

**Assessing the Effect of Drought on Agro-pastoralists Livelihood: A case study
in Afgooye district, Somalia.**



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in Afgooye district, Somalia.**

**A thesis project submitted to Van Hall Larenstein University of Applied Sciences for the
degree of Master of Science (MS) in Management of Development (Food and Nutrition
Security)**

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DEDICATION

I dedicated this study to my mother, Khadija Ahmed Geddi, my father, Abdillahi Hassan, and all the people of Somalia.

I am also dedicated to my brothers and sisters; they are unique and have never left my side, especially my brother Mohamed, for his help.

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CHAPTER ONE

1.0 Introduction

The inception of this project is drafted as partial fulfillment of the requirements for the master's degree in management of development, specialization in food and nutrition security of Van Hall Larenstein University of Applied Sciences. The commissioner of this research is the Somali farmers association (SFA), a local non-governmental organization. The thesis is designed into six chapters, the first chapter, consists of the background of the study, a clear objective of the thesis, and identified the research problem and research questions. The second chapter, covered literature review described the topic to be studied, its relevance, and the different authors' perspectives.

The third chapter cover research methodology outlined how the research undertook and how the information gathered and analyzed. Limitations of the study and ethical considerations in research explained. Chapter four covers the results while chapter five explained discussion. Finally, chapter six covers the conclusion and recommendation of the study. At the end of the thesis, including sections of the references and thesis project timeline.

1.1 Background

Somalia's climate is naturally arid and semi-arid, with two major rainy seasons. However, irregular rainfall and severe droughts that are becoming more intense and frequent increase the country's water scarcity, disrupting livelihoods and causing drought-related migration and population displacements. Recurrent and severe droughts, as well as conflict, have contributed to Somalia's long-running food crises. The bulk of an estimated million people in Somalia has been partially displaced by conflict (IPC, 2022). Due to the limited natural resources, pasture and water, there is boosted risk of inter-communal strife. Individuals have been internally displaced in search of pasture, water, food, and a means of subsistence (IFRC, 2022). Conflicts among pastoral communities result from competition for the scarcity of pasture and water supplies brought on by drought (IPC, 2022).

Particularly in central and southern Somalia, ongoing insecurity worsens the country's food security position. Since late 2021, there have been dramatic increases in population displacement brought on by the continued drought and internal conflict, with the current estimate of an internally displaced person (IDPs) standing at 2.9 million (OCHA, 2022). Increased political tensions, conflict is all present, and more population displacement will result from this, which will also

affect how markets operate, how people may access possibilities for employment and humanitarian aid, and whether or not it will exclude vulnerable populations, particularly in central and southern Somalia (IPC, 2022).

The climate situation is particularly problematic given that agriculture is the dominant sector of the Somali economy, and its performance is the most crucial determinant of the overall GDP growth rate. Furthermore, given that roughly 70% of the country's population lives in rural areas and relies heavily on agriculture for their livelihood (MoAI, 2017), this sector also plays an essential role in the nation's food security.

It is not surprising that after a period of slow recovery from the 2011 famine and chronic food shortages, Somalia's food security is again in jeopardy. This represents a significant setback for Somalia, especially when set against years of conflict, pests and diseases, and a series of climate shocks. Following several seasons of inadequate rainfall and rivers have dried up, resulting in near or total crop failures, significant water and pasture shortages, and livestock deaths, the humanitarian situation has become dire (IPC, 2022).

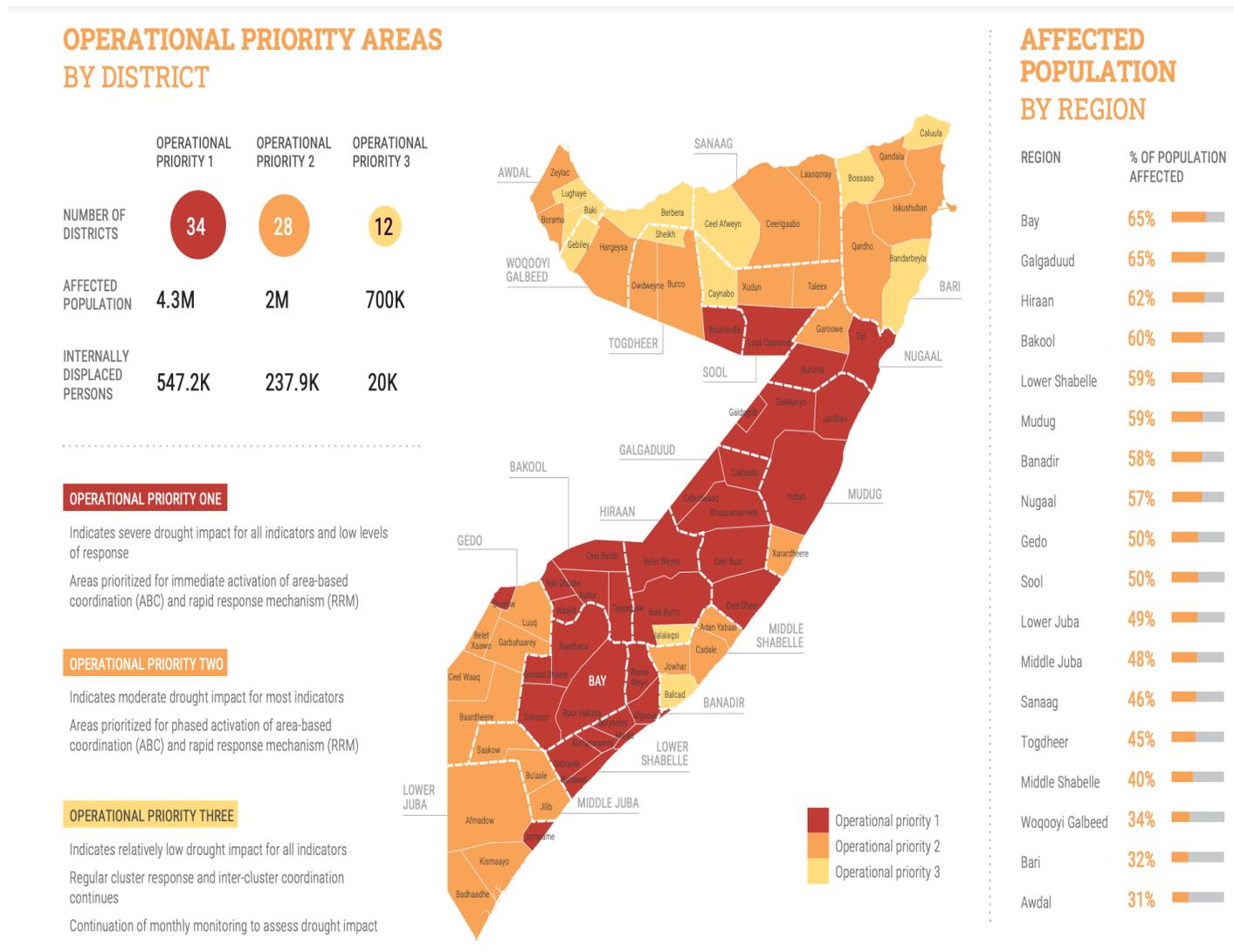
As the drought worsens across Somalia, the number of IDPs also rises. In that case, food prices skyrocketed (also as a result of a shortage of grain due to the war in Ukraine), and humanitarian aid was not ramped up to reach the country's most vulnerable people, farmers, and agro-pastoralists, who suffered from severe food shortages (IPC, 2022).

The general agro-pastoralist situation in Somalia is deteriorating and has been severely affected by the current drought. Drought-affected areas include Hawd Pastoral, Hiraan, Pastoral livelihoods in southern regions, and IDP settlements in Baidoa, Mogadishu, Dhusamareb, and Galmudug state (IPC, 2022).

Many rural households of agro-pastoralists face growing food insecurity, malnutrition, and the degradation of their livelihoods, limiting their ability to cope and contributing to a surge in population migration from rural areas to IDP camps and cities (IPC, 2022). As food reserves diminish, food costs rise, livelihood assets are lost, income sources decrease, and household food consumption discrepancies expand (WFP, 2022b). Acute food insecurity has gotten a lot worse since the beginning of 2022. Recent figures suggest that the drought affects around 7 million people, including agro-pastoralists, and many parts of the country, the total number of districts that drought affected is estimated 74 districts especially in the Afgooye district the focus of the study. More than 800,000 Somalis have fled their homes to this area close to Mogadishu, searching for

food, water, shelter, and medical assistance. They live in unhygienic temporary camps with 2.9 million people already displaced by conflict and catastrophic weather due to a lack of access to food. Between May and June, the Somalia drought disaster became much further, raising the priority of a few districts. Afgooye is among the worst affected district by the drought in lower Shabelle region and all evidence points to a severe impact from the lack and inadequate levels of reaction. In addition, the drought-stricken region's population is estimated at 59% (OCHA, 2022).

Figure 1: Drought impact snapshot (OCHA, 2022)



1.2 Problem Statement

At the start of this year, drought has been worsening and heightening the risk of famine in southern regions of Somalia. The impacts are increasing in magnitude and complexity, affecting adversely agro-pastoralist livelihood. According to IPC (2022), the numerous agro-pastoralists struggle with rising food insecurity, and the destruction of their livelihoods, which limits their capacity to adapt. The loss of livelihoods for many agro-pastoralists limits their ability to adapt (IPC, 2022). The agro-pastoralists are putting pressure on the local agro-pastoralist competing with the water and other natural resources.

Although limited studies are carried out to assess the effect of drought but how drought affected Agro-pastoralists in Afgooye is undefined. The commissioner of SFA needs to know the effect of drought on agro-pastoralist`s livelihoods in Afgooye. Such knowledge is vital to maximizing the impact of agro-pastoralist interventions to improve their livelihoods. In addition, the Office of the Presidential Envoy for Drought response is also interested in this research.

1.3 Research Objective

This study aims to assess the threats that drought that has been posing to agro-pastoralists livelihoods in the community of Afgooye district in Somalia to recommend ways to improve their livelihoods through appropriate interventions. The study's findings might guide the NGOs and government to develop interventions to promote agro-pastoralists livelihoods.

1.4 Main Research Question:

1. What is the effect of drought on agro-pastoralists livelihoods in Afgooye district, Somalia?

Sub research questions

1. What are the local vulnerability context faced by agro-pastoralists in Afgooye?

The objective of this question is intended to identify other vulnerabilities faced by agro-pastoralists in Afgooye except for drought.

2. What is the effect of drought on agro-pastoralists livelihoods assets?

The objective of this question is intended to clarify the effect of drought on livelihoods assets and identifying the assets that agro-pastoralist own.

3. What is the current agro-pastoralists food security after drought-impacted livelihood assets?

The objective of this question is to identify the situation of agro-pastoralists to measure food security after the effect of drought on livelihood assets.

4. What are the livelihood strategies practiced by agro-pastoralists in achieving food security?

The objective of this question is intended to clarify livelihood strategies practiced by agro-pastoralists in achieving food security.

5. What is the action of the government to improve practices against drought?

The objective of this question is intended to know actions the government can be taken to respond to the effect of drought and policies for the drought.

CHAPTER TWO

Literature review

This chapter focuses on drought-related literature and, definitions of key terms. Also, it conceptualizes livelihood of agro-pastoralists. Further within the chapter is identified conceptual framework.

2.1 Definitions of key terms

Livelihood

“A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base” (DFID, 2000).

Agro-pastoralism

Agro-pastoralism is the practice of combining agricultural and animal production in groups that are settled, nomadic, or transhumant. Agro-pastoralists' livestock differs according to climate, geographic location, environment, natural resource availability, and culture (Sanz et al., 2017).

The mixed crop and livestock (MCL) farming system is an eco-friendly farming system that combines the agricultural and livestock sectors, using crop waste as a significant feed source and animal waste as a source of fertilizer for the farm's own farmlands. (Widarni, 2020).

The world's mixed-crop and livestock (MCL) farming experience has shown that this method generates about half of the world's food. MCL farming gives agro-pastoralists the chance to boost farm efficiency by using crop and animal waste as farming input materials (Widarni, 2020).

Smallholder farmers are the principal recipients of mixed crop and livestock production technology, which is meant to help them switch from conventional to conservation farming (Kumar, 2014). According to research, conventional farming reduces soil fertility by using intense tillage and heavily relying on chemical fertilizers and pesticides. Therefore, the introduction of mixed-crop and animal farming, which uses crops and livestock, prevents effects of the use of chemicals (Widadie, 2015). Many nations and regions have succeeded with MCL farming system (Baba et al., 2019).

Food security

There are other definitions but a widely accepted definition is “when all people, at all times, have physical and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO, 2002).

Food availability, accessibility, use, and stability are the four pillars of this definition of food security. Accessibility denotes individuals' access to adequate resources for obtaining suitable foods for a nutritious diet. Utilization signifies sufficient energy and nutrient intake combined with good biological absorption of the food consumed, and stability indicates having access at all times and not losing such access (FAO, 2006).

Food Insecurity

When people lack regular access to safe and nutritious food for average growth and development, active and healthy life, they are seen as being food insecure.

Furthermore, the FAO (Food and Agricultural Organization) divides food insecurity into three major categories: (i) Acute: Severe hunger and malnutrition to the point where lives are immediately threatened (e.g., famine). (ii) Occasional: Existence of food insecurity due to a specific temporary circumstance. (iii) Chronic: the requirement of food needs is consistently or permanently threatened (FAO, 2021).

Millions of people in the worlds are at risk due to global food crises, particularly in countries where poverty, malnutrition, and hunger-related deaths are on the rise. For the poor, the combination of increased food prices plus a lack of health care might be disastrous (Ahmad et al., 2021).

Food shortages and distribution problems are common in nations like Somalia, resulting in persistent and frequently widespread hunger among large populations (WFP, 2022a). Furthermore, because the food-insecure region is politically unstable, it may result in political instability. People may endure emotions of estrangement, tension, and anxiety, as well as decreased production, reduced work participation and school performance, and lower income. The preoccupation with obtaining food may also disrupt household dynamics, leading to wrath, pessimism, and irritability, among other vices (Ahmad et al., 2021).

2.2 Vulnerability context

The external environment in which people live is referred to as the vulnerability context. It includes shock, which refers to sudden and often unpredictable events in the external environment, trends, which refers to gradual changes in the external environment over time, and seasonality, which refers to seasonal changes in the external environment (Ellis, 2003).

People with precarious livelihoods who reside in hazardous places are particularly vulnerable to calamities. According to Badolo & Kinda, third-world countries' food security may be impacted by climatic change in a number of ways, including rural income creation, family salaries, food prices, monetary assets, and civil unrest (Badolo & Kinda, 2014).

Climate change can also have an impact on rural labor markets by reducing livelihoods and decreasing demand for goods in impacted areas and climatic unpredictability can affect food security through (Nhemachena, et al., 2010).

2.2.1 Drought

Drought is a common natural occurrence brought on by a lack of water supplies over a large geographic area and for an extended length of time (Mahmoud et al., 2021).

Drought is part of destructive natural disasters, and it happens in almost every region of the world as a natural aspect of the climate. In recent decades, significant progress has been made in expanding global food production. Nonetheless, feeding 9.8 billion people by 2050 will be a challenge, particularly in drought-prone and drier areas of the developing globe. Droughts, for example, generate food crises in Sub-Saharan Africa regularly, which can be aggravated by other variables (e.g., heat waves, floods, conflict). Food production shocks have been more common in regions and across food sectors during the previous five decades (Cottrel et al., 2019). Extreme weather is responsible for half of these shocks. And have disproportionately negative consequences for countries with inadequate coping capability, such as farmers' ability to diversify food production or governments' ability to import food or provide insurance. For example, a drought in Somalia in 2022 triggered a national emergency, resulting in food insecurity for 6 million people (IPC, 2022). The extent to which different types of droughts impact food security is directly proportional to their spatial and temporal footprint. Droughts, for example, are determined mainly by the timing and duration of their occurrence. Drought occurrences with a short length (a few weeks) put less strain on agriculture and water management than multi-year, long-term droughts (Cottrel et al., 2019). Increasing the availability and use of methodological

tools and datasets for monitoring and predicting food security are among the research and initiatives needed to ensure food security (Williges, 2017).

Droughts are often characterized by a lack of precipitation, exacerbated by increased evapotranspiration due to high temperatures, which can disseminate to the land and result in less soil moisture and streamflow. Drought-induced water stress inhibits crop root growth, delays maturation, and lowers agricultural yield. Physically, this reduces food availability, particularly in areas where livelihoods rely heavily on rain-fed agriculture and are vulnerable to droughts and caused a global loss of cereals (maize, rice, and wheat) production of 1820 million kg over the last four decades (Lesk et al., 2016).

Lottering et al. (2021) indicated that a country's environment, people, and economy are all significantly impacted by droughts. However, there is a lack of reliable and comprehensive information on the effects of drought, so research into these effects and how they can be predicted and mitigated. Improving drought preparedness and mitigation is a crucial prerequisite to lessen the vulnerability of small-scale farmers and rural communities to the impact of drought.

The majority of drought responses focused on crisis-driven, reactive measures to deal with the drought or improve recovery, which did nothing to improve resilience against future droughts (Holman et al., 2021). The vulnerability drought in agro-pastoralists experienced sudden cessation in rainfall, the delayed beginning of rains, and insufficient rainfall, all of which contributed to poor crop yields or complete crop failure. The main effects of the drought on local economies were forced youth migration, starvation, animal sales to pay for cereals, and food shortages. The most at risk for drought were women, children, the elderly, and poor households without livestock, also vulnerable to drought as they had no means to buy grain to meet household food deficit (Ayantunde et al., 2015).

2.3 Livelihood Assets

The Sustainable Livelihood Framework lists the various assets that can assist ensure a household's livelihood. Human capital, natural capital, social capital, financial capital, and physical capital are the five capitals covered by the SLF (Scoones, 2009).

Human asset refers to the skills, knowledge, labor ability, and good health that enable people to pursue various livelihood options and achieve their goals (DFID, 1999, pp. 7).

Social asset refers to the social resources that enable people to pursue their life goals, such as networking and connection, which boosts people's trust and capacity to collaborate (Kollmair et al., 2002).

The natural asset consists of natural resources such as water, land, forests, biodiversity, air quality, erosion prevention, and rate of change. They benefit people's lives and are crucial for poor people who rely on natural resource-based activities for all or part of their income (Kollmair et al., 2002).

The physical asset comprises producer commodities and the essential infrastructure required to support livelihoods, such as transportation, adequate water supply and sanitation, secure housing and buildings, clean and affordable energy, and information access (Kollmair et al., 2002).

A financial asset is the financial resources and availability of cash or equivalent that people employ to attain their livelihood goals are referred to as financial capital (Kollmair et al., 2002).

2.4 Livelihood strategies

Strategies for achieving livelihood results are known as livelihood strategies. All the actions and practices that help an individual or a family manage their daily lives are referred to as livelihood strategies. It also refers to what households do with their assets to accomplish their intended results (Serrat, 2017). When sources of revenue from off-farm work are insufficient to cover living expenses, off-farm solutions are employed.

The World Bank updated its plans for the continent of Africa's development.

Even equitable growth and productive work "may not be enough for the chronically poor, who experience food insecurity. "According to the World Bank. Therefore, the Bank focuses on increasing the poor's resistance to droughts and floods, food shortages, and macroeconomic crises by establishing long-term social safety nets for the chronically poor and food insecure, such as near-cash transfers or food vouchers, conditional and non-conditional cash transfers, and food distribution programs is one of the resilience-building techniques (World Bank, 2011).

2.5 The conceptual framework of the study

It is an analytical framework that assists in comprehending elements that hinder or improve people's quality of life and researching how these aspects interact (Krantz, 2001).

According to Serrat (2017), Sustainable Livelihood Framework (SLF) is composed of five components:

2.5.1 Vulnerability context: refers to welfare insecurity in the individuals and households brought on by outside factors. It involves shocks (eg. Drought, diseases, death, etc), seasonalities (e.g: price changes, employment possibilities) and trends (e.g: economic, environment, etc.).

2.5.2 Livelihood assets: including human capital (e.g: education, health, knowledge and skills), natural (e.g: land, water, forest, biodiversity), physical capital (e.g: farming equipments, transport facilities, house and other infrastructures), financial capital (e.g: savings, loans, etc), and social capital (e.g: network and connections),

2.5.3 Transforming structure and processes: include levels of the government and private sectors and laws, policies, norms, institutions that affect livelihood.

2.5.4 Livelihood strategies: strategies used to reach livelihood outcomes. Eg: diversification, off-farm activities, migration and remittances.

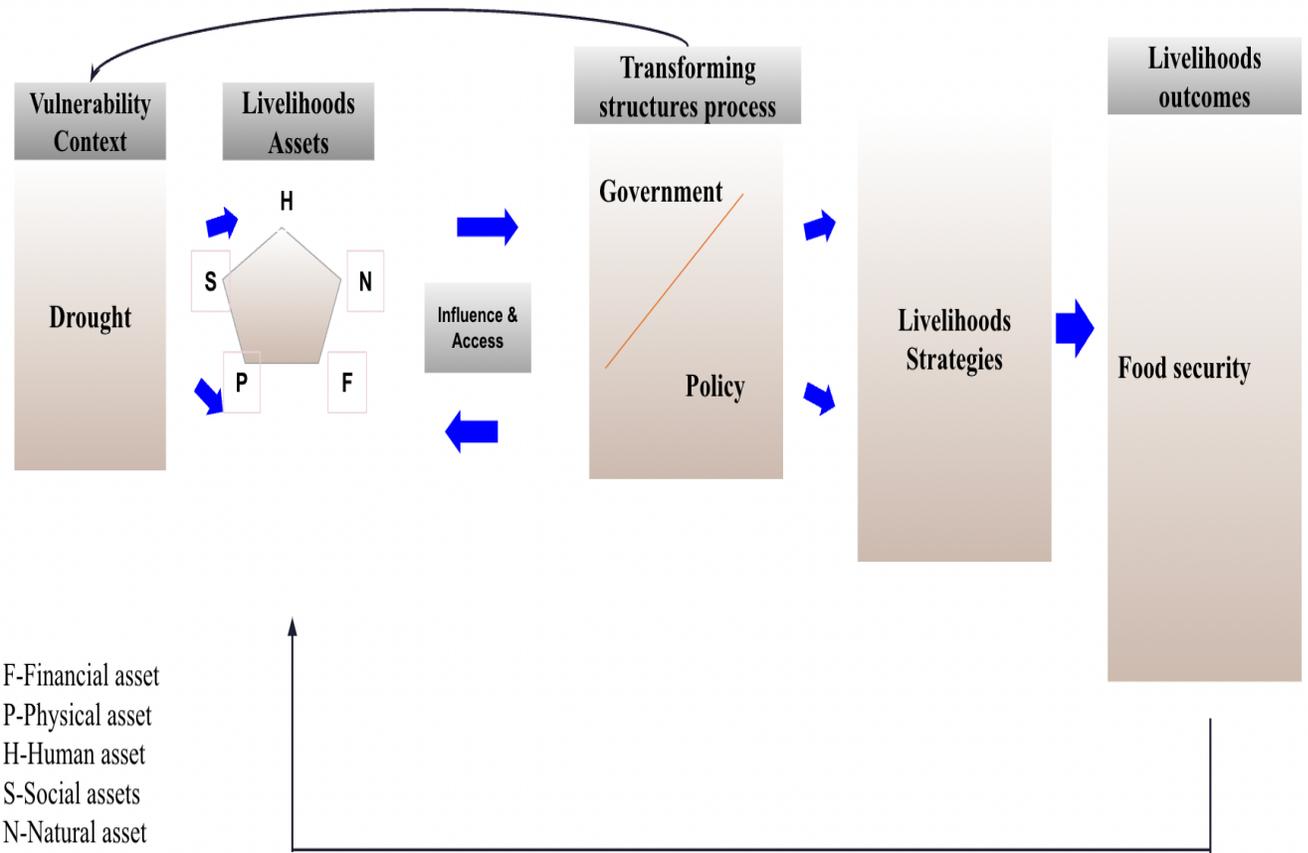
2.5.5 Livelihood outcomes: includes increased well-being, reduced vulnerability, improved food security, increased income and sustainable use of natural resource use.

Drought is a multifaceted issue affecting individuals, households, and communities, and various factors such as income, food prices. Government action programs can impact agro-pastoralists livelihood. In another way, food security results from household livelihood plans dependent on accessible assets such as natural, human, social, and physical resources.

In this research used the primary analysis a framework adopted on sustainable livelihood framework to understand the effect of drought on livelihood and the main reason for selecting this conceptual framework connects different variables used in relation to drought that affected agro-pastoralists. Furthermore, this framework used to understand how drought affects livelihood assets human capital, natural capital, social capital, financial capital, and physical capital that relates to the research sub-questions and action of the government to improve practices against drought.

The approach takes a holistic approach to livelihood analysis to identify those aspects in subject areas where a strategic intervention, either at the local or policy level, could be strategically significant for effective vulnerability reduction (Krantz, 2001).

Figure 2 Conceptual framework of the study



Source: (DFID 1992)

CHAPTER THREE

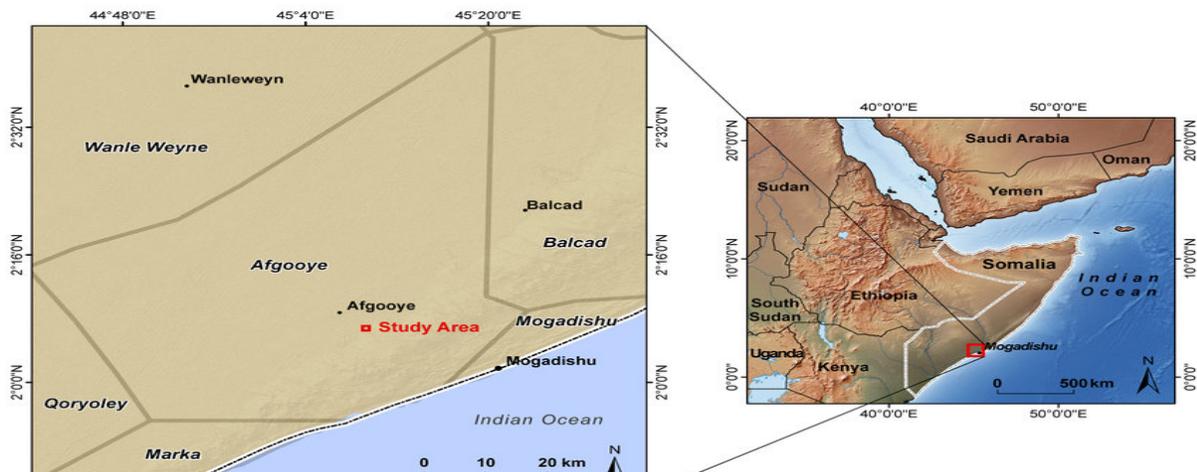
Research Methodology

This chapter outlined the research strategy used in the study. It demonstrated and justify the research design chosen, as well as provide information about the research techniques to be employed. The study area, population, and sample method discussed. It concluded by focusing on the data analysis process, research plan, expected risks and limitations during the research process, and ethical considerations.

3.1 Study area

The data collected from the Afgooye district in the Lower Shabelle region are the primary data source. Afgooye is a southwestern Somalia district 30 kilometers from the capital. It is a land suitable for cultivation; therefore, there are a lot of farmlands near the town—Afgooye is the home of agricultural production in Lower Shabelle and agro-pastoralists. The Shabelle River, the longest in Somalia, flows in this district. The population is estimated to be 79,400. The climate is typical, with four seasons, two wet seasons (winter and summer), and a moderate temperature (Abdi-Soojeede, 2018). In the south of Somalia, the seasonal rainy season usually begins in late March or early April, with April and May being the heaviest rainy months, but this year, the majority of Somalia's regions experienced sunny and dry weather in addition to that there was limited rainfall, The majority of central and southern Somalia are experiencing the most significant rainfall shortfalls during the current Gu season (FSNAU, 2022).

Figure 3 Map of Somalia showing the location of Afgooye



Source: Kristin Spröhnle

3.2 Research Approach

This research assessed the effect of drought on agro-pastoralists livelihoods in the Afgooye district. The research has adopted a case study approach applying the qualitative to better understand the current drought situation and obtain depth information while quantitative method used to assess the effect of drought on agro-pastoralists food security.

3.3 Research population

The research targeted the agro-pastoralists affected by the drought, while the areas were defined as places where drought was reported. The reason for selecting Afgooye is because the district has been severely affected the drought and is easily accessible to the researcher during the fieldwork. The target population of this study is the agro-pastoralists in Afgooye. A sample of 25 agro-pastoralist used for data collection. 25 Respondents comprising females and males will be purposive sampling selected from the study area of agro-pastoralists because purposeful sampling is a sampling strategy used by qualitative researchers to choose individuals who can offer in-depth and comprehensive information on the topic under study.

3.4 Data collection methods

Data obtained from primary and secondary sources. Secondary data was used from scientific journals, reports, and documents related to the effect of drought on agro-pastoralists livelihoods. The information provided from various sources assisted in developing a comprehensive understanding of the situation. The information provided a starting point for a more in-depth examination by gathering primary data.

Primary data was collected from agro-pastoralists during the fieldwork. A checklist of questionnaires prepared and tested people who fled the drought who live in the capital before going to the field.

The tools that used to obtain primary data are Semi-structured interviews, key informant interviews, and Household Food Insecurity Access Scale.

3.4.1 Semi-structured interviews are more precise when the researcher wants a specific question to answer. The reason for conducting the SSI was to allow the agro-pastoralist and interviewer to engage in a formal interview and give the agro-pastoralist the freedom to express themselves about the effect of drought on their livelihood.

Respondents also guided the questions in a standard way. Structured interviews carried out with the selected agro-pastoralists. A checklist with open-ended questions was used for the structured interviews.



Source: (Author, (2022))

3.4.2 Key informant interview

Key informant interviews used for data collection and purposively selected from the government officials to get information about the government actions to improve practices against drought and Agro-pastoralist leader who has first-hand knowledge about the community and veterinarian who knows the challenges of the Agro-pastoralist.

3.4.3 Household Food Insecurity Access Scale (HFIAS):

The Food and Nutrition Technical Assistance Project (FANTA) improved the HFIAS, was used to evaluate how the drought affected food security. The reason for selecting this measurement is to provide depth information about the current situation of food security to assess whether

households have experienced problems with food access and to discover changes in the food insecurity situation of agro-pastoralist. (Coates et al., 2007). Therefore, each agro-pastoralists is asked with a recall period of four weeks (30 days) and score is calculated based on answers to nine ‘frequency of occurrence’ questions and are broken into four categories based on HFIAS scores: food secure, severely food insecure, mildly food insecure, and moderately food insecure.

Table 1 Operationalisation of the research questions

Questions	Method	Source of Information	How respondents will be selected	Expected Information
1.What is the local vulnerability context faced by agro-pastoralists in Afgooye?	Semi-structured Interviews	agro-pastoralist	Purposive sampling	Other vulnerabilities that are affecting agro-pastoralists
2. What is the effect of drought on agro-pastoralists livelihoods assets?	Semi-structured Interviews	agro-pastoralist	Purposive sampling	Effect of drought on agro-pastoralists livelihoods assets
3. What is the current agro-pastoralists food security after drought-impacted livelihood assets?	HFIAS	agro-pastoralist	Purposive sampling	Situation of agro-pastoralists food security during drought
4. What are the livelihood strategies practiced by agro-pastoralists in achieving food security?	Semi-structured Interviews	agro-pastoralist	Purposive sampling	livelihood strategies practiced by agro-pastoralists
5. What is the action of the government to improve practices against drought?	key informant interview	Ministry of Humanitarian Affairs & Disaster Management	Purposive sampling	The national drought action plan

3.5 Data collection and analysis

Mid-July started the data collection in the Afgooye district. The process consisted of three steps: data collection from the place that affected the drought, data sorting to ensure rearrangement of the data collected from the field, and data analysis to produce a summary of the data collected from the area. For this research, the information gained from interviews, and questionnaires was analyzed by using Microsoft excel and SPSS to display field data in a presentable way. Primary data was recorded by using books for the responses from semi-structured interviews, and a phone recorder. Eventually, data transcription was conducted, after which the information was translated to English.

3.6 Research plan

The thesis project schedule was taken three months after obtaining administrative approval to collect data (See annex 2).

Table 2 risks and limitations

Risk	Effect	Probability	Management
Limited of transportation	Major	High	Rent a taxi
Rain during the data collection.	Major	High	Using waterproof bag to keep my books, money and mobile, waterproof boots, Umbrella, and raincoat.
Agro-pastoralists who are not interested in interviewing but important for data collection.	Minor	Moderate	Using incentives (food) for research participants.

3.7 Ethical considerations in research

3.7.1 Avoiding harm to respondents

As a researcher, my role is to get new data and ensure the physical, social, and phycological well-being and the privacy issues of the respondents. Not asking agro-pastoralist about their income, this question can endanger respondents, like security issues, and it is one of my principles to consider the right to confidentiality and anonymity.

3.7. 2 Communicating information and obtaining informed consent.

Sometimes the farmers are very tied up in getting information; in this situation, it is better to share some information to understand all the information they need to decide whether they want to participate. Like the time I require, the purpose of the study, how data will be recorded and stored, expected output of the research, but my society will never accept signing a form stating that they have participated in the study. Also, it can be challenging for some farmers to comprehend what research means.

3.8. 3 Wasting farmer's time

The farmers do not like to give information to someone they don't recognize. If you have questions, you have to pay them. This is what I needed to consider managing the respondent's time while searching for the information.

CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Socio-economic characteristics of the agro-pastoralists

The participants of the study mostly belonged agro-pastoralists who affected the current drought. 76% of the agro-pastoralists are between 21 and 50 years, meaning they are primarily young. While the rest are 24%, meaning they are older than 51. Based on the study's findings, 18 (72%) of the agro-pastoralists were men, while 7 (28%) were women. The results show that 84% of the agro-pastoralists are illiterate and 8% had a university level, while the primary and secondary education scored each 4% of the respondents. Most farmers have children; 92% have children between 0-10 years, while others have more than ten children, 8%. The majority of the agro-pastoralists were married (76%), followed by a single (4%) and widow (12%), while the remaining respondents were divorced (8%). A brief profile of the Socio-economic characteristics of the agro-pastoralists is provided in Table 3.

Table 3 Socio-economic characteristics of the agro-pastoralists (N=25)

Indicators		Occurrence	Percentage
Age (years)	21-50	19	76
	51-85	6	24
Gender	Male	18	72
	Female	7	28
Level of Education	University	2	8
	Secondary	1	4
	Primary	1	4
	illiterate	21	84
Household member	0-10	23	92
	11-25	2	8
Relationship status (Marital)	Divorced	2	8
	Widow	3	12
	Married	19	76
	Single	1	4
	Separated		

4.2 Local vulnerability context faced by agro-pastoralists

4.2.1 Population trends

The direction of change in the overall population of agro-pastoralists in the Afgooye district is increasing due to large agro-pastoralists fleeing the drought in the other regions. Most of the families of agro-pastoralists have many children; according to the study's findings, households number are an indicator of increasing population trends. The newly arrived agro-pastoralists in afgooye who fled the drought influenced the district's natural resources like water and grazing land.

“We have a big problem with the people who are not settled in this area and come from other regions who are looking for water and grazing land, this can cause a dispute between us ”. (Agro-pastoralists 8, 29 July, 2022).

4.2.2 Shocks

The shock was another local vulnerability context considered in this study; these shocks indicated by the agro-pastoralists:

4.2.2.1 Human health shocks

A health shock is a rapid decline in health brought on by a disease like Malaria, and this disease is the most significant health threat that agro-pastoralists suffer. People who get Malaria are typically very sick, which may cause them not to look for work or not take care of their livestock.

“Malaria is a considerable risk for my children and me. If you get malaria, you stay at home all those days. If I stay home, I worry that my livestock will die, and we all die. I have no one to replace me because my wife works on the farm”. (Agro-pastoralists 3, 29 July, 2022).

4.2.2.2 Conflicts

In Lower Shabelle, disputes over contentious land usage (grazing vs. crop production) and water access commonly occur between farmers, herders, and various pastoralist communities. Furthermore, the fighting between the government and the opposition has made it difficult for people to get the aid and service that the government and other agencies have intended for agro-pastoralists who are facing severe drought.

“We are trying to solve the problems of the agro-pastoralists, such as the wars between them and the things that cause problems like water. In addition to that, we are trying to dig wells, but what made it impossible is the roads that are not in good condition and the wars between the government and the opposition”. (DDM of mohadm, 12 August, 2022).

4.2.2.3 Crop loss

Pests and diseases are other calamities challenged by agro-pastoralists, leading to insufficient food. All of them agreed that the pests caused crop loss before and after harvest; among the pests they mentioned are desert locust, aphids, fall armyworm and stem borer. Likewise, fungi cause several postharvest diseases in fruits and vegetables during storage; one of the main challenges that cause disease is traditional storage.

“The problems of insects, weeds, and diseases are the biggest problems we have ever had. In recent years, locusts have destroyed our grazing land and crops. Infestation of crops in the field prior to harvest is the main problem” (agro-pastoralists leader, 2 August, 2022).

4.2.2.4 livestock health shock

Diseases significantly impact animal production; all of them mentioned that diseases are the main problem for animals after water scarcity and lack of grazing land.

“Diseases affecting farmers include mastitis, babesia, theileria, anaplasma, coccidia, and bacterial infections like blackleg, hemorrhagic septicemia, and botulism. In addition, animals frequently consume plastic bags, which reduces the production of animals and weakens their body of the animals” (veterinarian conversation, 2 August, 2022).



Source: (Author, (2022))

4.2.2.5 Drought

Drought was the most serious of the complaints that affected seriously agro-pastoralists and drought is associated with inadequate food, water, and forage for animals. All the people I interviewed agreed that water scarcity is the leading cause of the current drought. Agro-pastoralists get water from two sources, the river and the rain. If those two sources are missing, it is difficult for them to grow crops or find fodder for their livestock. The current drought has a significant impact on people's lives; The current drought has had a substantial effect on people's lives. People are forced to buy livestock at a low price and send them to the city to save their lives.

“The previous drought is worse than the current one. It has affected all our livelihood assets, but this one is drier than ever, with water being harder to find. Lack of water is a significant hindrance to what one can do when it comes to farming. I don't have food, shelter, or medicine, and the livestock is dying” (agro-pastoralists 17, 29 July, 2022).

4.2.3 Seasonality

The study also looked at seasonality as a vulnerability context facing agro-pastoralists. The elements under seasonality that were explored included price fluctuation.

4.2.3.1 seasonal shifts of prices

One significant seasonality factor acting as a vulnerability was price fluctuation. Most of the agro-pastoralists agreed that price fluctuation affected their food accessibility. They mentioned that they felt expensive after February, which they attributed to the war between Russia and Ukraine. They also noted that fodder, chemical fertilizers, and veterinary medicine have become more expensive.

“Everything has increased and become more expensive; the price constantly fluctuates; when I have little money, I have to buy food for my family, not fodder for my cattle, so I decided to save my family” (agro-pastoralists 21, 29 July, 2022).

4.3 Livelihood Assets Owned by agro-pastoralists.

This section focuses on findings based on livelihood assets owned by agro-pastoralists and how drought affected their livelihood asset. The livelihood assets are natural, physical, financial, social, or human capital.

4.3.1 Livelihood Assets own by agro-pastoralists before the drought.

Farmland was regarded by households as the most significant natural capital in the study area. Agro-pastoralists also considered the availability of water, grazing land, and firewood to be

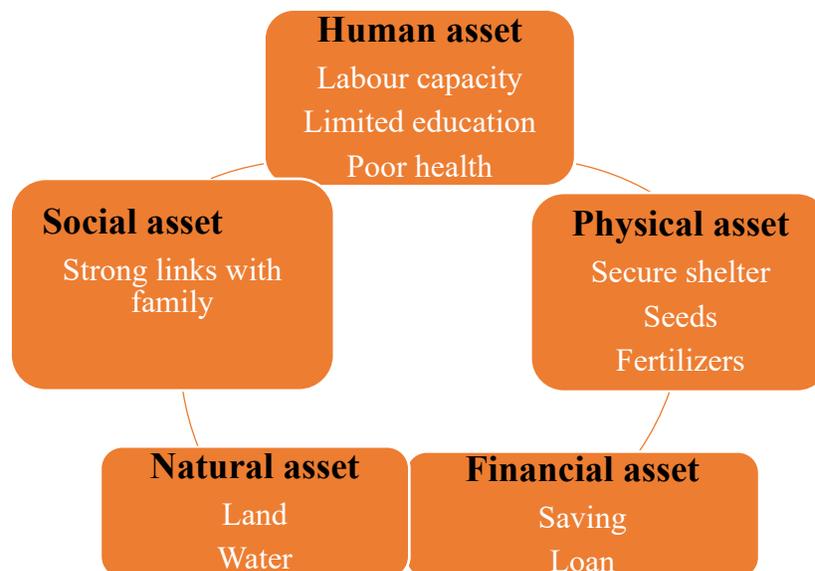
significant natural resources. Furthermore, Before the drought, agro-pastoralists noted that they had land to plant and water to use for irrigation and grazing land for their livestock.

On Human asset before the drought, agro-pastoralists lived in their villages and led their everyday lives. The capacity labor of the agro-pastoralists was very high due to a lot of time to herd the animals, so some of them walked long distances to obtain grazing land.

As this study shows, most agro-pastoralists are illiterate or have little education. According to the health section, there are no healthcare facilities. The existing facilities lack resources and staff; this implies that they cannot offer essential services or high-quality healthcare appropriate to their culture.

The physical asset of the agro-pastoralists consists of the basic infrastructure like shelter while they have producer goods including seeds, fertilizers, and livestock needed to support their livelihoods. In terms of the physical asset, most farmers had small machinery like a hoe, spade, axe, etc. A few years ago, oxen were used for cultivation, but modern tractors have replaced them. On the financial asset, the most significant savings they have were livestock, according loans the relationship between them and banks is inferior, and it is difficult for them to get a loan unless they bring a personal guarantee. The relationship between families and clans is powerful, and the agro-pastoralist are linked together by clan. mutual support, particularly related to the loss of a family member due to death and wedding.

Figure 4 Assets own by agro-pastoralists before drought.



Source: (Author, (2022))

4.3.2 Livelihood Assets own by agro-pastoralists after the drought.

4.3.2.1 Human capital

Size of the household, age, level of education and health, and prior experience in farming are crucial human capital assets for agro-pastoralist's livelihood.

On human assets, I looked at education, labor capacity, and the health system. Nothing has changed in education because there is no school, they go to; most are illiterate as I indicated in table 3 but would prefer to teach their children if they have schools in their area.

According to the labor capacity, they started other jobs than agropastoralism, like petty trade.

Water-borne illnesses were allegedly widespread in the study area's communities, and malaria was noted as a serious health issue in the Afgooye.

In terms of health, before the drought, they used to sell their livestock to find hospitals in big cities, but now they are struggling to save their lives.

“It's hard for me to go to the hospital or take my children because I don't have money to go to the hospital”(agro-pastoralists 18, 29 July, 2022).

4.3.2.2 Natural capital

The natural asset is very crucial for agro-pastoralist to derive their livelihoods. Most agro-pastoralist indicated that they left their land regarding water scarcity. The lack of water from the river and the lack of rain have made them unable to cultivate their fields and flee to their livestock to get water and grazing land.

“I come from a village near Afgooye; I have four hectares of farmland and a hundred goats. My wife used to work on the farm, and I looked for pasture for the goats, but now the wife has no work and can't farm due to insufficient water. I lost a lot of goats, and the rest I ran away to get water and pasture land for the livestock and left my family” (agro-pastoralists 25, 2 August, 2022).

4.3.2.3 Physical capital

Physical assets under this study included producer goods such as seeds and fertilizers. Most agro-pastoralists do not have sufficient seeds to cultivate the next year because they did not plant anything for the past three seasons due to water scarcity. On the other hand, The government banned NPK in the country that farmers use to fertilize the farm, fearing that the opposing groups would use them as explosives.

“I am worried about two things: the main one is water scarcity, and the second is that we don't have seeds to plant, and the seeds in the market are expensive, and I can't buy them. Furthermore, we are not allowed to use NPK and do not know how to make compost to improve the soil ” (agro-pastoralists 1, 3 August, 2022).

4.3.2.4 Social capital

Social assets in this study included all forms of society in terms of one relationship with others within the community. The study looks at whether social support is affected by drought.

Before the drought, the agro-pastoralist community helped each other during calamities, and during weddings, they collected livestock to help and give to the bridegroom's family. There is less mutual aid during the drought, but a strong link with clans still exists, were found to be the important social capital assets in the study area. but agro-pastoralists are not linking through standard norms, which causes them not to form organizations to pursue their interests.

“At times of weddings or when one of our friends is in trouble, we help each other, but at this time, everyone is struggling to save his family ” (agro-pastoralists 5, 5 August, 2022).

4.3.2.5 Financial capital

The study findings revealed that loans from financial institutions were minimal among agro-pastoralists before the drought and after the drought. Savings are the preferred type of financial asset and can be held in several forms, such as livestock. Livestock keeping is one of the practices embraced in the Afgooye district.

Almost all the agro-pastoralists in the area have one type of or mixed livestock, some of them don't have any because the drought has affected them. The situation is nevertheless different from previous years as a majority-owned few livestock.

The most common livestock in Afgooye is cows; cows are the most affected by drought rather than camels. This study indicated that camels could withstand droughts more than other animals.

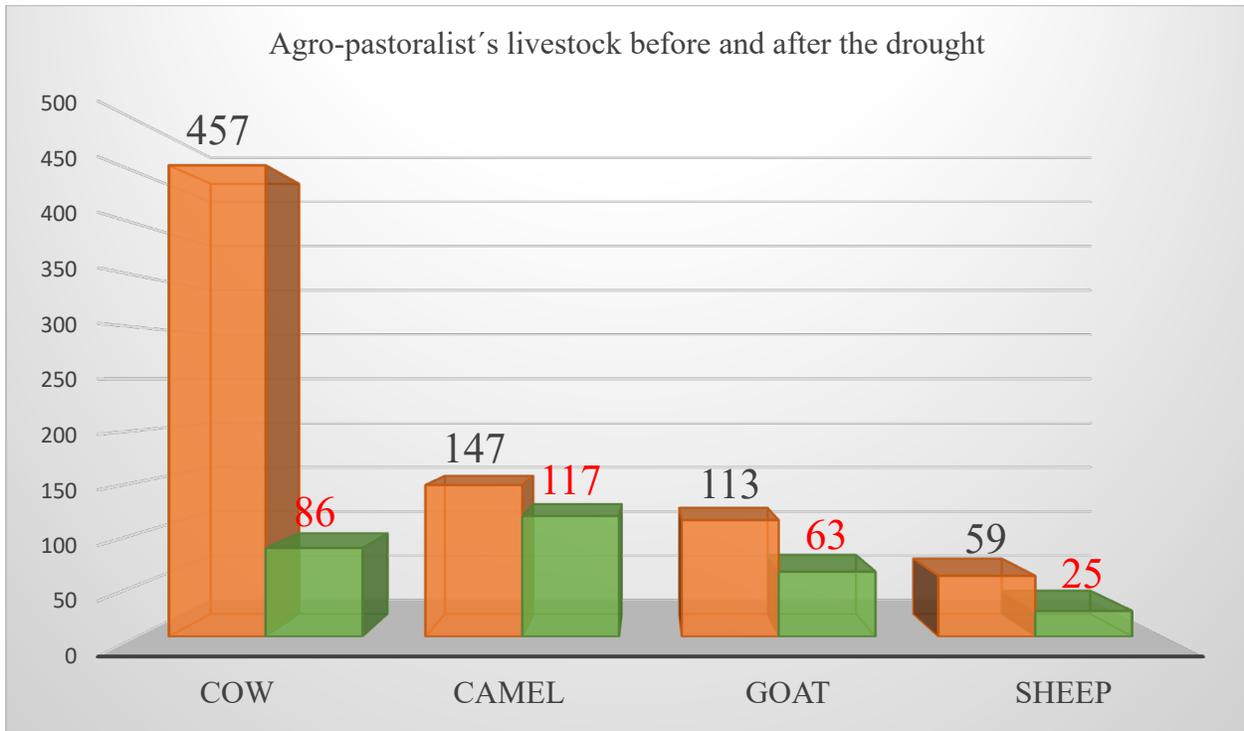
The agro-pastoralists indicated that they had 457 cattle before the drought, but they had 86 cattle after the drought. While the agro-pastoralists interviewed had 147 camels before the drought, they had 117 camels after the drought.

While goats and sheep had 113, 59 respectively before the drought, but after the drought, they had 63, 25 respectively.

According to the agro-pastoralist who has cattle, sheep and goats are very fragile to the drought, while the agro-pastoralist that had camels can live drinking camel milk for more than one year without eating food.

“If I have water and pasture for my animals I can live with camel milk without eating food” (agro-pastoralists 6, 5 August, 2022).

Figure 5 Agro-pastoralist’s livestock before and after the drought



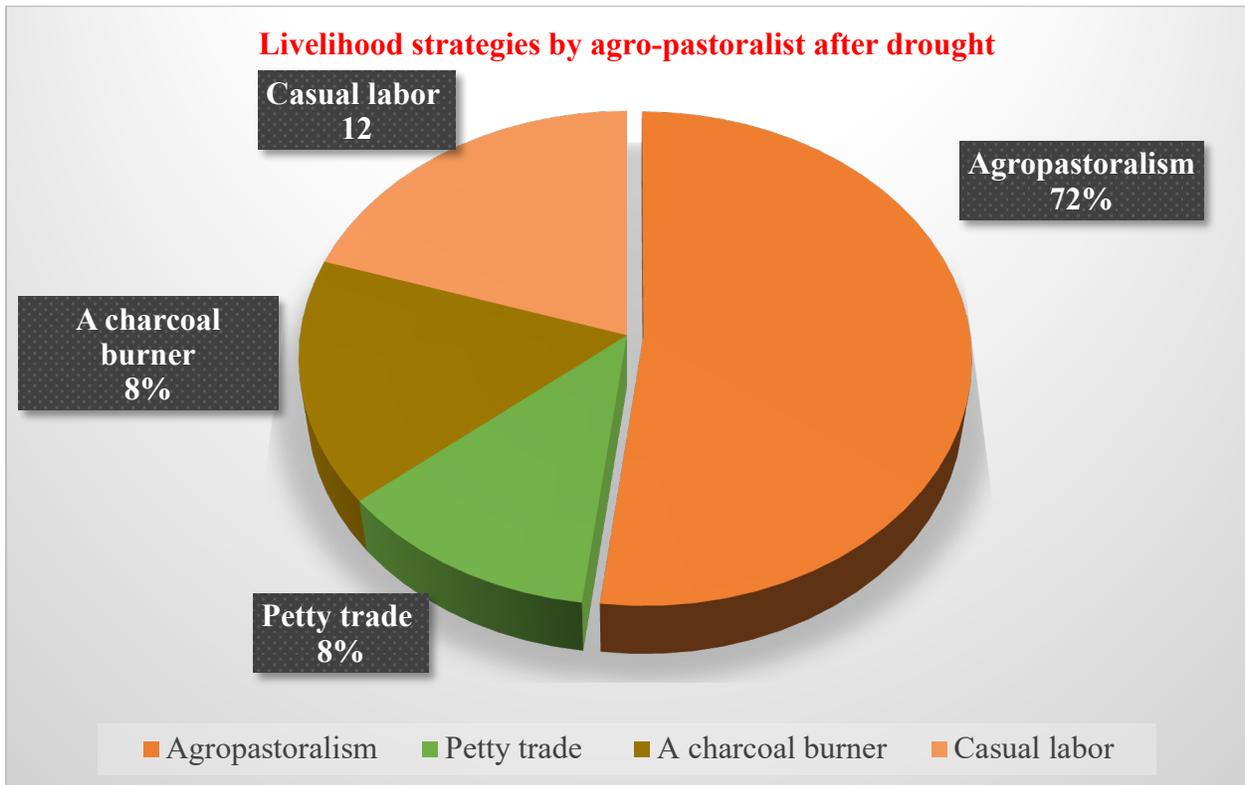
Source: (Author, (2022))

4.3.3 Livelihood strategies practiced by agro-pastoralists after drought

The livelihood strategies of agro-pastoralists differed significantly from those practiced by other works. Some of the livelihood strategies by agro-pastoralists included agro-pastoralism, casual labor, petty trade, and a charcoal burner, as indicated by respondents.

Most of them continue agro-pastoralism without looking for another job, 72%. While 12% of agro-pastoralists work in casual labor. Charcoal burners indicated they relied on cutting trees for their livelihood; 8% worked in traditional earth mound kilns. The rest noted 8% that they have petty trade.

Figure 6 Livelihood strategies by agro-pastoralist after drought



Source: (Author, (2022))

4.5 food security status after drought-impacted livelihood assets

Drought contributed to household food insecurity access prevalence in a variety of ways. These include a decrease in agricultural production and grazing land low price of livestock. Consumption is directly correlated with food security, as determined by the HFIAS. Various agro-pastoralists expressed different levels of food insecurity.

Most agro-pastoralists (68%) worried about not having food, while 100% could not eat preferred foods, and 96% ate just a few kinds of foods. 76% ate what they did not want to eat.

68% ate smaller meals than they felt were needed. More than half of the respondents (69%) ate fewer meals daily. Furthermore, 68% of the agro-pastoralists experienced not having food in the household, 68% experienced going to sleep without food, and 68% reported going the whole day without eating as represented by table 5.

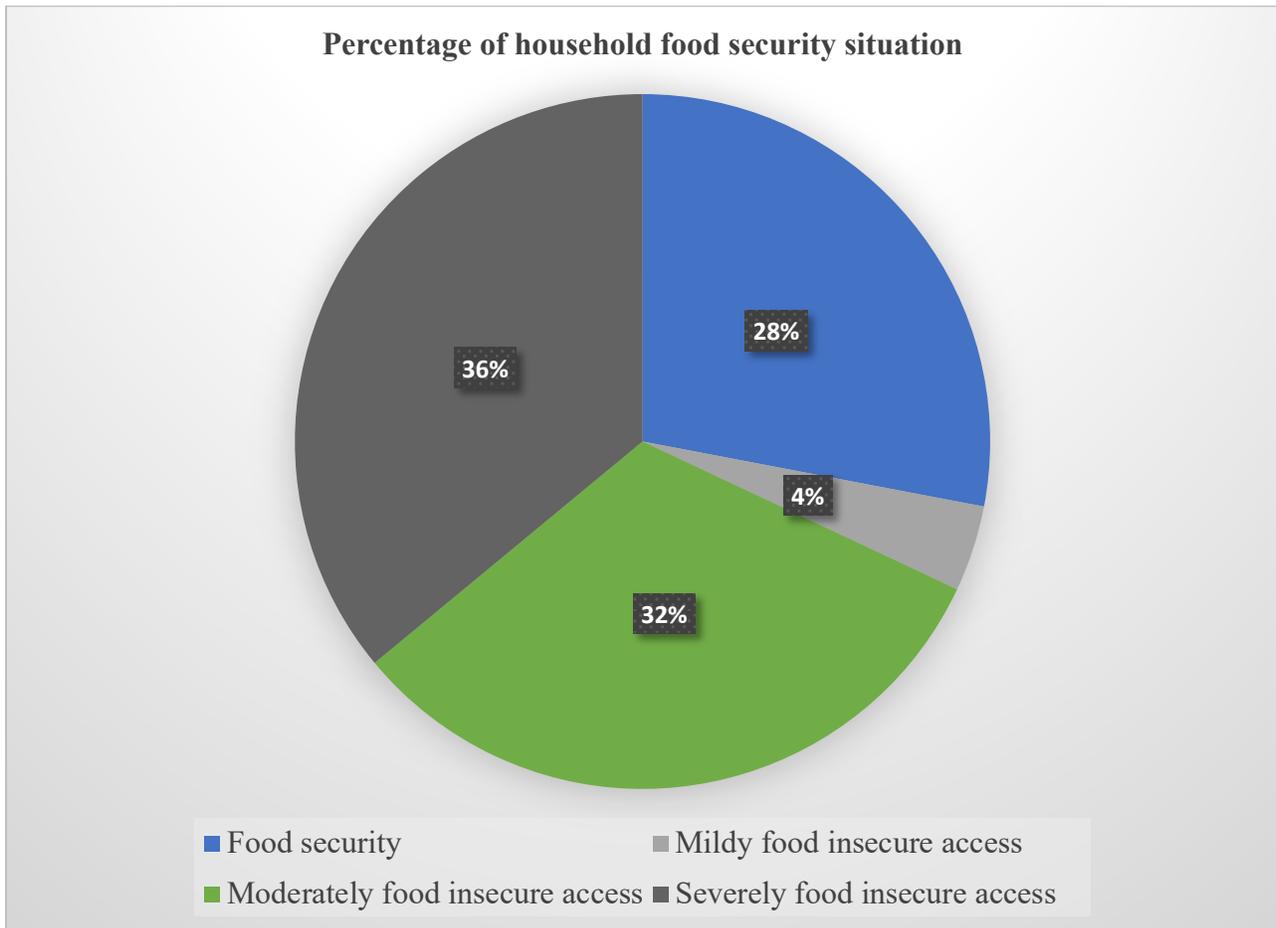
Table 4 Household Food insecurity Access scale (HFIAS)

No	HFIAS	Response (%)		Frequency (%)		
				Rarely	Sometimes	Often
1	Worry about food	No	32	12	28	28
		Yes	68			
2	Unable to eat preferred foods	No	0	32	40	28
		Yes	100			
3	Eat just a few kinds of foods	No	4	24	36	36
		Yes	96			
4	Eat foods they really do not want eat	No	24	8	20	48
		Yes	76			
5	Eat a smaller meal	No	32	0	40	28
		Yes	68			
6	Eat fewer meals in a day	No	31	0	41	28
		Yes	69			
7	No food of any kind in the household	No	32	16	28	24
		Yes	68			
8	Go to sleep hungry	No	32	16	48	4
		Yes	68			
9	Go a whole day and night without eating	No	32	24	44	0
		Yes	68			

The household food insecurity access prevalence (HFIAP) was utilized as an indicator of household food insecurity status; the results indicated that 28% of agro-pastoralists experienced none of the food insecurity (access) conditions or just experienced worry, but rarely. While 36% of the agro-pastoralists are considered severely food insecure, while 32% of the agro-pastoralists experienced a reduction in the size of meals or number of meals, rarely or sometimes, and is considered a moderately food insecure household.

A mild food insecure (access) household scored 4% worried about not having enough food sometimes or often unable to eat preferred foods.

Figure 7 Percentage of household food security situation



Source: (Author, (2022))

4.6 Actions of the government to improve practices against drought

4.6.1 National Drought Plan

For the last years, drought has been a common occurrence in Somalia. The government of Somalia has a plan. The plan's goal is to build a system and mechanism through which the Somali government and other relevant parties may work to lessen the wide range and frequent effects of droughts so that a resilient society can be built that can survive drought shocks.

The National Development Plan of Somalia (NDP-9) recognizes the critical need to strengthen community resilience against climate-driven disasters, particularly droughts. The NDP-9 is focused on four key priority areas: Inclusive politics, security and the rule of law, economic development, and social development. Additionally, it acknowledges that droughts are a barrier to Somalia's growth.

The drought plan mainly concentrates on three pillars: 1) developing a drought monitoring and early warning system, 2) assessing drought vulnerability, and 3) implementing measures to limit drought impacts and better respond to them.

“The government has many national policies, laws, and plans related to the national drought plan, we are implementing them, and the main thing is how we will implement the government's program in the coming years, and the government of Somalia is working cooperatively with all humanitarian partners to save lives and create a resilient society in the nation. ” (Former DG of mohadm, 10 August, 2022).

4.6.1.1 National Irrigational Policy

The 2019-approved National Irrigational Policy prioritizes several areas and aims, including enhancing the effectiveness of standard water management systems and developing plans for water management during extreme weather, maximizing groundwater resources for sustainable irrigation, encouraging community water use efficiency through training and education, improvements in the adoption of cost-effective and successful water consumption reduction solutions, especially for women and those at risk of poverty.

“The government attaches great importance to the irrigation policy to increase agriculture production and reduce water scarcity” (Former DG of mohadm, 10 August, 2022).

4.6.1.2 National Climate Change Policy (NCCP)

The government approved National Climate Change Policy in 2020. It is a new step in activating legislative tools to control the overall effects of climate change in Somalia. The NCCP shows how the Somalian government is politically committed to dealing with the repercussions of climate change, which substantially impact migration, stability, and the overall development of the nation. The NCCP focuses on two strategic dimensions: mitigating human-made emissions and factors that contribute to climate change and adaptation to the effects of climate change.

“It has had a great impact on the country's climate, which has affected the current drought in the country, so we must focus on the factors that contribute to climate change and adaptation to the effects of climate change” (DDM of mohadm, 12 August, 2022).

4.6.1.3 National Livestock strategy development

Regarding GDP contribution, internal consumption, and foreign currency profits, livestock has been and remains the backbone of the Somali economy. In collaboration with the World Bank and FAO, the Ministry of Livestock, Forestry, and Range has prepared a National Livestock strategy development, which provides a framework for the sector’s medium- and long-term development.

“Since our country has many animals, the government has many plans to promote the animal sector and agricultural production”(DDM of mohadm, 12 August, 2022).

Table 5 Summary of national policies, laws and plans related to National Drought Plan of Somalia

No	National Policies, plans and legislation related to National Drought Plan
1	National Irrigational Policy (2019) NIP
2	National Climate Change Policy (NCCP)
3	National Action Program (NAP’s) for the United Nations Convention to Combat Desertification (UNCCD)
4	National environmental policy 2020
5	National water policy
6	National agriculture policy
7	Disaster management policy
8	National food security and nutrition policy
9	National Livestock strategy development

4.6.2 Drought Response

The government renewed Somalia Disaster Management Agency (SODMA) to work on the current situation. SODMA started actions to minimize losses resulting from drought and food insecurity are being carried out rapidly throughout the country by the government to deal with the current drought that has affected farmers and herders. Actions are taken to cope with the immediate harm brought on by disasters and save people's lives.

Currently, there is a government drought response plan and operating procedures for emergency response to mitigate drought impacts. Humanitarian partners are rapidly expanding their response efforts in Somalia, prioritizing those most in need and at risk.

Relief includes all temporary aid, including financial assistance, temporary evacuation, food, medicine, shelter, clothing, and any other governmental or private assistance given to individuals or communities to help them recover from a disaster.

“The government has responded quickly to the drought and is working to save the people affected by the drought” (DDM of mohadm, 12 August, 2022).

CHAPTER FIVE

5.0 DISCUSSION OF RESULTS

5.1 Vulnerability context

In Somalia, a long-standing drought issue will likely worsen in 2022, increasing the likelihood of drought in the country's southern regions. The effects, which impact agro-pastoralists livelihood, are growing in size and complexity—the numerous agro-pastoralists struggle with rising food insecurity and the devastation of their livelihoods. The results indicate that the drought affected the livelihood of agro-pastoralism and food security; this finding agrees with Ayantunde et al. (2015), who indicated that drought is one of the significant hazards impacting cropland and livestock of the agro-pastoralists.

The vulnerabilities experienced in the Afgooye district are drought, population trends, human health shocks, conflicts, crops, livestock, and price fluctuation. The increased susceptibility of the agro-pastoralists in Afgooye adversely limits their ability to access food and continue their livelihoods.

The increasing number of people in the area, joined by other agro-pastoralists, creates a challenge for the environment, such as water and grazing land. Therefore, it can create a conflict between farmers and herders; the increased number of agro-pastoralists can also negatively impact the environment. This finding is consistent with Jobbins et al. 2020 who found conflicts over contentious land use (grazing vs. crop production) and water availability frequently arise between farmers and herders and various agro-pastoralist groups. Sometimes agro-pastoralist movements brought on by droughts start these conflicts or worsen them.

Afgooye, human, crops, and livestock are often challenged by the continuous impacts of insects and plant pests; these threats cause heavy annual losses, affecting those whose livelihoods depend on crops and livestock production. The emergence, spread, and severity of plant pests and diseases, as well as animal vector-borne diseases, are also influenced by climate change, extreme weather events, and seasonal variability, all of which harm yield and livestock production systems, the environment, and human health. This finding is in line with Wilkinson et al. 2011 that disease outbreaks in animals or plants occur naturally. Animal and plant diseases continue to severely threaten national economies, biodiversity, rural environments, food security, and human health.

5.2 Livelihood assets and strategies

The five capitals under the SLF are human capital, natural capital, social capital, physical capital, and financial capital. In the study area, possession of these capital assets varies among agro-pastoralists. The study investigated the effect of drought on agro-pastoralist assets, providing new insights into the relationship between drought, livelihood assets, and food security. Regarding human and social assets, there was no significant change in agro-pastoralism in education, health, and the relationship between families and clans still are strong.

Bazezew et al., (2013) found that in all agro-ecological zones, it was discovered that rainfall variability was a significant factor in the agricultural sector's poor performance and reduces the assets crops and livestock production also low level of productivity related to local environmental constraints.

According to the study, the leading cause of the current drought in afooye was the scarcity of water; low precipitation over an extended period and the river reduced its water, and people were not able to dig wells; in addition, the drought contributed to the dry-up of Shabelle river due to climate change. If the stress of drought on livelihood assets is prolonged, impacts can be felt for years. However, the drought has dramatically affected agricultural production with low yield and pastures where there was a lack of water; it also affected crops and livestock, as shown in figure 4. The most significant impact was on cattle and goats.

All the actions and routines that collectively facilitate how a person or household manages their finances are included in livelihood strategies. Most agro-pastoralists are doing agro-pastoralism, but some of the agro-pastoralists were seen to employ different types of livelihood strategies to meet their daily needs, the drought caused to don't rely on only one source, among the strategies were such as casual labor, petty trade, and a charcoal burner.

5.3 Food security

The household food insecurity prevalence (HFIAP) among agro-pastoralists utilized as an indicator of food insecurity status; The HFIAP categorizes into four levels: food secure, mild, moderately, and severely food insecure. The study indicated that most agro-pastoralists experienced drought effects. Approximately 72% (mildly+moderately+ severely) considered food insecure, which means they experienced in the last four weeks (previous 30 days) running out of food and, going to bed hungry or going a whole day and night without eating and experienced a

reduction in the size of meals or number of meals, rarely or sometimes, while 28% of agro-pastoralists were food security but experienced worry, but rarely.

The work Bahta (2022) showed that the majority of smallholder livestock farmers lacked drought resistance. The studies also showed that agricultural drought significantly impacted resources and food security

5.4 Actions of the government

The government's efforts to strengthen the response to drought and to build a resilient society that can withstand drought shocks, the Somali government and other relevant parties may seek to minimize the wide range and frequent consequences of droughts and climate change.

This study has potential limitations; two significant limitations could be addressed in future research. First, the study focused on the effect of drought on agro-pastoralists livelihood. Still, the agro-pastoralists mentioned that climate change contributes to drought while warmer temperatures enhance evaporation, which reduces surface water and dries out soils.

The second limitation was insufficient sample size for statistical crop yield measurements after the drought to know how the drought affected yield reductions; both these limitations need future studies to know the magnitude of their influence.

Reflection as a researcher

Students at Van Hall Larenstein (VHL) university are required to research to complete their master's degree. But I was worried when we started the program about how it could be possible to do research within a short period, but the modules delivered by the lecturers equipped me with the knowledge and skills to do research. Developing my practice abilities with the mini-research in Bergen Dal facilitated the acquisition of research fundamentals and helped me to gain confidence to interview someone. During that research, I detected that formulation of the research problem is the mother of all research, making it easier for me to make an objective of the study. At that time, I struggled to manage the stress because I was fasting and walking a long distance. What was related to cognition of my attitude was, "I believed that this mini research would ease my thesis later and the future research that makes me motivated. Furthermore, I found the teaching strategies that included theory and practice, individual and group work incredibly beneficial. Because before I started each chapter, I was trying to re-read the lessons given to us and the previous assignments that I received feedback from to reduce the confusion.

My research journey began with research proposal development; the selection of the proposal topic was a difficult task for me because the commissioner of my organization preferred an issue that was related to how drought is affecting food security but must be quantitative, but the university was interested in qualitative research to solve this challenge I selected both quantitative and qualitative methods for my research proposal. At that time, I was significantly affected by the organization's work, and I felt that the work of the organization and writing the proposal were so stressed. It was easy for me to come up with the research topic and objective, but I had difficulty coming up with the research questions and framework, and finally, I developed them.

During my research proposal, my supervisor was affected by COVID-19, and I feared she would not have time to review the proposal. My assessor Astrid van Rooij took over the correction of the proposal.

I started my topic, and I was definitely motivated to research this topic because it was a problem at that time in my country. I departed the Netherlands on the first of July and headed to my country. I spent time with my family the first week of July and started to prepare to get information about my study area. During that time, my commissioner made logistics arrangements for the fieldwork. I started the data collection process in mid-July. Finding an agro-pastoralist was very difficult because they were struggling with their livelihood. Early in the morning, he/she drives his

livestock to the grazing land. So, you have to go to the grazing land to get information. Interviewing in my native language helped me understand the agro-pastoralist's view.

I have gained valuable experience from the data collection work. It was my first time conducting such a kind of interview. I learned how they live, and I got a lot of experience, like how to live on camel milk only without food. You are facing many challenges as some people think you work for an organization or the government. Some refused the interview directly, while others rejected the photos and recording. Most of the agro-pastoralists that are really telling you the truth, and did not refuse the interview were the women. When I was interviewing, I had one of my colleagues accompany me to collect my data and interview the agro-pastoralist female. Still, the challenge was if she didn't know you, she won't give you an interview.

Some people go off-topic and talk to you about something else. It was also difficult to spend time listening to what you recorded and translating them into English. I have always tried soft skills such as empathic listening to show friendliness.

When I finished with the data collection of agro-pastoralist, I started looking for information from the government officials; they helped me a lot and gave me many documents that are not allowed in the public domain so that I could understand the steps taken by the government to prevent drought. After collecting data from the field, the analysis followed but before starting the analysis, I tried to empower my knowledge and skills about using SPSS, EXCEL, and Python. I started reading the books the university gave me, such as Research for development and writing your thesis, to improve my thesis. Also, the knowledge and skill I gained from the research Design and Implementation module and the mini-research exercise helped me to overcome it. Eventually, I learned a lot during the entire process. My analytical and report-writing abilities have also increased. My communication skills and teamwork abilities have improved due to my interactions with many stakeholders. The comments and feedback from my supervisor and my assessor were influential in helping me to think critically and properly shape my thesis. I tried to use my own framework, but I felt the challenge, so I got advice from my supervisor, and my assessor, they changed my idea to adopt the sustainable livelihood framework, that framework helped me and made easy for my analysis.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

This chapter includes conclusions in section 6.1 and recommendations of the study in section 6.2.

6.1 Conclusion

This research aimed to assess the effect of drought poses to agro-pastoralists livelihoods in the community of Afgooye district in Somalia to recommend ways to improve their livelihoods through appropriate interventions. Based on qualitative and quantitative analysis, droughts have negatively impacted the agro-pastoralists livelihood; before the drought, farmers cultivated their crops, and livestock was released into extensive vegetated outdoor lands for grazing. The study concludes that agro-pastoralists face vulnerabilities such as drought, health shock, conflicts related to land usage, seasonal shifts in prices and crop loss due to pests & diseases, livestock shock due to diseases, and drought have left animals starving to death. In addition, an increase in population puts pressure on available resources. Drought was the common shock challenging agro-pastoralists; the leading cause of the current drought in Afgooye was water scarcity that affected crops and livestock. The lack of water forced them not to plant crops and search for water and grazing land in distant places. Drought has greatly affected physical, natural, and financial assets, while human and social assets have not changed. These implications forced the agro-pastoralists to explore other livelihood strategies such as casual labor, petty trade, and a charcoal burner.

The study further concludes that the drought affected the food security of agro-pastoralist; the equivalent of 72% are considered food insecure, while the rest of agro-pastoralists are food secure, and many have left their fields in search of food, water, and pasture for livestock. On the other hand, the government is trying to improve the system and mechanism to build resilient agro-pastoralists and lessen droughts' widespread and frequent effects. Furthermore, measures are taken to mitigate this harm and preserve lives. Therefore, it can be concluded that the drought affected the livelihood assets and food security situation of the agro-pastoralist and the author declare no conflict of interest.

6.2 Recommendations

Based on the insights drawn from the study, the following recommendations are made as a priority for development intervention to reduce the effect of drought on agro-pastoralists livelihood and build the resilience of pastoral communities;

Recommendations to both Local and International NGOs

1. There is a need for a short-term intervention to save the lives agro-pastoralists, such as providing health care like hospital and Clinics, adequate clean water, shelter, and food assistance.

Recommendations to Government

2. There is a need to improve extension and social service delivery to agro-pastoralists, especially veterinary and good agricultural practice.
3. Providing agro-pastoralists plant drought-tolerant cereal crop varieties
4. A bottom-up approach with effective decentralization and active social involvement in the planning and implementing of drought risk management measures is crucial to moving from policy to practice.
5. Promoting reform within structures that make policy and provide services to the agro-pastoralist that can boost their livelihood assets like ministry of agriculture and irrigation.

Recommendation to the local research institutions and universities

6. Developing scientific and research programs can contribute to a better understanding climate change, its impacts, and mitigation alternatives.

Recommendation to the community

1. Management of local natural resources like water
2. Preventing deforestation and promoting afforestation

References

1. Abdi-Soojeede, M. (2018) *Crop Production Challenges Faced by Farmers in Somalia: A Case Study of Afgoye District Farmers*. *Agricultural Sciences*, **9**, 1032-1046. doi: [10.4236/as.2018.98071](https://doi.org/10.4236/as.2018.98071).
2. Ahmad, N. S. K. Shahnawaz, Muzafar Husain, Sajid Qamar & Zaid Alam (2021). Food Insecurity: Concept, Causes, Effects and Possible Solutions . *IAR J Huma Soc Sci*; 2(1): 105-113.
3. Ayantunde, A.A., Turner, M.D. and Kalilou, A. 2015. Participatory analysis of vulnerability to drought in three agro-pastoral communities in the West African Sahel. *Pastoralism: Research, Policy and Practice* 5(13):1-11.
4. Baba S, Dagong M I A, Sohrah S, and Utamy R F 2019. Factors affecting the adoption of agricultural by-products as feed by beef cattle farmers in Maros Regency of South Sulawesi, Indonesia. *Tropical Ani. Sci. J.* 42 76–80.
5. Badolo, F. & Kinda, S. R., (2014). Climatic Variability and Food Security in Developing Countries. *CERDI*, pp. 3-45.
6. Bahta, Yonas T., and Vuyiseka A. Myeki. 2022. "The Impact of Agricultural Drought on Smallholder Livestock Farmers: Empirical Evidence Insights from Northern Cape, South Africa" *Agriculture* 12, no. 4: 442. <https://doi.org/10.3390/agriculture12040442>
7. Bazezew, A., Bewket, W. & Nicolau, M. (2013). Rural households' livelihood assets, strategies and outcomes in drought-prone areas of the Amhara Region, Ethiopia: Case Study in Lay Gaint District. *African Journal of Agricultural Research*, 8(46), 5716-5727
8. Coates, Jennifer, Anne Swindale and Paula Bilinsky. 2007. *Household Food Insecurity Access Scale (HFIAS) for Measurement of Household Food Access: Indicator Guide (v. 3)*. Washington, D.C. FHI 360/FANTA.
9. Cottrell, R.S., Nash, K.L., Halpern, B.S. *et al.* 2019. Food production shocks across land and sea. *Nat Sustain* **2**, 130–137. <https://doi.org/10.1038/s41893-018-0210-1>.
10. DFID 1999. Sustainable Livelihoods Guidance Sheet, London : DFID.
11. DFID, (2000) . *Sustainable Livelihoods Guidance Sheet*, London : DFID.
12. Ellis, F., (2003). *Human Vulnerability and Food Insecurity:Policy Implications*, London: Overseas Development Group (ODG).

13. European Commission. 2022. *European Civil Protection and Humanitarian Aid Operations*. [Online] Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_20_1148 > [Accessed 4 June 2022].
14. FAO (2006). Food security. *Policy Brief 2*, 1–4. doi: 10.1016/j.jneb.2010.12.007.
15. FAO, 2002. The state of food insecurity in the world 2001. FAO, Rome.
16. FAO, 2021. *The State of Food Security and Nutrition in the World*. Rome, FAO. ISBN: 978-92-5-134325-8.
17. Food security and nutrition analysis unit, 2022. *Climate update*. [PDF] Available at: <https://fsnau.org/downloads/Climate-Update-May-2022.pdf> [Accessed 17 July 2022].
18. Holman, I.P.; Hess, T.M.; Rey, D.; Knox, J.W. 2021. A multi-level framework for adaptation to drought within temperate agriculture. *Front. Environ. Sci.* 8, 589871.
19. IFRC, 2022. *Somalia | Hunger Crisis* [Online] Available at: [International Federation of Red Cross And Red Crescent Societies](https://www.ifrc.org/en/what-we-do/crisis-response/somalia) [Accessed 1 July 2022].
20. IPC, 2022. *Somalia: Acute Food Insecurity Projection Update March 2022 and April - June 2022* [Online] Available at: <https://www.ipcinfo.org/ipc-country-analysis/details-map/en/c/1155523/?iso3=SOM> > [Accessed 4 June 2022].
21. Jobbins, M., Brottem, L., and McDonnell, A. (2021). *Pastoralism and Conflict: Tools for Prevention and Response in the Sudano-Sahel*, 2nd ed. Washington DC: Search for Common Ground.
22. Kollmair, M. and Juli, St. Gamper. (2002). The Sustainable Livelihoods Approach, Development StudyGroup, University of Zurich (IP6).
23. Krantz, L. (2001) ‘The sustainable livelihood approach to poverty reduction’, *Division for Policy and Socio-Economic Analysis*, (February), p. 44.
24. K. Williges, R. Mechler, P. Bowyer, J. Balkovic 2017. *Towards an assessment of adaptive capacity of the European agricultural sector to droughts* Clim Serv, 7, pp. 47-63.
25. Kumar S, Ansari M Q, Naresh R K, and Kumar V 2014. Integrating crop and livestock management for enhanced productivity, profitability and sustainability of the rice-wheat system in north west India *Int. J. Life Sci. Biotechnol. Pharma Res.* 3 74–84.
26. Lesk. C, P. Rowhani, N. Ramankutty 2016. Influence of extreme weather disasters on global crop production, *Nature*, 529 , pp. 84-87.

27. Lottering, S.; Mafongoya, P.; Lottering, R. 2021. Drought and its impacts on small-scale farmers in sub-Saharan Africa: A review. *S. Afr. Geogr. J.* 103, 319–341.
28. M.J. Sanz, J. de Vente, J.-L. Chotte, M. Bernoux, G. Kust, I. Ruiz, M. Almagro, J.-A. Alloza, R. Vallejo, V. Castillo, A. Hebel, and M. Akhtar-Schuster. 2017. *Sustainable Land Management contribution to successful land-based climate change adaptation and mitigation. A Report of the Science-Policy Interface*. United Nations Convention to Combat Desertification (UNCCD), Bonn, Germany.
29. Ministry of Agriculture and Irrigation, (2017). *Agriculture sector*, [Online] Available at: <<https://moa.gov.so/>> [Accessed 4 June 2022].
30. Mahmoud. S., Al-Khafaji, and Rusul A Al-Ameri, 2021 IOP Conf. Ser.: Earth Environ. Sci. 779 012077.
31. NRC, 2022. NGOs warn of possible famine in Somalia as Drought worsens, climate change, [Online] Available at: <<https://www.nrc.no/news/2022/april/ngos-warn-of-possible-famine-in-somalia-as-drought-worsens-urgent-action-required/>> [Accessed 4 June 2022].
32. Nhemachena, C., Hassan, R. & Kulasuriya, P., (2010). Measuring the economic impact of climate change on African agricultural production system. *Climate change economics*, 1(1), pp. 33-55.
33. OCHA, 2022. Humanitarian response plan, Drought impact [Online] Available at: <https://ochasomalia.org/hpc/hrp.html> [Accessed 4 July 2022].
34. Serrat, O. (2017). The Sustainable Livelihoods Approach. In: Knowledge Solutions. Springer, Singapore. https://doi-org.hvhl.idm.oclc.org/10.1007/978-981-10-0983-9_5
35. Scoones, I., (2009). Livelihoods perspectives and rural development. *The Journal of Peasant Studies*, 36(1), pp. 171-196.
36. Swindale, Anne, and Paula Bilinsky. 2006. *Household Dietary Diversity Score (HDDS) for Measurement of Household Food Access: Indicator Guide (v.2)*. Washington, D.C.: FHI 360/FANTA.
37. WFP, 2022. *As rains fail again, catastrophic hunger looms over Somalia* [Online] Available at: <https://www.wfp.org/news/rains-fail-again-catastrophic-hunger-looms-over-somalia> [Accessed 8 June 2022].

38. WFP, 2015. *Meta Data for the Food Consumption Score (FCS) Indicator*[Online] Available at: <<https://www.wfp.org/publications/meta-data-food-consumption-score-fcs-indicator>> [Accessed 4 June 2022].
39. Widadie F and Agustono 2015 Comparison of integrated crop-livestock and non-integrated farming systems for financial feasibility, technical efficiency and adoption (Case of farmers in Gunung Kidul Regency, Yogyakarta, Indonesia) *J. Int. Soc. Southeast Asian Agric. Sci.* 21 31–45.
40. Widarni N.A.A. (2020). *Determinants of the mixed crop and livestock farming practice among smallholder farmers in Magelang Regency, Central Java Province*. IOP Conference Series: Earth and Environmental Science, 454(1), [10.1088/1755-1315/454/1/012010](https://doi.org/10.1088/1755-1315/454/1/012010)
41. Williges, K. R. Mechler, P. Bowyer, J. Balkovic. 2017. Towards an assessment of adaptive capacity of the European agricultural sector to droughts. *Clim Serv*, 7, pp. 47-63.
42. Wilkinson K, Grant WP, Green LE, Hunter S, Jeger MJ, Lowe P, Medley GF, Mills P, Phillipson J, Poppy GM, Waage J. (2011). Infectious diseases of animals and plants: an interdisciplinary approach. *Philos Trans R Soc Lond B Biol Sci.* 12;366 (1573):1933-42. doi: 10.1098/rstb.2010.0415. PMID: 21624914; PMCID: PMC3130394
43. World Bank, (2011). *Africa's future and world banks support to it*, Washington: world bank.

Annexe

Annexe 1: Data collection tools

Semi-structured Interview checklist

A. agro-pastoralist profile

1. Name of agro-pastoralist
2. Gender
3. Age
4. Level of education
5. Household number
6. Relationship status

B. Direct questions

What is the effect of drought on agro-pastoralists livelihoods assets?

1. Do you live in Afgooye, or are you from another state affected by drought?
2. Which district are you from?
3. If you are from another state, how many months have you lived in afgooye?
4. What are the livelihood assets/capital you own before the drought?
5. What are the livelihood assets/capital you own after the drought?
6. How drought affected your:
 - A. Human asset: education of your children, work, health status,
 - B. Physical assets: water, tools for production (Horse, cow), buying seed, fertilizer, and pesticides,
 - C. Financial asset: dept from banks or others like companies.
 - D. Natural assets: Biodiversity, land, livestock
 - E. Social asset: Relationship of your family, kinship, community.
7. What is your primary source of livelihood?
8. What are the strategies for obtaining your livelihoods?
9. How do you get food and water?
10. How do you cultivate your farm during this drought and before drought?
11. Is your livestock alive or dead?
12. Can tell me the number of livestock and types that you have now and before the drought?
13. If you have livestock, where do you get water and fodder?

14. What are other vulnerabilities that you are facing like trends shocks and seasonality?
15. Do you get help from the government and organizations? If yes what kind of assistance that you get from the government?

Annexe: Key Informant Interview

1. What is the national drought policy or plan?
2. What are the long- and short-term measures for drought preparedness?
3. What is the post-drought response plan?
4. What services do you give to agro-pastoralists?
5. What laws do you have to control environmental degradation?

Annexe: “Household Food Insecurity Access Scale (HFIAS) ”

1. Did you worry that your household would not have enough food? And how often did this happen?
2. Were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources? And how often did this happen?
3. Did you or any household member have to eat a limited variety of foods due to a lack of resources? And how often did this happen?
4. Did you or any household member have to eat some foods that you did not want to eat because of a lack of resources to obtain other types of food? And how often did this happen?
5. Did you or any household member have to eat a smaller meal than you felt you needed because there was insufficient food? And how often did this happen?
6. Did you or any other household member have to eat fewer meals daily because there was insufficient food? And how often did this happen?
7. Was there ever no food to eat of any kind in your household because of a lack of resources to get food? And how often did this happen?
8. Did you or any household member go to sleep at night hungry because there was not enough food? And how often did this happen?
9. Did you or any household member go a whole day and night without eating anything because there was not enough food? How often did this happen?

Start

May 25, 2022

End

Tuesday, 27 September 2022

**Annex 2
Research
Plan**

Week	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	Notes		
Starting	May 25	Jun 30	Jun 6	Jun 13	Jun 20	Jun 27	Jul 4	Jul 11	Jul 18	Jul 25	Aug 1	Aug 8	Aug 15	Aug 22	Aug 29	Sep 5	Sep 12	Sep 19	Sep 26	Sep 27			
Phase One (Proposal)	Problem statement	█																					
	Background & Literature review	█																				Meeting with supervisor	
	Conceptual Framework, Methodology		█	█																		Meeting with supervisor	
	Revesion, Plan, Submission & Presentation			█	█																	Meeting with supervisor	
Phase Two (Data Collection)	Field				█																		
						█																	
							█																
								█															
									█														
										█													
											█												
Phase	Arranging the data									█												Meeting with supervisor	

