

The effect of floods on the livelihoods of smallholder women farmers. A case study in Bal'ad district, Somalia



Mohamed Ahmed Sheikh Mahamed

Student Number: 000031948

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The effect of floods on the livelihoods of smallholder women farmers. A case study in Bal'ad district, Somalia.

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Van Hall Larenstein University of Applied Sciences

Velp, The Netherlands.

Author of the Thesis: Mohamed Ahmed Sheikh Mahamed

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DEDICATION

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LIST OF ABBREVIATIONS

DFID	Department for International Development
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
IMF	International Monetary Fund
IRC	International Rescue Committee
KII	Key Interview Information
NGO	Non-governmental Organisation
SFA	Somali Farmers Association
SHMF	Smallholder Men Farmers
SHWF	Smallholder Women Farmers
SLF	Sustainable Livelihoods Framework
SoDMA	Somali Disaster Management Agency
SSI	Semi Structured Interview
SWALIM	Somalia Water and Land Information Management
UN OCHA	United Nations Office for the Coordination of Humanitarian Affairs
WASH	Water Sanitation and Hygiene
WFP	World Food Program

ABSTRACT

Floods have been a recurring issue in Somalia over the past three decades. The country experiences a semi-arid to arid climate with distinct wet and dry seasons. This research study focused on the Bal'ad district in southern Somalia, a flood-prone area with significant impacts on the community, especially women farmers. The study used a case study approach and qualitative research methods to investigate the effects of floods on smallholder women farmers in the district. A mix of data collection techniques, including semi-structured interviews (SSI), focus group discussions (FGDs), and key informant interviews (KIs), were employed to gather primary data.

The study organized its findings four sub-research questions: the effects of flooding on the livelihoods of small-scale female farmers, the capacities of smallholder female farmers to address their vulnerabilities, coping strategies employed during floods, and government support for flood management.

The Bal'ad district and its villages depend on five livelihood assets, natural, human, physical, financial, and social, to sustain their lives. However, floods in the district significantly disrupt these assets, with smallholder women farmers particularly vulnerable. Floods destroy agricultural land, displaced the people, damage property, and kill livestock, causing food shortages and financial losses.

In Bal'ad, women small-scale farmers confront vulnerabilities such as restricted access to resources, gender inequities, and a higher risk of natural catastrophes. Prolonged war and limited government assistance raise these vulnerabilities. Smallholder women farmers suffer constraints in tackling flood-related issues caused by the shortage of skills, training, and knowledge despite their reliance on traditional experience.

Floods and droughts are significant vulnerabilities affecting these farmers annually. Heavy rains and overflowing rivers cause floods that devastate fields and homes. The inadequate flood mitigation and preparedness exacerbates the impact floods, with limited Government and NGO support and reliance on diaspora aid. The district's infrastructure, including dams and canals, requires rehabilitation, adding to the challenges. The absence of necessities like electricity, clean water, and education further hampers their livelihoods.

The coping strategies employed by these farmers involve traditional methods such as flood prediction through local indicators, sandbag placement as a flood barrier, and community support. The findings revealed that these strategies have limitations, especially in the face of more severe or frequent floods. Despite traditional coping mechanisms and community support, rebuilding after floods remains a struggle.

The study recommends that addressing vulnerabilities requires holistic solutions, encompassing infrastructure improvement, disaster preparedness, and enhanced livelihood strategies. To mitigate and respond to the flood impacts and improve the quality of life for Bal'ad smallholder female farmers, various stakeholders, including the Somali Disaster Management Agency, the federal and state governments, non-governmental organizations (NGOs), smallholder farmers, and the Somali Farmers Association, recommended to collaborate on comprehensive measures.

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1. Introduction

This chapter describes the research study's background, research problem, problem owner, research objective, research question and sub-questions. The research addresses the effects of floods on the livelihoods of smallholder women farmers in the Bal'ad district, Middle Shabelle region, Somalia.

1.1 Background

Flooding is among the world's most significant natural catastrophes, harming the environment, humans, and other species while inflicting death, relocation, and property loss (Marfai, Sekaranom and Ward, 2015). Climate change, unpredictable weather, and economic conditions make it increasingly challenging for arid and semi-arid countries to cope with flood protection. Somalia is a country in the Horn of Africa that has experienced significant political and economic instability in recent decades. This instability has impacted the people's livelihoods in rural areas. Despite these challenges facing rural areas, climate change is also a factor that affects the livelihoods of people in rural areas (Beier and Stephansson, 2012)

In terms of gender inequality, Somalia ranks fourth in the world (IFRC, 2023). Female-headed families are among the most vulnerable and they are particularly at risk of violence based on gender (UN OCHA, 2021). Political unrest and continuous war have troubled Somalia for many years. Insecurity in the environment has resulted in significant violence, particularly gender-based violence. Women and girls are more vulnerable to gender inequality and other forms of violence during the disasters (IFRC, 2023).

Somalia has suffered climate change problems for over three decades, such as droughts and floods. According to the history of Somalia, the worst years of floods during the autumn rainy season were 1961, 1977, 1997, and 2006, while the spring season witnessed severe floods in 1981 and 2005 (SWALIM, 2023). Flash floods occur during the rainy season, from April to June and October to November. In the northern regions of the country, there is a higher occurrence of flash floods compared to other areas (An, 2020). The climate in the country is hot and dry, with a limited rainy season marked by severe rainfall events that can cause flash floods. They frequently cause state tragedies due to a lack of an effective early warning system (SWALIM, 2007). In 2021, flooding caused the displacement of about one million individuals and destroyed approximately 150,000 hectares of farmland in Somalia (UN OCHA, 2021).

Heavy rainfall, especially connected with tropical storms or isolated thunderstorms, can overflow the land's limited drainage capacity in many places in Somalia. Inadequate infrastructure, poor soil absorption, and insufficient water management systems enhance the effect of flash floods (An, 2020).

Agriculture is a vital sector for the country's economy and livelihoods. Most of Somalia's rural population is engaged in subsistence farming and pastoralism, providing many households with food, income, and employment opportunities (FAO, 2018). Over 9 million Somali people reside in rural areas, representing half of Somalia's population (World Bank, 2022). It is classified as pastoralists, with around 26% of the total population falling under this category; in comparison, another 23% comprises agro-pastoralists who rely on crop cultivation and livestock rearing for their livelihoods and In contrast, some rely solely on crop cultivation (FAO, 2018). Most agro-pastoralists live in the southern regions of Somalia, near the two rivers, Jubba and Shabelle.

Smallholder farmers are essential in Somalia's agricultural sector and rural economy. These small-scale farmers rely on traditional farming practices and scarce resources (IMF, 2022). They often cultivate various crops, including maize, millet, sorghum, and beans. The Jubba and Shabelle Rivers run through Somalia, and their combined basins occupy an area of 174,000 square kilometres. However, Ethiopia accounts for more than 60 per cent of the watershed area (Michalscheck, Petersen and Gadain, 2016). In southern Somalia, these rivers are the main water supply for the population living along their banks and are essential to irrigated agriculture.

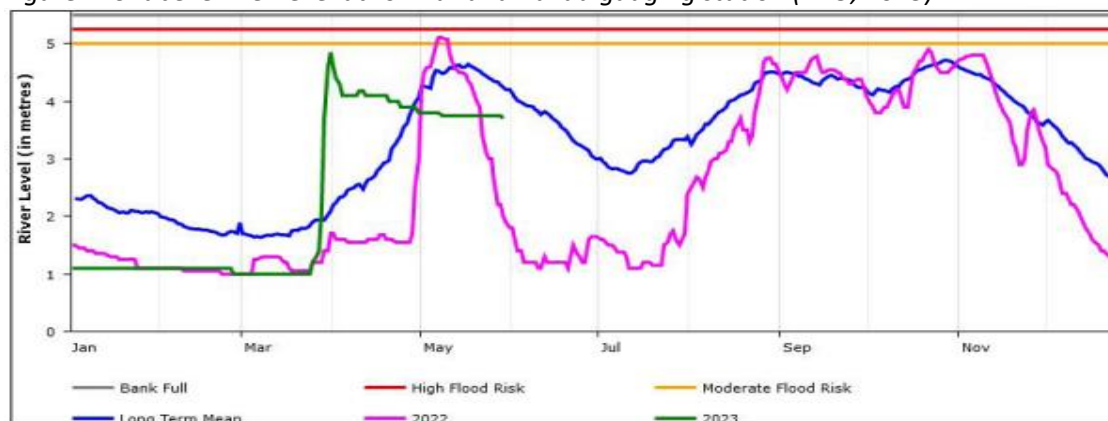
The southern regions of Somalia, particularly across the Jubba and Shabelle Rivers, are prone to river floods (Gure, 2021). These water courses regularly experience flooding events, which can significantly impact the surrounding areas. The rivers swell and overflow their banks when heavy rains occur, inundating nearby communities and agricultural lands.

Hirshabelle is one of the regional governments in Somalia, located in the southern part of the country. This area experiences annual floods, primarily caused by river overflow and flash floods (WASH, 2021). The most affected areas by these floods are Beledweyne, Jowhar and Bal'ad districts, situated along the Shabelle River [Figure 1] (FAO, 2023).

Heavy rains in some regions of the hills of Ethiopia have caused the Shabelle River to overflow its banks downstream in Somalia this year, 2023, displacing residents (FAO, 2023). Water has also swamped farmland, destroying the crops of farmers struggling with the worst drought in years. The floods significantly impact farmers, herders, and residents in these districts and neighbouring villages, resulting in substantial losses. Small-scale farmers are particularly vulnerable as they lose their crops and lack alternative means of livelihood. Among the most affected are smallholder women farmers (Tsige, Synnevåg and Aune, 2020)

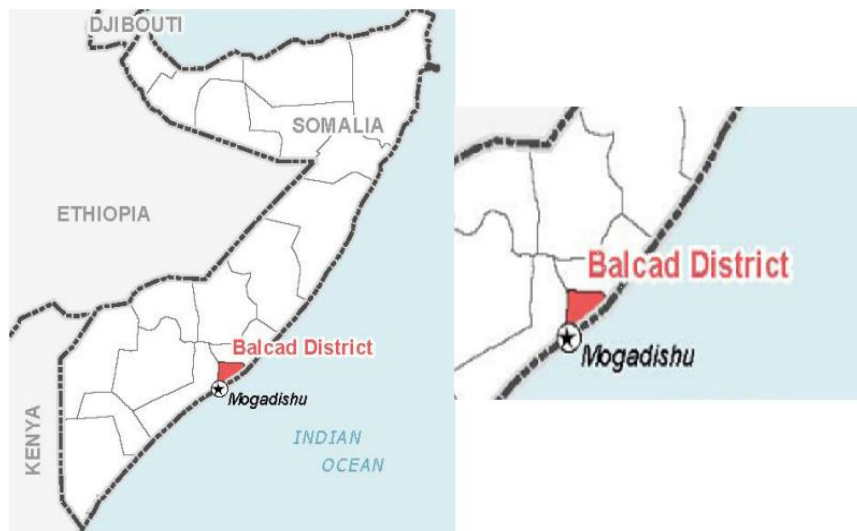
Women who are smallholder farmers frequently struggle to adjust to changing circumstances because they do not have the same access to resources as men, as mentioned in a study by Owusu and Yiridomoh (2021). They face many challenges in getting what they need, like land, seeds, equipment, and information. There are various reasons for these inequalities, including unfair social norms, laws that limit their rights, fewer education opportunities, and not having control of resources.

Figure 1: Shabelle river level at Jowhar and Bal'ad gauging station (FAO, 2023)



Bal'ad [Figure 2] is one of the districts in Hirshabelle regional state of Somalia. The district's economy is mainly based on agriculture and animal rearing (FAO, 2018). Like other areas in Somalia, Bal'ad has a population of smallholder farmers, including smallholder women farmers. These farmers are particularly vulnerable to the impacts of climate change (Owusu and Yiridomoh, 2021). Gender disparities restrict women's capacity to cope with and adapt to climate change since they have fewer assets, less access to resources, and suffer societal impediments (Tsige, Synnevåg and Aune, 2020). Therefore, this study focuses on the effect of floods on smallholder farmers in the Bal'ad district, particularly women small-scale farmers.

Figure 2: Bal'ad, Somalia. Map source : UN OCHA, (2015)



1.2 Problem Owner

The Somali Farmers Association (SFA), a local non-governmental organization (NGO) based in Somalia, is the commissioner of this research. Its purpose is to enhance the livelihoods of farmers and pastoralists in the nation, especially small-scale farmers in Bal'ad exposed to the effects of flooding, droughts, and pests, which substantially influence their livelihoods and agricultural productivity. It also supports sustainable agricultural and livestock production techniques by offering training, teaching, and advocating for policy changes or legislative reforms that benefit small-scale farmers and herders.

1.3 Research Problem

Spring (Gu) rains fell in Somalia in April and May of this year, and nearly 500,000 people have been affected by flash floods across Somalia, particularly in Hirshabelle regional state districts like Beledweyne, Jowhar and Bal'ad (UN OCHA, 2023).

Bal'ad is among the places that have experienced current and historic flooding. Around thirteen thousand acres of vegetable crops in 23 communities were damaged by flash floods, according to UN OCHA (2020). As a result of the flood, there were fatalities, evictions, property losses, and food insecurity.

The water also damaged large tracts of farmland. Small-scale agricultural producers and cattle farmers already at risk from the district's prolonged violence and drought were even more susceptible due to the soil erosion it generated.

The floods significantly impact smallholder farmers' livelihoods, particularly women farmers (Owusu and Yiridomoh, 2021). These women are essential to the farming community. Smallholder farmers experience shortages of food and unstable financial situations when floods destroy their agricultural products and livestock.

This study addresses the inadequate knowledge of Somali Farmers Association on the effects of floods on the livelihoods of small-scale female farmers in the Bal'ad district, and there needs to be more research on the coping mechanisms that women farmers employ to mitigate the impact of floods. This study seeks to fill this gap in knowledge by examining the effects of floods on the livelihoods of smallholder women farmers, to offer suggestions for appropriate measures to improve their circumstances. The Somali Farmers Association, commissioning this research, needs a clear understanding of the current situation of women small-scale farmers, to improve and intervene in the small-scale female farmers' livelihoods negatively impacted by floods. This research is also relevant to Somalia's Disaster Management Agency.

1.4 Research Objective

This study aims to evaluate the effects of flooding on the livelihoods of smallholder women farmers in the Bal'ad district and provide recommendations for suitable interventions to improve their situation. The research findings could offer direction to NGOs and government agencies to design initiatives supporting smallholder women farmers' livelihood.

1.5 Research Question

What is the effect of floods on the livelihoods of smallholder women farmers in Bal'ad district, Somalia?

1.5.1 Sub-Research Questions

1. How does flooding effect the livelihood assets of small-scale female farmers in Bal'ad?
2. What are the capacities of women smallholder farmers to address their vulnerabilities?
3. What coping strategies do smallholder women farmers use when affected by floods?
4. What steps are the government taking to support the Bal'ad community in disaster flood management?

CHAPTER TWO: LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

2.0 Literature Review

The chapter provided an extensive literature review of various articles and publications relevant to the fundamental ideas of floods, livelihood, and smallholder women farmers. It also created a conceptual framework to support understanding these concepts.

2.1 Definitions of key concepts

2.1.1 Flood

Flooding is a natural disaster that occurs when a region or area experiences excessive water due to heavy rainfall, storm surge, or other weather events (Luino, 2016). The earth may become saturated during heavy rain, causing runoff that overwhelms rivers, streams, and other drainage systems. The extra water disperses throughout the nearby terrain, frequently harming buildings, residences, and agricultural fields.

Flooding can induce topsoil erosion, which can harm agricultural practices (Balgah *et al.*, 2023). Floodwaters can pick up and carry away the nutrient-rich top layer of soil, known as topsoil, as they flow over land and cause soil erosion. Due to the increasing frequency of disasters like floods and droughts, the world's agricultural output and livelihoods depending on farming are especially dangerous (Balgah *et al.*, 2023). In Somalia, two types of floods occur, flash floods and river floods.

Flash flood

Flash floods occur when the land cannot absorb rainwater efficiently, leading to temporary lakes and wetlands (Balgah *et al.*, 2023). These floods are frequently triggered by intense or prolonged rainfall that surpasses the carrying capacity of watercourses located upstream (Billi, Alemu and Ciampalini, 2015). As a result, there is a rapid and forceful discharge of water downstream, characterized by its swift and decisive flow.

Strong or a series of rainfall events with limited infiltration capacity often trigger pluvial and river flash floods (Gosset *et al.*, 2023). When water infrastructure such as dams or water mains meant to store or transport water fails, flash flooding can occur extremely fast on streams and river tributaries. Due to its quick onset, this flooding can have profound effects that might harm houses and other structures and impair communications, transportation systems and hectares of agricultural products (Ahmed *et al.*, 2022).

In Somalia, flash floods have devastated communities, particularly those heavily dependent on agriculture for their livelihoods. The displacement of millions of people due to flooding exacerbates the already vulnerable conditions farmers and their families face (UN OCHA, 2021). When farmers experience such losses, it can significantly weaken their resilience and ability to sustain themselves.

River flood

River flooding occurs due to torrential rain covering watershed basins, leading to surges of water that cause rivers to overflow their banks (Gosset *et al.*, 2023). The duration of this flooding can range from days to weeks or longer. Riverine floodwaters are distinguished by slow riverside spills caused by heavy

rainfall that lasts for a long time (Balgah *et al.*, 2023). They devastate nearby residents and properties such as agricultural lands, buildings, business centres, and other livelihood assets. Moreover, the effects of river floods can persist for several years, as communities of developing countries cannot easily recover their losses.

Future climate change is expected to have many effects, including an increased risk of river flooding (Arnell and Gosling, 2016). Changes in precipitation patterns, intensities, and timing explain how the hydrological cycle may vary as the climate warms further. These changes may significantly impact river systems, raising the possibility of flooding. Human activities like deforestation, urbanization, and the modification of natural landscapes can affect water absorption and flow through river systems (Billi, Alemu and Ciampalini, 2015). By diminishing the land's natural ability to absorb and retain water and increasing runoff and flood danger, these changes may worsen the effects of heavy rains.

The Bal'ad district is prone to both river floods and flash floods. These two types of floods occur in the Southern regions of Somalia due to various factors, such as heavy rainfall or excessive rainwater over an extended period, which causes the river to overflow its bank (An, 2020). In Bal'ad, river floods mainly occur.

2.2 Flood Management

Flood control is one of the community's most urgent environmental challenges (Gökçekuş, Kassem and Yusuf, 2021). While preventing natural hazards such as floods is difficult, many ways exist to reduce their effects. Drainage systems, levees, and flood-control structures can contribute to reducing the impacts of flooding. Advanced technologies, such as early warning systems, are essential for accurately predicting and monitoring floods, as they can help pre-protect against flooding hazards (SWALIM, 2007). The government plays an important role in flood management by developing flood rules and regulations, coordinating emergency response activities during floods, and promoting public knowledge about flood dangers, safety measures, and preparedness techniques.

Flood prevention and water management structures, such as canals, drainage pathways, barriers, waterways, and rehabilitated floodplains, are beneficial in preventing or mitigating the effects of floodwater (Twigg, 2015). These structures manage water flow during heavy rains or high river levels. The function of these flood management is to monitor and control water movement, reducing the risk of flooding. Community initiatives, like flooding prevention and reservoirs, will probably need community funding for implementation and the capacity and organization required for management and service (Twigg, 2015). Multiple initiatives fail in the long-term because they focus on technological infrastructure and hardware rather than creating the community capabilities required to manage technological systems.

2.3 Smallholder Farmers

A smallholder farmer is an individual or household involved in agricultural production on a small scale. They own or manage a small plot of land, rely on their farming activities for their livelihoods from family members, and utilize agriculture as their primary means of revenue production and food availability (Vignola *et al.*, 2015). Smallholder farming is common in developing countries and essential to food security, rural development, and poverty reduction, and it typically uses antiquated farming tools.

Smallholder farmers generally employ family members' labour because their farms are small and frequency range from 2 to 10 hectares (Aniah, Kaunza-Nu-Dem and Ayembilla, 2019).

Small-scale farmers face various limitations, such as low crop yields, low productivity, and difficulty accessing markets and credit. Credit is essential for them in order to invest in improved agricultural products (Wondimagegnhu *et al.*, 2019). These difficulties mostly impact smallholder farmers, leading them to seek additional sources of income other than farming to offset the risks connected with agricultural output and improve their long-term financial stability. Nevertheless, non-farm alternatives are limited, and the income gained from such activities needs to be increased, making poor rural populations even more vulnerable (Wondimagegnhu *et al.*, 2019).

2.4 Smallholder Women Farmers

Smallholder women farmers contribute to the world's food availability (Owusu and Yiridomoh, 2021). According to the Food and Agriculture Organization (FAO), women comprise about 43% of the world's agricultural workforce in developing nations. Small-scale agriculture has consistently been the primary source of livelihood for those living in Sub-Saharan Africa, and it will still be so over time (Kaur, 2021). In certain regions, women smallholders encounter various limitations compared to men who are also engaged in small-scale agriculture. These challenges include limited land, credit, resource access and inadequate education and training opportunities (Tsige, Synnevåg and Aune, 2020).

According to many research, rural women are disproportionately in danger from the negative consequences of climate change (Jost *et al.*, 2016). The impacts of climate change significantly harm women who are small-scale agricultural producers as they rely on agricultural output and possess fewer environmental assets (Yiridomoh *et al.*, 2021). For example, these women face challenges such as reduced crop yields, increased vulnerability to extreme weather events like droughts or floods, and limited access to resources and technologies that could help mitigate climate risks.

Since males tend to pursue other careers, women do more farming responsibilities. Consequently, they need more opportunities to use agricultural resources like land, support facilities, and products to adapt to unpredictability and change (Jost *et al.*, 2016). In certain societies, women may not own property or have land for farming; instead, they only inherit from their parents or spouses after they pass away. Additionally, gendered societal norms and duties might limit women's ability to adapt.

Women in underdeveloped countries are more likely to engage informal labour, such as subsistence farming, household duties, and parental care tasks (Naz and Saqib, 2021). This type of job is frequently not recognized or valued economically, making it harder for women to save or build resilience against natural disasters.

The clan structure serves as the foundation of the largely patriarchal society of Somalia. Due to substantial gender disparities, Somalia ranks as the fourth-worst nation globally for its situation of women (FAO, 2021). Under traditional customs, women and girls are still treated as minors. Additionally, they are mainly left out of political decision-making since they cannot join community members or clan systems (FAO, 2021).

In the Bal'ad district community, men primarily own the lands, particularly farmlands, which results in men taking on the primary role of managing the family than women (Ahmed, 2018). Consequently, women residing in the Bal'ad district are vulnerable to disasters like floods and droughts due to their limited access to resources.

2.5 The Effects of Floods in Somalia

Climate change is a global issue that affects many aspects of life and the environment (Vu, Liu and Tran, 2019). Somalia is one of the countries most exposed to the effects of climate change, such as the effect of floods. The country is already experiencing recurring droughts and floods, which have devastating effects on the livelihoods of millions of people (An, 2020).

Climate change has resulted in food and water shortages, animal husbandry losses, and population relocation in Somalia. These outcomes have had severe social and economic complications, including increasing poverty, environmental clashes, and displacement. The floods significantly restrict and obstruct growth and development, making rural populations more vulnerable and expanding and spreading the incidence of poverty (Gure, 2021). These destructive floods not only hinder the advancement of economic growth but also limit access to essential services, disrupt agricultural activities, displace populations, and impede infrastructural development.

Flooding is a serious agricultural disaster as it negatively effects agriculture and destroys types of crops and soil (Balgah *et al.*, 2023). The floods also effect livelihood assets, such as physical and natural assets, destroy homes, roads, and bridges, and kill livestock (Ahmed *et al.*, 2022).

This year (2023), floods have occurred in many parts of Somalia. Severe rains in the southern areas have generated flash floods, and the rains have filled the rivers and caused floods, resulting in further losses such as mortality and property devastation. For example, in the Beledweyne district, part of the Hirshabelle regional government, the flood affected the entire district and its surroundings after the river flooded. The flooded river has also reached the Buulo Barte, Jowhar, and Bal'ad districts under the same Hirshabelle regional territory (FAO, 2023) .

2.6 Livelihoods

Livelihoods are the numerous methods, plans, and activities used by people, households, and communities to secure their means of subsistence and promote their well-being (DFID, 1999). Livelihood involves the interaction of various types of capital and is influenced by societal capital, which includes social, human, financial, physical, and other natural aspects of a community's resources (Woyesa and Kumar, 2021).

A sustainable livelihood can withstand and rebound from stress and shocks while improving its capacities and resources, offering long-term opportunities for future generations, and positively impacting national and global livelihoods (Woyesa and Kumar, 2021). In Sub-Saharan Africa, land tenure is among the most significant factors measuring smallholder farmers' livelihoods (Wondimagegnhu *et al.*, 2019). However, women are less likely to be landowners than males and tend to pursue non-farming livelihoods in sub-Saharan countries according to Owusu and Yiridomoh (2021), though they can be land users.

Weather-related occurrences have disastrously impacted Somalia since there are insufficient disaster response and water management systems (IFRC, 2023). The livelihoods of whole people are threatened by damaged crops and animals and degraded crop supply networks and trade.

2.7 Vulnerability Context

The Vulnerability Context refers to the external situations in which individuals live, according to DFID (1999). It includes significant trends, unexpected shocks, and seasonal changes that tremendously influence people's lives, resources, and asset availability. Trends include long-term patterns and changes in economic, social, and environmental conditions that impact the well-being and resilience of individuals or communities. Unexpected shocks, such as unforeseen events or crises, include natural disasters like droughts, floods, conflicts, and economic problems. Seasonal changes encompass agriculture, food prices, and resource availability.

Flood risks are one of the vulnerability context shocks; they come unexpectedly and destroy assets and livelihoods. Naz and Saqib (2021) argue that 'vulnerability denotes the extent to which individuals or properties are susceptible to harm caused by hazards, while resources refer to the assets expected to diminish due to the aftermath of potential threats.

Conflicts have a significant impact on the production of smallholder farmers. In semi-arid Sub-Saharan Africa, conflicts related to natural resources, particularly land, have been exacerbated by increasing population pressure and competing political interests (Ellis, 2005). Land degradation is a key driver of these conflicts, which has significant implications for agricultural practices and traditional migratory herding. In Somalia, the lack of security and clan-related conflicts make rural communities vulnerable. Political instability, violent conflict, and extremist groups have afflicted the country for decades.

The absence of security has significantly impacted Somalia. The nation has encountered tremendous difficulties sustaining security and stability over the past three decades. In the wake of the central government's collapse in 1991, Somalia fell into disorder and lawlessness (Ramsbotham, Woodhous and Miall, 2016). Various warlords and factional leaders emerged, each governing different regions and frequently engaging in violent wars with opposing factions.

Establishing control and ensuring the population's protection in this chaotic environment proved challenging for any centralized authority. Consequently, ineffective administration allowed radical organizations like Al-Shabaab to gain power and launch assaults, further destabilizing the nation. The war and insecurity led to over 1.3 million internal displacements in 2009 (Ramsbotham, Woodhous and Miall, 2016).

The vulnerability context has been considered the degree to which individuals or things have the potential to be impacted by a hazard (Naz and Saqib, 2021). At the same time, resources are assets that decrease due to the consequences of hazards. Therefore, the vulnerability context of this research focuses on seasonality and floods.

Somalia is vulnerable to climate change and accompanying natural catastrophes, which present enormous difficulties to the nation's future development, food security, and reducing poverty (Gure, 2021). Smallholder female farmers in Bal'ad are among the vulnerable populations affected by climate change like floods.

2.8 Livelihood Assets

Livelihood assets are resources or skills that people, households, or communities use to make income and maintain their way of life. The essential assets for livelihoods in the framework for sustainable livelihoods are divided into five primary groups known as forms of capital (DFID, 1999). These include social, natural, financial, human, physical and natural. These livelihood assets are relevant to this research because it is necessary to the Bal'ad rural community, which is affected by disasters like droughts and floods.

Human Asset is fundamental to livelihood diversification and their significance in Sub-Saharan Africa's growth. Increasing livelihood diversity has a positive influence on lowering poverty and vulnerability. This method depends on and contributes to the development of human capital, which comprises knowledge, competencies, and an openness to new ideas (Ellis, 2005). It generates revenues and remittances, which extend household alternatives by providing flexible financial resources. In the context of smallholder farming, it is frequently noticed that women are more vulnerable to human capital than males (Naz and Saqib, 2021). For example, women smallholder farmers often face challenges accessing essential resources such as land, credit, and agricultural inputs. Limited land ownership and control access can restrict their ability to invest in and manage their farms effectively. This lack of resource control can hinder their capacity to develop their human capital and agricultural skills.

Physical Asset refers to the tangible assets used in production, such as machinery, equipment, and tools or land, buildings, and infrastructures (Azumah, 2023). Floods are more vulnerable to physical assets like buildings and roads and often destroy them (Azumah, 2023). Smallholder farmers often need farming equipment and tools which can significantly enhance their agricultural productivity and reduce labour requirements. These tools can be hoes or advanced types of equipment like tractors. In many developing countries, society cannot afford advanced materials. Instead, they use traditional ploughing equipment such as weeding hoes, pick mattocks, spading forks, and sickles (DFID, 1999).

Social Asset describes the benefits and resources people and communities develop through social networks and connections. It involves the relationships, trusts, and standards that allow individuals to cooperate and work together (Azumah, 2023). It plays a significant role in smallholder farmers in rural areas mitigating the impacts of climate disasters like floods and droughts (Amare and Simane, 2017). Social cooperation facilitate the dissemination of information about weather patterns, forecasts, and early warning systems (Gure, 2021). During floods or droughts, social capital enables smallholder farmers to come together and provide mutual support and share resources such as water, seeds, or livestock feed to mitigate the impact of natural disasters.

Financial assets refer to various economic resources that enable families to build money, make savings, and create livelihood plans to support their way of life (Azumah, 2023). Access to financial services is essential for individuals and households, particularly those with low incomes or poverty since it allows them to manage their cash flow. Loans, savings such as cash deposits and insurance are forms of social safety (DFID, 1999). Somalia needs more suitable financial systems, especially in countryside areas. Hawalas are essential in facilitating remittance transfers from Somalia overseas to their family back home (FAO, 2021). Moreover, the informal financial system, including hawala, has played a significant role during disasters such as droughts and floods.

Natural assets are the term used to describe the availability of natural resources, including air, water, land, rivers, forests, and biodiversity (Woyesa and Kumar, 2021). These resources form the foundation from which flows of resources and services are derived, which are crucial for supporting human livelihoods. Examples of such services include nutrient cycling, which ensures the availability of essential elements for plant growth, and erosion protection, which helps to safeguard productive soils (DFID, 1999). Farmers consider land the foundation of natural resources as an essential component of their economic assets. The land size they own represents the extent of their natural resource inventory (Azumah, 2023).

2.9 Policies, Institutions and Process

Policies and institutions are critical in shaping communities' socioeconomic and environmental conditions (DFID, 1999). They determine access to resources, livelihood opportunities, decision-making processes, and the well-being of smallholder farmers. These policies and institutions directly impact people's sense of integration and ability to cope with challenges such as floods and droughts. By implementing effective policies and institutions, governments can support livelihood adaptations and mitigation strategies in response to floods. These strategies enable smallholder farmers to adjust and adapt to the changing circumstances imposed by flood conditions.

Moreover, decision-making processes can be structured to ensure the participation and inclusion of disaster-affected communities, allowing them to develop and implement adaptation and mitigation strategies. By providing the necessary support, policies and institutions can enhance resilience and minimize the negative impacts of hazards on livelihood. They also shape long-term development and sustainability efforts.

When natural disasters such as floods occur, national and local governments determine how communities respond to the disaster. (Gure, 2021). National and regional governments have important roles in developing institutions and procedures to address community disaster management circumstances, particularly in dealing with floods. The local government's principal function is to plan and manage each element of the community's recovery during and after the disaster (Marfai, Sekaranom and Ward, 2015).

2.10 Coping Strategies

Coping strategies are activities, attitudes, and procedures people or groups use to manage and adapt to stressful or difficult situations (Mamta Mehar, Surabhi Mittal, 2016). Smallholder farmers' food security and livelihoods suffer significantly due to flood-related relocation since they turn to harmful coping mechanisms that limit their potential to recover from future hardship.

In many developing nations, particularly in areas prone to natural hazards such as floods and droughts, communities often have limited capacity to cope with these challenges (Twigg, 2015). They rely heavily on their local knowledge and traditional practices to address and mitigate the impacts of such hazards. For example, farmers have long-established drought and flood resistance coping mechanism strategies, which include shifting animals to different places and selling cattle. Coping strategies can give valuable insights into how long-term might effectively prepare and manage climate change in local communities (Mubiru *et al.*, 2018). Traditional structures that support and safeguard communities are present in Somali society. Somalis have significantly benefited from the traditional institutions and coping strategies that have let them endure and bounce back from repeated shocks and difficulties such as conflicts, droughts, and floods.

2.11 Capacity

Capacity is the collective power and ability of individuals, groups, and communities to grow and maintain their skills and resources, allowing them to make well decisions and take practical steps to reduce the impact of disasters (Hagelsteen and Burke, 2016). Climate change has a wide variety of negative impacts on numerous nations at various levels across the world. Nonetheless, the most severe extreme effect falls disproportionately on developing countries (Aniah, Kaunza-Nu-Dem and Ayembilla, 2019). They have a limited capacity and adapt to the consequences of climate change. Weak institutional frameworks have hindered developing nations' ability to develop and implement adaptation measures effectively. Building society's capacity requires a skilled workforce capable of implementing and managing climate change adaptation initiatives.

Female small-scale farmers often have lesser adaptability capacity due to their dissimilar access to resources (Owusu and Yiridomoh, 2021). They frequently encounter various obstacles that prevent them from accessing necessary resources, including land, financing, seeds, fertilizers, machinery, and technology. Numerous factors contribute to these inequities, including discriminatory societal norms, legislative restrictions, fewer educational possibilities, and a lack of resource control. Pastoralism and nomadic lifestyles, for example, have helped communities adapt and endure in times of crisis, such as floods, droughts, or conflicts. These processes entail migrating people and livestock, searching for water and grazing places, guaranteeing livelihood preservation, and minimizing the effects of catastrophic calamities.

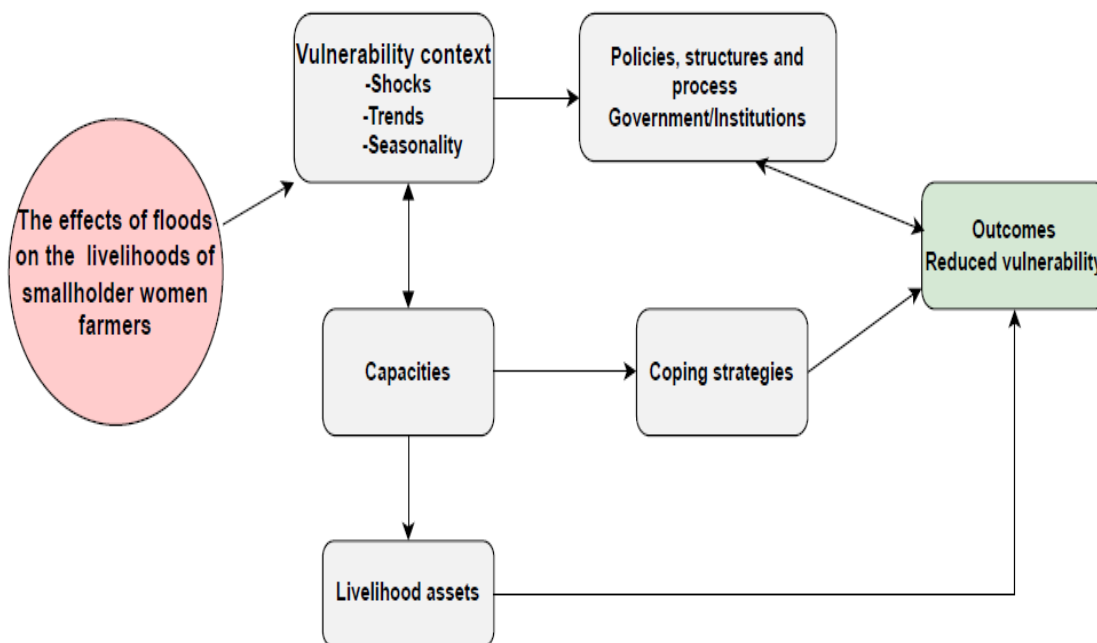
2.12 Conceptual Framework

The conceptual framework of this research highlighted how small-scale farmers use various techniques to cope with the consequences of flooding. It allows to attain better sustainable livelihood results (DFID, 1999).

Interactions with authority, such as government institutions and policymakers, can significantly influence livelihood opportunities and outcomes.

The below framework [figure 3] illustrates the conceptual framework adjusted from DFID, which was used to describe the vulnerable context of the community living in the Bal'ad district, including farmers, livestock, and other assets affected by floods.

Figure 3: Conceptual framework



Source: Adapted SLF conceptual framework (DFID, 1999)

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Introduction

This chapter provides and discusses the study's research methodology. It contains the study area, research design, sampling method, data sources, data collection and limitations, data analysis and processing and ethical consideration.

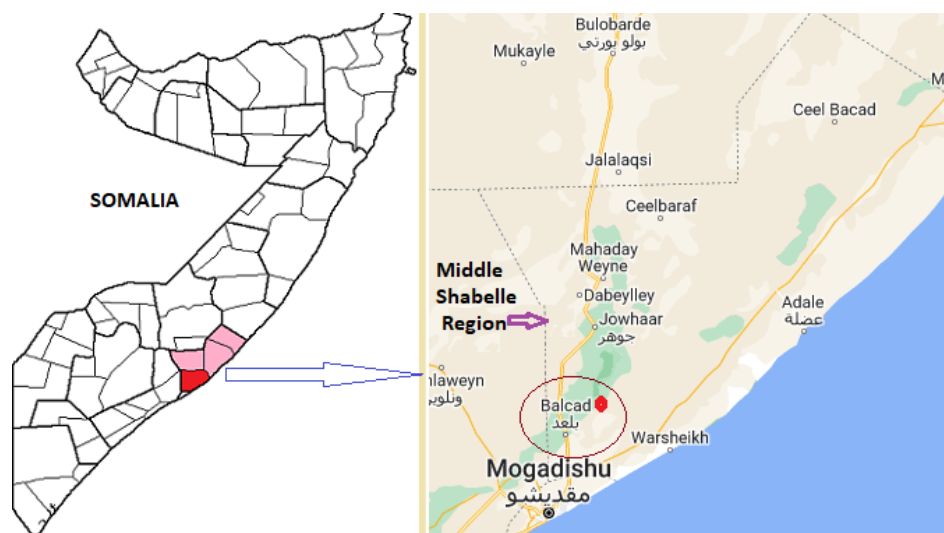
3.1 Study Area

Bal'ad district [fig. 5] is in southern Somalia, within the Middle Shabelle region. The area is approximately 35 kilometers northeast of Mogadishu's capital city and covers about 4,380 square kilometers (Citypopulation, 2019). It stands as the second-largest district in the Middle Shabelle region. The Bal'ad area is inhabited by approximately 255,291 people, with more than 75% residing in rural areas (Citypopulation, 2019). Most of the population is comprised of farmers and pastoralists.

The district's economy is based on agriculture and livestock, with crops such as sorghum, millet, beans, and maize being essential sources for local farmers. In addition to crop farming, goats, cattle, and camels are crucial to the local economy. The district is along the Shabelle River, prone to flooding during heavy rainfall or when it exceeds capacity. The community has experienced devastating floods, causing displacement of people, loss of property crops, and disruption of livelihoods (An, 2020). Apart from climate challenges, the district faces insecurity and instability due to the presence of an extremist militant group.

Area Selection: Bal'ad [figure 4] is one of the areas that are affected by floods annually. The reason for selecting the Bal'ad district is that the floods strongly impact the community, particularly women farmers. There is a need to raise awareness among the government and NGOs about this issue. The Somali Farmers Association organization aims to draw the attention of aid agencies and the government to assist and support smallholder women farmers in Bal'ad affected by the flood disasters.

Figure 4: Bal'ad map, Middle Shabelle region, Somalia



Source (google.com/map, 2023)

3.2 Research Design

The research methodology for this study is based on the case study approach. A desk study was carried out before conducting the fieldwork. It involved exploring relevant literature related to the chosen field of study. Qualitative research was utilised to understand the research area better to identify gaps in knowledge (Tomaszewski, Zarestky and Gonzalez, 2020).

3.3 Sampling and Data Collection

Data Collection: The data sources for this case study included secondary and primary data. Secondary data was collected through a desk study and review of relevant literature, reports, and related documents. Primary data was collected through semi-structured interviews with smallholder women farmers in the Bal'ad district who had experienced floods, focus group discussions, key informant interviews with government officials, and observations (Busetto, Wick and Gumbinger, 2020).

Due to security circumstances, assistance was sought from trusted colleagues in the home country to support the data collection process. The colleagues were responsible for gathering the necessary information and data on behalf of the researcher. Communication occurred online through voice and video calls, with the colleague's sharing notes, pictures, recorded voices, and videos related to the fieldwork. The research assistant used Somali for the interviews since it is the native language of the interviewees.

My role as a lead researcher included creating detailed protocols and guidelines, implementing quality assurance measures to ensure the collected data's accuracy and integrity, joining online with research assistant during data collection, overseeing and managing the data conducted by colleagues, and drafting reports.

Sampling: The sampling method for this case study was purposive because it focused on a specific population of interest, aiming to gain an in-depth understanding of participants with flood experience (Busetto, Wick and Gumbinger, 2020). The participants selected were smallholder women farmers who had experienced floods and resided in flood-prone areas. Additionally, the community shared language, ethnicity, religion, and cultural similarities.

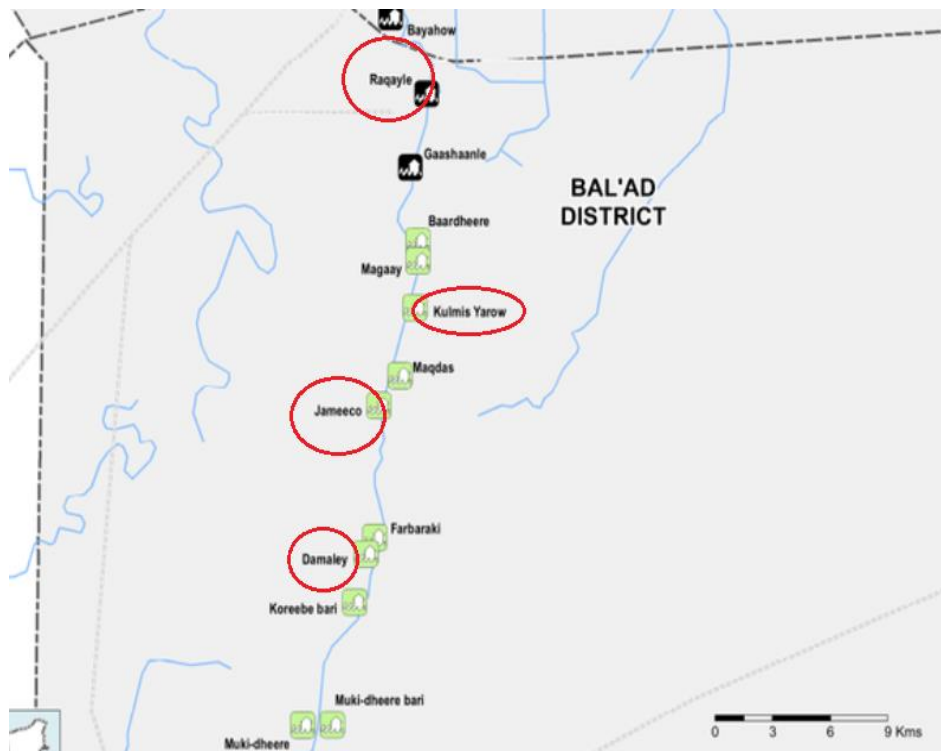
Purposive sampling was employed to select participants for the focus group discussions (FGDs) to obtain in-depth information. Semi-structured interviews (SSI) were conducted to collect rich data, particularly when addressing sensitive issues. Key Interview Informants (KIIs) were chosen using snowball sampling to gather information from government representatives, NGOs, and individuals with specialized knowledge or expertise in floods. To ensure sufficient data within the limitations of time, security, and available resources, the respondent group comprised 30 individuals. They included 14 smallholder women farmers interviewed through semi-structured interviews and one focus group discussion (FGD) with 16 flood-affected women and men to express their perspectives on the challenges of floods and the support they receive, 2 government officials, 1 flood expert, and 1 NGO staff member. The selection criteria were considered factors such as age, gender, marital status, level of education, flood-related experience, and knowledge. The locations of sampling data consisted of 5 villages in flood-prone areas near the river in the Bal'ad district, as shown in the table and map below.

Table 1: SSI resident location villages of flood-prone areas in Bal'ad district

SSI Respondent's resident villages in Bal'ad	No. of respondents
Buula-Raqay	2
Damaleey	3
Jameeco	1
Barwaaqo	4
Kulmis Yaroow	4
Total	14

Source: Author, (2023)

Figure 5: Map of flood-prone villages near the river in Bal'ad district



Source: UN OCHA (2015)

The above figure (5) illustrates the flood-prone location of Bal'ad district. These villages, located near the riverbank, were chosen as the sampling areas for the research study.

Table 2: Sampling

Participants	Focus	Numbers
FGD	Smallholder women and men farmers	1
SSI	Smallholder women farmers	14
Experts	Flood expert	1
KIIs	Government official	2
NGO staff	Aid worker	1

Source: Author, (2023)

Semi-Structured Interview (SSI)

The researcher first developed a set of open-ended interview questions aligned with the sub-research questions. Pre-testing interviews were conducted among colleagues before the researcher brought the list to the field to make sure the questions addressed the sub-research questions and to identify any changes that needed to be made.

The research assistant then chose contents who could provide valuable insights into the sub-research questions. Criteria such as knowledge, experience, and specific demographics were used in the selection process, and every SSI session with interviewees took 45 to 60 minutes. These SSI interviews offered valuable data to the research assistant, which assisted in the research.

Photo 1: SSI respondent of smallholder women farmer and the researchers



Source: Author, screenshot and normal shot of researchers and SSI respondent (2023)

Key Informant Interviews (KIIs)

Key informant interviews (KIIs) were a valuable qualitative research method used to gather in-depth information and insights from key individuals with specific knowledge or expertise related to the research topic (Tomaszewski, Zarestky and Gonzalez, 2020). In this case, the research topic focused on understanding the effects of floods on the livelihoods of smallholder women farmers. The KII sessions involved 3 key informants: 2 government officials, 1 flood expert, and 1 NGO staff member.

These key informants are important for the research study because government institutions influence flood management laws and policies. Non-government organisations are also involved in community preparedness, relief, and recovery programmes during and after the disaster. Flood management experts have flood experience and can provide helpful information about the challenges and possible solutions.

During the KII sessions, the research assistant engaged with each informant for 45-60 minutes. The aim was to explore their perspectives and gather detailed information on how floods impacted smallholder women farmers' livelihoods and their roles. The research assistant competence in conducting the interviews allowed us to extract valuable insights and firsthand experiences from the informants.

The data obtained from the KIIs were documented in note-taking and recorded audio using a recording device. This approach ensured the accurate capture of the information shared during the interviews. The rich and detailed information obtained from the key informants greatly assisted the researcher in preparing for and conducting subsequent field investigations.

The results obtained from the KIIs were instrumental in answering the last sub-research question related to the steps the government, NGOs, and flood experts are taking to support the Bal'ad community in disaster flood management of smallholder women farmers. The qualitative data collected through the KII sessions provided a comprehensive understanding of the challenges faced by smallholder women farmers in flood-affected areas. They offered valuable insights into potential strategies for mitigating the impacts of floods on their livelihoods.

Photo 2: KII Interview, the research assistant, and Deputy Commissioner of (SoDMA)



Source: Author, (2023)

Focus Group Discussions (FGDs)

The research assistant conducted a Focus Group Discussion interview and prepared an open space near the river. The research assistant has chosen this place due to security issues. FGDs were held with both women and men to explore their perceptions of floods and their effects. Mixed-gender focus group discussions in Bal'ad smallholder farmers produced a more comprehensive dataset, reflecting the diversity of experiences, challenges, vulnerabilities, coping strategies associated with floods and opinions of the smallholder farmers community.

Due to poor security in the area, gathering women in a central location took much work. Therefore, the research assistant decided to limit the interview time. All sub-research questions were asked to both groups to understand the differences between men and women before and after the disaster.

Considering the cultural context, where women tend to be shy, the research assistant encouraged them to freely express themselves despite their fears about the extremist group partly controlling the district. The FGD interviews lasted for 1 hour, during which data was collected using a voice recorder and notebook. The results of the FGD interview were effective.

Photo 3: FGD interview of smallholder farmer participants and the research assistant



Source: Author, (2023)

Some of the men and women participating in the FGD interview refused to have their photos and videos taken, citing their safety concerns. The researcher published only the pictures and videos of those who felt comfortable.

3.4 Data Processing and Analysis

After the information was gathered from the field, the data analysis commenced. The recorded focus group discussions (FGDs), key interview informant (KII), semi-structured interviews (SSIs), and observations were transcribed using translation tools from Somali to English (Busetto, Wick and Gumbinger, 2020). Before data collection, the Semi-Structured Interview (SSI) questions were tested with colleagues to ensure their effectiveness and appropriateness for the research objectives. The coding process involved carefully reading the transcripts to identify relevant information units. Triangulation was employed to ensure consistency and reliability by comparing findings found in the research field (Tomaszewski, Zarestky and Gonzalez, 2020). The implications of the findings were discussed, including how they contributed to addressing the identified knowledge gaps. Finally, the findings were organized according to sub-research questions, which helped structure the results section of the research report. The data was reviewed to ensure a clear understanding of the variables and their meanings. The relevant themes that emerged from the data were determined.

3.5 Ethical Consideration

The research assistant secured the participants' informed consent before starting the focus group discussions and interviews. Securing informed consent and ensuring confidentiality, anonymity, and safeguarding of participants' privacy are crucial ethical considerations in any research involving human subjects (Azumah, 2023).

The research assistant responded appropriately to protect the privacy of the participants. By ensuring the participants' privacy, the research assistant created a safe environment in which participants felt comfortable sharing their thoughts, experiences, and opinions, and it prepared a place for their own story of the respondent during the data collection.

The research assistant let the respondents know that their identities and personal details would be kept confidential to create a safe environment for sharing sensitive or privileged information. Anonymity further protected the participants, as their responses and contributions were anonymous. The data collected from each participant was coded to prevent individual identification, ensuring their privacy, and reducing the risk of potential harm.

3.6 The limitations of the research

In Somalia, conducting research related to women was a critical issue. The extremist group partially controlled the area where I had planned to conduct my research. The security issue was one of the limitations that prevented me from carrying out my thesis research in my country.

During the data collection, the research assistant also faced several significant limitations, particularly due to the security situation in the Bal'ad district, controlled indirectly by the extremist group. These limitations had a direct impact on the research timeline and the way data was collected. Some of the critical limitations include:

Insecurity: Bal'ad district being under the indirect control of Al-Shabaab, posed a significant threat to the safety of the research team. This resulted in a delay in data collection, as they had to postpone their planned data collection from the third week of July until the end of the fourth week.

The delay has resulted in logistical challenges, such as rescheduling transportation, accommodations, and coordination with local research assistance and incurred different costs.

Security problems on the road: The research assistant faced security issues even during their journey to the Bal'ad district. While the team was travelling, they encountered armed individuals on the street and felt scared and insecure. The gunmen asked them questions about their destination. Although they did not mention the reason for their journey, they said they were heading to the Bal'ad district. That event was one of the challenges or obstacles that affected the research assistant while collecting the data.

Key Informants: The research assistant encountered several challenges during the planning phase of interviewing the KII participants. Due to the sensitive nature of government staff security, obtaining government representatives, especially those from the Somali Disaster Management Agency, for interviews required a considerable amount of time and effort. Fortunately, the research assistant utilized snowball sampling by leveraging existing connections and networks through individuals who knew them.

Participants needed to gain familiarity with interviews: Since most women farmers interviewed for the first time, they felt uneasy or shy during the Focus Group Discussions (FGDs). It has resulted in limited participation and a need for more time to build trust and rapport with the participants. Researchers and facilitators have created a safe and supportive environment during the FGDs to overcome these barriers to encourage more active participation. Furthermore, some participants, both women and men, have refused to have their photos or videos taken due to fear for their safety.

Internet Connection Problem: The research team experienced poor internet connectivity during data collection, occasionally resulting in disconnections.

CHAPTER FOUR: FINDINGS

The fourth chapter centres on analysing field study findings. The findings were organised around four sub-research questions; the effect of flooding on small-scale female farmers' livelihood assets, the capacities of women smallholder farmers to address their vulnerabilities, and the coping strategies used by smallholder female farmers when affected by floods. Furthermore, the chapter discusses the government and NGOs support to the Bal'ad community in disaster flood management. The results and findings were analysed in graphs, pie charts, tables, figures, and infographics.

4.1 Respondents' demographics

The research involved male and female participants who contributed data to facilitate the analysis.

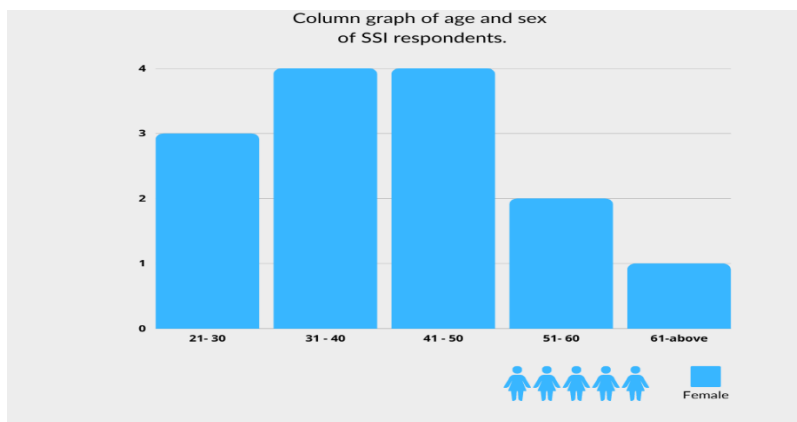
From the flowing table and column chart illustrates the age and sex of the SSI respondents.

Table 3: SSI respondents age and sex

Age	Female
21-30	3
31-40	4
41-50	4
51-60	2
61-above	1
Total	14

Source: Author, (2023)

Figure 6: The column chart of age and sex of SSI respondents



Source: Author, (2023)

The above figure (6) shows the age and sex of SSI respondents. The study involved 14 individuals of SSI. The respondents' ages vary from 21 to 61 and above. Age-wise, the oldest response was around 62. The most junior responder was in the 21–30 age group.

FGD Respondents age and sex

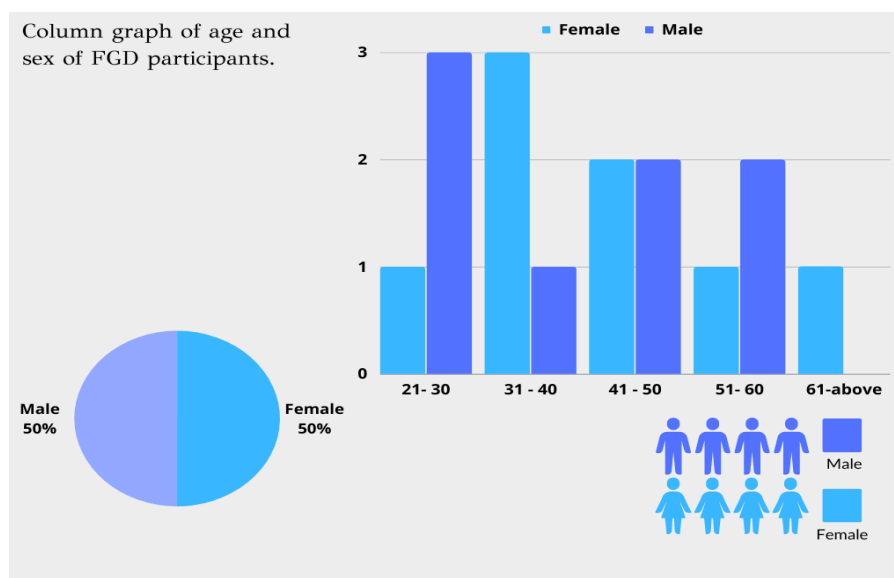
The age and gender of the research FGD participants are represented in the flowing table of column graph.

Table 4: FGD age and sex

Age	Female	Male
21-30	1	3
31-40	3	1
41-50	2	2
51-60	1	2
61-above	1	-
Sub-total	8	8
Total	16	

Source: Author, (2023)

Figure 7: The column chart of age and sex of FGD participants



Source: Author, (2023)

The provided Figure (7) displays information about the age and gender distribution of the 16 participants involved in the focus group discussion (FGD). The age range of the respondents falls from 21 years old to 61 years old and beyond, with the oldest participant being approximately 62 years old. The youngest participant falls into the 21–30 age category.

Key informants age and sex

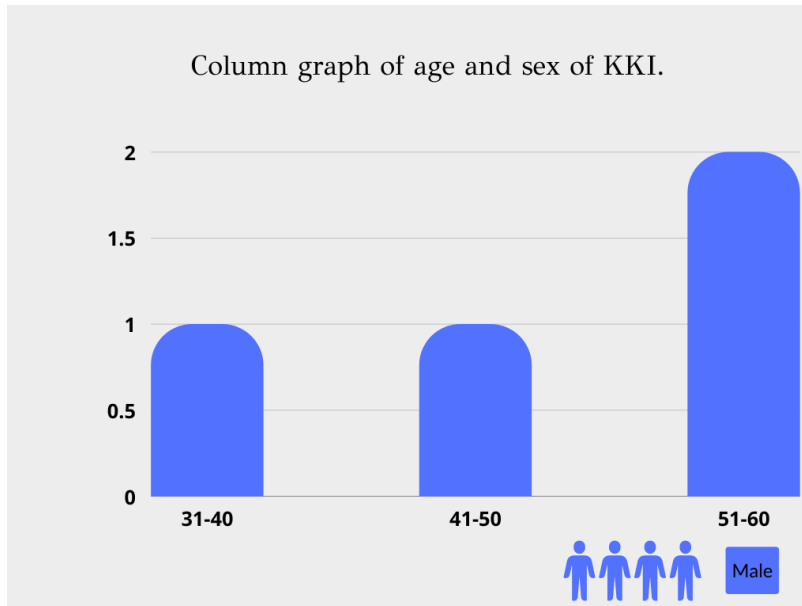
From the flowing table and column chart illustrates the age and sex of the Key Informants.

Table 5: KII age and sex

Age	Male
31-40	1
41-50	1
51-60	2
Total	4

Source: Author, (2023)

Figure 8: The column chart of age and sex of KII.



Source: Author, (2023)

The above figure (8) illustrates the demographic information of the key informant respondents, focusing on their age and gender. The study included 4 KII participants whose ages ranged from 31 to 60 years old.

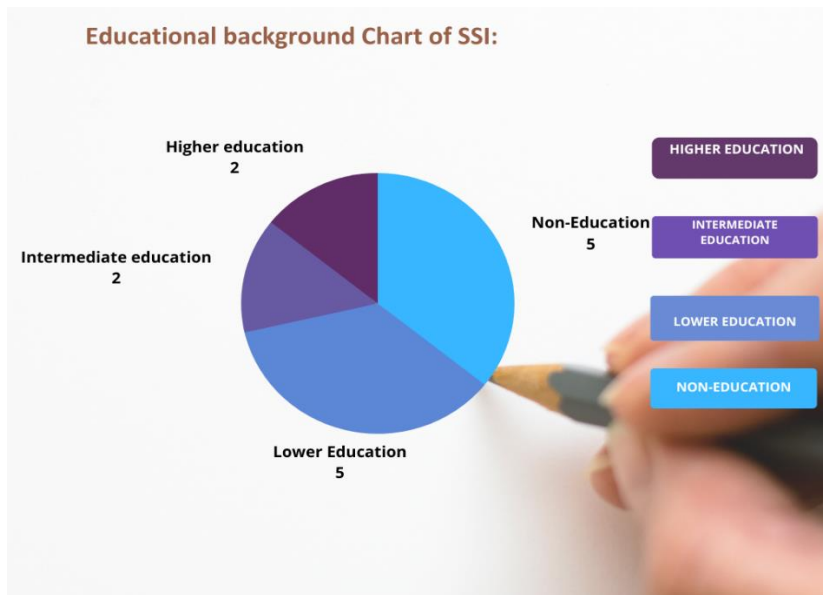
Educational Background level

Table 6: SSI Educational Background level

Education level	No.
Non-Education	5
Lower Education	5
Intermediate education	2
Higher education	2
Total	14

Source: Author, (2023)

Figure 9: Level of education of SSI respondents



Source: Author, (2023)

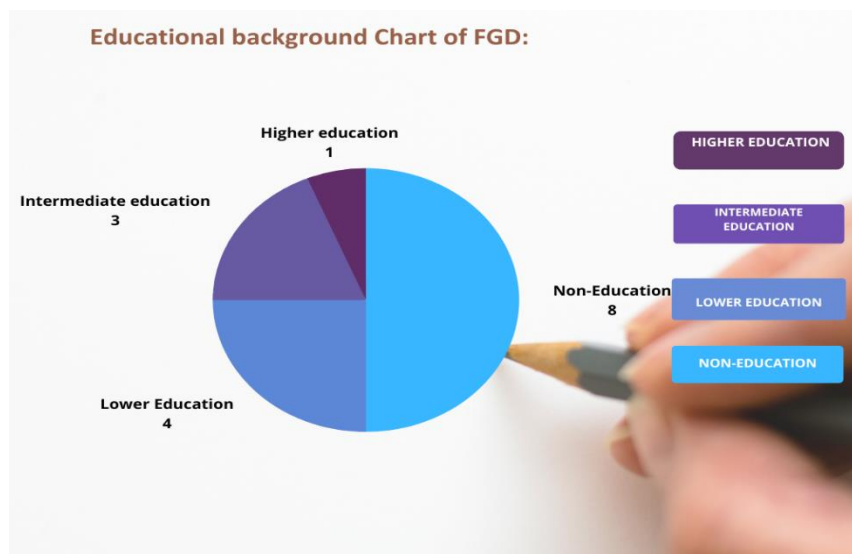
The figure (9) represents the level of education of SSI female respondents. Among the respondents, 5 were uneducated, meaning that over a quarter of the participants received no formal education. The number of respondents who studied at a lower education level was 5. This shows that most of the respondents had either less education or no formal education at all. Only 4 participants received intermediate and higher education. This indicates that a tiny number of respondents attained intermediate and higher education levels.

Table 7: FGD educational background level

Education level	No.
Non-Education	8
Lower Education	4
Intermediate education	3
Higher education	1
Total	16

Source: Author, (2023)

Figure 10: Level of education of FGD participants.

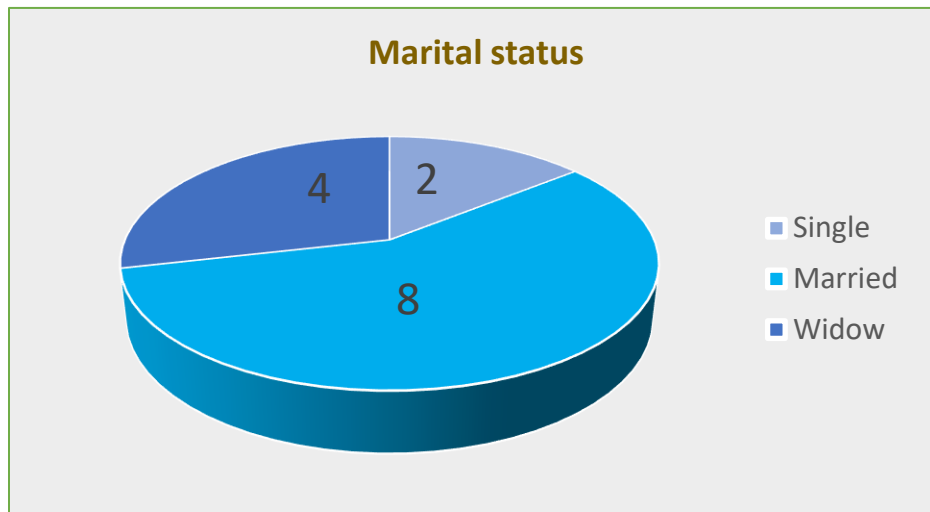


Source: Author, (2023)

The above figure (10) shows the educational background of the FGD participants. Most participants, specifically 8, did not have formal education, meaning that more than half of the group had no schooling. Additionally, 4 participants received education at a lower level, highlighting that most participants needed more formal education. On the other hand, only 4 participants had intermediate or higher education qualifications, indicating that a minimal number had attained these higher educational levels.

Marital status

Figure 11: Marital status of SSI smallholder women farmers

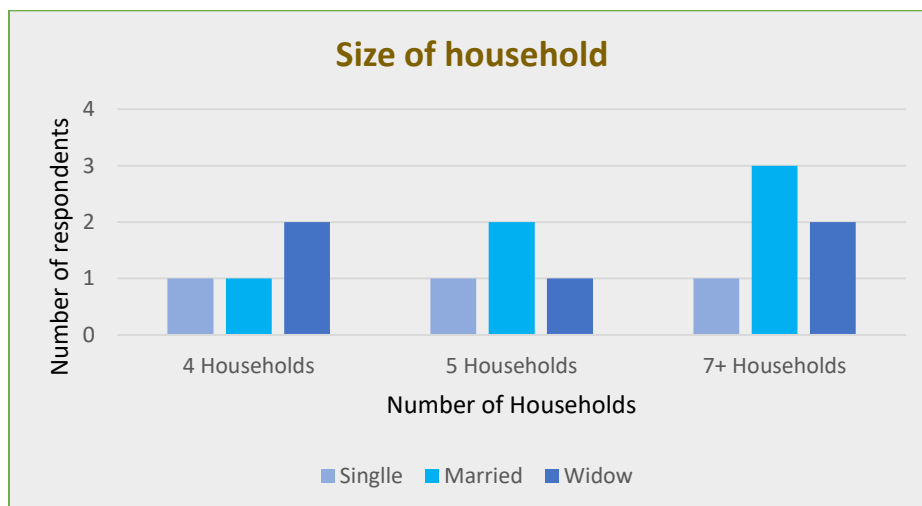


Source: Author, (2023)

The figure (11) displays the marital status of smallholder women farmers. Considering the experience of small-scale female farmers in agriculture and floods, the research assistant interviewed 14 individuals for the SSI. Out of these participants, 2 were single, 8 were married, and 4 were widowed. The aim was to gather important information from them.

Size of household respondents

Figure 12: Size of household



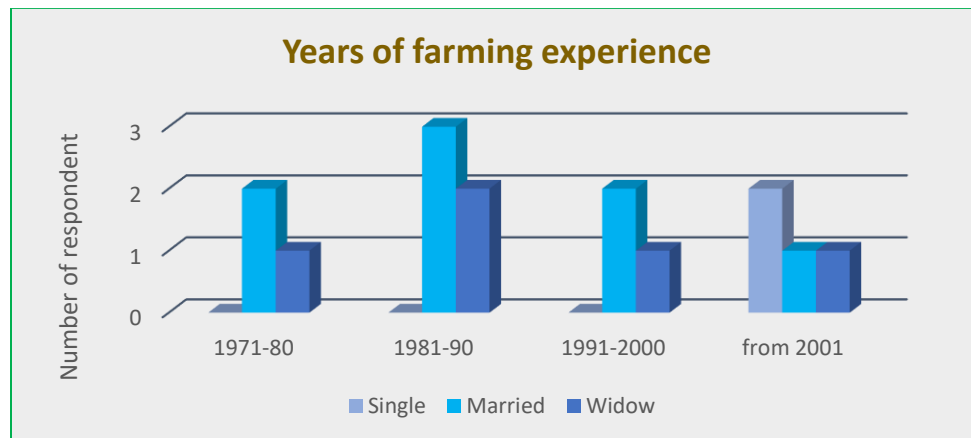
Source: Author (2023)

The column chart figure (12) above shows the size of household respondents among SSI. There is 1 single household, 1 married household and 2 widowed households that have a similar number of family members, ranging from 4 household members. Additionally, there is 1 single household, 2 married

households and 1 widowed household with 5 members. Furthermore, 1 single household, 4 married households and 2 widowed households have more than 7 household members.

Years of Farming Experience

Figure 13: Farming Experience



Source: Author (2023)

Based on the information from the above column chart figure (13), it can be observed that farmers mostly started their farming between the ages of 10 years old and above.

4.2 Flood affecting the livelihood assets of small-scale female farmers in Bal'ad.

The community living in the Bal'ad district, and its villages possess five types of livelihood assets. These assets include natural, human, physical, and financial assets. However, the occurrence of floods in Bal'ad district significantly affects these livelihood assets. Among the communities vulnerable to the impacts of river and flash floods are smallholder women farmers. Droughts, insects, and conflicts are also affecting the community.

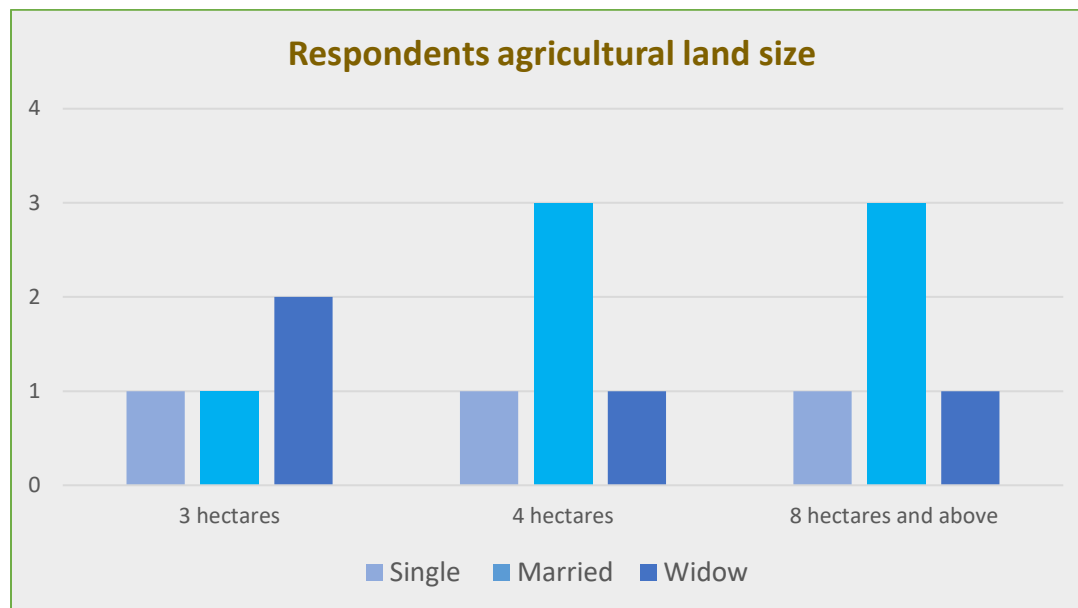
The findings from field research indicate that smallholder women farmers in the Bal'ad area are particularly susceptible to the adverse effects of floods on their livelihood assets. The following are the findings of Smallholder women farmers livelihood assets in Bal'ad district.

4.2.1 Natural assets

Smallholder women farmers in the Bal'ad district primarily depend on natural assets, including fertile land, water resources, and biodiversity. However, floods pose a significant threat to these resources. Severe flooding has led to soil erosion and sedimentation, reducing the fertility of agricultural land.

According to the study, the floods in the Bal'ad district caused displacement and damage to agricultural land, trees, and wildlife and killed livestock. Consequently, the floods have reduced agricultural production, leading to severe food shortages. The following chart represents the agricultural land size of smallholder women farmers in the Bal'ad district.

Figure 14: Respondents land size



Source: Author, (2023)

The figure (14) above illustrates the agricultural land sizes of smallholder women farmers respondents, classified into three categories: Single, Married, and Widow. In the 3-hectares land size category, there is 1 single farmer, 1 married farmer, and 2 widows. In the 4-hectares land size category, there is 1 single farmer, 3 married farmers, and 1 widow farmer. Lastly, in the 8 and above hectares land size category, there is a 1 single farmer, 3 married farmers, and 1 widow farmer. Somali farmers prefer to measure farmland in hectares. The respondents stated that they mostly inherited the land from their relatives.

As per the information provided in the graph column on the land size of smallholder women farmers from a semi-structured interview, there were findings related to the flood effect on natural assets in the Bal'ad district.

The findings revealed that smallholder women farmers in the Bal'ad district experienced significant challenges and disruptions due to floods. The flood effect on natural assets refers to the impact of flooding events on the land and other resources that these women rely on for agricultural activities and livelihoods. One of the respondents who is 56 years old, asked the question if she owns land and the importance of the land and stated:

"Asalamu alaikum, my son, as you can see, the land is the most important thing for smallholder farmers in Bal'ad. Without land, life is impossible because most of the Bal'ad society are farmers. They plant different types of crops, and their livelihood depends on farming" (SSI Respondent 2, SHWF).

"Floods first destroy agricultural crops and then create erosion, removing soil from above. This has an impact on soil fertility and production, making it harder for farmers to achieve good harvests. As a result, the floods left us with nothing" (FGD Participant 6, SHWF).

Floods significantly impact agricultural land, especially for smallholder farmers, and women farmers are particularly vulnerable to these effects. During the focus group discussion, participants highlighted how floods affect agricultural land.

The land sizes used by smallholder farmers are tiny compared to the number of family members they have. Smallholder women farmers argue that their land needs to be improved to meet their requirements. A respondent said:

"Most of us, we inherit farmland from our parents or husbands. When parents divide the land among their children for inheritance, they give each of them a portion of the land they had. As a result, each person gets a small portion, which is why each family has minimal agricultural land" (SSI Respondent 5, SHWF).

The research assistant observed the farmland of smallholder farmers. The photo below represents one of the maize farmlands.

Photo 4: Smallholder women farm near the riverbank in Bal'ad



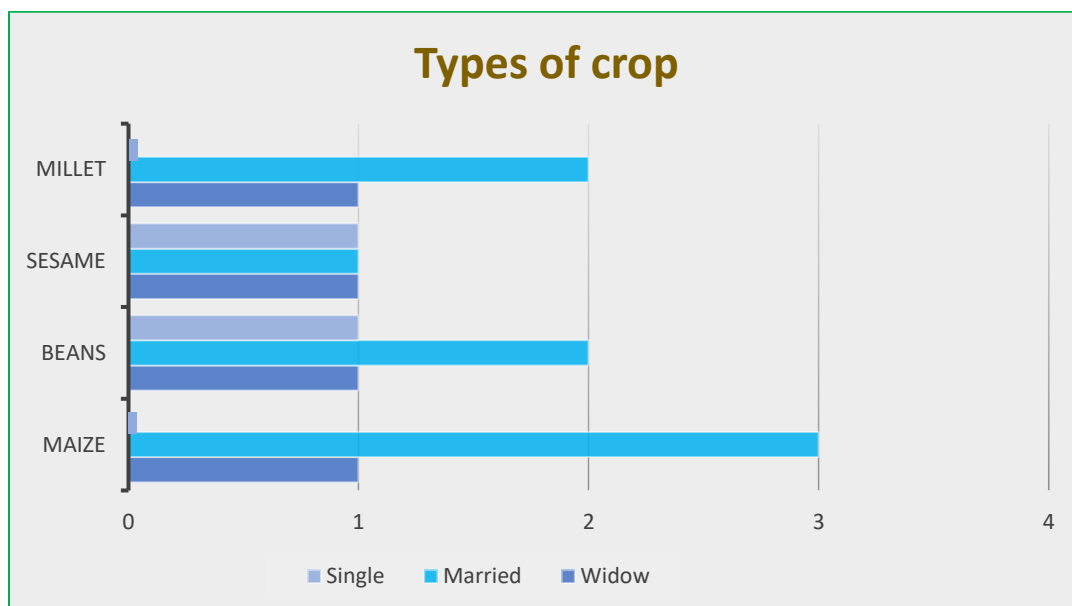
Source: Author (2023)

The above photo (4) is a farm near the river. It belongs to one of the respondents, and we can see that it is prone to flooding due to its proximity to the river. Most of the floods cause damage to the farmland around the river.

4.2.2 Physical Assets

Smallholder farmers in the Bal'ad district have a variety of physical assets to support their agricultural activities and livelihoods. The research assistant examined the physical assets of smallholder female farmers in the area. It shows old agricultural tools and equipment, such as hoes, shovels, and ploughs, which are necessary for various farming duties. Seeds and planting supplies are also physical assets used by smallholder women farmers. The below bar chart describes the different types of crops cultivated by smallholder women farmers in Bal'ad district.

Figure 15: Types of crops



Source: Author (2023)

The information provided in figure (15) shows the types of crops used by small female farmers in the Bal'ad district. They predominantly grow millet, sesame, beans, and maize, as their livelihood depends on these crops. In the case of millet, there is plot cultivated by 2 married woman and 1 by widow. Sesame and beans are planted by 1 single woman, 1 married woman, and 1 widow. As for maize, it is grown in 3 plots by married women and in 1 plot by widowed.

The crops mentioned are adversely affected by floods, which pose significant challenges for small-scale female farmers. Floods cause crop damage or loss, soil erosion, and difficulties in planting and harvesting.

Photo 5: Maize farm effected by floods in Bal'ad (July-2023)



Source: Author, (2023)

The above photo (5) shows one of the maize farms affected by floods in July 2023 in the Bal'ad district, Somalia.

One of the participants who talked about the crops uses and how it affects the flood said:

"I grow beans, but it is always affected by drought and floods. At the beginning of this year, our fields were affected by floods caused by the rains in spring season" (FGD Participant 8, SHWF).

The research assistant observed that smallholder farmers plant other crops like maize and millet. The respondents declared that they do not have a market for the crops they cultivate. The reason respondent gave was:

"Even if I raise crops on my farm, there will be no market for the harvest. Whenever I try to sell the products, the aid workers bring similar food into the country, and then there is no value to our products, resulting in a loss for us. It discourages farmers from taking too long to plant" (SSI Respondent 4, SHWF).

Photo 6: Smallholder women farmers harvesting beans.



Source: Author (2023)

The photos (6) above show two women harvesting beans on their farm in the Bal'ad district. Farmers are having difficulty finding markets for their grown products, in addition to challenges with floods and droughts. According to responses, humanitarian organizations bring similar food supplies outside the nation. As a result, even if the farmers successfully cultivate their products, they struggle to sell, resulting in financial losses.

The research assistant observed that farmers use hoes for ploughing the farm and machetes for cutting the grass. Furthermore, the research assistant observed that a donkey cart is the primary physical asset employed by small-scale female farmers in the Bal'ad district. They use it to carry various agricultural produce, and other household necessities.

One of the men participating in the FGD interview highlights:

"The donkey cart is the only vehicle we use to transport our households. We use it to carry crops from the fields, such as maize, millet, and beans. We also fetch water from the river by bringing water cans. We even use it for evacuation when floods occur and to carry out our essential household materials"
(Participants 3, SHMF).

Farmers in the Bal'ad district are low-income and do not use modern farming equipment. They usually use traditional, non-mechanized tools that do not require fuel.

Photo 7: Donkey cart and an old tractor in Bal'ad



Source: Author (2023)

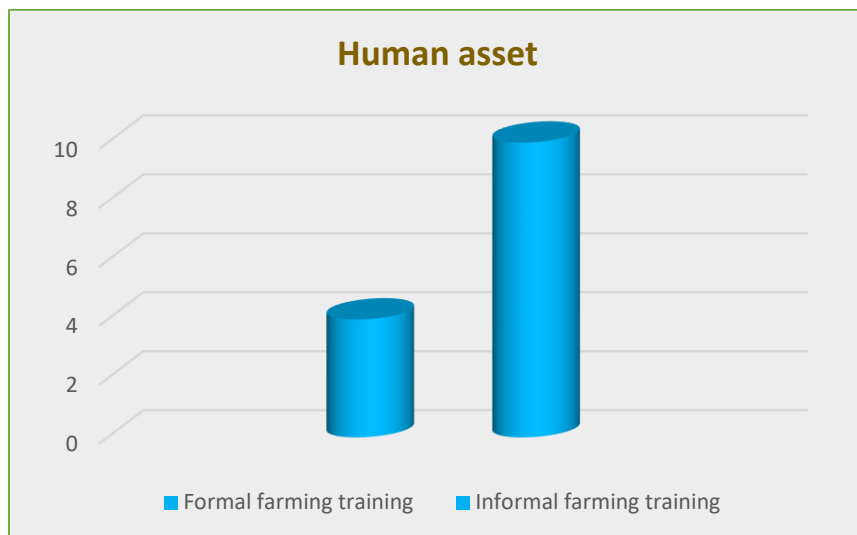
The photos (7) above show an old donkey cart and tractor used in the Bal'ad district, particularly in rural areas. The locals use the donkey cart to transport agricultural produce, household items, and water cans from the river, while the tractor is used in agriculture.

4.2.3 Human Assets

Bal'ad district, human assets generally refer to smallholder farmers, notably women farmers, who are actively involved in both agricultural labour and household duties. According to the study, the human assets of these smallholder women farmers include farming experience, traditional knowledge, labour, and resilience in confronting circumstances of hardship.

In the district of Bal'ad, there are a few primary and secondary schools, such as Ifiye, Imamu Shafici, and Bal'ad Primary and Secondary School. However, in rural areas, there are no schools. Various factors contribute to the lack of schools in rural Bal'ad. According to the findings of interviews, insufficient infrastructure and funding pose significant obstacles to establishing educational institutions in these areas. Some smallholder women farmers have primary and higher education, while many of them do not have any education. Although some NGOs provide training, it is inadequate to meet their primary educational needs. The following figure describes the level of education of smallholder women farmers in Bal'ad.

Figure 16: Human asset



Source: Author (2023)

Based on the above data figure (16), the findings reveal that most smallholder women farmers have obtained informal farming training. The figure indicates that 10 out of 14 have informal farming knowledge, while the remaining 4 have received formal farming training. This data suggests that most small-scale female farmers have gained knowledge through informal farming, such as traditional practices, experience, and local knowledge. At the same time, a smaller group has pursued formal training related to farming, which could include agricultural training, workshops, or formal education in agriculture provided by NGOs or schools. One of the SSI respondents stated:

"I have been farming in the Bal'ad district for many years and have learned so much from my parents and grandparents. Our traditional knowledge about crops, seasons, and the land has been passed down through generations. We know which crops to plant during which seasons, and we have special techniques to deal with pests and diseases. During floods, we have developed specific strategies or techniques to cope with flooding events from our experiences, though the losses caused floods are huge" (SSI Respondent 7, SHWF).

Most of the interviewees in the SSI and FGD sessions mentioned that people living in the rural areas of Bal'ad district do not have formal agricultural training. They attributed this issue to insecurity, lack of economy, and inadequate infrastructure. One of the individuals of FGD participant who managed to receive formal education said:

"People who live in rural areas will be able to access formal training, in my opinion, if security is made better and the government offers financial assistance. The world has changed, becoming more modern and technological. We lack the knowledge and tools to use farming and prevent floods, indicating the prevailing poverty and lack of knowledge" (FGD Participant 2, SHMF).

Although the farmers of Bal'ad district, especially in the villages, need basic knowledge, a few NGOs and the government train the farmers. One of the SSI respondents said:

"I have received some training from NGOs and the government. They taught us about early warning signs of floods, how to protect our crops and livestock during floods, and what to do after a flood. However, it is not enough; we need regular education and training. Additionally, we require flood mitigation training and tools" (SSI Respondent 9, SHWF).

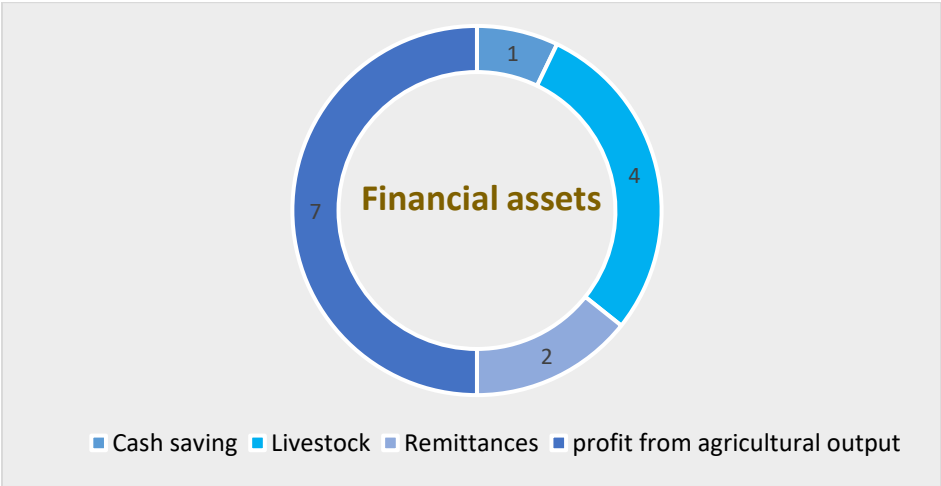
The flood expert from KII in Bal'ad district explained the reason for the lack of education among people living in rural areas:

"Before the collapse of the central government of Somalia, there was a project called the rural education campaign. However, when the central government disappeared, insecurity and economic problems arose, leading to the rural population becoming uneducated." (KKI Flood expert, 1)

4.2.4 Financial Assets

Smallholder women farmers in the Bal'ad area experience financial constraints due to their reliance on subsistence farming and the negative effects of droughts and floods on agricultural productivity. In Bal'ad rural areas, access to formal financial services, such as credit, loans, and insurance, is not available, making it difficult for farmers to invest in their farms and cope with the impacts of natural disasters like floods. The pie chart figure 13 below indicates the sources of earnings for smallholder farmers.

Figure 17: Financial assets



Source: Author, (2023)

Figure (17) above shows the sources of income for smallholder women farmers in the Bal'ad district. The primary income source is agricultural products, with 14 respondents; 7 of them receive money from selling products, while 4 of them receive money from livestock. Remittances come from the income of 2 of the respondents, while cash savings come from 1 of them.

Some farmers grow crops and raise livestock. They get income from the animals' milk, sell the animals themselves, and sell parts of the crops harvested from the farm.

The research assistant asked SSI respondent about her sources of income. The SSI responder stated:

"I own agricultural land and I get income from it. I sell crops from the farm in the market and generate some income. However, floods and droughts always affect crops and reduce the source of income" **(SSI Respondent 4, SHWF).**

One of the respondents who raised livestock said:

"I sell the milk from my cows, which brings in money. Additionally, I raise goats and sell them in the market, providing me income" **(SSI Respondent 10, SHWF).**

The research assistant noticed that formal banking services financing farmers are absent in the district villages. However, some NGOs provide cash assistance during flood events to help them survive. While this short-term assistance is valuable, there are more sustainable long-term solutions to address farmers' financial constraints in Bal'ad. Managing financial resource during flood, SSI respondent explained and said:

"It is a tough situation during floods because they affect our daily lives and destroy all our assets, such as farms, houses, animals, and people. At that time, we receive cash assistance from NGOs to manage our livelihood, but it doesn't help us much" **(SSI Respondent 6, SHWF).**

The Bal'ad district and its villages are part of the districts under the governance of the Hirshabelle regional government. When floods occur, the federal and regional government provides aid received from NGOs to the people affected. One of the FGD respondents described the support they received from the government and said:

"When floods occur, the federal and local governments, particularly the disaster management agency in partnership with humanitarian groups, support us. They provide flood-affected clean water, biscuits, and cash assistance. However, it is insufficient to meet all our needs" **(FGD Participant 6, SHWF).**

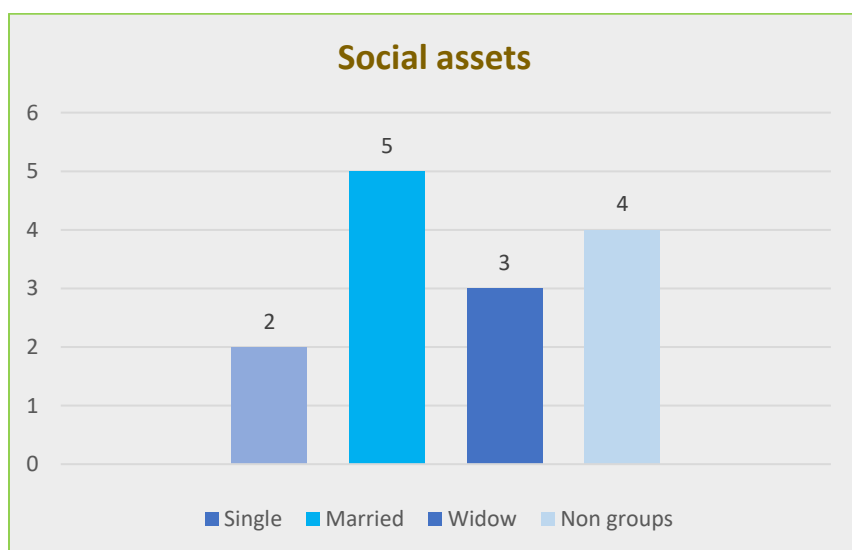
Although the efforts of the government and non-governmental organizations are helpful, respondents pointed out that the relief supplied may need to be improved to meet all the needs of the impacted individuals and communities.

4.2.5 Social Assets

The social asset is a significant part of the people living in the Bal'ad district, especially smallholder women farmers during disasters such as floods. They support themselves from the disaster of floods when it happens. The findings reveal how communities engage when floods occur. Communities in the district come together during floods to share basics like food, water, and other household items, especially smallholder farmers. They organise community initiatives such as flood evacuations, temporary shelter building, and practical support to the flood affected.

Smallholder women farmers rely on social asset to access resources, such as food, shelter, or emergency supplies when their farms or homes are flooded. The given figure 14 illustrates the groups of social assets of smallholder women farmers.

Figure 18: Social Assets



Source: Author (2023)

The above figure (18) shows the social assets of smallholder female farmers. It shows that 2 singles, 5 married, and 3 widows are participating in the social network group. Additionally, 4 individuals do not participate in any part of the social group. According to studies on the social assets of smallholder women farmers, some farmers are members of social network farmer's organizations. However, smallholder women involve themselves in a few specific social groups. For example, a cooperative group of widows supports each other and addresses their challenges. Additionally, there are groups of single women who are friends and consist of three or more members. These kinds of groups are usually formed based on age, similar situations, or types of work. NGOs cooperate with these groups when they need to provide training and capacity building. Respondent explained the social groups they have:

"There are farmers' cooperative groups in the Bal'ad district, but most women farmers are not participating. However, the women farmers have their specific focus group, and I am a part of that group. We usually share our issues, experiences, and support each other, whether it is related to fieldwork, marriage, children, and so on" (SSI Respondent 10, SHWF).

The column chart demonstrates that some people do not belong to social groups. One of the participants stated:

“I don't think it's important to be part of social groups because I do not see significant personal benefits in being part of them. However, from the perspective of providing help in times of disasters like floods and droughts, it's important” (FGD Participant 12, SHWF).

Smallholder female farmers in a group have a different perspective on how these groups help individuals during flood-related challenges. Respondent said:

“When floods happen, we help each other with many things. For example, some people lost all their fields or the materials they were using, and we helped each other in such times. Even then, we help those not part of the group because it is a critical time” (FGD Participant 9, SHWF).

Participants noted that they have challenges in forming groups of social networks. They mentioned that they sometimes could not meet or share their issues for the sake of security. They sometimes face problems from the extremist group. Even when NGOs offer valuable training related to agriculture, some participants may feel compelled to miss out on these opportunities to safeguard their safety.

4.3 Capacities of women smallholder farmers to address their vulnerabilities.

4.3.1 Vulnerabilities of smallholder female farmers:

Vulnerability describes the external circumstances and challenges that people or societies face. According to the findings, the vulnerability of smallholder women farmers in the Bal'ad district consists of various factors influencing their way of life, resources, and asset availability. They have suffered protracted conflict, political instability, and recurring natural disasters, significantly affecting their livelihoods. The findings also cover smallholder female farmers' capacity to manage their difficulties.

In Somalia, women smallholder farmers are more vulnerable than men due to limited access to essential resources such as land, credit, and agricultural inputs. Women are also vulnerable to natural disasters such as floods rather than men. Furthermore, in times of conflict and instability, women smallholder farmers face security risks, making it difficult for them to tend to their farms and engage in agricultural activities, as men often fight.

Women farmers in the Bal'ad district of Somalia face many challenges and vulnerabilities related to shocks, trends, and seasonality. In terms of shocks, floods are vulnerable to smallholder women farmers. Every year, there is rain in Somalia, which causes floods.

Smallholder farmers in the Bal'ad district face trends such as challenges like limited access to loans and insurance, inflation affecting their ability to buy essential farming items, rural-to-urban migration reducing the farming workforce, and political conflicts hurting crop production and incomes.

In Bal'ad district, Somalia, smallholder farmers face significant agricultural seasonality due to the two rainy seasons (Gu) and a dry season (Jilaal), where floods destroy crops in the Gu (spring) season, and the Jilaal (winter) season brings drought, leading to higher food prices and food insecurity for farmers.

At the beginning of this year, there was a flood in Hirshabelle's regional state, especially in the districts of Beledweyne, Jowhar, and Bal'ad. Smallholder women farmers have been affected by the spring season rains. A respondent from the FGD said:

"The heavy rains and the overflowing water of the river cause floods that have affected the fields. Last year, I lost the crops in my field due to the flood, and this year I am afraid that the Dayr (Autumn) rains will affect my field. More importantly, there are poor houses near the riverbank, which cannot prevent flooding, and it is mostly the affected area. My house is near the river, making it vulnerable to river surplus after torrential rainfall." **(FGD Participant 13, SHWF).**

Floods frequently affect the residents of Hirshabelle state, particularly in the Bal'ad district, occurring during specific seasons. A respondent elaborated on this, stating:

"Floods are the most serious disaster in our district. They usually happen in the Spring (Gu) and Autumn (Dayr) seasons. This year, there was rainfall in the spring season, which affected the crops and it also caused damage to farmland and the houses, especially those near the river" **(SSI Respondent 8, SHWF).**

Participants declare that the support from the government during and after the flood is less. They claim that there is no flood mitigation and preparedness. Participant of FGD explained:

"We receive help from the government, but it is insufficient to meet all our needs. The government assists and delivers most of the items humanitarian NGO organizations send us. But the Somali diaspora took an essential role and supported us during floods" **(FGD Participant 16, SHMF).**

Bal'ad district's infrastructure, including roads and dams, has suffered damage and requires rehabilitation. The district's dam was constructed a long time ago and has not been repaired since the central government's collapse. The researcher assistant observations indicate significant damage to the barrier. Additionally, the canals in the area are filled with sand or grass, and it needs maintenance, and clearing. The flood expert in Bal'ad highlights the urgent need for restoration and maintenance efforts to ensure proper functioning and resource management in the district. The expert said:

"As you can see, the river is full of water and the dam stores water and uses it to irrigate farms across the Hirshabelle region. Since it was built in 1975, it has not been repaired; it needs rehabilitation because many farmers use it and depend on their livelihood. The people cannot repair it because it requires a lot of money, and the government or donor agencies can do it. These canals are also filled with sand after the floods; sand and grass need to be cleared." **(KKI, Flood expert, 1).**

Photo 8: Flood expert and the research assistant



Source: Author (2023)

The photo (8) above shows the research assistant interviewing a flood expert in the Bal'ad district. The interview took place on the bank of the river that passes through the Bal'ad district. During the interview, the expert shared information about floods, their effects on the district, and strategies to cope with and manage flood-related challenges.

The agricultural community also needs more necessities of daily life, such as electricity, clean water, and educational centers. One of the respondents explained these issues:

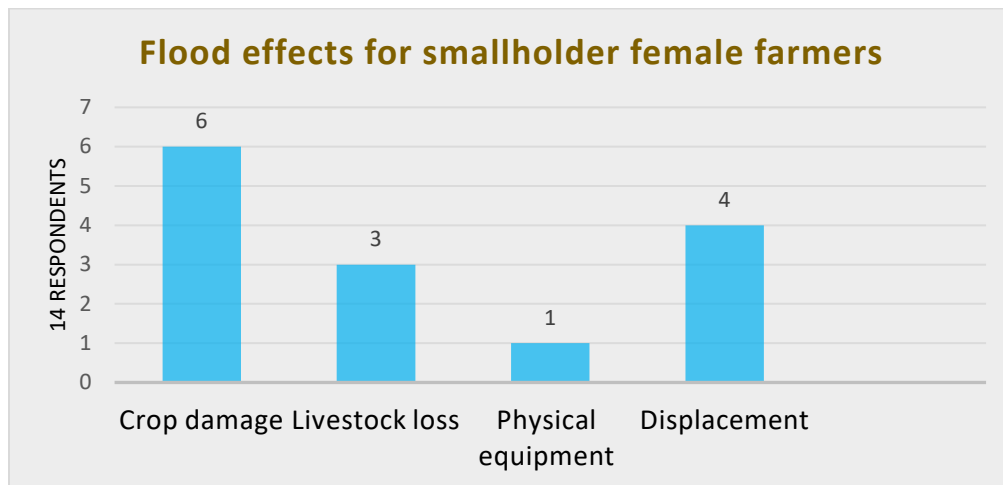
"If we are people living in rural areas, apart from drought, floods, and insecurity, we also do not have the basic things of life such as clean water, electricity, healthcare and education. We hope that the government will provide these things" (SSI Respondent 14, SHWF).

The district administration explained the reason the people living in rural areas did not get basic infrastructure and said:

"There are private sectors that provide services such as water, electricity, as well as health services that private hospitals mostly provide, and we hope they will reach the village areas, soon."

(KII, Government officer, 1)

Figure 19: Flood effects for smallholder female farmers



Source: Author, (2023)

The figure above (19) illustrates the effects experienced by smallholder female farmers. Out of 14 SSI respondents, 6 have lost their crops due to flooding. Among them, 4 were displaced from their residential areas, 3 lost livestock, including cows, goats, donkeys, and chickens, and 1 lost physical equipment.

Researchers Observations

The research assistant made observations during data collection and encountered several issues. One of the significant findings was that the bridge in the Bal'ad district needs rehabilitation to mitigate the problems caused by floods. The Bal'ad Bridge over the river was initially built long ago and has yet to be renovated since the civil war. Additionally, the research assistant observed that the riverbank needs to be filled with sand to prevent floods. Furthermore, during the data collection process, the research noticed a specific gender dynamic in the district's agricultural activities, with women predominantly working in the fields.

Photo 9: The researchers' observation during data collection



Source: Author (2023)

Photo 10: Damaged Dam and Canal in Bal'ad



Source: Author, (2023)

The photos above (10) show the damage to the dam that passes through the Bal'ad district, which farmers use to irrigate their fields and control the river's water when it overflows or rains heavily. It also shows a picture of a canal blocked by sand or grass that needs to be cleared. According to the study found, the agricultural community faces challenges in repairing infrastructure due to financial limitations and lack of necessary equipment, such as roads, healthcare, dams, Etcetera.

During FGD and SSI interviews, participants consistently identified security as the most severe vulnerability they faced. One of the SSI respondents explained the issue of security and said:

"The biggest problem I face is insecurity. When I cultivate agriculture, it is taken by force by extremists or militias. Even when I try to sell the crops I have harvested from the farm, they are stopped on the road by checkpoints and charged money that I cannot afford" (SSI Respondent 11, SHWF).

4.3.2 Capacity of smallholder women farmers:

The capacity of women small-scale farmers during and after the flood is limited. Findings investigate that, although farmers employ traditional procedures based on their local experience, there is still a shortage of appropriate skills and insufficient training and knowledge. Additionally, there is a lack of planning for disaster risk awareness and mitigation methods. Respondent explained and said:

"We rely on traditional knowledge and community resilience during disasters such as floods. Our capacity is limited, but we anticipate assistance from the government and non-governmental organizations" (SSI Respondent 14, SHWF).

Farmers, particularly smallholder female farmers, struggle with extreme weather conditions such as droughts and floods. They have adapted to recurring flood occurrences throughout time by establishing resilience. They use their experiences to learn and improve their capacity to resist floods.

On the other hand, in Somalia, communities support each other when disaster strikes, such as drought and floods, or when a fire occurs. Traders, Mosques, and other places where the community gathers, money is collected to do something for the community affected by the disaster, and it is a form of capacity. One of the respondents explained how the community system helps during the crisis:

“When floods occur, fundraises from different parts of society, such as mosques, businesses, and markets. There is also a broadcast on the radio for the serious situation to collect money” (SSI Respondent 10, SHWF).

Farmers in the Bal’ad district use traditional capacity skills to prevent disasters as they are rural people who live in villages. They also cannot afford to study or attend school because of poverty and insecurity. Capacity is the most important thing to get training and new skills so that they can deal with disasters. NGO staff commenting said:

“There are programs for the agricultural society, especially in developing capacity skills, but the amount is very little since there are some unsafe areas, and NGOs are unable to reach these locations” (KII, NGO staff 1).

4.4. Coping strategies used by smallholder women farmers when affected by floods.

Smallholder women farmers employ traditional coping mechanisms to mitigate and prevent the impacts of floods on their agricultural activities. These techniques derive from their local knowledge and experience. One method for anticipating floods and assisting in their preparedness is awareness. According to the study results, Most SSI respondents said farmers in flood-affected areas were aware of the possibility of floods because of their traditional knowledge and experience. A respondent explained the way the farmers prepare before flood occurrence and said:

"There are approaches to predicting when a flood will happen, but they are usually worthless. One of them is when there is fog in the sky, which means heavy rain is coming, and we should prepare for the flood that will cause rain. Also, when the river is full of water, it shows it is overflowing and wants to cause floods. Sometimes the floods exceed our ability to control them; they cause us losses" **(SSI Respondent 1, SHWF).**

Another coping strategy of smallholder women farmers is to listen to the radio for information about floods that will occur in their area. The radio receives flood warning information from the Somali Water Land and Information Management (SWALIM) or other NGO organisations dealing with Somalia’s climate change events.

During floods, affected people take a variety of strategies to mitigate the impact of flooding and manage the aftermath. Findings revealed that respondents prioritise their safety by evacuating to non-flooded locations or designated shelters before the floodwaters rise. Respondent described what does during the flood:

“When the floodwaters rose to a critical level, we immediately left our home and fled to non-flooded areas, such as a location far from the river or other villages where rainfall was not affected. That is our first action we do” (SSI Respondent 5, SHWF).

An additional finding of coping strategies respondents used was to place sandbags as a barrier, stacking sandbags at the river's corners when the water is overflowing to reduce the risk of flooding fields along the river. They also place sandbags in front of their homes to stop floodwaters to control and manage the movement of the water.

A respondent explaining how they use sandbags said:

“We get sandbags from NGO organizations, before or during the floods, and they send us through the government and distribute them to us. We place them in front of the houses, especially at the entrance, so the water does not flood us much. Sandbags helped us, but the quantity of the sandbags distributed was always less than the quantity the flood victims needed” (SSI Respondent 7, SHWF).

After the flood waters reduce, locals face the difficult challenge of reconstructing their homes, infrastructure, and livelihoods. Farmers need a long time to recover from flood damage as they require greater financial capacity to rebuild damaged houses, land, farms, and other infrastructure. A respondent explained the strategies farmers use to cope with flood-related challenges:

“Community supports each other during and after the flood. We share food, water, and cloth. The government also distributes us aid from NGOs, such as clean water, food, and equipment to build houses and supplies us with plant seeds.” (SSI Respondent 3, SHWF).

Some smallholder female farmers have devised a new strategy after experiencing floods that damaged their homes and fields. These farmers lived near the river, and whenever there was a flood, the water in the river was affected. One of the farmers who came up with the new Strategy said:

“I was always vulnerable to the floodwaters of the river. My farm and my house were close to the river. Then, I relocated and moved a little further from the river, even though the farm is still along the river” (FGD Participant 6, SHMF).

Once floods hit, the vulnerable community receives relief assistance after a while. And this demonstrates that the preparation is inadequate. One of the most prevalent concerns among farmers, for example, is that they receive sandbags after the floods have caused problems or that the number of sandbags the community provides is insufficient.

One of the NGO staff members responding if there is a contingency plan for flood situations said:

“Humanitarian organizations attempt to reach victims as soon as possible. However, several factors slow things down, such as insecurity. The roads are unsafe, and aid cannot reach them shortly. We utilize Aeroplan’s to distribute supplies to flood victims. That’s how things get delayed. If roads get safe, a contingency plan will be effective” (KII, NGO staff 1)

Farmers learn that, although immediate relief is essential. However, addressing the root causes of the vulnerability requires more comprehensive solutions, such as repairing and maintaining dams and canals, improving flood preparedness, and better farming methods.

4.5 Steps the government is taking to support the Bal’ad community in disaster flood management.

Floods in Somalia damage farmers, especially small-scale women farmers. The federal government of Somalia assists them by collaborating with national and international relief organizations when flood affected.

These international organizations include FAO, UN OCHA, WFP, IRC, while other local NGOs are like SWALIM. The government has a particular agency to aid communities affected by disasters such as floods and droughts, named the Somali Disaster Management Agency - SoDMA. During the KKI interview, an officer from the agency explained the steps they take and said:

“You know that in most of the places where the river flows, the Shabelle River in Hiran and Middle Shabelle regions, starting from Beledweyne, Bula Barde, Jowhar and Bal’ad, there are floods that affect the farmers who farm along the river. They suffer from floods and need immediate assistance, such as food, clean water, healthcare, medicine, and temporary shelters. After the floods, they need to be rehabilitated and provided with seeds and farm equipment. So, the government, with the help of aid agencies, is taking the steps I have mentioned” (KII, Government Officer 2).

As the findings revealed, it happens that most of the farmers are not with enough aid that has been delivered. They are faced with a shortage of food and seeds. A respondent explained this issue and said:

"The support provided to us is beneficial, and we value the help from the government and foreign organizations. However, the extent of the floods and their effects on our farms are frequently so serious that further assistance may be required to satisfy our demands adequately. Our crops are destroyed by the floodwaters, which also harm our tools and property. It is not always enough to keep us going until the next harvest, even though we receive food and some seeds” (SSI Respondent 9, SHWF).

Farmers devastated by floods are aided to recover from the disaster, as mentioned by one of the KKI respondents. There is a fixed term to benefit from this help, a government representative explained:

"Most farmers impacted by the floods receive sufficient help for three months. After those three months, their situation is re-evaluated, whether they are still in need” (KII, Government Officer 1).

The study also indicates that individuals impacted by disasters are more inclined to support international humanitarian organizations that offer aid. In this context, the government's role primarily focuses on facilitating assistance distribution. A KKI respondent explaining this matter stated:

"The government of Somalia manages donations such as food, medicine, or other essential materials and ensures delivery to areas experiencing issues like floods and droughts. Additionally, the government coordinates efforts to engage Somali individuals within the country and in the diaspora, enlisting their help in delivering aid and providing financial contributions. Thus, the government plays a significant role in arranging these efforts" (KII, Government Officer 2).

When delivering aid to flood-affected areas, there are challenges faced by aid workers. There is also the possibility that the aid being carried out may be harmed. Government respondent explained:

"One of the challenges is the country's infrastructure in terms of roads, which are difficult to reach in some areas. There are also security challenges because Al-Shabaab militias are in some places. There is also a large humanitarian situation, and in need of great assistance, the aid provided may be limited to the flooded areas" (KII, Government Officer 2).

Photo 11: The research assistant at the center of SoDMA.



Source: Author, (2023)

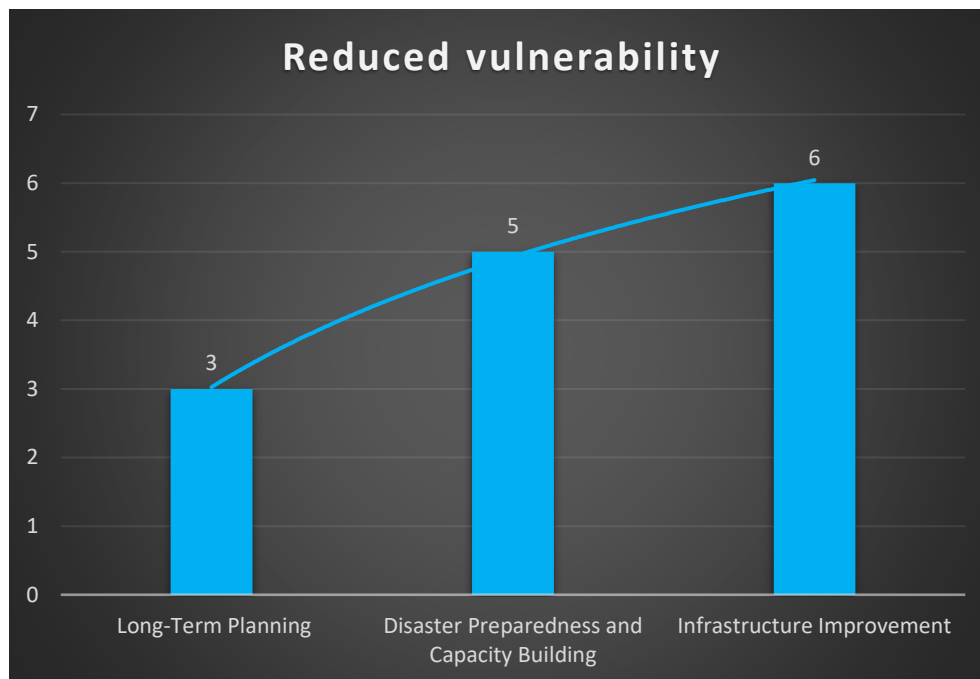
The above photo (11) is the research assistant at the centre of the Somali Disaster Management Agency (SoDMA), during an interview with KKI representatives.

4.6 Reduced vulnerability

Reduced vulnerability describes the situation or circumstance in which people, communities, or institutions are less vulnerable to the negative effects of different stresses or hazards, such as natural disasters, economic shocks, or societal changes.

For small-scale female farmers in Bal'ad, the reduced vulnerability would mean that these farmers and their livelihoods are less likely to be severely affected by the effects of floods and other challenges they face. The chart below shows the respondent's perception of reducing the vulnerability of floods of smallholder woman farmers in the Bal'ad district.

Figure 20: Reduced vulnerability



Source: Author, (2023)

The above chart figure (20) shows respondents' reduced vulnerability. Six out of 14 respondents believe that the reduced vulnerability of the effects of floods on the livelihoods of smallholder farmers is to improve the district's infrastructure. Five respondents suggest disaster preparedness and capacity building is the main point that can reduce vulnerability.

The other 3 respondents agreed that the district's disaster needs a long-term plan. A respondent explained the livelihood outcomes of farmers said:

"Training and education for smallholder women farmers is the most important to reduce the disaster. Most farmers do not know how to prevent floods, and nobody else from abroad, such as humanitarian organisations, cannot do much. Building their capacity is the best way to prevent floods" (SSI Respondent 4, SHWF).

The role of the government in reducing the vulnerability of floods, one of the government officials explained and said:

“The government is well-prepared, recognising the necessity of proactive planning and readiness. It has devised comprehensive strategies to prevent, manage, and address various challenges. For instance, the government is preparing for floods in riverine areas in anticipation of the rainy season during Dayr (autumn). It includes establishing evacuation protocols for flood-prone areas and increasing public awareness about flood survival strategies. The government has also implemented mitigation measures to minimise the risk of humanitarian crises. Furthermore, we collaborate closely with international donor organisations to support our efforts” (KII, Government Officer 2).

Reducing vulnerability is a process that requires collaboration between governments, NGOs, communities, and the state government, by combining short-term relief efforts and long-term, sustainable measures to build resilience and empower vulnerable farmers to withstand the challenges they face better.

CHAPTER FIVE: DISCUSSION OF FINDINGS

The findings describe the impact of floods on the livelihood assets of small-scale female farmers in the Bal'ad district. It also highlights the capacity of smallholder farmers, their coping strategies, and the support received from the government. Here is the discussion of the findings related to the effected floods of smallholder women farmers in the Bal'ad district.

5.1 Effects of flooding on livelihood assets of small-scale female farmers in Bal'ad:

The community in this area relies on five livelihood assets: natural, human, physical, financial, and social. Floods significantly affect these assets, particularly for smallholder women farmers.

Natural Assets: Smallholder women farmers in the Bal'ad district heavily depend on natural assets like fertile land, water resources, and biodiversity. Floods lead to soil erosion, sedimentation, agricultural land, trees, and wildlife damage. According to Amare and Simane (2017), floods reduce agricultural production and lead to food shortages. The impact of floods on agricultural land fertility is particularly problematic, making it challenging for smallholder farmers in Bal'ad to achieve good harvests.

Physical assets: The findings revealed that, smallholder women farmers in the Bal'ad use physical assets such as agricultural tools and equipment, seeds, and planting supplies. The types of crops they grow, including millet, sesame, beans, and maize, are negatively affected by floods, causing crop damage, soil erosion, and difficulties in planting and harvesting. Farmers in this area mostly rely on traditional, non-mechanized farming tools and donkey carts to transport agricultural produce and household necessities.

Human assets: According to the findings, the human assets of smallholder women farmers in the Bal'ad include farming experience and traditional knowledge. While some farmers have formal training, many do not have access to it because of problems, including insecurity, a shortage of financing, and poor infrastructure. Informal farming knowledge is commonly passed down through generations, helping farmers adapt to challenges like floods. Informal training activities generates many rural women without formal training to undertake better agricultural activities (Yiridomoh *et al.*, 2021).

Financial assets: Smallholder women farmers face financial constraints due to reliance on subsistence farming and the negative impacts of floods and droughts (Yiridomoh *et al.*, 2021). Access to formal financial services is limited in the Bal'ad rural areas, hindering farm investment and disaster resilience. Primary income sources of smallholder women farmers in Bal'ad include agricultural products and livestock, but floods reduce these income streams. While NGOs and governments provide short-term cash assistance during disasters, more sustainable solutions are needed.

Social assets: The social asset play a crucial role in supporting smallholder women farmers during floods (Azumah, 2023). They share resources, offer practical support, and organize initiatives to cope with flood-related challenges. The Bal'ad smallholder female farmers provide a platform for sharing experiences, addressing challenges, and supporting each other in various aspects of their lives, including farming, marriage, and family matters. The importance of these social groups is particularly evident during natural disasters like floods and droughts. Members of these groups come together to help each other, and in some cases, they extend their support to those who are not part of the group. This demonstrates the sense of solidarity and community among these women.

5.2 Women smallholder farmers vulnerabilities and their Capacities:

The findings also presented in the study shed light on the capacity and the vulnerabilities faced by smallholder women farmers in the Bal'ad district of Somalia, particularly regarding recurring floods.

5.2.1 Vulnerabilities of Smallholder Female Farmers:

Smallholder female farmers in Bal'ad face significant challenges in accessing essential resources like land, credit, and agricultural inputs. This limits their ability to engage in productive farming activities and hinders their economic independence. Women are more vulnerable to natural disasters, such as floods, which can destroy crops and homes (Owusu and Yiridomoh, 2021).

The study reveals that smallholder women farmers receive limited support from the government support during and after floods. They rely heavily on NGO humanitarian organizations and the Somali diaspora for assistance, highlighting the need for improved government intervention. The study underscores the importance of infrastructure, such as dams, canals, roads, and housing, in mitigating the impact of floods. The disrepair of critical infrastructure, like the dam in the Bal'ad district, highlights the need for consistent maintenance and rehabilitation efforts. According to Balgah *et al.* (2023), the inadequate of infrastructure contributes to the community's vulnerability.

5.2.2 Capacity of Smallholder Female Farmers:

Establishing a capacity for disaster risk reduction has been highlighted as one of the primary methods of significantly lowering catastrophe damages (Hagelsteen and Burke, 2016). The capacity findings presented the challenges women small-scale female farmers in the Bal'ad face during and after floods, particularly regarding their capacity to cope with such disasters. The research reveals that these Bal'ad farmers heavily rely on traditional procedures and local experiences to manage floods. While this demonstrates their resilience, it also highlights certain limitations in their approach.

However, there is a difference between the capacity we discussed in the literature review and the one we examined in the findings. The results revealed that the absence of appropriate skills, inadequate training, and insufficient knowledge are significant barriers to effectively addressing flood-related challenges. Findings also highlight the unique situation in Somali society, where communities exhibit a powerful sense of solidarity during disasters. This collective response involves mobilizing financial support from various sources, such as mosques, businesses, and markets.

5.3 Coping Strategies of Smallholder Women Farmers:

The coping strategies of smallholder women farmers are crucial to the discussion. The female smallholder farmers use traditional coping mechanisms, such as predicting floods through local indicators, relocating to higher ground or other areas, using sandbags, and community support, reflect the resourcefulness and resilience of these farmers. However, these strategies have limitations, especially in the face of more severe or frequent floods (Mubiru *et al.*, 2018).

5.4 The Role of Government and Support:

The government's role in disaster management is important. The study points out the government's steps in collaboration with international and national organizations to provide relief and support to flood-affected communities in the Bal'ad. However, there seem to be challenges in delivering aid effectively due to infrastructure constraints and security concerns. According to An (2020), better coordination and long-term solutions are essential to address the root causes of vulnerability.

While immediate relief efforts are necessary, the study emphasizes the importance of focusing on long-term solutions to address the vulnerabilities of smallholder women farmers. It includes investing in infrastructure, disaster preparedness, and building capacity among the affected communities. Comprehensive strategies that empower women farmers and enhance their resilience are significant for sustained improvement.

Reflection

To meet the requirements for the Master's program, MoD students have to conduct research and fieldwork with guidance from an appointed supervisor. I have gained much knowledge from all the modules programs taught at Van Hall Larenstein University. The mini research gave me a great understanding that helped me write my proposal and thesis.

With the assistance provided by my supervisor, I was able to improve the process of developing the research question, objectives, and sub-research questions, despite making several changes. After multiple revisions, this collaborative effort eventually made it easier for me to arrive at a satisfactory formulation. Additionally, I faced challenges while adapting the conceptual framework, leading to multiple revisions in this aspect.

I encountered difficulty sourcing reliable information for my research during the literature review phase. I checked academic websites, conducted searches on platforms like Google Scholar and Greeni, and spent significant time gathering accurate and relevant information related to my study. Later, I learned how to collect data from these websites using software options such as Mendeley, which can upload documents and is available for managing referencing.

The methodology was another area that required repeated improvement. One recurrent issue was the selection of respondents for interviews. Initially, I decided to interview smallholder women farmers exclusively. However, following guidance from my assessor, I expanded the scope to include men, especially during the Focus Group Discussions (FGDs). This modification was made to ensure a comprehensive understanding of the perceptions of both genders.

Due to security reasons, I could not travel to the country, so I approached my data collection colleagues to collect it for me. We planned to start data collection after July 10; unfortunately, there were explosions in Mogadishu by extremist groups in a military camp. The explosion delayed the time we planned to start data collection in the Bal'ad district for small-scale women farmers. We plan to start again on 24 July. Fortunately, we could, although the team encountered security problems.

On the other hand, it was difficult for research assistant to convince the SSI and FGD interviewees about the purpose of the research, as they were unfamiliar with this matter. SSI Respondents and FGD participants also feared for their safety during the interview. For the flood experts, the plan was to interview two of them, but unfortunately, we only met one due to time constraints.

Other problems encountered by the researcher and assistants included internet problems. Since we were communicating online during the data collection, we were hampered by the weakness of the internet, which caused the internet to go off the air several times. The other challenge we faced was contacting KKI respondents, especially the government officials like the SoDMA chairman; it took us days to find them. We also used snowball sampling with the help of people who knew government officials.

Focus group discussion was one of the primary data collections. Since there was a time constraint and a security issue, research assistant strives to create an environment where participants feel safe and comfortable expressing their opinions to maintain the participants' validity and reliability. The research assistant planned to hold the focus group discussion in an open space. They chose the team to conduct the FGD interview in an open area near the river, and they also designed chairs on which participants, men, and women, sat together. The research assistant asked questions equally to both men and women, ensuring that each gender group had the opportunity to participate and express their views and opinions. Participants gave satisfactory answers to each section of the interview. The researchers successfully facilitated a productive and inclusive discussion where all participants felt heard and respected.

In doing this research, I gained much experience and hope to expand that knowledge. I gained valuable insights from this research, particularly in improving my research skills. I learned how to conduct research, including data collection and analysis. My knowledge of online data collection and proper referencing has also grown.

The report writing process has been incredibly beneficial. I have developed my abilities in formulating main and sub-research questions and defining research objectives. I understand the importance of designing and describing research methodology, which forms the foundation of any research. Furthermore, I have learned how to present findings, draw conclusions, and provide recommendations. Regarding my professional growth, there has been a significant difference between when I started university and when I graduated. The knowledge I have gained will continue to enhance my capabilities.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study investigated the effect of flooding on the livelihoods of small-scale female farmers in the Bal'ad district. To achieve the study's objective, the research performed semi-structured interviews, focused group discussions, and key informant interviews with the involvement of the primarily concerned stakeholders, such as smallholder female farmers, government officials, NGOs, and flood experts.

Four sub-research questions guided the research; the first question focused on the effects of flooding on the livelihood assets of smallholder female farmers in the Bal'ad. The study findings indicate that the livelihood assets of smallholder female farmers in the Bal'ad district are significantly affected by floods. These livelihood assets included natural, physical, human, financial and social assets. The floods particularly impacted agricultural resources, livestock, homes, and infrastructure. The study highlighted the crops cultivated by smallholder female farmers, including millet, sesame, beans, and maize. These crops are affected by floods during rainy seasons.

The second question of the study stresses the capacities of smallholder female farmers to address their vulnerabilities. Smallholder women farmers in the Bal'ad district face vulnerabilities that impact various aspects of their livelihoods. These vulnerabilities include protracted conflict, recurring natural disasters, and gender-based access to essential resources disparities.

The findings reveal that women are particularly vulnerable compared to men. Limited access to resources such as land, credit, and agricultural inputs hinders their ability to engage effectively in farming activities. Additionally, smallholder female farmers are more vulnerable to natural disasters such as floods, which destroy their agricultural productivity and lead to food shortages.

According to findings and discussions, the capacity of women small-scale farmers in Bal'ad is limited. They heavily rely on traditional methods based on their local experience to cope with disasters like floods. However, this self-reliance approach is limited due to insufficient skills, training, and knowledge. Moreover, a noticeable inadequate disaster risk awareness and mitigation planning further hampers their ability to address the flood disaster challenges.

The third sub-question of the study was coping strategies used by smallholder women farmers when affected by floods. Smallholder women farmers in Bal'ad flood-affected areas employ a combination of traditional coping mechanisms and local knowledge to mitigate and prevent the impacts of floods on their agricultural activities. The study findings indicate that awareness plays an essential role in flood preparedness, with farmers relying on their traditional knowledge and experience to anticipate and mitigate flooding. Sandbag placement as a flood barrier is another widely used strategy, both along riverbanks and in front of homes, to control and manage floodwaters effectively. However, challenges arise after floods, as farmers require significant financial resources and support to rebuild their homes, farmland, and infrastructure.

The fourth question of the study was the steps the government is taking to support the Bal'ad community in disaster flood management. Based on the findings and discussions, the federal government of Somalia plays an important role in responding to natural disasters such as floods by collaborating with national and international humanitarian aid organizations.

The role of the government in supporting the flood-affected community includes facilitating assistance distribution from international organizations. It is recommended that the government allocate additional funds to its annual budget to aid the disaster victims.

The study highlighted the need for both short-term relief measures and long-term strategies to mitigate the impact of floods on small-scale female farmers. Government support, NGO interventions, and community networks were identified as important avenues for improving farmers' resilience and livelihoods in the face of flooding. The study concluded the significant interventions that address the flood affected of smallholder women farmers in the Bal'ad district.

6.2 Recommendations

Floods significantly affect the livelihoods of female small-scale farmers in the Bal'ad district. To improve the quality of life for smallholder women farmers in the Bal'ad district, the researcher recommends the following measures to be taken by various stakeholders, including the Somali Disaster Management Agency, the federal and state governments of Somalia, non-governmental organizations (NGOs), smallholder farmers, and the Somali Farmers Association.

1. To Somali Disaster Management Agency:

The disaster management agency should collaborate to provide comprehensive disaster preparedness training to smallholder women farmers. This includes community gatherings, and groups, to train people about disaster preparedness , raising awareness about early warning signs of floods, evacuation procedures, and methods for protecting their farms and homes.

2. To the Federal and State Government:

- a. The federal and regional government should involve the local community in Bal'ad in disaster management planning. Encourage the formation of community-based organizations that can work together to implement strategies, share knowledge, and provide mutual support during times of flood crisis.
- b. To deliver aid assistance to the flood-vulnerable population, the federal and state governments recommend addressing security issues on the roads to protect aid workers and volunteers involved in distributing aid.

3. To the Government and NGO's:

- a. The government and NGOs should design interventions that consider the unique challenges faced by Bal'ad women farmers, including their limited access to resources, decision-making power, and participation in social networks. It should recognise and address the gender-specific vulnerabilities that women farmers face. Implement programs that empower women economically, socially, and politically, allowing them to participate in decision-making processes and disaster resilience efforts actively.
- b. The government and NGOs should be given urgent attention to repairing and maintaining infrastructures such as dams, canals, and roads in Bal'ad. Properly functioning infrastructure can significantly reduce the impact of floods and enhance overall disaster resilience. Thus, it is important to note that infrastructure development and maintenance can be costly, and securing funds may not always be readily available to the Bal'ad community. Therefore, finding sustainable financing mechanisms and exploring partnerships with relevant stakeholders, including

international NGO organisations and the federal government, may be necessary to ensure the maintenance and improvement of infrastructure in flood-prone areas like the Bal'ad district.

4. To Smallholder farmers in Bal'ad district:

- a. Planting trees around the river will reduce flooding by absorbing excess water from the soil and helping prevent erosion along riverbanks. It also reduces the potential of mud collection in the water, which could lead to flooding. Both women and men of smallholder farmers in Bal'ad have access to participate in planting trees.
- b. Bal'ad smallholder female farmers are mainly not participating in the social network farmer's organizations. It recommends that the female farmers should participate in social networks; this will help them share knowledge and access resources such as seeds, fertilizers, and farming equipment. They can receive emotional support from their peers and help in times of need, such as during natural disasters.

5. To Somali Farmers association:

- a. The Somali Farmers Association (SFA) should seek partnerships with stakeholders such as NGOs that deal with disasters like floods to help the disaster-vulnerable community in Bal'ad, federal and state government.
- b. The Somali Farmers Association should arrange training sessions for Bal'ad smallholder female farmers to obtain useful agricultural knowledge and learn how to cope and respond to floods.

References

- Ahmed, A.M. (2018) 'Practising on-farm diversification and its contribution to food accessibility among smallholder farmers of Balcad district , Middle Shabelle region , Somalia', (September).
- Ahmed, M.A. *et al.* (2022) 'The Recurrence of Natural Disasters in Jowhar, Middle Shabelle Region, Somalia: The Causes and Impacts', *Journal of Environmental Protection*, 13(09), pp. 657–670. Available at: <https://doi.org/10.4236/jep.2022.139042>.
- Amare, A. and Simane, B. (2017) 'Determinants of smallholder farmers ' decision to adopt adaptation options to climate change and variability in the Muger Sub basin of the Upper Blue Nile basin of Ethiopia', *Agriculture & Food Security*, pp. 1–20. Available at: <https://doi.org/10.1186/s40066-017-0144-2>.
- An, P. (2020) 'SOMALIA FLOODS IMPACT AND NEEDS ASSESSMENT'. Available at: <https://documents1.worldbank.org/curated/en/764681585029507635/pdf/Somalia-2019-Floods-Impact-and-Needs-Assessment.pdf> (Accessed: 29 May 2023).
- Aniah, P., Kaunza-Nu-Dem, M.K. and Ayembilla, J.A. (2019) 'Smallholder farmers' livelihood adaptation to climate variability and ecological changes in the savanna agro ecological zone of Ghana', *Heliyon*, 5(4), p. e01492. Available at: <https://doi.org/10.1016/J.HELİYON.2019.E01492>.
- Arnell, N.W. and Gosling, S.N. (2016) 'The impacts of climate change on river flood risk at the global scale', *Climatic Change*, 134(3), pp. 387–401. Available at: <https://doi.org/10.1007/s10584-014-1084-5>.
- Azumah, O.K. (2023) 'Influence of Livelihood Assets on the Livelihood Outcomes of Smallholder Farmers in the Bawku East District of Northern Ghana', pp. 129–144. Available at: <https://doi.org/10.4236/jss.2023.115011>.
- Balgah, R.A. *et al.* (2023) 'Impacts of Floods on Agriculture-Dependent Livelihoods in Sub-Saharan Africa: An Assessment from Multiple Geo-Ecological Zones', *Land*, 12(2). Available at: <https://doi.org/10.3390/land12020334>.
- Beier, A.-C. and Stephansson, E. (2012) 'Environmental and Climate Change Policy Brief: Somalia', pp. 1–30. Available at: <http://sidaenvironmenthelpdesk.se/wordpress3/wp-content/uploads/2013/04/Environment-policy-brief-Somalia-2012.pdf>.
- Billi, P., Alemu, Y.T. and Ciampalini, R. (2015) 'Increased frequency of flash floods in Dire Dawa, Ethiopia: Change in rainfall intensity or human impact?', *Natural Hazards*, 76(2), pp. 1373–1394. Available at: <https://doi.org/10.1007/s11069-014-1554-0>.
- Busetto, L., Wick, W. and Gumbinger, C. (2020) 'How to use and assess qualitative research methods', *Neurological Research and Practice*, 2(1), p. 14. Available at: <https://doi.org/10.1186/s42466-020-00059-z>.
- Citypopulation (2019) *Balad District, Middle Shabelle region, Somalia*. Available at: https://www.citypopulation.de/en/somalia/admin/shabeellaha_dhexe/2103__balcad/a (Accessed: 22 June 2023).
- DFID (1999) 'Sustainable livelihoods guidance sheets.', pp. 1–150. Available at: <https://www.livelihoodscentre.org/documents/114097690/114438878/Sustainable+livelihoods+guidance+sheets.pdf/594e5ea6-99a9-2a4e-f288-cbb4ae4bea8b?t=1569512091877> (Accessed: 01 June 2023).
- Ellis, F. (2005) 'Small Farms, Livelihood Diversification, and Rural-Urban Transitions: Strategic Issues in Sub-Saharan Africa'. Available at: https://www.researchgate.net/profile/Peter-Hazell/publication/285630998_The_rural_nonfarm_economy_Pathway_out_of_poverty_or_pathway_in

/links/56665ec808ae4931cd62709e/The-rural-nonfarm-economy-Pathway-out-of-poverty-or-pathway-in.pdf#page=142 (Accessed: 03).

FAO (2018) *Rebuilding Resilient and Sustainable Agriculture in Somalia*. FAO. Available at: <https://www.fao.org/publications/card/en/c/I9060EN/> (Accessed: 29 May 2023).

FAO (2021) *National gender profile of agriculture and rural livelihoods, National gender profile of agriculture and rural livelihoods*. Available at: <https://doi.org/10.4060/cc2041en>.

FAO (2023a) *Flood Advisory for Beletweyne along Shabelle River, Somalia (Issued 8th May, 2023)*. Available at: <https://reliefweb.int/report/somalia/flood-advisory-beletweyne-along-shabelle-river-somalia-issued-8th-may-2023>.

FAO (2023b) 'Shabelle river flood update', (May), pp. 0–1.

Gökçekuş, H., Kassem, Y. and Yusuf, A.M. (2021) 'Sustainable Flood Retention Basin in Beledweyne City Somalia', pp. 1418–1421.

Gosset, M. *et al.* (2023) 'Hydrometeorological Extreme Events in Africa: The Role of Satellite Observations for Monitoring Pluvial and Fluvial Flood Risk', *Surveys in Geophysics*, 44(1), pp. 197–223. Available at: <https://doi.org/10.1007/s10712-022-09749-6>.

Gure, A. (2021) 'The Role of Climate information and Early Warning Systems in Supporting Disaster Risk Reduction in Somalia', pp. 1–50. Available at: https://www.researchgate.net/publication/355394121_The_Role_of_Climate_information_and_Early_Warning_Systems_in_Supporting_Disaster_Risk_Reduction_in_Somalia.

Hagelsteen, M. and Burke, J. (2016) 'Practical aspects of capacity development in the context of disaster risk reduction', *International Journal of Disaster Risk Reduction*, 16, pp. 43–52. Available at: <https://doi.org/10.1016/j.ijdr.2016.01.010>.

IFRC (2023) 'Somalia IFRC network country plan, Appeal number MAASO001'. Available at: <https://reliefweb.int/report/somalia/somalia-2023-ifrc-network-country-plan-maaso001> (Accessed: 12 July 2023).

IMF (2022) 'Somalia selected issue', *Food insecurity in Somalia*, pp. 1–23. Available at: <https://www.imf.org/en/Publications/CR/Issues/2022/12/16/Somalia-Selected-Issues-527027> (Accessed: 29 May 2023).

Jost, C. *et al.* (2016) 'Understanding gender dimensions of agriculture and climate change in smallholder farming communities', *Climate and Development*, 8(2), pp. 133–144. Available at: <https://doi.org/10.1080/17565529.2015.1050978>.

Kaur, M. (2021) *Smallholder Farmers: The Backbone Of Food Security, World Food Program*. Available at: https://docs.wfp.org/api/documents/WFP-0000133644/download/?_ga=2.148149556.26521771.1684104509-974673273.1682633849 (Accessed: 1 June 2023).

Luino, F. (2016) 'Floods BT - Encyclopedia of Engineering Geology', in P.T. Bobrowsky and B. Marker (eds). Cham: Springer International Publishing, pp. 1–6. Available at: https://doi.org/10.1007/978-3-319-12127-7_126-1.

Mamta Mehar, Surabhi Mittal, N.P. (2016) 'Farmers coping strategies for climate shock: Is it differentiated by gender?', 44(April 2016), pp. 123–131. Available at: <https://doi.org/https://doi.org/10.1016/j.jrurstud.2016.01.001>.

- Marfai, M.A., Sekaranom, A.B. and Ward, P. (2015) 'Community responses and adaptation strategies toward flood hazard in Jakarta, Indonesia', *Natural Hazards*, 75(2), pp. 1127–1144. Available at: <https://doi.org/10.1007/s11069-014-1365-3>.
- Michalscheck, M., Petersen, G. and Gadain, H. (2016) 'Impacts of rising water demands in the Juba and Shabelle river basins on water availability in south Somalia', 6667(May). Available at: <https://doi.org/10.1080/02626667.2015.1058944>.
- Mubiru, D.N. *et al.* (2018) 'Climate trends, risks and coping strategies in smallholder farming systems in Uganda', *Climate Risk Management*, 22(October 2016), pp. 4–21. Available at: <https://doi.org/10.1016/j.crm.2018.08.004>.
- Naz, F. and Saqib, S.E. (2021) 'Gender-based differences in flood vulnerability among men and women in the char farming households of Bangladesh', *Natural Hazards*, 106(1), pp. 655–677. Available at: <https://doi.org/10.1007/s11069-020-04482-y>.
- Owusu, V. and Yiridomoh, G.Y. (2021) 'Assessing the determinants of women farmers' targeted adaptation measures in response to climate extremes in rural Ghana', *Weather and Climate Extremes*, 33, p. 100353. Available at: <https://doi.org/10.1016/j.wace.2021.100353>.
- Ramsbotham, O., Woodhouse, T. and Miall, H. (2016) *Contemporary Conflict Resolution*. Fourth Edit. Croydon, London: Great Britain By CPI Group (UK) Ltd.
- SWALIM (2007) 'Improving Flood Forecasting and Early Warning in Somalia', (June). Available at: [http://www.faoswalim.org/resources/site_files/W-10 Improving Flood Forecasting and Early Warning in Somalia.pdf](http://www.faoswalim.org/resources/site_files/W-10%20Improving%20Flood%20Forecasting%20and%20Early%20Warning%20in%20Somalia.pdf) (Accessed: 28 May 2023).
- SWALIM (2023) *Flood monitoring in Somalia (The historically most recent severe floods of Somalia)*. Available at: <https://www.faoswalim.org/water/floods/flood-monitoring>.
- Tomaszewski, L.E., Zarestky, J. and Gonzalez, E. (2020) 'Planning Qualitative Research : Design and Decision Making for New Researchers', 19, pp. 1–7. Available at: <https://doi.org/10.1177/1609406920967174>.
- Tsige, M., Synnevåg, G. and Aune, J.B. (2020) 'Gendered constraints for adopting climate-smart agriculture amongst smallholder Ethiopian women farmers', *Scientific African*, 7, p. e00250. Available at: <https://doi.org/10.1016/j.sciaf.2019.e00250>.
- Twigg, J. (2015) 'Disaster Risk Reduction'. Available at: <http://bvpad.indeci.gob.pe/doc/pdf/esp/doc2601/doc2601-contenido.pdf> (Accessed: 04 June 2023).
- UN OCHA (2020) *Somalia: Hagaa Season Floods Update*. Available at: <https://reliefweb.int/report/somalia/somalia-hagaa-season-floods-update-1-19-july-2020-ens0> (Accessed: 30 May 2023).
- UN OCHA (2021) 'Somalia Humanitarian Needs Overview', (January), pp. 2–113. Available at: <https://reliefweb.int/report/somalia/2021-somalia-humanitarian-needs-overview> (Accessed: 29 May 2023).
- UN OCHA (2023) *Somalia: Flash and Riverine Floods Situation Report No. 1*. Available at: <https://reliefweb.int/report/somalia/somalia-2023-flash-and-riverine-floods-situation-report-no-1-14-may-2023> (Accessed: 30 May 2023).
- Vignola, R. *et al.* (2015) 'Ecosystem-based adaptation for smallholder farmers: Definitions, opportunities and constraints', *Agriculture, Ecosystems and Environment*, 211, pp. 126–132. Available at: <https://doi.org/10.1016/j.agee.2015.05.013>.

Vu, H.T., Liu, Y. and Tran, D.V. (2019) 'Nationalizing a global phenomenon: A study of how the press in 45 countries and territories portrays climate change', *Global Environmental Change*, 58(July), p. 101942. Available at: <https://doi.org/10.1016/j.gloenvcha.2019.101942>.

WASH (2021) 'WASH Cluster Gu Flood Response Update, Hirshabelle_Somalia', (flood problem). Available at: <https://www.humanitarianresponse.info/en/operations/somalia/infographic/wash-cluster-gu-flood-response-update-june-2021>.

Wondimagegnhu, B.A. *et al.* (2019) 'Determinants of farm livelihoods of smallholder farmers in Yayu biosphere reserve , SW Ethiopia : a gender disaggregated analysis Determinants of farm livelihoods of smallholder farmers in Yayu biosphere reserve', *Cogent Economics & Finance*, 7(01). Available at: <https://doi.org/10.1080/23322039.2019.1645583>.

World Bank (2022) *Rural population - Somalia*. Available at: <https://data.worldbank.org/indicator/SP.RUR.TOTL?locations=SO> (Accessed: 9 September 2023).

Woyesa, T. and Kumar, S. (2021) 'Potential of coffee tourism for rural development in Ethiopia: a sustainable livelihood approach', *Environment, Development and Sustainability*, 23(1), pp. 815–832. Available at: <https://doi.org/10.1007/s10668-020-00610-7>.

Yiridomoh, G.Y. *et al.* (2021) 'Women smallholder farmers off-farm adaptation strategies to climate variability in rural Savannah, Ghana', *GeoJournal*, 86(5), pp. 2367–2385. Available at: <https://doi.org/10.1007/s10708-020-10191-7>.

Interviews

Research Study: The Effect of Floods on the Livelihoods of Smallholder Women Farmers in Bal'ad District, Somalia.

Principal Investigator: Farah Qorshe

Contact Information: E-mail:

Introduction:

My name is Farah Qorshe; I am a research assistant on behalf of Mohamed Ahmed Sheikh, a student studying at Van Hall Larenstein University of Applied Sciences in The Netherlands. We are conducting this research as part of his study. You are invited to participate in research entitled "The Effect of Floods on the Livelihoods of Smallholder Women Farmers in Bal'ad District." The study aims to examine the existing livelihoods in the district, understand the effects of floods on the livelihoods, and determine the coping strategies employed by smallholder women farmers to mitigate the impacts of floods.

Study Procedure:

If you choose to participate, you will be asked to provide information through interviews, such as asking questions about your livelihood assets, your capacity and coping strategies after a flood occurs and the role of government before and after the flood. The data collected will be used solely for this study and treated with strict confidentiality. Your personal information will be anonymized, and all data will be aggregated to protect your identity. Your participation in this study is estimated to take approximately 60 minutes.

To further safeguard the privacy of your identity, the conversation will be coded with an identification code instead of your real name, and the study results will be released without your name. If you consent, the study's researcher will audio record your comments. The written notes of the recordings will be used to create an anonymous profile of you. Your time spent completing this interview is greatly appreciated.

Benefits of Participation:

While there may not be direct benefits to you as a participant, this research aims to understand better the challenges faced by smallholder women farmers in Bal'ad district, specifically in flood-prone areas. The findings may help inform policies and interventions that support these communities and their livelihoods.

Data Handling and Publication:

The data collected in this study will be stored securely and maintained under data protection regulations. The findings of this research may be published in academic journals, but no personally identifiable information will be disclosed.

Consent:**By voluntarily agreeing to participate in this study, you indicate that:**

You have had the opportunity to ask questions and have received satisfactory answers.

You know your participation is voluntary, and you can withdraw anytime.

You understand that your participation involves sharing personal information related to the study.

You consent to the use of your anonymized data for analysis and publication.

Please sign below to indicate your informed consent:

Participant's Signature:

Date:

Thank you for considering participation in this study. Your contribution is precious and greatly appreciated.

Note: A copy of this consent form will be provided for your records.

Key Informant Interview**Subject: Request for Assistance in Conducting Interviews with Disaster Management Agency Officials**

Dear Mr. Chairman,

I trust this message finds you in good health. My name is Mohamed Ahmed, and I am pursuing a Master's degree at a university in the Netherlands. My thesis is centred on the floods in the Bal'ad district and their profound impact on small-scale women farmers.

A key component of my research involves conducting interviews with officials from the Disaster Management Agency. In this regard, I request your assistance in facilitating these crucial interviews. Due to my inability to be physically present in the country, I have entrusted a representative in Somalia with the task of collecting data on my behalf.

Please consider my request. The insights and perspectives shared by the officials from the Disaster Management Agency would prove invaluable for the depth and quality of my thesis research.

I appreciate your time and consideration in this letter.

With the deepest respect and appreciation,

Mohamed Ahmed Sheikh Mahamed

Appendix 2: Interview Guide - Semi-Structured Interview

Interviewer	
Interviewee code number	
Date	
Interview duration	
Area	

The details of the demographic participant's

Part 1: Respondents information

- Name: _____
- Age: _____
- Sex: _____
- Educational Background: _____
- Marital status: _____
- Household Size: _____
- Years of Farming Experience: _____

Section 1: Livelihood Assets Interview Questions

A. Natural Assets:

1. Do you own, rent, or have access to agricultural land?
 - a. If you have, what is the size of your farmland?
 - b. If not, how do you access land for farming??

B. Physical Assets:

1. What types of seeds do you use for farming?
 - a. How does flood affect seeds in storage and crops in the field?
 - b. Beside the flood, what are the other effects of the crops?
2. What types of farming equipment and tools do you have?
3. How do floods impact your farming infrastructure (e.g., irrigation systems, storage)?

4. Are there any challenges in accessing or maintaining equipment and tools?

a. If there are, what are the challenges?

b. If not, how did you maintain from the challenges?

C. Human Assets:

1. What skills and knowledge do you possess related to farming?

2. Have you received any training or support related to flood response from the government or NGOs?

a. If yes, what was the support?

b. If not, what was the reason?

D. Financial Assets:

1. What is the source of income for you and your household?

a. If there is, where does the income sector fall, name them?

2. How do you manage your financial resources during flood events?

3. Have you received financial aid or assistance from the government or NGOs during or after flood events?

a. If it is yes, what was that financial, cash, credit etc.?

4. Have you experienced any loss of financial assets due to floods?

a. If yes, what were the losses?

b. If not, how did you protect yourself from the losses of the floods?

4. Do you have insurance coverage to protect your assets from natural disasters like floods?

5. What challenges are there in accessing financial resources?

a. Do you have emergency savings to cover immediate expenses arising from flood-related damage, like temporary shelter, food,

clothing?

E. Social Assets:

1. Do you have any social networks or group support systems related to farming?

a. If yes, what are they?

2. Are you part of any farming groups or cooperatives?

- a. How do these networks or support systems contribute to your livelihood?
- b. How do these groups help you during flood-related challenges?
- c. Does the corporation give you training related to flood prevention?
- 3. Are there any challenges or limitations in accessing social networks or support?
 - a. If yes, what are the challenges? Give an example.

Section 2: Interview questions related to flood effects and capacity.

- 1. How do floods affect your agricultural production?
- 2. Where are the most flooded effect-prone areas in the Bal'ad district? How can you differ from other places?
- 3. How severe are the floods in terms of damage caused?
- 4. How frequently does flooding occur in the Bal'ad district?
 - a. for example, which seasons, or years?
- 5. Have you experienced crop loss or damage due to floods? What crops are most vulnerable to flooding?
- 6. Have floods caused damage to infrastructures such as agricultural land, homes, roads, and Dams, MCHs?
- 7. Has the government implemented any policies or plans to mitigate floods? If yes, what was the implementation?
- 8. Do you have other obstacles rather than floods, such as security problems? If there is, mention?
- 9. What capacity do smallholder female farmers use during and after the flood?
- 10. How does the community system help during the flood effects?

Section 3: Interview questions about Coping Strategies.

- 1. do you have any strategy before a flood occurs? If it exists, what are they?
- 2. What immediate actions do you take when floods occur?
- 3. How do you cope with the need for temporary relocation during floods?
- 4. What strategies do you use to cope with flood-related challenges? Have you adopted any new strategies after experiencing floods?
- 5. How do you collaborate with other farmers or community members during floods?
- 6. Do you have a contingency plan for flood situations? If yes, do you have any examples of the plan?

7. What lessons have you learned from previous flood events?
8. Do you have any questions?

Appendix 3: Interview Guide – Focus Group Discussion

Interviewer	
Interviewee code number	
Date	
Interview duration	
Area	

- Name: _____
- Age: _____
- Gender: __Male_____Female_____
- Educational Background: _____

Interview Guide – Focus Group Discussion (16 participants)

Livelihood flood Impact:

1. How do floods impact smallholder women farmers livelihoods?
2. Are there any specific equipment which farmers use during floods?
3. How can formal education be improved in rural areas?
4. What support do smallholder farmers receive from the government and NGOs?

Flood Impact on Agricultural Activities:

1. In your experience, how do floods affect agricultural activities, specifically for smallholder women farmers?
2. What are smallholder women farmers' main challenges or difficulties during and after flood events?
3. Have floods resulted in the loss of crops, livestock, or agricultural infrastructure? Please share any specific incidents or examples.

Coping Strategies:

1. What do smallholder women farmers employ the common coping strategies to mitigate the effects of floods on their livelihoods?
2. How effective are these coping strategies in minimizing the impact of floods?
3. Are there any existing initiatives or programs that help build resilience among smallholder women farmers in flood-prone areas?

Support and Interventions:

1. What support or assistance do smallholder women farmers receive from government agencies, NGOs, or other organizations during and after flood events?

Appendix 4: Interview Guide – Key Informant Interview

Interviewer	
Interviewee code number	
Date	
Interview duration	
Area	

- Age: _____
- Gender: __Male_____Female_____
- Educational Background: _____
- Current Occupation: _____

Section 1: Government and Non-Government Interview Questions.

1. What kind of support or assistance do smallholder women farmers receive from government and non-governmental organizations during floods?
2. How effective are these support measures in addressing smallholder women farmers' immediate and long-term needs?
3. What role does the government play in supporting smallholder women farmers affected by floods?
4. What are the challenges that the government faces when providing aid assistance to flood-affected areas?

5. What strategies or initiatives are in place to build the resilience of smallholder farmers to future flood events?

Section 2: Flood Experts Interview Questions.

1. In your experience, what are the main challenges for the lack of education among people living in rural areas?
2. Are there any specific strategies or approaches that you recommend mitigating the impacts of floods?
3. Can you share any examples of successful interventions or best practices in addressing the effects of floods?
4. What lessons have been learned from previous experiences that can guide future efforts?

Appendix 5: Research Plan and Schedule

The research reports were conducted in four phases: desk study, fieldwork, final report writing, and submission.

Table 8: Research activity schedule				
Activities	June 2023	July 2023	August 2023	September 2023
Proposal Submission				
Fieldwork				
Data Analysis				
Report Writing				
Report Submission				

Appendix 6: SSI interview coding list

SSI Smallholder Farmers Code	Age	Sex	Marital status	Education	Land size	Type of farmland ownership	Crop
SHWF01	62	F	Widow	Less educated	3 hectares	Personal owned	Sesame
SHWF02	41	F	Widow	Educated	4 hectares	Personal owned	Beans
SHWF03	30	F	Single	Less educated	8 hectares and above	Personal owned	Maize
SHWF04	35	F	Married	Uneducated	8 hectares and above	Personal owned	Beans
SHWF05	26	F	Single	Less educated	4 hectares	Family owned	Sesame
SHWF06	37	F	Married	Less educated	8 hectares and above	Personal owned	Maize
SHWF07	47	F	Widow	Uneducated	8 hectares and above	Personal owned	Millet
SHWF08	58	F	Married	Uneducated	8 hectares and above	Personal owned	Maize
SHWF09	28	F	Single	Uneducated	3 hectares	Personal owned	Beans
SHWF10	32	F	Married	Less educated	4 hectares	Personal owned	Millet
SHWF11	39	F	Married	Educated	4 hectares	Personal owned	Sesame
SHWF12	46	F	Married	Less educated	4 hectares	Personal owned	Millet
SHWF13	57	F	Widow	Uneducated	3 hectares	Personal owned	Maize
SHWF14	23	F	Single	Less educated	3 hectares	Personal owned	Maize

Source: Author, (2023)

Appendix 7: FGD interview coding

No.	FGD coding	Ages	Sex
1	SHWF01	54	F
2	SHWF02	42	F
3	SHMF03	26	M
4	SHMF04	28	M
5	SHWF05	43	F
6	SHWF06	32	F
7	SHMF07	57	M
8	SHWF08	38	F
9	SHMF09	29	M
10	SHMF10	50	M
11	SHWF11	62	F
12	SHMF12	56	M
13	SHMF13	44	M
14	SHWF14	31	F
15	SHMF15	27	M
16	SHWF16	40	F

Source: Author, (2023)

Photo 12: Flooded farm in Bal'ad district



Source: Author, (2023)