multi-dimensional analysis of vulnerabilities, focusing on both environmental and anthropogenic stressors.

Resilience theory focuses on the ability of communities or systems to absorb disturbances, adapt, and transform to maintain functionality (Walker & Salt, 2020).
It highlights the dynamic interplay between adaptive capacity and transformative change as essential components of resilience, Relevance**:** The theory is instrumental in evaluating governmental and non-governmental strategies aimed at enhancing resilience among pastoral communities. Initiatives like climate-smart agriculture and livelihood diversification are key resilience- building measures (Béné et al., 2022). Critique and Application: While resilience theory provides a comprehensive framework, it is often critiqued for not adequately addressing power dynamics and systemic inequalities (Leach, 2021). This study incorporates local perspectives, including indigenous knowledge, to offer a more inclusive resilience assessment.
Sustainable Livelihoods Framework (SLF); The Sustainable Livelihoods Framework emphasizes the role of assets (natural, financial, social, human, and physical), vulnerability contexts, and institutional processes in determining livelihood outcomes (Scoones, 2015).

Indigenous Knowledge Systems Theory; This theory highlights the significance of traditional ecological knowledge in managing natural resources, predicting disasters, and fostering community resilience (Nyong et al., 2021). Indigenous practices are characterized by their deep understanding of local eco-systems and sustainability. Relevance**:** Indigenous knowledge systems are essential for understanding local strategies for disaster risk reduction and resilience in Elidar Woreda. Practices such as communal grazing and water conservation are central to mitigating disaster impacts. Critique and Application: While widely recognized, indigenous knowledge is often undervalued in formal disaster management frameworks (Mercer et al., 2020). This study emphasizes the integration of these practices into institutional strategies to enhance their effectiveness.

2.2. Review of Empirical Studies

This section presents a critical review of empirical studies related to the impacts of natural and anthropogenic disasters on pastoral communities and the effectiveness of mitigating intervention mechanisms. The analysis identifies knowledge gaps, synthesizes findings, and highlights areas for further research in the context of Elidar Woreda, Afar Regional State. The empirical studies are organized based on their relevance to the research objectives.

Empirical studies have extensively documented the adverse effects of natural and anthropogenic disasters on pastoral communities. For instance, studies by Hussein et al. (2022) highlight that recurrent droughts and floods significantly undermine the livelihoods of pastoralists by reducing livestock numbers, their primary source of income. Similarly, conflicts over scarce resources due to climate-induced migration have been reported by Getachew and Tesfaye (2021) as exacerbating vulnerabilities among pastoral communities.

While many studies have quantified the economic losses from such disasters, few have examined their psychological and social impacts. For example, Abebe et al. (2020) emphasized the psychological stress caused by the loss of cultural identity as pastoralists are forced to abandon their traditional way of life. These findings underscore the multifaceted nature of disaster impacts but reveal a gap in longitudinal studies that assess the long-term adaptive capacities of these communities.

Empirical evidence suggests mixed results regarding the effectiveness of resilience strategies implemented by governmental and non-governmental organizations (NGOs). A study by Yimer and Ali (2019) found that governmental initiatives, such as the Productive Safety Net Program (PSNP), have improved food security in drought-prone areas but have faced challenges in targeting and resource allocation.

NGO-led interventions, including water harvesting projects and community-based livestock insurance schemes, have shown promise. For instance, Tsegaye et al. (2021) reported that these programs significantly reduced livestock mortality during droughts in Afar region.

However, empirical evidence also highlights the lack of coordination between governmental and non-governmental actors, as noted by Kassa (2022), which undermines the overall effectiveness of resilience strategies.

Several studies have documented the crucial role of indigenous knowledge and practices in disaster risk reduction among pastoral communities. Desta and Coppock (2020) highlighted traditional rotational grazing systems as an effective mechanism for sustaining pasture

availability during dry seasons. Additionally, Tadesse (2021) reported that local water-sharing agreements have mitigated conflicts over scarce water resources during droughts.

However, the integration of indigenous knowledge into formal disaster risk management frameworks remains limited. Studies by Ahmed et al. (2022) have pointed to the undervaluation of local practices by policy-makers, which restricts the potential for synergistic approaches. This gap highlights the need for further research on how indigenous knowledge can complement modern resilience strategies.

2.3. Research Gaps

The review of existing literature on the impacts of natural and anthropogenic disaster factors on pastoral communities highlights several critical research gaps that need to be addressed:

Limited Geographic Focus on Elidar Woreda: While there is significant research on disaster impacts on pastoralist communities, most studies are regional or national in scope and do not delve into the unique socio-economic and environmental conditions of Elidar Woreda in the Afar Regional State. This limits the understanding of localized vulnerabilities and resilience strategies specific to this area.

Insufficient Analysis of the Interaction between Natural and Anthropogenic Factors: Existing studies often focus on natural disasters (e.g., droughts and floods) or anthropogenic factors (e.g., conflicts, infrastructure development, and land-use changes) in isolation. There is a gap in understanding how these factors interact to create compounded challenges for pastoral communities in Elidar Woreda.

Neglect of Indigenous Knowledge and Practices: Pastoralist communities often employ indigenous knowledge systems and practices to cope with and adapt to disasters. However, these strategies are underexplored in the literature, leaving a critical gap in developing mitigation mechanisms that are culturally sensitive and grounded in local realities.

Limited Assessment of Mitigation Mechanisms: There is inadequate research evaluating the effectiveness of existing disaster mitigation and intervention mechanisms in Elidar Woreda. Additionally, studies often fail to propose context-specific strategies that address the unique needs and conditions of pastoral communities.

Theoretical and Methodological Limitations: Many existing studies lack an interdisciplinary or systems-based approach that integrates socio-economic, institutional, and environmental

perspectives. This gap limits a comprehensive understanding of the complexities surrounding disaster impacts and mitigation efforts. This leaves a critical gap in designing sustainable solutions for disaster risk reduction.

2.4. The Conceptual Framework

This section outlines the conceptual framework of the study, which serves as a guiding structure for evaluating and assessing the impact of natural and anthropogenic disaster factors on pastoral communities in Elidar Woreda, as well as identifying mitigating intervention mechanisms.

The framework operationally defines the key concepts, factors, variables, and indicators used in the research, offering clarity on how they will be understood and analyzed. A diagram is included to visually represent the relationships between these elements.

Factors Contributing to Disaster Impacts: Natural Factors: Frequency and severity of droughts, floods, and desertification. Anthropogenic Factors: Resource conflicts, land policies, and developmental pressures.

Dependent Variable: Livelihood outcomes of pastoral communities (e.g., livestock mortality, food security, income levels).

Independent Variables: Natural disaster factors (e.g., rainfall variability, land degradation), Anthropogenic factors (e.g., resource disputes, land policies). Intervening Variable: Effectiveness of mitigating interventions (e.g., early warning systems, livelihood support).

Indicators:

- For Natural Disaster Impacts: Rainfall data, frequency of droughts and floods, extent of desertification.
- For Anthropogenic Factors: Incidence of conflicts, policies affecting land use, population displacement rates.
- For Resilience and Mitigation: Adoption of alternative livelihoods, participation in intervention programs, community preparedness levels.

Below is a simplified textual description of the conceptual framework diagram. A visual diagram should depict these relationships clearly:

Inputs: Natural Disaster Factors (Droughts, Floods, Desertification), Anthropogenic Factors (Conflicts, Land-use Changes, Policy Impacts)

Processes: Interaction of natural and anthropogenic factors, Existing coping mechanisms and mitigation interventions.

Outputs: Livelihood outcomes of pastoral communities (food security, income levels, livestock health).

Feedback Loop: Evaluation of the effectiveness of interventions and adjustments to improve resilience.

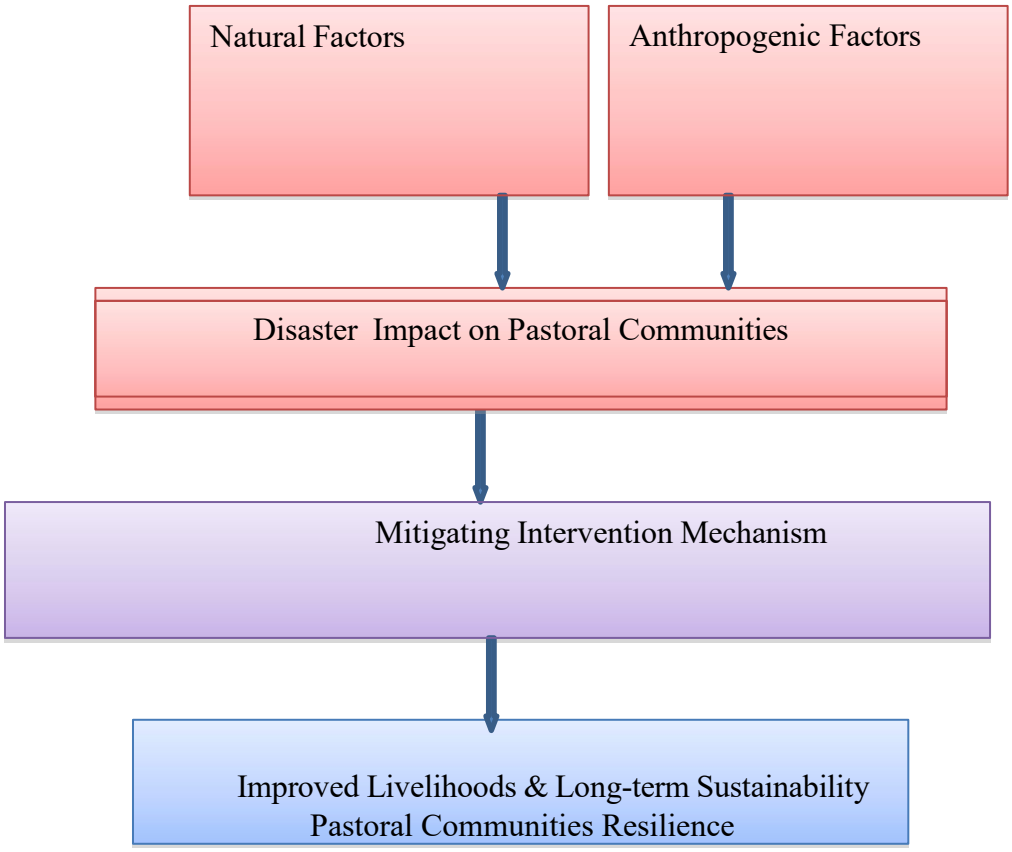

Figure 1: The Conceptual Framework

Source: Designed by researcher, 2024

CHAPTER THREE

3. RESERCH METHODOLOGY

3.1. Description of the Study Area

Life in Elidar Woreda, a unique corner of northeastern Ethiopia's Afar Region, is shaped by its incredibly arid environment and a deep connection to the land. This vast area, covering nearly 11,636.48 square kilometers, is strategically located, sharing borders with Eritrea and Djibouti, which is vital for trade and resources (Muluneh et al., 2024).

Nestled within the geologically active Afar Depression, Elidar is home to notable peaks like Mount Alayta. The climate here is a hot desert, where temperatures often soar above 40∘C during the intense Hagai dry season (May to June). While there are two main rainy seasons, Karma (July-September) and Sugum (March-April), rainfall is generally low and unpredictable. This makes the region incredibly vulnerable to droughts, leading to severe water shortages, displacement, and food insecurity for its communities (Afar Region Finance Office, 2024).

Based on the 2007 census, Elidar had a population of 58,087 people, living at a density of about 4.99 people per square kilometer (https://en.wikipedia.org/wiki/Elidar_(woreda)). The heart of their livelihood is pastoralism, a traditional way of life centered on raising livestock like camels, cattle, and small ruminants. This means families often move with their animals to find pasture and water, a practice deeply tied to the region's climate (Tamire et al., 2025). While some areas with reliable water sources also practice agro-pastoralism, the reliance on livestock makes the community highly susceptible to climate shocks. Programs like the Productive Safety Net Program (PSNP) are crucial in helping families cope with food insecurity (FAO, 2016).

Water is a constant challenge in Elidar. Though groundwater resources exist, particularly in fractured basalt aquifers, and seasonal floods can recharge localized sources, managing water points and traditional water reservoirs (birkas) is essential for survival (UNESCO, 2015). Unfortunately, the people of Elidar have also faced displacement, not only from past conflicts like the Eritrean-Ethiopian War but also from more recent climate-driven events such as flash floods (UNICEF, 2024).

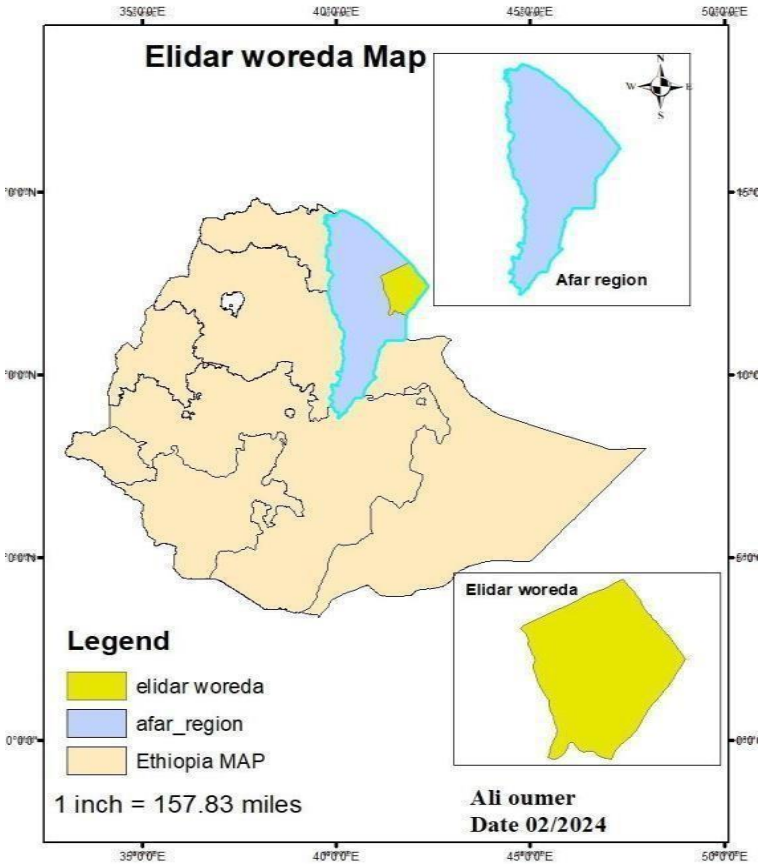

Figure 2: Map of Elidar Woreda

3.2. Research Design and Approach

The research adopted a mixed-methods design integrating across-sectional and explanatory reserch design to investigate the impacts of disasters, identify key drivers, and evaluate the effectiveness of mitigating interventions within one year data collection. It also adopted both quantitative and qualitative approaches means numeric and nan numeric data were collected.

3.3. Types and Sources of Data

This research utilized both primary and secondary data to comprehensively assess the impact of disaster on pastoral communities and its mitigation interventions.

The primary data were collected through surveys, interviews, and observation with pastoral community members, local government officials, and disaster management experts. This data will provide first-hand insights into the community's experiences, perceptions, and the effectiveness of existing interventions. Primary data is essential to address specific research questions related to the lived experiences of the pastoralists and the local context. Secondary data

were gathered from government reports, academic articles, NGOs, and disaster management organizations. Secondary data is crucial for understanding broader trends, validating primary data, and comparing findings across different sources. These data sources are chosen to ensure a comprehensive, evidence- based analysis and to address the research questions effectively.

3.4. Sampling Procedure and Sample Size Determination

The sample frame comprised lists of households and community leaders within Elidar Woreda. These lists were compiled from local administrative records and government documents, ensuring accuracy, currency, and freedom from duplication to represent every segment of the population. This research employed a multistage sampling technique, integrating both probability and non-probability methods to ensure a representative and comprehensive dataset. Purposive Sampling was used to select the district and kebeles due to exposure to disaster. Random Sampling was used to select sample respondents Within each kebeles households. A simple random sampling method was employed to ensure representation from community the communities. This strategy allowed equal chance for all.

The sample size for this research was determined through a combination of statistical, practical, and contextual considerations, accounting for the diverse target population and available resources. The sample size was calculated using a statistical formula for proportion-based sampling, aiming for high precision and minimal error. The sample size was determined by purposively selecting two kebeles Bure and Andaba, and Adgeno and Temekule identified as central areas facing significant challenges. From these kebeles, where the total number of households was 1,242 and 977 respectively (total 2,219), a sample size was calculated using a formula used was $n=Z^2pq/e^2$ developed by Cochran (1977). Assuming a 50% proportion ($p=0.5$, $q=0.5$) and a 94% confidence level ($Z=1.88$) with a 0.06 error, the sample size (n) was 246. While 94% slightly less common than the traditional 95% level, this decision was made to optimize the sample size given resource limitations/ensure feasibility of fieldwork/balance the need for precision with the practicalities of data collection in a remote pastoral setting. Therefore, 246 households were randomly selected from the pastoral communities in the chosen kebeles.

Key informants were identified purposively based on their roles and expertise. This comprehensive approach ensured that the sample accurately represented the population, captured its heterogeneity, and aligned with the research objectives.

3.5. Data Collection Methods

This research used a combination of qualitative and quantitative instruments tailored to the objectives and context of the study. The questionnaires and interview guides were developed based on research objectives, pre-tested for validity and reliability, and adjusted accordingly. Data collectors were trained to ensure clarity and consistency during the data collection process. These instruments are justified as they effectively capture both quantitative trends and qualitative depth relevant to the study.

Structured questionnaires were used to collect quantitative data from households on the impacts of disasters and coping mechanisms. There was enumerator and training for them. Interviews were conducted with key informant such as government woreda administrative office, Woreda Finance office, Regional Disaster Risk Management, Samra University, and NGO / Humanitarian agency at regional level representatives to capture expert perspectives one per each. Semi-Structured questionnaires were used for gathering qualitative insights into community experiences and intervention feedback. Observation Checklists were used for field visits to assess environmental and socio-economic impacts firsthand.

3.6. Data Validity and Reliability

To ensure data quality, this research adopted rigorous measures for validity and reliability.

For Validity a pilot study were pre-tested questionnaires with 15 respondents to confirm that the instruments measure the intended variables. Tools were refined based on feedback from the pilot study to eliminate ambiguities. Also, expert reviewed the relevance, clarity, and alignment of questions with research objectives. For Reliability a consistency in data collection maintained through training data collectors on standardized procedures. Techniques such as data cleaning (handling outliers and missing values) and cross-verification of responses were employed to ensure completeness and consistency. These measures enhanced the credibility and generalizability of this research findings.

3.7. Data Analysis

This research employed a mixed-methods approach to comprehensively analyze the collected data. For quantitative data, the process began with careful editing, coding, classification, and tabulation. Key variables like disaster types, community resilience, and intervention mechanisms were carefully operationalized and measured using appropriate scales. Statistical analysis involved both descriptive statistics (e.g., mean and frequency table) to summarize the data. The findings from also analyzed and presented using a variety of visual aids, including pie charts to effectively communicate the results.

For qualitative data underwent thematic analysis, where textual information from interviews and observations was coded and categorized into themes directly reflecting the study's objectives. Additionally, content analysis systematically examined patterns and trends in community responses regarding disaster impacts and mitigation mechanisms. These qualitative methods were chosen to capture the rich depth, diversity of experiences, and crucial contextual insights from the community. The findings were also presented using a variety of visual aids, including figures, plates, and photographs, to effectively communicate the results.

3.8. Ethical Considerations

Ethical considerations involve issues like personal disclosure, authenticity, and credibility of the research report, the role of researcher in cross-cultural contexts and concerns of personal privacy through different forms of internet data collection (Creswell,2009). Therefore, to ensure originality, confidentiality, avoid plagiarism and other concerns the attempts made to appropriately cite and give credit for each respective author. Besides, efforts made to get informed ethical consent from respondents and collected data kept anonymous.

CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.1. Response Rate

For the research titled A total of 246 papers distributed for pastoral communities in Elidar Woreda were randomly selected for the quantitative survey. Among the distributed questionnaires, 213 completed surveys were returned, resulting a response rate of 86.58%, reflecting good rate.

4.2. Demographic Characteristics of the Respondents

Key demographic variables such as age, sex, education level, and experience were described here.

Table 1: Demographic Characteristics of the Respondents

N	Variables	Categories	Frequency	Percentage (%)
1	**Sex**	Male	139	65.3
		Female	74	34.7
		Total	**213**	**100.0**
2	**Age**	20-30	58	27.2
		31-40	64	30.0
		41-50	47	22.1
		Over 51 Years	44	20.7
		Total	**213**	**100.0**
3	**Experience**	Below 5 Years	63	29.6
		6-10 Years	91	42.7
		11-16 Years	35	16.4
		Above 16 Years	24	11.3
		Total	**213**	**100.0**
4	**Educational Status**	Below Certificate	108	50.7
		BA/BSc Degree	42	19.7
		College Diploma	63	29.6
	Total		**213**	**100.0**

Source: Field Survey, 2024

Based on Table 1, the demographic profile of the study's respondents offers crucial insights into the characteristics of individuals involved in pastoral communities and disaster resilience activities in Elidar Woreda.

Sex distribution showed a clear male dominance, with 65.3% male respondents compared to 34.7% female. This disparity likely reflects the prevailing gender roles within these pastoral communities, where men traditionally hold primary decision-making roles, particularly in public and economic spheres, and are often the main representatives in community interactions. This finding highlights a potential limitation in capturing the full range of experiences, especially those unique to women, who often bear significant burdens during and after disasters but may be less visible in formal data collection.

Regarding **age**, the majority of respondents fell within the 31–40 years age range (30%), closely followed by those aged 20–30 years (27.2%). This distribution points to a significant presence of the active workforce within the respondent pool. This is particularly valuable because individuals in these age groups are typically at the forefront of daily pastoral activities, making them key participants in both experiencing disaster impacts and implementing resilience strategies. Their insights are likely grounded in current, direct involvement in livelihood and community efforts.

The **experience level** of respondents was notably high, with 42.7% reporting 6–10 years of experience. This indicates a substantial proportion of individuals who possess considerable, practical knowledge derived from prolonged engagement in pastoral practices and direct encounters with disasters and resilience efforts. This experience is critical for providing nuanced and informed perspectives on the effectiveness of various mitigation mechanisms and the long-term impacts of environmental challenges.

Finally, **educational status** revealed that approximately half of the respondents (50.7%) had attained an education level below a certificate. This finding underscores the significant challenges in accessing formal education within these communities, often attributed to the nomadic lifestyle and frequent environmental disruptions like droughts and floods. This educational background suggests that while respondents possess invaluable practical and

experiential knowledge, their formal literacy and access to digitally conveyed information might be limited, which has important implications for designing effective ICT-based interventions.

4.3. The Impact of Disaster on Pastoral Communities

Table 2: Impact of disaster in pastoral communities

Impacts of Disaster	**Frequency**	**Percentage (%)**
Economic Devastation and Livelihood Collapse	100	46.95
Food and Nutrition Insecurity	35	16.43
Displacement and Social disruption	48	22.54
Environmental Degradation and Resource Conflict	30	14.08
Total	**213**	**100**

Source: own analyzed

Figure 3: Water scarcity, loss of livestock, lack of health services, and displacement)

Source: Field survey, 2024, Photo taken

The devastating impact of disasters on pastoral communities in Elidar Woreda was powerfully conveyed by **key informants**, who painted a stark picture of their losses.

University Researcher

"Disasters such as droughts and flash floods have devastating impacts on pastoral communities in Elidar. The loss of livestock—often the sole asset of households—leads to economic collapse, leaving families without income or safety nets. This directly translates into food and nutrition

insecurity, especially for children and pregnant or lactating women. As pastures disappear and water points dry up, entire communities are forced to move, disrupting traditional social structures and increasing tensions over access to scarce resources. Over time, this movement and overgrazing also contribute to environmental degradation, creating a vicious cycle where land becomes less productive and conflicts over remaining resources intensify.

🏵 NGO Official (Humanitarian Aid/Development Worker)

"We've seen how disaster after disaster erodes the resilience of pastoralists in Elidar. When a major drought hits, it's not just about losing animals—it's the collapse of their entire livelihood system. Families can't afford to buy food, leading to malnutrition and health crises. Many are displaced temporarily or even permanently, often settling near limited water sources, which strains those resources further and sparks conflict. We're responding with emergency food aid and nutrition programs, but long-term recovery is difficult without restoring ecosystems and building more resilient livelihood options beyond livestock."

🏛 Government Officer (Local Disaster Risk Management Office)

"In Elidar, disasters hit hard because of the fragile ecosystem and the dependence on livestock. Economic losses from droughts are massive, and when people lose their herds, they fall into extreme poverty. Food insecurity becomes widespread, requiring regular humanitarian interventions. Displacement disrupts community cohesion and puts pressure on already limited services and infrastructure. At the same time, environmental degradation accelerates as degraded lands become unproductive, pushing herders into contested areas, increasing resource-based conflicts. Our focus is on early warning systems, climate-smart interventions, and supporting alternative livelihoods, but progress is slow due to funding and accessibility challenges."

The impact of disasters on pastoral communities is profound and multifaceted, striking at the very heart of their unique way of life and livelihood. These communities, often inhabiting fragile arid and semi-arid environments, are intrinsically linked to natural resources, making them disproportionately vulnerable to environmental shocks **Table 2**.

Economic Devastation and Livelihood Collapse of disaster impact counts 46.95%: this could be Mass Livestock Mortality: Disasters, especially droughts, floods, and disease outbreaks

(epizootics), lead to widespread death of livestock (cattle, camels, goats, sheep). For pastoralists, livestock are their primary assets, source of income (milk, meat, sales), and social capital. Their loss means immediate destitution, loss of savings, and an inability to recover. Reduced Productivity: Even surviving animals may suffer from poor health, reduced milk yields, lower weight gain, and diminished reproductive capacity, severely impacting household food security and market value. Asset Depletion and Indebtedness: Families are often forced to sell remaining healthy animals at low prices to buy food or water, leading to further asset stripping and mounting debt. Market Disruptions: Disasters disrupt supply chains, raising the prices of essential goods (cereals, water) while simultaneously causing livestock prices to plummet, creating unfavorable terms of trade.

Food and Nutrition Insecurity of disaster impact counts 16.43%: The loss of livestock directly translates to a lack of milk and meat, which are dietary staples. This leads to severe food shortages, increased reliance on external food aid, and high rates of acute malnutrition, particularly among children, women, and the elderly. Water scarcity, especially during droughts, further exacerbates nutritional challenges and increases the risk of waterborne diseases.

The impact of disasters on Displacement and Social disruption is presented 22.54%: Disasters often force pastoral communities to abandon their traditional grazing lands and water sources, leading to both short-term and protracted internal displacement. Forced migration disrupts social networks, access to services, and traditional migratory routes, which are vital for sustainable pastoralism. Displacement can also lead to increased pressure on host communities and heightened tensions. The loss of livestock, central to pastoral identity and culture, can cause significant psychological distress, loss of status, and breakdown of traditional social support systems. Displacement can lead to family separation and a decline in communal cohesion. Access to education and healthcare is severely interrupted as families migrate or prioritize survival, impacting long-term human development.

The impact of disasters on Environmental Degradation and Resource Conflict is counts 14.08%: Disasters can exacerbate existing environmental vulnerabilities. For instance, concentrated grazing around shrinking water points during droughts intensifies land degradation. Competition over dwindling natural resources (pasture, water) often escalates into inter-communal conflicts, leading to violence, further displacement, and disruption of traditional

resource management systems.

In essence, disasters create a cascading effect on pastoral communities, undermining their economic stability, food security, social structures, and overall well-being, often leading to chronic vulnerability and dependence on external assistance.

Dereje (2020) similarly identified drought disaster as a recurring phenomenon with devastating effects on pastoral livelihoods. The vulnerabilities reported—water scarcity, loss of livestock, and displacement—are symptomatic of the dual impacts of natural and anthropogenic pressures. Water scarcity as the primary vulnerability signals the urgent need for sustainable water resource management, a sentiment echoed in studies by Yohannes (2021).

4.4. The Key Vulnerabilities on Pastoral Communities

Table 3: Key vulnerabilities in pastoral communities

Vulnerabilities Type	**Frequency**	**Percentage (%)**
Resource-Based Conflicts and Insecurity	110	51.6
Livelihood Over-reliance on Livestock	65	30.5
Limited Access to Basic infrastructure Services	38	17.9
Total	**213**	**100**

Source: own analyzed

University Researcher

"Pastoral communities in Elidar are highly vulnerable due to their deep dependence on livestock, which is extremely sensitive to climatic shocks like drought. With recurring dry spells and limited alternative livelihood options, families face increasing pressure when pasture and water become scarce. This often triggers resource-based conflicts between clans and even across borders, especially as herders move into contested zones in search of grazing land. Moreover, access to basic services—like education, health, and clean water—is minimal, further marginalizing these populations and reducing their resilience to disasters."

NGO Official (Humanitarian Organization)

"In our fieldwork in Elidar, we've seen how climate-induced displacement is becoming more frequent, especially after flash floods or prolonged droughts. Pastoralists have no safety net

beyond their animals, so when livestock die, entire households collapse. This over-reliance makes them extremely vulnerable. At the same time, tensions over water points and grazing areas are rising, sometimes escalating into violence. And without proper roads, clinics, or schools, it's incredibly difficult to reach people with aid or build long-term resilience. We're seeing a cycle of crisis and response that needs to be broken through sustainable development and peacebuilding efforts."

🏛 Government Officer (Local Disaster Risk Reduction Office/Agriculture Bureau)

"The government recognizes that pastoralist communities in Elidar face significant risks. Their heavy reliance on livestock means any environmental shock has immediate and severe consequences. We're working to promote alternative livelihoods and improve early warning systems for droughts and floods. However, insecurity linked to competition over dwindling natural resources remains a major challenge. Infrastructure like roads, water supply systems, and emergency shelters is still underdeveloped, which hampers both service delivery and disaster preparedness. Coordination between local authorities, NGOs, and communities is key to building resilience in this fragile environment."

Pastoral communities in Elidar Woreda, like much of the Afar region, face a complex web of vulnerabilities that threaten their livelihoods and well-being. These vulnerabilities stem from environmental, socio-economic, and institutional factors **Table 3**.

Livelihood Over-reliance on Livestock 30.5%**:** The economy is almost entirely dependent on livestock (cattle, camels, small ruminants). Any shock that affects animal health or numbers (drought, disease outbreaks, market fluctuations) directly translates into livelihood collapse, asset depletion, and food insecurity for households. Limited diversification into alternative income-generating activities or off-farm employment opportunities means fewer safety nets when pastoralism is disrupted.

Limited Access to Basic infrastructure support/ Services 17.9%**:** Water Scarcity: Despite the Awash River, access to safe, reliable water points for both human and livestock consumption remains a major challenge, especially during dry seasons. Communities often rely on unsafe surface water, increasing health risks. Poor Healthcare and Education: Health facilities and schools are often scarce, distant, or may even close during crises, leading to reduced access to

essential health services (including veterinary care) and interrupted education for children. Inadequate Market Access: Remote locations, poor road networks, and exploitation by intermediaries lead to unreliable market access. This results in falling livestock prices (when pastoralists are forced to sell during crises) and soaring food prices (for staple foods they need to buy), creating a severe terms-of-trade disadvantage. Pastoral communities often face marginalization in national development policies, which may historically favor sedentary agriculture. Insufficient investment in tailored infrastructure (e.g., strategic water points, veterinary services accessible to mobile populations) and early warning systems can exacerbate vulnerabilities. Challenges in effectively implementing social protection programs (like PSNP) in remote pastoral areas due to distribution issues and traditional sharing mechanisms.

Resource-Based Conflicts and Insecurity 51.6%**:** Competition over dwindling grazing lands and water points, particularly during droughts, often escalates into inter-communal conflicts. This insecurity leads to loss of life, livestock raiding, forced displacement, and restricts access to crucial dry-season grazing areas. These interconnected vulnerabilities mean that a single shock, like a severe drought, can quickly trigger a cascade of negative impacts, pushing already fragile households into deeper poverty and chronic food insecurity, highlighting the urgent need for context-specific and integrated interventions.

4.5. The Effectiveness of Governmental and NGO Resilience Strategies on Pastoral Communities

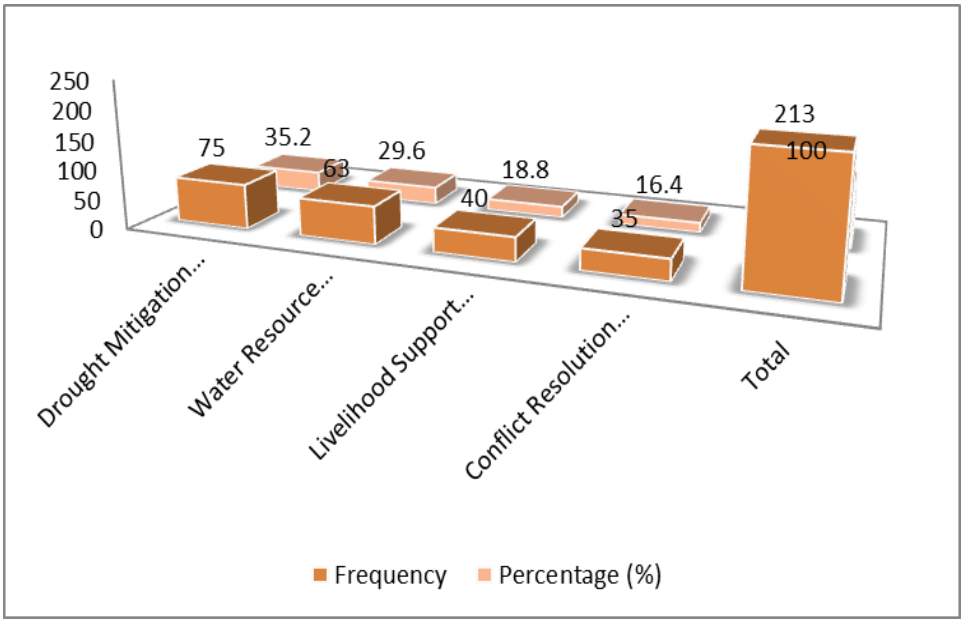

Figure 4: Effectiveness of Governmental Resilience Strategies

***Source: own computation*, 2024**

Key Informant Interviews result

University Researcher

"The Ethiopian government has made efforts to build resilience in Elidar through drought mitigation programs like early warning systems and seasonal livestock market interventions. Water infrastructure such as boreholes and water pans has improved access, especially during dry seasons. However, these initiatives often remain fragmented and underfunded. While there are attempts at livelihood diversification—such as small-scale irrigation and camel milk production—the overreliance on pastoralism persists. Conflict resolution mechanisms exist but are inconsistently applied, especially across clan lines and border areas. On the NGO side, emergency relief is critical during crises, but long-term impact comes from their capacity-building and alternative livelihood projects, which help communities adapt beyond livestock dependence."

NGO Official

"We see the government's role as foundational—especially in scaling up early warning systems and drilling new boreholes, which are life-saving during droughts. But we also notice gaps in sustainability; some water points break down without proper maintenance systems. That's where NGOs step in—we rehabilitate infrastructure and train local committees to manage them. Our own programs focus on short-term emergency aid during disasters, but increasingly we're investing in livelihood diversification—like beekeeping, small businesses, and vocational training—to reduce vulnerability. We also run community-based peacebuilding workshops that complement formal conflict resolution structures. Overall, collaboration between government and NGOs is improving, but coordination can still be stronger."

🏛 Government Officer (Local Disaster Risk Reduction/Agriculture Bureau Staff)

"Our office prioritizes drought preparedness and water development in Elidar. The Productive Safety Net Program (PSNP) and seasonal livestock marketing campaigns have helped reduce dependency on emergency aid. We've expanded water access through boreholes and berkads, though maintenance remains a challenge. Livelihood support programs, especially for youth and women, are being scaled up, but adoption is slow due to cultural attachment to herding. On the conflict front, local elders and administrative leaders work together, but cross-border tensions require higher-level intervention. We welcome NGO support in emergency response and infrastructure rehab, but we need better alignment with national frameworks to ensure long-term impact and avoid duplication."

The findings presented in **Figure 4** provide a valuable snapshot of how pastoral communities in Elidar Woreda perceive the effectiveness of various governmental resilience strategies. The data indicates a varied perception, with some interventions seen as more impactful than others.

The results show that drought mitigation programs were perceived as the most effective governmental resilience strategy, accounting for 35.2% of responses. This high ranking is understandable given that drought is the most frequent and devastating natural disaster in the Afar region, directly threatening the very existence of pastoral livelihoods. Such programs likely encompass initiatives like early warning systems, emergency fodder provision, destocking/restocking schemes, and perhaps veterinary support during dry periods. The communities' reliance on these interventions during times of extreme stress would naturally lead to a higher perceived effectiveness, as they directly address the most pressing existential threat.

However, it's important to consider *what specific aspects* of these programs were effective, and if they were sustainable or merely provided short-term relief. Research often points to challenges in the timeliness and scale of such interventions in pastoral areas.

Following drought mitigation, water resource development garnered 29.6% of the perceived effectiveness. This score highlights the critical importance of water access for both human and livestock survival in an arid environment like Elidar. Water development initiatives would typically include the construction or rehabilitation of boreholes, communal ponds, and water harvesting structures. The consistent provision of water, even if limited, directly improves access to a vital resource and can help prevent massive livestock losses and displacement during dry seasons. However, studies on water development in pastoral areas often reveal complexities, such as increased decentralization around new water points leading to localized overgrazing and rangeland degradation, or the challenge of ensuring long-term maintenance and equitable access.

Livelihood support initiatives were perceived as effective by 18.8% of respondents. These programs typically aim to diversify income sources or strengthen existing ones beyond traditional pastoralism, such as promoting small-scale trade, irrigated agriculture (for agro-pastoralists), or providing asset transfers. While crucial for building long-term resilience and reducing over-reliance on livestock, their lower perceived effectiveness compared to drought mitigation and water development might suggest several things: they may be less immediate in their impact during a crisis, their benefits might not be universally distributed, or they may face challenges in adapting to the highly mobile and traditional nature of pastoral livelihoods. It could also indicate a preference for interventions that directly support traditional pastoralism over diversification.

Finally, conflict resolution mechanisms received the lowest perceived effectiveness at 16.4%. This is a significant finding, as resource-based conflicts, often exacerbated by environmental stress and shrinking resources, are a major source of vulnerability and disruption in pastoral areas. The lower score could suggest that: Government-led conflict resolution approaches might not be as effective as traditional, community-based mechanisms, or they might not adequately address the root causes of conflict. These mechanisms might be reactive rather than proactive, intervening only after conflicts have escalated. There might be a lack of trust in formal resolution

systems, or insufficient integration with well-established customary laws and elders' councils that communities traditionally rely on.

Overall Implications: The data suggests that governmental strategies directly addressing immediate, life-threatening environmental impacts (drought and water scarcity) are more readily recognized as effective by pastoral communities. This highlights the urgent humanitarian needs that drive these perceptions. However, the relatively lower scores for livelihood support and, critically, conflict resolution, point to areas where governmental and NGO interventions may need significant re-evaluation and strengthening. Building true long-term resilience requires not only addressing immediate environmental shocks but also fostering economic diversification and, crucially, establishing robust and locally accepted mechanisms for managing inevitable resource conflicts. This indicates a potential gap between emergency relief/basic service provision and more holistic, sustainable development approaches.

The prevalence of drought mitigation programs as a key governmental strategy reflects the prioritization of immediate disaster response mechanisms in arid regions. This aligns with findings by Abebe (2020), who noted similar strategies implemented in the Somali region of Ethiopia. Despite the recognition of water resource development as an important strategy (29.6%), its effectiveness may be limited by logistical and infrastructural challenges, as highlighted in previous studies by Gebre (2018).

Table 4 Effectiveness of Non-Governmental Resilience Strategies

Resilience Strategy	**Frequency**	**Percentage (%)**
Emergency Relief Aid	85	39.9
Livelihood Diversification Support	60	28.2
Capacity-Building Programs	45	21.1
Infrastructure Rehabilitation	23	10.8
Total	**213**	**100**

***Source: own computation*, 2024**

Table 4 shows the perceived effectiveness of non-governmental organizations (NGOs) in implementing resilience strategies within Elidar Woreda's pastoral communities. The data, based on respondent feedback, reveals a clear preference for immediate, life-sustaining

interventions over longer-term development initiatives.

Emergency Relief Aid stands out as overwhelmingly the most effective NGO strategy, with 39.9% of respondents highlighting its impact. This high percentage isn't surprising. In contexts like Afar, where communities face recurrent and severe shocks (like drought and floods), timely provision of food, water, and emergency shelter directly addresses immediate survival needs. For communities on the brink, relief aid can literally be a lifesaver, allowing them to endure a crisis rather than face complete collapse. Its immediate and tangible benefits are highly visible and directly felt by the beneficiaries, explaining its strong perception of effectiveness.

Livelihood Diversification Support comes in second at 28.2%. This category likely includes initiatives such as promoting small-scale irrigation, supporting alternative income-generating activities (e.g., small businesses, poultry farming), or providing training for new skills. While less immediate than emergency aid, its significant ranking suggests that communities also value efforts to reduce their overwhelming reliance on livestock. This indicates a recognition that diversifying income streams can build more sustainable resilience against future shocks, even if the benefits materialize over a longer period.

Capacity-Building Programs were perceived as effective by 21.1% of respondents. These programs typically focus on enhancing community knowledge and skills, perhaps in areas like modern livestock management, rangeland rehabilitation, early warning system interpretation, or disaster preparedness. While crucial for empowering communities with the tools to manage their own risks, their lower ranking compared to direct aid or livelihood support suggests that the impact of capacity-building might be less immediately apparent or harder to quantify from the beneficiaries' perspective. It could also point to challenges in the design or delivery of these programs, ensuring they are truly relevant and accessible to pastoralists with unique educational backgrounds and mobile lifestyles.

Lastly, Infrastructure Rehabilitation received the lowest perceived effectiveness at 10.8%. This category would encompass efforts to rebuild or repair crucial community assets like water points, communal shelters, or local access roads after a disaster. While essential for recovery and future resilience, its low ranking could imply several factors: perhaps such projects are fewer in number, take longer to complete, their benefits are less directly felt at

the household level compared to emergency aid, or the scale of destruction often outweighs the rehabilitation efforts. It might also suggest that communities prioritize interventions that directly support their mobile livelihoods over fixed infrastructure in certain circumstances.

Overall Implications: The data strongly suggests that NGOs are most effectively perceived when they address the immediate and pressing needs of pastoral communities through emergency relief. While important, the relatively lower perceived effectiveness of longer-term development interventions like capacity building and infrastructure rehabilitation highlights a potential gap. This could mean that these initiatives are either insufficient in scale, face challenges in implementation within the pastoral context, or simply take longer to yield noticeable benefits compared to emergency aid. It suggests that while NGOs excel at crisis response, there's a continued need to strengthen their long-term, sustainable resilience-building efforts, ensuring these are integrated effectively with the unique characteristics and priorities of Elidar Woreda's pastoral communities.

Emergency relief aid dominated non-governmental strategies (39.9%), consistent with research by Yohannes (2021), which highlighted the reliance on external aid during crises.

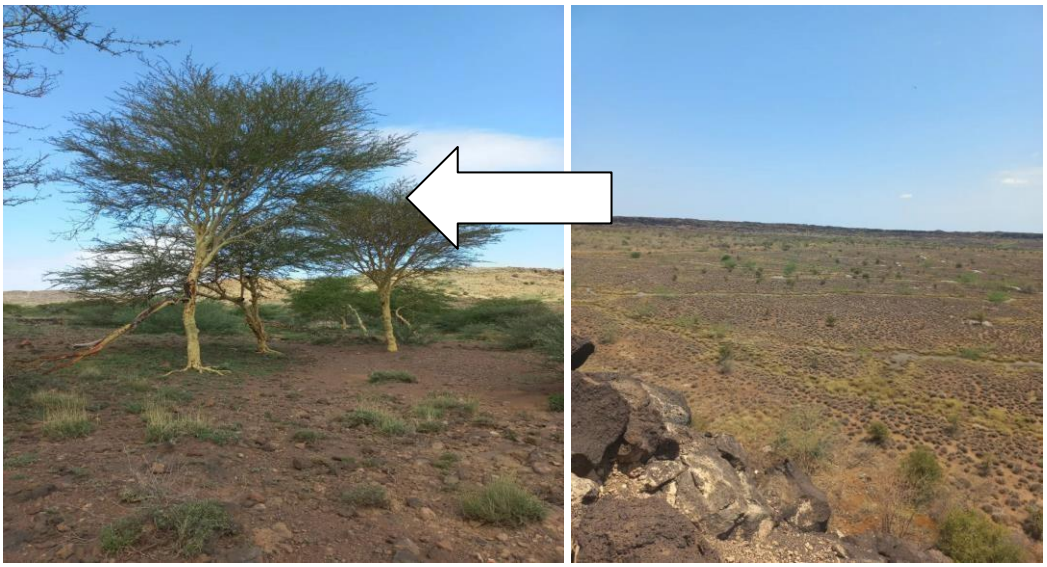

Figure 5: Perceived sample Effectiveness of Resilience Strategies

Source: Field survey, 2024, Photo taken from Woreda DRM gallery

4.6. The Role of Indigenous Knowledge and Local Practices in Reducing Disaster Risks and Build Resilience in Pastoral Communities

Table 5 : Indigenous Knowledge Practices in Disaster Risk Reduction

Practice	Frequency	Percentage (%)
Seasonal Migration	82	38.5
Water Harvesting and Conservation	58	27.2
Livestock Diversification	45	21.1
Indigenous Conflict Resolution	28	13.2
Total	213	100

Source: Field survey, 2024

KII result

University Researcher

"Pastoral communities in Elidar have long relied on indigenous knowledge systems to manage environmental shocks. Seasonal migration, for example, is not random—it follows ancestral routes based on weather patterns and pasture availability. This mobility helps reduce pressure on degraded lands and ensures access to water during dry periods. Locals also practice traditional water conservation methods like digging berkads (water reservoirs) and using sand dams to store rainwater, which sustains both people and livestock. Livestock diversification—raising camels, goats, and cattle with different climate tolerances—is another smart adaptation strategy. And when it comes to conflict, elders play a central role in resolving disputes over grazing rights and water access through customary mediation systems like the 'shimgla' peace process. These practices are deeply rooted and can complement formal disaster risk reduction strategies if properly recognized and integrated."

NGO Official (Resilience or Peacebuilding Program Officer)

"We've seen that community-led solutions are often more sustainable than externally imposed ones. For example, seasonal migration allows herders to avoid total livestock loss during droughts, but this practice is increasingly constrained by land encroachment and insecurity. We support these movements by mapping traditional routes and advocating for their protection. We

also work with communities to reinforce indigenous water harvesting techniques while adding modern elements like solar-powered pumps. On the livestock front, we promote camel and goat rearing as they're more resilient to drought. When it comes to conflict, we partner with traditional leaders to strengthen indigenous mediation mechanisms, especially in areas where formal legal systems are weak or inaccessible. Recognizing and reinforcing these local systems builds trust and improves disaster preparedness."

🏛 Government Officer (e.g., Local Disaster Risk Management Office)

"Our office recognizes the importance of indigenous practices in enhancing resilience. Seasonal migration remains a key coping mechanism, and we are working with local leaders to ensure safe passage for herders across administrative boundaries. Traditional water harvesting structures like berkads are being rehabilitated under our drought mitigation programs. Encouraging livestock diversification aligns with national policies on climate adaptation, and we're promoting it through extension services and breed improvement initiatives. Indigenous conflict resolution is part of our community-based early warning and response systems—we train local elders and youth groups to mediate disputes before they escalate into violence. Integrating local knowledge into formal planning has improved community ownership of resilience-building efforts."

Table 5 highlights the prominent role of indigenous knowledge (IK) and local practices in enabling pastoral communities in Elidar Woreda to reduce disaster risks and build resilience. The data underscores that traditional methods remain critical for survival and adaptation in the face of recurrent shocks.

Seasonal Migration emerges as the most frequently cited indigenous practice for disaster risk reduction, with **38.5%** of respondents acknowledging its importance. This is highly logical within a pastoral context. Seasonal migration (or transhumance) is a fundamental adaptive strategy that allows pastoralists to move their livestock in search of pasture and water, strategically avoiding degraded areas during droughts and accessing productive zones post-rainfall. It's a proactive measure that minimizes exposure to localized resource scarcity and maximizes resource utilization, thereby reducing vulnerability to climate-induced food and water shortages. Its high frequency underscores its continued centrality to Afar pastoral livelihoods.

Water Harvesting and Conservation is the second most recognized practice, cited by **27.2%** of respondents. In an arid region like Afar, access to water is paramount. This practice likely encompasses a range of traditional techniques, such as constructing *birkas* (traditional water reservoirs), digging shallow wells, and managing natural depressions to capture and store rainwater from sporadic downpours. The emphasis on water conservation reflects the deep understanding among pastoralists of the preciousness of water and the necessity of managing it efficiently, directly contributing to both human and livestock survival during prolonged dry spells.

Livestock Diversification accounts for **21.1%** of the responses. This practice involves raising a mix of livestock species (e.g., camels, cattle, goats, sheep), each with different ecological requirements and drought tolerances. For example, camels are more drought-resistant than cattle, while goats are browsers and can utilize a wider range of vegetation. By diversifying their herds, pastoralists mitigate risk: if one species is heavily impacted by a specific disaster (e.g., cattle by severe drought), others may survive, providing a crucial buffer and maintaining some level of livelihood security. This strategy reflects a sophisticated understanding of ecological niches and risk management.

Finally, **Indigenous Conflict Resolution** mechanisms were recognized by **13.2%** of respondents. While having a lower frequency than other practices, its inclusion is vital. In pastoral areas, competition over scarce resources (pasture, water) often escalates into conflicts, especially during disasters. Indigenous conflict resolution mechanisms, typically led by elders and traditional leaders, play a crucial role in mediating disputes, enforcing customary laws, and restoring peace. Their effectiveness in preventing or mitigating violence directly reduces human-induced disaster risks and creates an environment conducive to recovery and resilience-building. The relatively lower percentage might suggest that while these mechanisms are important, perhaps their effectiveness is more challenged in the face of escalating modern pressures, or they are seen as a response to the *consequence* of resource scarcity rather than a direct *risk reduction* practice for the environmental hazard itself.

Overall Implication: The data powerfully demonstrates that traditional knowledge and practices are not remnants of the past but continue to be **active, vital, and highly valued strategies** for disaster risk reduction in Elidar Woreda. These practices represent centuries of accumulated

wisdom adapted to the harsh Afar environment. Any external interventions aiming to build resilience must carefully consider, respect, and integrate these indigenous practices rather than supplanting them. They form the bedrock of community resilience, highlighting the importance of a bottom-up, context-specific approach to disaster management.

Table 6: Perceived Effectiveness of Indigenous Practices

Effectiveness Level	**Frequency**	**Percentage (%)**
Highly Effective	95	44.6
Moderately Effective	78	36.6
Ineffective	40	18.8
Total	213	100

Source: Field survey, 2024

Table 6 provides crucial insight into how pastoral communities in Elidar Woreda perceive the overall effectiveness of their own indigenous knowledge practices in the context of disaster risk reduction and resilience. The data strongly suggests a high level of confidence in traditional methods. A significant majority of respondents view indigenous practices as effective. Specifically, 44.6% rated these practices as "Highly Effective," and another 36.6% considered them "Moderately Effective." Combined, this means **81.2%** of the pastoral community members believe their traditional ways of managing risks are beneficial. This overwhelmingly positive perception underscores the deep trust and reliance communities place on their accumulated ancestral knowledge and adaptive strategies.

The high perceived effectiveness of indigenous practices is logical within the Afar context for several reasons: Contextual Relevance: These practices (as detailed in Table 5) are developed over generations, specifically tailored to the unique environmental conditions, resource availability, and socio-cultural norms of the Afar lowlands. They are practical, readily accessible, and require minimal external resources. Direct Lived Experience: Communities have experienced the direct benefits of these practices over time. When a family successfully navigates a drought by moving their herds to traditional grazing reserves, the effectiveness of these indigenous strategies becomes evident and reinforces their value. Empowerment and Ownership: Unlike external interventions, indigenous practices are owned and controlled by the community. This intrinsic ownership fosters a sense of empowerment and responsibility,

contributing to their successful application and perceived efficacy. Holistic Approach: Indigenous knowledge often integrates various aspects of life – environmental understanding, social cohesion, and economic survival – into a holistic resilience framework, which may be more effective than fragmented external interventions.

Conversely, **18.8%** of respondents perceived indigenous practices as **"**Ineffective." While a minority, this segment is important to consider. Their perception could stem from: Exacerbated Environmental Stress: The increasing frequency and intensity of climate shocks (e.g., more severe and prolonged droughts than in the past) might be pushing the limits of traditional coping capacities, rendering some practices less effective than before. External Pressures: Factors like land encroachment, increased population density, and restricted traditional mobility routes (due to conflict or administrative boundaries) can undermine the feasibility and effectiveness of practices like seasonal migration. Changing Livelihood Dynamics: Some younger generations or those with more exposure to external influences might perceive traditional methods as insufficient in the face of modern challenges, or they might prefer more technologically advanced solutions. Specific Practice Limitations: While overall effectiveness is high, certain practices might be more successful than others, or their success might depend on specific environmental conditions.

Overall Implication: Table 6 strongly reinforces the notion that indigenous knowledge is a cornerstone of resilience for pastoral communities in Elidar Woreda. The high perceived effectiveness of these practices suggests that any externally driven disaster risk reduction and resilience-building initiatives should prioritize understanding, valuing, and integrating local knowledge. Ignoring or undermining these traditional methods would be a significant oversight, as they are clearly trusted and widely employed by the communities themselves. This highlights the need for collaborative, bottom-up approaches that build upon existing strengths while selectively introducing complementary modern techniques to address emerging challenges.

This aligns with research by Alemu (2020), which highlights the effectiveness of mobility in managing ecological variability in pastoral regions. Similarly, water harvesting techniques reflect community ingenuity in addressing water scarcity, consistent with findings from similar arid zones in Ethiopia (Abebe, 2019). Studies by Yohannes (2021) emphasize that integrating indigenous knowledge with scientific approaches could enhance their effectiveness and

sustainability. These findings echo research by Gebre (2018), who noted that modern development initiatives often overlook or undermine local systems, reducing community resilience.

Figure 6: Key Challenges in Utilizing Indigenous Knowledge

Source: Field survey, 2024, Photo during interview and the challenges Influences their indigenous practice

CHAPTER FIVE
CONCLUSION AND RECOMMENDATION

5.1. Conclusion

This study explored the impacts of disasters, key vulnerabilities, resilience strategies, and the role of indigenous knowledge systems among pastoral communities in Elidar Woreda, located in the arid lowlands of the Afar Region. Accordingly, the communities in Eliidar woreda are highly impacted by natural and anthropogenic disasters, resulted economic devastation and livelihood collapse, food and nutrition insecurity, displacement and social disruption, and environmental degradation and resource conflict. these challenges are exacerbated by livelihood over-reliance on livestock, limited access to basic infrastructure support/ services, and resource-based conflicts and insecurity, making it difficult for communities to cope with and recover from disasters effectively. Governmental and NGO-led resilience strategies play a crucial role in mitigating disaster impacts, but they remain insufficient to fully address the needs of pastoral communities. Coordination gaps, lack of localized approaches, and challenges in implementation reduce the overall effectiveness of these interventions. Strengthening collaboration between stakeholders and tailoring resilience strategies to the unique socio-cultural and environmental conditions of the region are necessary for improved outcomes. Indigenous knowledge continues to be a valuable asset in disaster risk reduction, with traditional practices such as seasonal migration, water harvesting, and livestock diversification proving effective in enhancing resilience. Bridging the gap between indigenous knowledge and modern disaster management approaches is essential to creating sustainable and contextually relevant resilience strategies for pastoral communities in Elidar Woreda. In conclusion, pastoral communities in Elidar Woreda demonstrate remarkable resilience in the face of recurring environmental shocks. Their deep-rooted indigenous knowledge systems, combined with external support, offer promising pathways for reducing disaster risks and enhancing adaptive capacities. However, without sustained investment in infrastructure, alternative livelihoods, and inclusive governance, these communities will continue to face cycles of vulnerability and crisis. Future policies and programs must prioritize local voices, local solutions, and collaborative partnerships to ensure meaningful and lasting change.

5.2. Recommendation

The findings suggest that disaster risk reduction and resilience-building efforts in Elidar must adopt a multi-dimensional, context-specific approach that combines:

- Strengthened governmental early warning systems and infrastructure development,
- Expanded NGO-led emergency aid and capacity-building programs,
- Integration of indigenous knowledge with modern scientific approaches to enhance cultural relevance and community ownership.

To build sustainable resilience, the following recommendations are proposed:

1. Promote Livelihood Diversification: Encourage alternative income sources such as small-scale irrigation, beekeeping, and vocational training to reduce dependence on livestock.
2. Strengthen Local Governance and Conflict Mediation Systems: Support and formalize indigenous conflict resolution mechanisms while improving cross-border coordination.
3. Invest in Sustainable Water Infrastructure: Ensure maintenance and equitable access to boreholes, berkads, and other water points.
4. Enhance Emergency Response Coordination: Improve collaboration between government agencies, NGOs, and local communities to ensure timely and targeted interventions.
5. Recognize and Integrate Indigenous Knowledge: Incorporate traditional practices into national DRR frameworks to improve adaptation and foster community-led solutions.

Suggestions for Future Research

- ✓ Investigate the gender dimensions of disaster impacts and resilience strategies
- ✓ Conduct in-depth studies on the transmission and evolution of indigenous practices in response to changing environmental and socio-economic conditions.
- ✓ Assess the effectiveness of specific governmental and NGO interventions over time to identify best practices and areas for improvement.
- ✓ Explore the role of technology, such as early warning systems and mobile platforms, in enhancing disaster preparedness and response in pastoral regions.

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Appendix

Survey questioner

Dear respondents, I am Ali Oumer, MSc. student in DRM and Pastoral Development. This survey aims to gather community perspectives on: The impact of disasters on their lives and livelihoods, The key vulnerabilities that make them susceptible to shocks, The effectiveness of existing resilience strategies and The role and perceived effectiveness of indigenous knowledge in disaster risk reduction. The findings will contribute to a better understanding of how local experiences, traditional practices, and formal interventions intersect—and how future policies and programs can be more inclusive, sustainable, and effective in building resilience among pastoral communities in Elidar Woreda. Your participation is voluntary, confidential, and valuable. It will help inform efforts to support pastoralists in adapting to environmental changes and improving their overall well-being.

Thank you for your time and insights.

For enquiry contact me by 0905961825

Section A: Socio-Demographic Information

1. Sex:
    - ✓ Male
    - ✓ Female
2. Age group:
    - ✓ 20-30
    - ✓ 31-40
    - ✓ 41-50
    - ✓ Over 51 Years
3. Experience
    - ✓ Below 5 Years
    - ✓ 6-10 Years

- ✓ 11-16 Years
- ✓ Above 16 Years

4. Education level :

   - ✓ No formal education
   - ✓ Primary school
   - ✓ Secondary school
   - ✓ Vocational
   - ✓ Tertiary education

Section B: Impact of Disasters on Pastoral Communities

Please indicate the impact of recent disasters (droughts, floods, etc.) on your community.

5. How have disasters affected your household's livelihood? (Multiple Choice)
   - ✓ Severe livestock loss
   - ✓ Reduced milk/meat production
   - ✓ Asset depletion (selling animals for food)
   - ✓ Market disruptions
   - ✓ Complete livelihood collapse
6. Has your household experienced food insecurity due to disasters?
   - ✓ Yes, severe
   - ✓ Yes, moderate
   - ✓ No
7. Have you or any family members been displaced due to environmental shocks?
   - ✓ Yes, temporarily
   - ✓ Yes, permanently
   - ✓ No
8. What were the effects of displacement on your social life? (Multiple Choice)
   - ✓ Family separation
   - ✓ Loss of traditional support systems
   - ✓ Increased conflict with host communities
   - ✓ Breakdown of cultural norms

- ✓ No significant effect

9. Have you observed increased land degradation or resource competition after disasters?
   - ✓ Yes, significantly
   - ✓ Yes, moderately
   - ✓ No

Section C: Key Vulnerabilities in Pastoral Communities

10. To what extent is your community vulnerable to resource-based conflicts?
    - ✓ Very high
    - ✓ High
    - ✓ Moderate
    - ✓ Low
11. How dependent is your household on livestock as a source of income and nutrition?
    - ✓ Fully dependent
    - ✓ Mostly dependent
    - ✓ Somewhat dependent
    - ✓ Not at all dependent
12. Do you face challenges accessing basic services (healthcare, education, clean water)? (Yes/No)
    - ✓ Healthcare
    - ✓ Education
    - ✓ Clean Water
    - ✓ Roads and transport
    - ✓ Markets
13. What is the biggest challenge you face in accessing these services?

Section D: Effectiveness of Resilience Strategies

Governmental Strategies:

14. How effective are the following government interventions in your area?

- ✓ drought early warning systems
- ✓ Boreholes and water development projects
- ✓ Livelihood diversification programs
- ✓ Conflict resolution mechanisms

15. How effective are the following NGO interventions in your area?

- ✓ Emergency relief aid (food, water, shelter)
- ✓ Income diversification support
- ✓ Capacity-building programs (training, awareness)
- ✓ Infrastructure rehabilitation (water points, roads)

Section E: Role of Indigenous Knowledge and Practices

18. Which of the following traditional practices does your community use to cope with disasters? *(Multiple Choice)*
    - ✓ Seasonal migration
    - ✓ Water harvesting and conservation
    - ✓ Livestock diversification
    - ✓ Indigenous conflict resolution
    - ✓ Other: _____
19. How effective do you find these indigenous practices in reducing disaster risks?
    - ✓ Highly effective
    - ✓ Moderately effective
    - ✓ Ineffective
20. Have external interventions (government or NGO) helped strengthen or replace your traditional coping strategies?
    - ✓ Strengthened them
    - ✓ Replaced them
    - ✓ No change
21. What challenges do you face in practicing your traditional methods? *(Open-ended)*

Section F: Suggestions and Recommendations

22. What kind of support would help your community better prepare for future disasters?
23. Would you be interested in participating in local disaster preparedness or resilience-building programs?

- Yes
- No
- Maybe

24. Any additional comments or suggestions?

Key informant questions

Background Information

What is your current role/position?

How long have you been working in this field or region

Objective 1: Assess the Impact of Disasters on Pastoral Communities

1. In your experience, what are the most common types of disasters affecting pastoral communities in Elidar Woreda, and how do they affect livelihoods?
2. How have repeated disasters impacted the environment, resource availability, and long-term well-being of these communities**?**

Objective 2: Identify Key Vulnerabilities in Pastoral Communities

3. What do you consider the biggest vulnerability facing pastoral communities in Elidar, and how does over-reliance on livestock contribute to this?
4. How frequent are resource-based conflicts in the area, and what challenges exist in accessing basic services like water, health care, and education**?**

Objective 3: Evaluate the Effectiveness of Governmental and NGO Resilience Strategies

5. What government programs or NGO interventions have been implemented in Elidar to build resilience, and which ones have had the greatest impact?

6. What are the major limitations or gaps in current resilience strategies, and how can coordination between government, NGOs, and communities be improved?

◈ Objective 4: Explore the Role of Indigenous Knowledge and Local Practices in Disaster Risk Reduction

7. In your opinion, how important is indigenous knowledge in helping communities cope with disasters, and what are some key traditional practices used for environmental risk management?
8. Do you believe these indigenous practices remain effective today, and have you seen cases where modern interventions supported or undermined them?

◈ Objective 5: Provide Policy and Program Recommendations

9. What are the biggest challenges to integrating indigenous knowledge into formal disaster risk reduction frameworks in Elidar?
10. What changes or support would make current resilience-building efforts more effective for pastoral communities, and what recommendations would you give to policymakers or development actors?