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IMPACTS OF DISASTER RISK MANAGEMENT PRACTICES ON HOUSEHOLD FOOD SECURITY STATUS IN ETHIOPIA: THE CASE OF, TARMABER WOREDA, ETHIOPA

BY

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A THESIS SUBMITTED TO CENTRE FOR FOOD SECURITY STUDIES, COLLEGE OF DEVELOPMENT STUDIES, ADDIS ABABA UNIVERSITY

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ADDIS ABABA, ETHIOPIA

DECLARATION

I, the undersigned, affirm that the research project titled "Impacts of Disaster Risk Management Practices on Household Food Security in Ethiopia: The Case of Amhara regional State, North Shewa Zone, Tarmaber woreda'' was conducted under the guidance of Dr. Temesgen Tilahun as part of my pursuit of a Master of Science degree in Food Security and Development Studies in the year 2024. All information sourced from literature has been duly credited within the text, and a comprehensive list of references is provided. This thesis has not been previously submitted for any other degree or institution.

_____ _____

Mebrat Aynalem Date

Advisor; Approval Sheet

This certificate attests that the thesis titled ***"Impacts of Disaster Risk Management Practices on Household Food Security in Ethiopia: The Case of Amhara regional State, North Shewa Zone, Tarmaber woreda''*** has been submitted by Mebrat Aynalem as part of the requirements for the degree of Master of Science in Food Security and Development Studies. The research was conducted under my supervision, and I confirm that the student has satisfactorily fulfilled all requirements. Therefore, I hereby recommend that the thesis be submitted to the department for evaluation.

_____	_____	_____
Name of Advisor	Signature	Date

APPROVAL SHEET FOR THE BOARD OF EXAMINERS

This certifies that the thesis titled ***"Impacts of Disaster Risk Management Practices on Household Food Security in Ethiopia: The Case of Amhara regional State, North Shewa Zone, Tarmaber woreda''*** prepared by Mebrat Aynalem, and submitted for the Degree of Master of Science in Food Security and Development Studies, adheres to the university's regulations and meets the expected standards of originality and quality

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Name of external Examiner Signature Date

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Name of Internal Examiner Signature Date

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Name of Advisor Signature Date

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Name of Chair Person Signature Date

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Acronyms and Abbreviations

AGP ……...Agricultural Growth Programme

DRM ……...Disaster Risk Management

DRR ……Disaster Risk Reduction

DRMFSS …….Disaster Risk Management and Food Security Sector

ETB …….Ethiopian Birr (ISO currency code)

FAD …….Food Availability Decline

FCS ……..Food Consumption Score

FGD …….Focus Groups Discussion

FAO …….Food and Agriculture Organization

FDRE …….. Federal Democratic Republic of Ethiopia

HFA …….. ..Hyogo Framework for Action

HFIAS ……Household Food Insecurity Access Scale

HHH ……Household Head

HHs …….Households

IFPRI …….. International Food Policy Research Institute

KII ……...Key Informants Interview

PAR ……Pressure And Release

PSNP ……. Productive Safety Net Program

RRP ……Recovery and Rehabilitation Practices

SPP …… Social Protection Program

SPSS ……..……Statistical Package for the Social Sciences

UNICEF ……..United Nations International Children's Fund

UNDRR ……..... United Nations Disaster Risk Reduction

UNISDR …...…..United Nations International Strategy for Disaster Reduction

WFP ……... World Food Program

Abstract

Disaster Risk Management (DRM) practices significantly impact household food security status, particularly in Tarmaber Woreda, Ethiopia, within the Amhara Regional State, North Shewa zone. This study aimed to investigate the impact of DRM practices on household food security status, considering prevalent disasters such as floods, conflicts, and pest infestations. A mixed research approach was employed, with data collected from 336 households through survey questionnaires, key informant interviews, and observations. Descriptive and inferential analyses, including binary logistic regression, were conducted. The findings revealed significant impacts of DRM practices on food security outcomes, particularly in mitigating the adverse effects of floods. The logistic regression analysis demonstrated that variables such as household planning status before disasters (B = 2.446), participation in social protection programs (B = 2.608), planting drought-resistant crops (B = 1.364), effective use of early warning systems and information (B = 1.366), and early warning and information training (B = 0.626) significantly influenced food security outcomes. Socio-economic factors like marital status, educational status, income levels, and age of household heads were also found to correlate with food security status. The study underscores the importance of proactive DRM practices, such as household planning, participation in social protection programs, and adoption of resilient agricultural practices, in enhancing household resilience and food security in disaster-prone areas like Tarmaber Woreda. Recommendations include strengthening disaster preparedness measures and promoting community resilience-building initiatives.

Keywords: Disaster risk management, food security status, conflicts, Disasters, Tarmaber.

CHAPTER 1

1.1 Background of the Study

Globally, food security remains a critical issue, for instance, by 2020 nearly 12 percent of the global population or around 928 million people were severly food insecure and it is greater than by 148 million people compared with 2019. The main factors for this high figure of people to be food insecure are climate related disasters, conflict or their combinations (FAO 2021). The Food and Agriculture Organization (FAO) emphasizes the importance of resilient food systems and effective disaster risk management (DRM) practices in combating food insecurity. Climate-induced disasters such as droughts, floods, and hurricanes have increased in frequency and intensity, severely affecting agricultural productivity and food availability. Consequently, there is a growing recognition of the need to integrate DRM into agricultural policies and practices to enhance food security globally (World Bank, 2021).

Africa is particularly vulnerable to food insecurity due to its reliance on rain-fed agriculture, high poverty rates, and limited infrastructure. The continent experiences a high incidence of climate-related disasters, including prolonged droughts and erratic rainfall patterns, which disrupt food production and supply chains (African Development Bank, 2019). Sub-Saharan Africa, in particular, faces significant challenges in achieving food security, with about one in four people undernourished (FAO, 2019). Efforts to improve food security in Africa have increasingly focused on strengthening DRM practices, promoting sustainable agricultural techniques, and enhancing the resilience of communities to climatic shocks (United Nations, 2018).

Ethiopia, one of the most disaster-prone countries in Africa, has a history of recurrent droughts, floods, and other natural hazards that severely impact food security. The agricultural sector, which employs about 80% of the population, is highly vulnerable to these climatic shocks (Ethiopian Central Statistics Agency, 2020; World Bank 2020). Despite various governmental and non-governmental efforts to address food insecurity, the country still struggles with high levels of malnutrition and poverty. The Ethiopian government has implemented several programs aimed at improving DRM and agricultural productivity, such as the Productive Safety Net Programme (PSNP) and the

Agricultural Growth Programme (AGP), but challenges remain in achieving sustainable food security for all (Gebremedhin et al., 2018).

Within Ethiopia, the Amhara Regional State is particularly affected by food insecurity due to its susceptibility to natural disasters and socio-economic challenges. The region frequently experiences droughts, floods, and land degradation, which hinder agricultural productivity and food availability (Tefera & Endalew, 2020). Efforts to improve DRM in Amhara have included initiatives to promote sustainable land management, reforestation, and the construction of small-scale irrigation systems. Understanding the specific challenges and opportunities within this region is crucial for designing effective DRM and food security strategies.

Tarmaber Woreda, located in the North Shewa Zone of the Amhara Regional State, serves as a microcosm of the broader food security challenges faced by the region. The Woreda is characterized by its rugged terrain, erratic rainfall, and limited access to infrastructure and markets, all of which contribute to its vulnerability to food insecurity (Mulugeta et al., 2019). The local population relies heavily on subsistence agriculture, making them particularly susceptible to climatic shocks. While various DRM initiatives have been implemented in Tarmaber, including community-based disaster risk reduction programs and sustainable farming practices, there is a lack of comprehensive studies evaluating their impact on household food security. This research aims to fill this gap by providing an in-depth analysis of the effectiveness of DRM practices in improving food security in Tarmaber Woreda.

Therefore, the research has assessed the imacts of disaster risk management practice and analyze the food security status of the households within the study area.

1.2. Statement of the Problem

Household food security in Ethiopia, particularly in the Amhara Regional State, has been a persistent challenge, compounded by recurrent natural disasters and insufficient disaster risk management (DRM) practices. The North Shewa Zone, specifically Tarmaber Woreda, is notably susceptible to climatic shocks such as drought, floods, and landslides, which severely affect agricultural productivity and food availability (Gebremedhin et al., 2018). These disasters exacerbate the vulnerabilities of households, leading to chronic food insecurity and heightened poverty levels (Tefera &

Endalew, 2020). The pressing need to understand the impacts of DRM practices on household food security in this context forms the core of this research.

Despite various initiatives by governmental and non-governmental organizations to enhance DRM, the effectiveness of these measures in improving food security remains under-examined. Traditional DRM practices in Tarmaber Woreda are often reactive rather than proactive, focusing more on post-disaster relief than on pre-disaster preparedness and mitigation (Mulugeta et al., 2019). This reactive approach limits the capacity of households to withstand and recover from shocks, further entrenching food insecurity. Previous studies, such as those by Belay et al. (2020), have highlighted the need for a paradigm shift towards proactive DRM strategies but have not extensively explored their direct impacts on food security.

Moreover, the integration of sustainable agricultural practices with DRM is essential for enhancing food security. However, limited research has been conducted on how sustainable farming techniques can be aligned with DRM practices to ensure long-term food security in Tarmaber Woreda. While studies by Kassie et al. (2017) suggest that improved agricultural methods, such as drought-resistant crops and efficient water management systems, can significantly reduce the adverse impacts of disasters on food production, there is a lack of empirical evidence on the adoption and effectiveness of these practices in Tarmaber Woreda.

Additionally, socio-economic factors such as income levels, education, and access to markets play a critical role in the resilience of households to food insecurity. Households with higher income and better access to resources are generally more capable of implementing effective DRM practices (Devereux & Guenther, 2018). However, in Tarmaber Woreda, many households lack these essential resources, limiting their ability to adopt and benefit from advanced DRM strategies. Existing studies have primarily focused on the broader implications of socio-economic factors on food security (Yaro, 2016), but specific analyses in the context of DRM adoption in Tarmaber Woreda are scant.

Furthermore, the role of community-based organizations and local governance in DRM cannot be overlooked. Effective community participation and strong local governance structures are essential for the successful implementation of DRM practices (Tadesse

et al., 2018). However, in many parts of Tarmaber Woreda, community engagement in DRM is often limited, and local governance structures may lack the capacity and resources to support comprehensive DRM initiatives. While research by Alemu & Deressa (2019) has shown the importance of community and governance in DRM, there remains a significant gap in understanding how these factors specifically affect food security outcomes in Tarmaber Woreda.

Therefore, this study has sought to fill the existing gaps in the literature by providing a comprehensive analysis of the impacts of DRM practices on household food security in Tarmaber Woreda, North Shewa Zone, Amhara Regional State. By examining the effectiveness of current DRM strategies, the integration of sustainable agricultural practices, the socio-economic factors influencing DRM adoption, and the role of community and governance, this research aims to offer valuable insights and recommendations for policymakers and practitioners working towards enhancing food security in disaster-prone areas of Ethiopia.

1.3. Objectives of the Study

1.3.1. General Objective

The general objective of this study was to investigate the impacts of disaster risk management practices on households' food security.

1.3.2. Specific Objectives

The specific objectives of this research are to:

- identify the major disasters that affect the households' food security
- classify households of the study area according to their food security situation
- examine the impacts of DRM practices on households' food security

1.4. Research Questions

The study has tried to address the following research questions:

1. What are the major disasters that affect households' food security?
2. What is the level of households' food security within study area?
3. What is/are the major impact/s of DRM practices on households' food security?

1.5. Scope and Limitations of the study

1.5.1 Scope of the study

This research has spatial, thematic, analytical, and temporal scopes. First, the spatial scope of this study is concentrating on analysing the Tarmaber woreda food security status experienced from three kebeles disaster risk management practices, which are purposively selected. Second, the analytical scope is linked with analysing households' food security status resulted from practicing disaster risk management approaches. The third scope, thematic, indicates the disaster risk management and food security concepts and finally, temporal scope is the research period covered the time duration from January to June 2024.

The study limitations were associated with methodological issues in the manner that there was shortage of skilled data collectors because of fear due to local conflict existence. This resulted in more time taking during the data collection process and needed to invest extra more money. The other limitation of the study was that it was impossible to conduct focus group discussion because of state of emergency in Amhara region declared by the government, not to conduct discussion with gathering people. And moreover, since there were no much more empirical studies conducted within this thematic and study area, most of the related literatures mentioned in this research are documents and reports of different institutions.

1.5.2 Limitations of the study

While the study provides significant insights into the impact of disaster risk management practices on household food security in Tarmaber Woreda, Ethiopia, it was not without limitations. Firstly, the reliance on self-reported data from survey

questionnaires may introduce biases, as respondents might underreport or overestimate their food security status or the effectiveness of disaster management practices due to recall errors or social desirability. Additionally, the cross-sectional design of the study limits its ability to establish causal relationships between disaster management interventions and food security outcomes, as it captures data at a single point in time. The sample size, though substantial, may not fully represent the diverse demographic and socio-economic conditions of the broader population, potentially affecting the generalizability of the findings. Moreover, external factors such as regional economic conditions, political instability, and global climatic changes, which also influence food security, were not exhaustively controlled for, thereby limiting the scope of the conclusions drawn. Lastly, the study's focus on Tarmaber Woreda may restrict the applicability of its recommendations to other regions with different environmental and socio-economic contexts, suggesting a need for further research to validate these findings across diverse settings in Ethiopia.

1.6. Significance of the study

This study is significant as it addresses the critical intersection of disaster risk management (DRM) practices and household food security in the disaster-prone region of Tarmaber Woreda, North Shewa Zone, Amhara Regional State, Ethiopia. By providing a comprehensive analysis of the effectiveness of current DRM strategies, the integration of sustainable agricultural practices and the socio-economic factors influencing DRM adoption, this research offers valuable insights for policymakers, practitioners, and local communities. The findings can guide the development of more effective DRM and agricultural policies, enhance community resilience to climatic shocks, and ultimately improve food security outcomes in Tarmaber Woreda and similar contexts. Additionally, this study contributes to the broader body of knowledge on food security and disaster resilience in Sub-Saharan Africa, highlighting practical solutions that can be scaled and adapted to other vulnerable regions.

1.7. Ethical consideration

Research ethics kept with 100% confident in all the process of data collection, analysis, and findings dissemination and which protect respondents from any possible harm through keeping their confidential issues and other privacy principles. During data collection process, there was no any respondent making him or her to sign-off consent requiring special circumstance like respondents' image/photo capturing.

1.8. Organization of the study

In this study, the organization follows a structured framework comprising five main sections. Firstly, the introduction provides an overview of the research context, objectives, and significance. The literature review presents a comprehensive analysis of existing scholarly works relevant to the study's focus. Methodology outlines the research design, data collection procedures, and analytical techniques employed. Results shows the findings derived from data analysis and interpretation. Finally, the discussion synthesizes the results within the context of existing literature, offering insights, implications, and avenues for future research.

CHAPTER 2

2. RELATED LITERATURE REVIEW

2.1. Conceptual Related Literature Review

2.1.1. Concept of Disaster Risk Management

Disaster Risk Management (DRM) is a comprehensive approach aimed at reducing the adverse impacts of natural and man-made hazards through systematic efforts to analyze and manage the causal factors of disasters (UNISDR, 2015). It involves a cycle of activities including risk assessment, mitigation, preparedness, response, and recovery. Risk assessment is the first step in DRM, where potential hazards are identified and their likelihood and impact on vulnerable populations are analyzed (Wisner et al., 2004). This assessment helps in understanding the nature of risks and informs the design of targeted mitigation and preparedness strategies.

Mitigation and preparedness are critical components of DRM that focus on reducing the vulnerability of communities to disasters and enhancing their capacity to respond effectively. Mitigation measures may include structural interventions, such as building flood defenses, and non-structural interventions, like enforcing land-use planning and environmental regulations (Twigg, 2007). Preparedness activities involve developing emergency plans, conducting drills, and educating communities about disaster risks and response actions (UNISDR, 2015). These proactive steps are essential in minimizing the damage caused by disasters and ensuring a swift and effective response when disasters occur.

Response and recovery are the reactive phases of DRM that occur after a disaster has struck. The response phase involves immediate actions to save lives, protect property, and meet the basic needs of affected populations (Alexander, 2002). This includes search and rescue operations, provision of emergency shelter, food, water, and medical care. The recovery phase focuses on restoring normalcy by rebuilding infrastructure, rehabilitating affected communities, and revitalizing the economy (Smith & Petley, 2009). Effective recovery also involves integrating risk reduction measures into the rebuilding process to enhance resilience against future disasters.

The integration of DRM into sustainable development is increasingly recognized as essential for reducing disaster risks and building resilient communities. The Sendai Framework for Disaster Risk Reduction 2015-2030 emphasizes the importance of adopting a holistic approach that includes public and private sector engagement, and community participation in DRM (UNISDR, 2015). It highlights the need for inclusive policies that address the specific vulnerabilities of different groups, particularly women, children, and marginalized communities. By aligning DRM with development goals, countries can ensure that efforts to reduce disaster risks contribute to broader objectives of poverty reduction, sustainable growth, and social equity (World Bank, 2013).

2.1.1.1. Disaster preparedness

Disaster preparedness is a proactive approach within Disaster Risk Management (DRM) aimed at ensuring communities, organizations, and individuals are ready to effectively respond to and recover from the impacts of disasters. It encompasses a range of activities such as developing and implementing emergency plans, conducting regular training and drills, establishing early warning systems, and educating the public about disaster risks and safety measures (UNISDR, 2015). Preparedness efforts also involve the coordination of resources and stakeholders to enhance response capabilities, ensuring that emergency services, supplies, and communication networks are in place and functional when disasters occur (Twigg, 2007). By fostering a state of readiness, disaster preparedness helps to minimize the immediate impact of disasters, save lives, and facilitate quicker recovery, thereby enhancing community resilience and reducing overall vulnerability to hazards.

2.1.1.2. Disaster mitigations

Disaster mitigation refers to the efforts taken to reduce or eliminate the long-term risk to human life and property from natural and man-made hazards. This component of Disaster Risk Management (DRM) focuses on proactive measures that aim to minimize the potential impact of disasters before they occur. Structural mitigation includes the design and construction of physical infrastructure such as dams, levees, and earthquake-resistant buildings to withstand hazard forces (Alexander, 2002). Non-structural mitigation involves policies and regulations like land-use planning, environmental management, and building codes that guide sustainable development practices and

prevent settlements in high-risk areas (Smith & Petley, 2009). Effective mitigation requires a comprehensive understanding of risk factors, continuous monitoring, and the integration of scientific and technical knowledge into policy and practice.

The benefits of disaster mitigation extend beyond immediate risk reduction to fostering sustainable development and resilience. By investing in mitigation strategies, communities can significantly reduce the economic and social costs of disasters. For instance, restoring natural buffers such as wetlands and mangroves can protect coastal areas from storm surges while also providing ecological and economic benefits (World Bank, 2013). Additionally, community-based mitigation programs that involve local stakeholders in planning and decision-making processes can enhance social cohesion and ensure that mitigation measures are culturally appropriate and widely accepted (Twigg, 2007). Ultimately, effective disaster mitigation not only protects lives and property but also contributes to the long-term stability and prosperity of communities by promoting adaptive and resilient development pathways.

2.1.1.3. Disaster preventions

Disaster prevention involves taking measures to completely avoid or eliminate the occurrence of disasters, particularly those that are man-made or influenced by human activities. This proactive approach focuses on addressing the root causes of vulnerabilities and hazards through comprehensive planning and policy interventions. Key strategies for disaster prevention include enforcing stringent environmental regulations to prevent deforestation and promoting sustainable agricultural practices to reduce soil erosion and water scarcity (UNISDR, 2015). Additionally, investing in education and awareness campaigns can empower communities to adopt preventive behaviours and practices. While it is often challenging to prevent natural disasters entirely, reducing the risk factors and enhancing environmental stewardship can significantly mitigate their potential impacts and contribute to safer, more resilient societies.

2.1.1.4. Disaster response

Disaster response encompasses the immediate actions taken during and after a disaster to save lives, protect property, and meet the basic needs of affected populations. This phase of Disaster Risk Management (DRM) involves the mobilization of emergency

services, including search and rescue operations, medical care, shelter provision, and the distribution of food and water (Alexander, 2002). Effective disaster response requires swift coordination among governmental agencies, non-governmental organizations, and community groups to ensure timely and efficient delivery of aid and resources (Smith & Petley, 2009). Advanced preparation, such as pre-positioning supplies and establishing clear communication channels, is critical for an effective response. The primary goal of disaster response is to minimize the immediate impacts of the disaster, stabilize the situation, and lay the groundwork for subsequent recovery and rehabilitation efforts.

2.1.1.5. Disaster recovery and rehabilitation

Disaster recovery and rehabilitation encompass the long-term efforts to restore affected communities, infrastructure, and economies following a disaster. This phase of Disaster Risk Management (DRM) focuses on addressing the social, economic, and environmental impacts of the disaster, and rebuilding resilience to future hazards. Recovery efforts often include the reconstruction of damaged infrastructure such as homes, schools, hospitals, and roads, as well as the restoration of essential services like electricity, water, and sanitation (Twigg, 2007). Rehabilitation initiatives aim to support the physical and psychological well-being of affected populations by providing psychosocial support, livelihood assistance, and access to healthcare and education services (Smith & Petley, 2009).

Effective disaster recovery and rehabilitation require careful planning, coordination, and collaboration among various stakeholders, including government agencies, non-governmental organizations, international donors, and local communities. These efforts should be guided by principles of sustainability, inclusivity, and resilience, taking into account the needs and priorities of the affected populations (UNISDR, 2015). Additionally, integrating disaster risk reduction measures into the recovery and rebuilding process can help minimize future vulnerabilities and enhance the long-term resilience of communities to similar disasters (World Bank, 2013). By focusing on both physical and social recovery, disaster recovery and rehabilitation efforts contribute to the restoration of normalcy, the promotion of sustainable development, and the enhancement of community resilience in the aftermath of disasters.

2.2. Concept of Food Security

Food security is a multidimensional concept that encompasses the availability, accessibility, utilization, and stability of food to meet the dietary needs and preferences of all individuals within a household, community, or nation (FAO, 2008). At its core, food security entails ensuring that all people have physical and economic access to sufficient, safe, and nutritious food to lead healthy and active lives. Availability refers to the consistent supply of food through domestic production, imports, or aid, while accessibility relates to the ability of individuals to obtain food through purchase, production, or barter, without facing undue constraints such as affordability or physical access (FAO, 1996).

Utilization encompasses the adequate intake of essential nutrients from diverse food sources, as well as the proper preparation and consumption practices to ensure optimal nutrition and health outcomes (UNICEF, 1990). It emphasizes the importance of a balanced diet that meets the dietary requirements of different age groups and promotes overall well-being. Additionally, food security entails stability in food access and utilization over time, with individuals and communities being resilient to shocks and stressors such as economic downturns, natural disasters, and conflict (FAO, 2015). This requires robust social protection mechanisms, effective risk management strategies, and sustainable food systems that can withstand external pressures and disruptions.

The concept of food security extends beyond mere access to calories to encompass broader dimensions of well-being, including social equity, environmental sustainability, and cultural identity (Maxwell et al., 2000).

Achieving food security requires addressing underlying drivers of food insecurity such as poverty, inequality, and inadequate governance, as well as promoting sustainable agriculture, equitable distribution systems, and inclusive social policies (IFPRI, 2020). Furthermore, recognizing the interconnectedness of food security with other development goals, such as health, education, and gender equality, is essential for designing comprehensive strategies that address the root causes of hunger and malnutrition (FAO, 2021). By adopting a holistic approach that integrates social, economic, and environmental considerations, countries can build resilient food systems that ensure the well-being of present and future generations.

2.2.1. Food availability

Food availability refers to the physical presence of an adequate and diverse supply of food within a given area, whether at the national, regional, or local level. It is a fundamental component of food security, ensuring that sufficient quantities of food are produced or imported to meet the dietary needs and preferences of the population. Food availability is influenced by various factors, including agricultural production, trade policies, infrastructure, and market dynamics (FAO, 2009). Sustainable food availability requires investment in agricultural productivity, technology adoption, and infrastructure development to enhance food production and distribution systems. Additionally, addressing challenges such as climate change, land degradation, and water scarcity is crucial for maintaining stable and resilient food supplies over time (FAO, 2019). By promoting agricultural diversification, improving market access for smallholder farmers, and fostering international cooperation, countries can enhance food availability and contribute to global efforts to achieve food security for all.

2.2.2. Food accessibility

Food accessibility refers to the ability of individuals and households to obtain and afford adequate quantities of nutritious food that meets their dietary needs and preferences. It encompasses both physical and economic dimensions, ensuring that food is within reach in terms of distance to markets, availability of transportation, and infrastructure such as roads and storage facilities (FAO, 1996).

Economic accessibility relates to the purchasing power of individuals and their ability to afford food without compromising other essential needs such as housing, healthcare, and education. Factors such as income levels, employment opportunities, food prices, and social safety nets influence economic access to food. Ensuring food accessibility requires addressing underlying determinants of poverty, inequality, and social exclusion, as well as implementing policies and programs that promote equitable access to resources and opportunities for all members of society (FAO, 2015). By improving both physical and economic access to food, countries can enhance food security and promote the well-being of their populations.

2.2.3. Food utilization

Food utilization refers to the proper intake, absorption, and utilization of nutrients from food to meet the dietary needs and support the health and well-being of individuals. It encompasses various aspects such as dietary diversity, food safety, hygiene practices, and nutritional knowledge. Adequate food utilization ensures that individuals consume a balanced diet containing essential nutrients such as vitamins, minerals, proteins, and carbohydrates necessary for growth, development, and overall health (UNICEF, 1990). Poor food utilization, characterized by inadequate intake of key nutrients or improper food preparation and handling, can lead to malnutrition, micronutrient deficiencies, and related health problems. Therefore, promoting healthy eating habits, nutrition education, and food safety measures are essential components of ensuring optimal food utilization and improving overall nutritional outcomes (FAO, 2021). Additionally, addressing broader social determinants such as access to clean water, sanitation, and healthcare facilities can further enhance food utilization and contribute to better health outcomes for individuals and communities.

2.2.4. Food stability

Food stability refers to the consistency and predictability of food availability, access, and utilization over time, ensuring that individuals and communities have reliable access to nutritious food without disruption. It encompasses both short-term and long-term stability, including the ability to withstand and recover from shocks and stresses such as natural disasters, economic fluctuations, conflicts, and other emergencies. Short-term food stability involves maintaining regular food supplies and preventing sudden disruptions in food markets, distribution systems, and supply chains. This requires effective crisis preparedness, early warning systems, and emergency response mechanisms to mitigate the impacts of shocks on food security (FAO, 2017).

Long-term food stability, on the other hand, involves addressing underlying vulnerabilities and building resilience in food systems through sustainable agricultural practices, diversified livelihood strategies, social protection programs, and inclusive policies that promote equitable access to resources and opportunities (IFPRI, 2020). By promoting food stability, countries can enhance the resilience of individuals and

communities to external shocks, ensure food security for all, and contribute to sustainable development and poverty reduction efforts.

2.3. Theories Related to the Study

2.3.1. Presure and Release Model (PAR)

The Pressure and Release (PAR) Model, formulated by Blaikie, Cannon, Davis, and Wisner in 1994, serves as a conceptual framework for analysing the processes underlying disaster vulnerability and risk. This model delineates disasters as the culmination of two primary components: pressures and hazards. Pressures denote the deep-seated root causes of vulnerability, encompassing socio-economic, political, and environmental factors such as poverty, inequality, rapid urbanization, and environmental degradation (Blaikie et al., 1994). These pressures engender conditions of susceptibility and exposure, rendering specific communities or groups more vulnerable to the impacts of hazards. Hazards, conversely, represent the natural or human-induced events or processes capable of causing harm, such as earthquakes, floods, droughts, and industrial accidents. When hazards intersect with vulnerable conditions wrought by pressures, they precipitate disasters, resulting in loss of life, property damage, and livelihood disruption.

The PAR Model underscores the dynamic interplay between pressures and hazards, as well as the pivotal role of underlying socio-economic, environmental, and political determinants in shaping vulnerability and resilience to disasters. Through a holistic comprehension and addressing of both vulnerability's root causes and the immediate triggers of disasters, the PAR Model aims to inform more efficacious strategies for disaster risk reduction and resilience enhancement (Blaikie et al., 1994).

2.3.2. Food Availability Decline Theory (FAD)

The Food Availability Decline Theory (FAD) is a conceptual framework proposed by Sen in 1981 to elucidate the causes of famine and food insecurity. This theory posits that food crises primarily arise not due to an absolute shortage of food, but rather from a decline in people's ability to access food, particularly the most vulnerable segments of the population. According to Sen, famines occur not because of a lack of food availability in the aggregate, but because certain groups or individuals lack the entitlements necessary to access food in times of scarcity. Entitlements refer to the

various means by which individuals can acquire food, including ownership of land, employment, wages, social safety nets, and access to markets (Sen, 1981). When people experience a decline in their entitlements, such as through loss of employment, displacement, or soaring food prices, they become unable to procure food despite its overall availability in the market.

Consequently, famine and food insecurity are understood as failures of entitlements rather than mere inadequacies of food supply. The FAD Theory underscores the importance of addressing underlying socio-economic inequalities, disparities in access to resources, and failures in governance systems to prevent and mitigate food crises and enhance food security for all (Sen, 1981).

2.3.3. Economic Theory

Economic theory remains a cornerstone of understanding and addressing complex economic phenomena, drawing upon a plethora of principles and models. Recent developments in economic theory have contributed to a deeper understanding of various economic issues and policy challenges. For instance, research by Acemoglu and Robinson (2019) has highlighted the role of institutions in shaping long-term economic development, emphasizing the importance of inclusive institutions in fostering prosperity.

Furthermore, advancements in behavioural economics, as elucidated by Kahneman (2019), have shed light on the psychological factors influencing economic decision-making, offering insights into consumer behaviour, market anomalies, and policy design. Additionally, game theory, as explored by Myerson and Maskin (2017), continues to inform our understanding of strategic interactions and cooperation in economic settings, with implications for competition policy, negotiation strategies, and international relations.

2.4. Empirical Related Literature Review

Empirical studies examining the impacts of disaster risk management (DRM) practices on household food security status in Ethiopia's Amhara Regional State, particularly within the North Shewa Zone of Tarmaber Woreda, provide valuable insights into the effectiveness of interventions aimed at reducing vulnerability to climate-related shocks

and enhancing resilience among rural communities. By analysing recent research conducted since 2017, this empirical review seeks to explore the multifaceted relationships between DRM initiatives, food availability, access, utilization, and stability, offering a comprehensive understanding of the factors influencing household food security outcomes in disaster-prone areas.

Dereje et al. (2018) conducted research in the Amhara Region of Ethiopia, focusing on the effectiveness of DRM initiatives in improving food security. Their study highlighted the importance of agricultural diversification and small-scale irrigation schemes in increasing food availability and reducing vulnerability to climate-related hazards. These interventions played a crucial role in ensuring households had access to diverse and nutritious food throughout the year.

Gebrehiwot et al. (2019) investigated the impact of DRM interventions on food access and utilization in Ethiopia. Their findings emphasized the significance of social protection programs and livelihood diversification strategies in enhancing household food security. By providing safety nets and supporting income-generating activities, these interventions helped households overcome food access barriers and improve their nutritional status.

Kassa et al. (2020) conducted a study in the North Shewa Zone of Ethiopia, focusing on community-based disaster risk reduction programs. Their research highlighted the role of these programs in strengthening local resilience and ensuring food access during times of crisis. By promoting community cohesion and implementing risk reduction measures, these interventions contributed to improved food security outcomes in the region.

Tefera and Endalew (2021) assessed the impact of DRM interventions on food security status specifically in Tarmaber Woreda, Amhara Region. Their study emphasized the need for integrated approaches that address both short-term food availability and long-term resilience-building measures. They found that interventions focusing on livelihood diversification, infrastructure development, and social protection contributed significantly to improving food security outcomes in the area.

A study by Solomon et al. (2017) investigated the effectiveness of early warning systems in reducing food insecurity in Ethiopia. Their research demonstrated that

timely and accurate early warnings enabled communities to take proactive measures to protect their crops and livestock, thereby mitigating the impacts of disasters on food production and availability.

Berhanu et al. (2018) conducted research on the role of community-based disaster risk management committees in enhancing food security in rural Ethiopia. Their study revealed that these committees played a crucial role in mobilizing resources, coordinating response efforts, and disseminating information during emergencies, contributing to improved food security outcomes at the local level.

A study by Abate et al. (2019) examined the impact of climate-smart agricultural practices on household food security in Ethiopia. Their research demonstrated that the adoption of climate-resilient farming techniques, such as conservation agriculture and agroforestry, helped households maintain stable food production and income streams despite climate variability and extreme weather events.

Worku et al. (2020) conducted a study on the effectiveness of food assistance programs in mitigating food insecurity in Ethiopia. Their research revealed that targeted food aid distribution, coupled with nutrition education and livelihood support, significantly improved food access and dietary diversity among vulnerable populations, contributing to enhanced food security outcomes.

Finally, a study by Tilahun et al. (2021) investigated the impact of natural resource management interventions on household food security in Ethiopia. Their research highlighted the importance of sustainable land and water management practices in increasing agricultural productivity, improving household incomes, and reducing food insecurity in rural communities.

These empirical studies collectively provide comprehensive insights into the impacts of disaster risk management practices on household food security status in Ethiopia's Amhara Regional State, North Shewa Zone, and Tarmaber Woreda. Through various interventions and approaches, including early warning systems, community-based disaster risk reduction programs, climate-smart agriculture, and social protection measures, these studies demonstrate the potential for DRM initiatives to enhance resilience and mitigate food insecurity risks in vulnerable communities.

2.5. Conceptual Framework of the study

The food security status of households can be impacted by different reasons. Firstly, the households' food security status could be affected through the adverse impacts of disasters occurred within their living areas. Examples of those disasters are drought, flood, conflict, pests (often desert locust infestations), rainfall variability, water scarcity, landslide and others. Some of the adverse impacts that caused by disasters could be reduced farmlands' production, limited availability of livestock pasture, water, and health impacts on livestock, poor infrastructures, reduced water and crop conditions of irrigation lands, and etc. would lead households to be food insecure. However, if these disasters are managed and/or controlled following the DRM practices properly, their impacts on the lives and livelihoods of communities wound be minimized and food security can be assured.

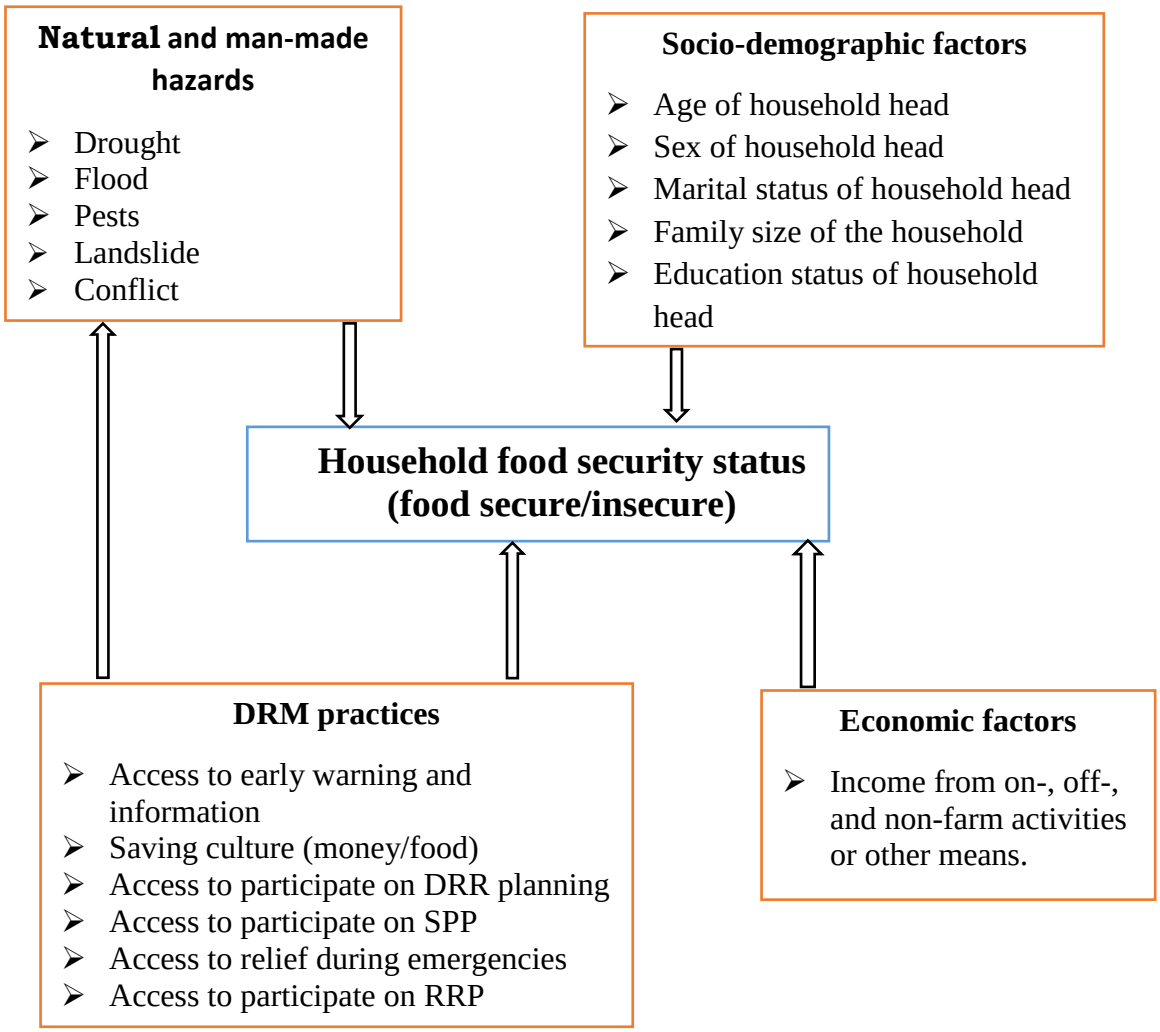
Secondly, households could be affected by their poor practical applications of DRM practices including preparedness, prevention, mitigation, response and recovery and rehabilitations measures. Some of the critical tasks that needs great accomplishment (before, during, and post-disasters occurred) for the rural households to be food secure are building saving culture of in-kind and money, access to early warning and information, access to Social Protection Programs (SPP), access to participate on Recovery and Rehabilitation Practices (RRP), and access to get relief or support during emergency conditions. The strong practical accomplishments of these DRM approach practices enable households to capacitate themselves and reduce immediate and long-term vulnerabilities and meeting all four pillars of food security: availability, accessibility, utilization, and stability of food, otherwise, food insecure.

Thirdly, the socio-demographic characteristic of the household such as age, sex, level of education, family size, marital status, and income had the capacity to determine the households' applications of DRM practices and influence, negatively or positively, their food security status. For example, if the more households of a given community are educated enough, they will have better understanding and application performance about disasters and their prevention, mitigation, preparedness, response and recovery and rehabilitation measures than that of the non-educated communities. Similarly, workable ages of households, like ages between 18 and 60, could also influence the RDM practices applications positively on their food security status.

Fourthly, there are also economic factors, which affect the households' food security condition. Among these factors, the households' farmland size and an income gained from various sources are the main once.

Hence, the following conceptual framework depicts that the impacts of DRM approaches practices on households' food security is determined by types of disasters occurred, socio-demographic factors of the household, and the degree of households' practical applications of DRM practices.

Figure 1: Conceptual framework of the study



Source: Conceptual framework of the study.

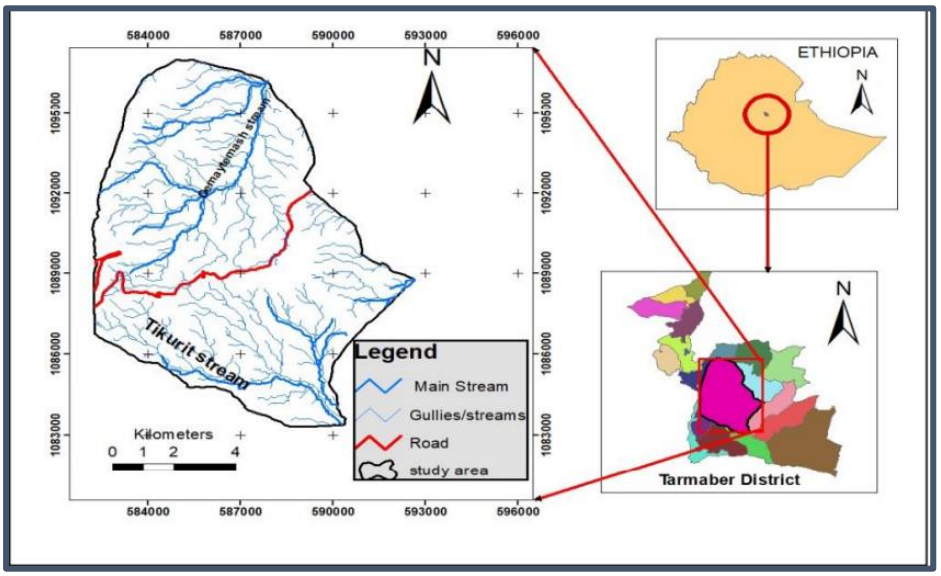
CHAPTER 3

3. RESEARCH METHODS

3.1. Description of the Study Area

The study area, Tarmaber woreda, is located in the western escarpment of the Main Ethiopian Rift (MER) which lies in the Amhara National, Regional state in the North Shewa Zone, Central Ethiopia (Figure 2). The area is about 190km in the north direction of the capital city; Addis Ababa. Geographically, it is bounded in between $9^0$48'0"N - $9^0$55'30"N and $39^0$45'1.5"E - $39^0$50'42"E and the total area coverage is 92km^2 (Elias; & Suryanarayana, 2021). It has 19 rural and 4 urban kebeles, with a total population of 113, 787 (56,417 Female) (CSA, 2023), scattered under three main agro-climatic conditions highland (consisting of 4 kebeles), midland (consisting of 8 kebeles), and lowland (consisting of 7 kebeles) with an area percentage coverage of 54.25, 28, and 17.75 respectively (Tarmaber woreda Agriculture Office, 2023). The study area populations used the mixed farming system as their dominant livelihood source together with selling of firewood, charcoal, local alcoholic drinks, and etc. (Debebe et al. 2020).

Figure 2: Map of the Study Area



Source: Adapted from (Elias; & Suryanarayana, 2021)

3.2. Research Design and Approach

This research employed an explanatory research design to elucidate the causal relationships between disaster risk management practices and household food security status. Data were gathered through household questionnaire surveys, observations, and Key Informants Interviews (KIIs). Originally, the researcher intended to collect information from sample respondents through focus group discussions. However, due to government restrictions and emergency protocols in the Amhara region, conducting meetings and discussions was not feasible. Therefore, the study adapted its methodology to focus primarily on explanatory analysis to uncover the underlying causes and effects of disaster risk management practices on household food security status.

Moreover, the research also used one of the food security status measuring indicators, Households Food Insecurity Access Scale (HFIAS), to construct index and by which households are classified into two categories, food secured and food insecure. To make it more clarified, the nature of HFIAS households' food security status categorization is four – food secured, mildly, moderately, and severely food insecure. For ease of use of binary logit regression, the researcher categorized these four classes of households' food security status into two, i.e., considering the first category food secured as food secured and considering the rest three categories (mildly,moderately, and severely food insecure) as food insecure.

The other research design used was use of econometric model that is binary logit regression model to analyse the impacts of DRM practices on households' food security.

3.3. Data Types and Sources

Different types of data (both primary and secondary) such as demographic, socio-economic, DRM practices, etc. are collected, organized and analysed from the respondents.

3.3.1. Primary Data Sources

The primary data sources that are used for this research are interview from households' respondents, key informants' interview, and observations.

3.3.2. Secondary Data Sources

The secondary data sources of the study are journal articles, websites, reports of national, regional, and international, internet resources, books, different governmental and non-governmental organizations reports and documents like policies, strategies, and others, published and unpublished reports, academic researches, and statistical information at a different level and other sources which properly described the impacts of disaster risk management practices on household food security.

3.4. Sample Size Determination and Sampling Techniques

3.4.1. Sample size determination

The study used/applied a formula for sample size determination that can represent the whole population in the study area. This sample size determination formula is illustrated bellow (Yemane, 1967).

$$n = \frac{N}{1 + N(e)^2} \quad \text{.....(1)}$$

Where:
n = sample size
e = Population size (N): 2096
e= Level of precision (e): 0.05 (5%)

Therefore, based on the data given from study area, the three purposively, due to transport access and relatively free from local conflict, selected study kebeles, named as Adokie, Sina, and Wanzaberet, total household populations are 603, 649, and 844 respectively. The total population of the study is 2096. With 95% confidence interval and 5% level of precision or sampling error, the research sample size was:

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

$$n = \frac{2096}{1+2096\ (0.05)^2}$$

$$n = \frac{2096}{1+2096(0.0025)}$$

$$n = \frac{2096}{1+5.24}$$

$$n = \frac{2096}{6.24}$$

n = 335.89

n = 336

Out of the three kebeles population size, 336 sample size was determined based on the above formula and then sample sizes of each kebeles was determined as below;

From Adokie kebele 603 total population $\frac{N1*n}{N} = \frac{603*336}{2096} = 97$

From Sina kebele 649 total population $\frac{N1*n}{N} = \frac{649*336}{2096} = 104$

From Adokie kebele 844 total population $\frac{N1*n}{N} = \frac{844*336}{2096} = 135$

Each kebele sample size households are registered alphabetically and selected based on systematic random sampling method for households' questionnaire interview.

3.4.2. Sampling Technique

The sampling technique employed in this study is purposive, strategically chosen due to the high incidence of various disasters in the selected woreda, including landslides, frost, saline soil farmland, desert locust infestations, and the impacts of climate change variability. Additionally, the study area benefited from social protection programs like the Productive Safety Net Program (PSNP). Leveraging the researcher's familiarity with local civil servants facilitates efficient access to necessary information and data, thereby reducing research costs.

3.5. Data Collection Tools

3.5.1. Household Survey Questionnaire

Throughout the data collection phase, household survey questionnaires were utilized to gather data from chosen participants. Even though the respondents were mostly farmers, as some of them were illiterate, these questionnaire were filed by well-trained and experienced data collectors who have a capacity to gather/record the required data and thus, the data was gathered correctly as required and the analysis is done based on that. Those questionnaires comprised a combination of open-ended and closed-ended questions, facilitating the acquisition of pertinent information for the research. Additionally, the Household Food Insecurity Access Scale (HFIAS) questionnaire was employed to evaluate the food security status of households, employing questions on frequency and occurrence. Furthermore, the HFIAS questionnaire proved instrumental in constructing an index and conducting binary logistic regression analysis.

3.5.2. Key Informants Interview (KII)

In addition to the households' survey questionnaire of data collection, key informants interview (KII) guide is applied to interview key informants of woreda sector office heads, experts, and kebele experts and leaders or cabinets. By this interview, data are taken from offices of agriculture, women affairs, administration, health, environment, livestock, education, water, road and one local and one international non-governmental organization working in the study area. In total, 11 KIIs were carried out to verify households survey questionnaire responses particularly focused on the names of major disasters occurred, their significant impact on households food security, households' training taking status on early warning and information, actions taken by households before, during and after disasters occurred, and existence and effectiveness of social protection programs within the study area. Those KIIs findings were helpful to verify the analysis of major disasters occurred and impacts of DRM practices on households' food security within the study area.

3.5.3. Observations

This method of data collection enabled the researcher to assess or monitor the full range of behavioural and non-behavioural activities/events of the selected respondents.

Observing such type of data provided chances to have detail understanding towards various conditions and food security situation while considering this research in the study area. Frequent travel to the study area was important to understand and gather relevant information and/or data that strengthened the analysis of the impact of DRM practices on households' food security.

3.6. Methods of Data Analysis

3.6.1 Descriptive Statistics

Once the research data, both qualitative and quantitative, were collected, edited, coded, and checked for quality, accuracy, and completeness, they were analyzed via SPSS software program version 26. Descriptive statistics were utilized to summarize respondents' data and analyze various outputs such as mean, standard deviation, percentage, maximum and minimum values, and frequency distributions. These statistics were instrumental in comparing and contrasting independent variables over households' food security status, dependent variable.

3.6.2 Econometric Analysis

The study employed econometric analysis, specifically binary logistic regression, to assess the impact of Disaster Risk Management (DRM) practices on households' food security status. Logistic regression, chosen for its robustness in handling non-normal independent variables, precisely evaluated the relationship between regressed and explanatory variables and predicted their significance. The logistic model equation was utilized to predict the probability of households being food secure, considering various explanatory variables. This approach provided valuable insights into the determinants of households' food security status and allowed for policy implications based on accurate modeling results (Maddala, 1983; Amemiya, 1984).

3.6.3. Descriptions of Variables

There are two main variables identified in this research, dependent variable and independent variables. The dependent variable is the chance of being food secured or insecure whereas the independent variables are the one that can determine the food security status of the households within the study area. Here it is important to give one issue regarding dependent variables that can influence households to be food

secured/insecure in one way or another. Therefore, in the case of this research, only selected independent variables have the likelihood potential that can determine the households to be either food secured or not. Both dependent and independent variables are further explained as below.

3.6.3.1. Dependent variable

The status of households' food security, the dependent variable, in the binary logit regression analysis is a dichotomous variable which denoting households' food security status within the study area. The food security indicator that was used during this study was HFIAS that has four categories of food security status measurement-food secured, mildly, moderately, and severely food insecure. However, these four categories are merged into two categories, i.e., classifying the first two class (food secured and mildly food insecure) as food secured and the last two classes (moderately and severely food insecure) as food insecure. Then, the food secured households are coded as 1, otherwise 0.

3.6.3.2. Independent variables

Table 1: Description of variables

Variable	Type	Description	Coding/ Values	Expected Relationship with Food Security
Sex of Household Head (SexHH)	Dummy	Determines whether the household head is male or female, influencing economic opportunities and information access.	Male = 1, Female = 0	Positive (for male-headed households)
Marital status of the household	Dummy	Marital status of the household influences the resource sharing and better economic status	1 = Married, 0 = Not married	Positive (for married households)
Age of Household Head (AgeHH)	Continuous	Age of the household head, affecting capacity to cope with disasters and access to resources.	Continuous	Positive or Negative
Family Size of Household (FaSHH)	Continuous	Number of members in the household, affecting resource needs and food security.	Continuous	Negative

Educational Status of HH Head (EduSHH)	Dummy	Education level of the household head, affecting knowledge and disaster risk management practices.	Educated = 1, Non-educated = 0	Positive
Income of Household (IHH)	Continuous	Household income, influencing ability to secure food and manage disasters.	Continuous	Positive
Disaster Occurrence Status (DisaSHH)	Dummy	Experience of households with disasters, affecting their food security.	Experienced = 1, Not experienced = 0	Negative
Drought	Dummy	Impact of drought on household food security.	Affected = 1, Not affected = 0	Negative
Landslide	Dummy	Impact of landslides on household food security.	Affected = 1, Not affected = 0	Negative
Flood	Dummy	Impact of floods on household food security.	Affected = 1, Not affected = 0	Negative
Conflict (War)	Dummy	Impact of conflicts on household food security.	Affected = 1, Not affected = 0	Negative
Pest	Dummy	Impact of pests on household food security.	Affected = 1, Not affected = 0	Negative
Asset Loss due to Disasters (ALoDisa)	Continuous	Asset loss due to disasters, affecting household food security.	Continuous	Negative
Credit Access (CrdAHH)	Dummy	Access to credit, aiding in disaster preparedness and food security.	Access = 1, No access = 0	Positive
Use of Early Warning and Information Methods (EWaIM)	Dummy	Use of early warning and information methods, improving disaster preparedness and food security.	Used = 1, Not used = 0	Positive

Early Warning and Information Training Status (EWaITS)	Dummy	Training in early warning and information, enhancing disaster preparedness and food security.	Trained = 1, Not trained = 0	Positive
DRR Planning Experience (HHDRRPexp)	Dummy	Experience in disaster risk reduction planning, enhancing pre-disaster readiness and food security.	Experienced = 1, Not experienced = 0	Positive
Saving Culture (SaCHHs)	Dummy	Practice of saving, providing resilience against disasters and improving food security.	Saves = 1, Does not save = 0	Positive
Preparedness and Mitigation Measures (HHPreMitigMesu)	Dummy	Practice of preparedness and mitigation measures before disasters, enhancing food security.	Practices = 1, Does not practice = 0	Positive
Flood Diversion	Dummy	Impact of flood diversion practices on household food security.	Practices = 1, Does not practice = 0	Negative
Use of Pesticides	Dummy	Impact of pesticide use on household food security.	Uses = 1, Does not use = 0	Negative
Soil and Water Conservations (physical and biological)	Dummy	Impact of soil and water conservation practices on household food security.	Practices = 1, Does not practice = 0	Negative
Drought/Frost Resistant Crops	Dummy	Use of drought/frost resistant crops, affecting household food security.	Uses = 1, Does not use = 0	Negative
Support Status During Disaster (SuppSDias)	Dummy	Access to support during disasters, aiding in disaster resilience and food security.	Access = 1, No access = 0	Positive
Social Protection Program Participation (PartSSPP)	Dummy	Participation in social protection programs, enhancing food security through additional benefits.	Participates = 1, Does not participate = 0	Positive

CHAPTER 4

4. RESULT AND DISCUSSION

The study findings and their discussions are written under this chapter which mainly focused on the discussion part of result of descriptive and inferential (econometric binary logit regression) analyses.

The analysis of demographic factors and as well as the DRM practices of households is done by using descriptive statistics whereas significant and non-significant factors affecting the households' food security situation are identified and analyzed through binary logistics regression method.

4.1. Socio Demographic Characteristics of Households

Table 2: Demographic characteristics of households

Variable	Category	Frequency	Percent
Sex of Respondents	Female	67	19.9
	Male	269	80.1
	Total	336	100.0
Marital Status	Not Married	18	5.4
	Married	318	94.6
	Total	336	100.0
Religion	Orthodox	327	97.3
	Muslim	9	2.7
	Total	336	100.0
Educational Status	Literate	137	40.8
	Illiterate	198	58.9
	2	1	0.3
	Total	336	100.0

Source: Own study result (2024)

As shown in the table above, the significant majority of households are male-headed (80.1%). Male-headed households might have better access to economic opportunities, resources, and decision-making processes compared to female-headed (19.9%) households. This disparity can affect food security, as male-headed households might be more capable of leveraging economic and agricultural opportunities to enhance food security.

As far as marital status of respondents concerned, the majority of respondents are married (94.6%), which might suggest a stable household structure. Married households often have combined resources and labour, which can contribute positively to food security by ensuring a more stable income and better resource management.

The population is predominantly Orthodox (97.3%). Religious affiliation can influence community support systems, agricultural practices, and access to food aid or relief programs. Both Orthodox and Muslim communities, there may be specific communal support systems that can be leveraged in times of food insecurity.

Moreover, a significant portion of the respondents is illiterate (58.9%). Education is closely linked to food security as it affects a household's ability to access information, implement modern agricultural techniques, and utilize disaster risk management practices effectively. Literate (40.8%) individuals are more likely to be aware of and employ improved agricultural practices, access credit, and navigate relief systems, contributing to greater food security.

Thus, the above result implies that with a high percentage of male-headed households, there may be better overall access to resources and economic opportunities, which can enhance food security. However, female-headed households might be more vulnerable and require targeted interventions. High rates of marriage can indicate stable household structures, which is beneficial for pooling resources and labour, thus improving food security. Married couples may be better equipped to manage agricultural tasks and economic challenges.

Even the dominance of the Orthodox religion in the study area, both Muslim and Christian followers found in area suggests that food security strategies might need to consider religious practices and community support systems inherent within the communities. In addition, the high rate of illiteracy is a critical concern. Illiterate households may struggle to adopt advanced agricultural practices, access formal credit, and effectively respond to food security initiatives. Therefore, increasing educational opportunities and literacy rates is vital for enhancing food security.

To sum up, the demographic characteristics highlight specific areas where interventions can be targeted to improve food security. Enhancing educational programs, supporting female-headed households, leveraging community support systems, and promoting

stable household structures are essential strategies for addressing food insecurity in the studied area.

Table 3: Mean Summary of Age, Family size and Income of Households

Descriptive Statistics			
	N	Mean	Std. Deviation
Age of households	336	43.39	11.516
Family size	336	4.57	1.606
Household's income in ETB	336	51,797.41	27,203.951

Source: Own study result (2024)

As clearly shown in the above table 3, the average age of household heads is 43.39 years. This age suggests that many household heads are in their prime working years, which can positively influence food security, as they are likely to have the physical capacity and experience to manage agricultural activities and other income-generating activities. However, as age increases, the capacity to engage in labour-intensive activities may decrease, potentially affecting food security negatively in older households.

In additions, the average household consists of approximately 4.57 members. Larger family sizes can have a dual impact on food security. On one hand, more family members can provide additional labour for agricultural and income-generating activities, potentially enhancing food security. On the other hand, larger families require more resources and food, which can strain household resources and contribute to food insecurity, especially during times of disaster or economic hardship.

Moreover, the average annual income of households is 51,797.41 Ethiopian Birr (ETB). A higher household income generally enhances food security as it enables households to purchase food, invest in better agricultural inputs, access health and education services, and save for future needs. The relatively high standard deviation (27,203.951 ETB) indicates significant variability in household incomes, suggesting disparities in economic well-being among households. Households with lower incomes are more vulnerable to food insecurity.

Therefore, the study finding implies that the average age of household heads suggests a mature population capable of managing household and agricultural responsibilities. However, support may be needed for older household heads who might face physical limitations in their work capacity. While the average family size suggests a balanced household structure, larger families might need additional support to ensure food security. Programs aimed at improving agricultural productivity and income generation can help balance the resource demands of larger households.

Further, the average income level indicates a relatively moderate economic status, but the wide range of incomes points to inequality. Targeted interventions are necessary for lower-income households to enhance their food security through access to credit, improved agricultural techniques, and disaster preparedness programs.

Generally, the demographic characteristics related to age, family size, and income highlight key areas for enhancing food security. Addressing the needs of older household heads, managing the resource demands of larger families, and reducing income disparities through targeted economic support and capacity-building initiatives are crucial steps in improving food security for the population.

4.2. Analysis of Household Food Security Status in the Study Area

The food security situation analysis conducted in the Amhara Regional State, North Shewa Zone, Tarmaber Woreda reveals several analyses as clearly shown in the table below.

Table 4: Frequency distribution of households by food security situation

Food security situation of households			
Categories		**Frequency**	**Percent**
Valid	Food secured	233	69.3
	Mildly food insecure	33	9.8
	Moderately food insecure	56	16.7
	Severely food insecure	14	4.2
	Total	**336**	**100.0**

Source: Own study result (2024)

As illustrated from the table above, of the 336 households surveyed, 69.3% are categorized as food secure. This indicates that a significant portion of the households have consistent access to enough food for an active and healthy life. However, 30.7% of households experience some level of food insecurity, ranging from mild to severe. This highlights a considerable portion of the population facing challenges in accessing an adequate and nutritious diet consistently.

In addition, among the food insecure households, the majority fall into the categories of moderately food insecure (16.7%) and mildly food insecure (9.8%). This suggests that while severe food insecurity is present, it is less prevalent compared to moderate and mild food insecurity. Thus, the result implies that a smaller percentage (4.2%) of households are classified as severely food insecure, indicating a critical situation where households have limited or uncertain access to food, leading to hunger and malnutrition. The findings underscore the importance of targeted interventions to address varying levels of food insecurity within the community. For households classified as mildly or moderately food insecure, interventions may focus on strategies to improve income, enhance agricultural productivity, and provide access to social safety nets such as food assistance programs or nutrition education.

The relatively small proportion of severely food insecure households still requires urgent attention. Immediate relief efforts, such as food aid distribution, livelihood support, and social protection programs, may be necessary to alleviate acute hunger and prevent severe malnutrition and its associated consequences.

Therefore, it is essential for policymakers, local authorities, and NGOs to collaborate closely to design and implement context-specific interventions tailored to the needs of the community, taking into account factors such as seasonal variations, market access, and environmental conditions.

To sum up the study result revealed the food security situation of households in the Amhara Regional State, North Shewa Zone, Tarmaber Woreda, informing evidence-based decision-making and the prioritization of interventions to improve food access and nutrition outcomes for vulnerable households.

4.2.1. Socio Demographic Characteristics of Households by Food Security Status

Table 5: Cross tabulation of households sex by food security status

Sex of the households	**Food secured**		**Food insecure**		**Total**	
	Frequency	%	Frequency	%	Frequency	%
Male	210	62.5	59	17.6	269	80.1
Female	23	6.8	44	13.1	67	19.9
Total	233	69.3	103	30.7	336	100
$\chi 2$ =35.891, df=1,p=0.001(<0.05)						

Source: Own study result (2024)

The cross-tabulation of households' sex by food security status reveals notable differences in food security outcomes between male- and female-headed households. Among male-headed households, a significant majority (62.5%) are food secure, while only 17.6% are food insecure. In contrast, female-headed households are less likely to be food secure, with only 6.8% being food secure and a higher proportion (13.1%) being food insecure. Overall, out of the total 336 households, 69.3% are food secure, and 30.7% are food insecure. These results suggest that male-headed households are more likely to experience better food security compared to female-headed households, highlighting a potential area of concern regarding gender disparities in food security.

The results of the Chi-Square test for the relationship between the sex of the households and their food security status show a significant association. The Chi-Square value is 35.891 with 1 degree of freedom, and the p-value is less than 0.001, which is statistically significant at the commonly used significance level of 0.05. The cross-tabulation table reveals that the majority of the households (269 out of 336, or 80.1%) are male-headed, with 210 (62.5%) being food-secured and 59 (17.6%) being food-insecure. In contrast, among the female-headed households (67 out of 336, or 19.9%), 23 (6.8%) are food-secured, and 44 (13.1%) are food-insecure. These findings suggest that the sex of the household head is a significant factor in determining the household's food security status, with male-headed households being more likely to be food-secured compared to female-headed households.

Table 6: Martial status by household food security status

Marital status	Household food security status				Total
	Food insecure		Food secured		
	Frequency	%	Frequency	%	Count
Not married	12	3.6	6	1.8	18
Married	91	27.1	227	67.9	318
Total	103	30.7	233	69.3	336
$\chi 2 = 2.193$, df = 1, P > 0.05					

Source: Own study result (2024)

The cross-tabulation of marital status by household food security status illustrates a clear relationship between marital status and food security outcomes. Among married households, a substantial majority (67.9%) are food secure, while 27.1% are food insecure. In contrast, not married households exhibit a more balanced distribution, with 1.8% being food secure and 3.6% being food insecure. Overall, of the 336 households surveyed, 69.3% are food secure, and 30.7% are food insecure. These findings suggest that married households tend to have better food security compared to not married households, indicating that marital status may play a significant role in household food security.

The results of the Chi-Square test ($\chi 2 = 2.193$, df = 1, P > 0.05) indicate that there is no statistically significant association between the marital status and the household food security status. The cross-tabulation table shows that the majority of households (318 out of 336) are headed by married individuals, with 91 (27.1%) being food-insecure and 227 (67.9%) being food-secured. For the not-married households, 12 (3.6%) are food-insecure, and 6 (1.8%) are food-secured. The p-value of 0.139 is greater than the commonly used significance level of 0.05, suggesting that we fail to reject the null hypothesis of no significant relationship between marital status and household food security status. These findings suggest that the marital status of the head of household is not a significant factor in determining the household's food security status.

Table 7: Educational background by household food security status

Educational status * Household food security status cross tabulation				
		Household food security status		Total
		Food insecure	Food secured	
Educational status	Literate	62	137	199
	Illiterate	41	96	137
Total		103	233	336
$\chi 2 = 0.437$, df = 1, P > 0.05				

Source: Own study result (2024)

The cross-tabulation of educational status by household food security status illustrate the relationship between literacy and food security. Among literate households, 137 out of 199 (68.8%) are food secure, while 62 out of 199 (31.2%) are food insecure. In contrast, among illiterate households, 96 out of 137 (70.1%) being food secure and 41 out of 199 (29.9%) being food insecure. Overall, out of the total 336 households, 69.7% are food secure, and 30.7% are food insecure. These findings suggest that illiterate households have a slightly higher rate of food security compared to literate households, indicating that factors other than literacy, such as economic status, social support, or access to resources like land availability and number of livestock owned, may play significant roles in determining food security.

The results of the Chi-Square test ($\chi 2 = 0.437$, df = 1, P > 0.05) indicate that there is no statistically significant association between the educational background and the household food security status. The cross-tabulation table shows that households 137 out of 336) are headed by individuals with an illiterate educational background, with 41 (29.9%) being food-insecure and 96 (70.1%) being food-secured. Among the literate households, 62 (31.2%) are food-insecure, and 137 (68.8%) are food-secured. The p-value of 0.509 is greater than the commonly used significance level of 0.05, suggesting that we fail to reject the null hypothesis of no significant relationship between educational background and household food security status. These findings suggest that the educational background of the head of household is not a significant factor in determining the household's food security status.

Table 8: Households Annual income by food security status

Households income * Household food security status cross tabulation				
		Household food security status		Total
		Food insecure	Food secured	
Households annual income In ETB	<30000	46	0	46
	30001-50000	57	0	57
	50001-70000	0	83	83
	>70001	0	150	150
Total		103	233	336
(t = -4.464, df = 334, p < 0.001)				

Source: Own study result (2024)

The cross-tabulation of household annual income by food security status reveals a clear relationship between income levels and food security outcomes. Households earning less than 30,000 ETB annually have the proportion of 13.7% of households with being food insecure. Similarly, households with an annual income between 31,000 and 50,000 ETB also exhibit a high proportion of food insecurity, at 17%. In contrast, households with an income between 51,000 and 70,000 ETB show a significant improvement in food security, with only 24.7% being food insecure. The most substantial food security is observed among households earning more than 71,000 ETB annually, where 44.6% are food secure. Overall, these results indicate a positive correlation between household income and food security, underscoring the critical role of economic resources in ensuring household food security. Households with higher incomes are better positioned to achieve and maintain food security compared to those with lower income.

The results of the independent sample t-test reveal a statistically significant difference in the mean annual income of household heads between food-insecure and food-secured households ($t = -4.464$, $df = 334$, $p < 0.001$). The Levene's test for equality of variances ($p = 0.065$) suggests that the assumption of equal variances is met. The mean annual income of household heads in food-insecure households is 49,061 ETB, while the mean annual income in food-secured households is 61,560 ETB. This indicates that households with higher-income household heads are more likely to be food-secured, a finding that is consistent with the results of the previous Chi-Square test. Overall, these results suggest that the annual income of the household head is a significant factor in determining the household's food security status.

Table 9: Households age by household food security status

age of households * Household food security status cross tabulation			
Count			
Age of HHs	Household food security status		Total
	Food insecure	Food secured	
18-30 years	18	27	45
31-40 years	31	80	111
41-50 years	28	73	101
51-60 years	15	30	45
Above 61 years	10	24	34
Total	102	234	336
(t = -2.660, df = 334, p = 0.008)			

Source: Own study result (2024)

The cross-tabulation of household head age (HHs age) by food security status presents how age influences food security outcomes. Here's the analysis presented in paragraph form:

The analysis of household head age by food security status reveals distinct patterns across different age groups. Among households headed by individuals aged 18-30 years, 60% (27 out of 45) are food secure, whereas 40% (18 out of 45) are food insecure. For those aged 30-40 years, the highest level of food security is observed, with 72.1% (80 out of 111) being food secure and 27.9% (31 out of 111) being food insecure. In the 40-50 years age group, 72.3% (73 out of 101) are food secure, and 27.7% (28 out of 101) are food insecure. Households headed by individuals aged 50-60 years show a lower food security rate, with 66.7% (30 out of 45) being food secure and 33.3% (15 out of 45) being food insecure.

Finally, for those above 60 years, 70.6% (24 out of 34) are food secure, while 29.4% (10 out of 34) are food insecure. Overall, out of the total 336 households, 69.6% are food secure, and 30.4% are food insecure. These findings suggest that the age of the household head plays a role in determining food security, with the highest food security levels found among households headed by individuals in their 30s and 40s.

The results of the independent sample t-test (t = -2.660, df = 334, p = 0.008) indicate a statistically significant difference in the mean age of household heads between food-

insecure and food-secured households. The Levene's test for equality of variances (p = 0.691) suggests that the assumption of equal variances is met. The mean age of household heads in food-insecure households is 38.33 years, while the mean age in food-secured households is 41.45 years, indicating that older household heads are more likely to have food-secured households. These findings, combined with the results of the previous Chi-Square test, suggest that the age of the household head is a significant factor in determining the household's food security status, with older individuals being more likely to have food-secured households.

4.3. Major Disasters that Affect the Households' Food Security

Table 10: Frequency and percentage of households affected by various disasters

Variable	Category	Frequency	Percent
Drought	No	325	96.7
	Yes	11	3.3
	Total	336	100.0
Landslide	No	306	91.1
	Yes	30	8.9
	Total	336	100.0
Flood	No	143	42.6
	Yes	193	57.4
	Total	336	100.0
Conflict	No	239	71.1
	Yes	97	28.9
	Total	336	100.0
Pest	No	275	81.8
	Yes	61	18.2
	Total	336	100.0

Source: Own study result (2024)

In above table, the analysis of major disasters affecting household food security in the Amhara Regional State, North Shewa Zone, Tarmaber Woreda revealed major disaster challenges faced by communities in maintaining food access and stability. Firstly, while drought appears to affect only a small percentage (3.3%) of households, its significance cannot be understated. Even minor drought events can have cascading effects on agricultural productivity, water availability, and livestock health, particularly in regions reliant on rain-fed agriculture like Tarmaber Woreda. Therefore, despite it's relatively

low frequency, measures to mitigate drought's impact, such as water conservation strategies and drought-resistant crop varieties, remain crucial for enhancing overall food security resilience.

In addition, the analysis reveals that landslides are not a prevalent concern affecting the food security and livelihoods of households surveyed in the study area, with the majority (91.1%) indicating that landslides did not affect them. While other disasters like floods, conflict, and pest infestations emerge as significant challenges, the relatively low frequency of landslides suggests that they have a minimal direct impact on household food security in Tarmaber Woreda.

Moreover, floods pose a significant threat to food security, influencing 57.4% of households. Flood events can result in crop damage, soil erosion, and contamination of water sources, posing immediate challenges to food availability and long-term consequences for agricultural productivity. Therefore, comprehensive flood risk management strategies, including infrastructure improvements, land-use planning, and community-based flood preparedness programs, are essential to minimize the vulnerability of households to flood-related food insecurity.

Further, conflict emerges as a notable factor affecting food security, with nearly a third (28.9%) of households reporting its impact. Conflict disrupts agricultural activities, displaces populations, and impedes access to markets and essential services, exacerbating food insecurity among affected communities. Addressing conflict-related food insecurity requires not only conflict resolution efforts but also interventions aimed at restoring livelihoods, rebuilding infrastructure, and promoting social cohesion to create an environment conducive to sustainable food production and access.

Therefore, the analysis effectively achieves its objective of identifying major disasters affecting household food security in the study area. By highlighting the multifaceted nature of food insecurity drivers, from natural hazards like drought, landslides, and floods to human-induced factors such as conflict, the findings underscore the importance of holistic and context-specific interventions to build resilience and ensure food security for vulnerable populations in Tarmaber Woreda.

The Key Informant Interview (KII) response confirmed that the major common disasters affecting households in the study area. The participant identifies floods,

conflicts (specifically referencing the Northern Ethiopian war from 2021-2023), and pests as the primary disasters influencing their community. This categorization aligns with the quantitative data presented earlier, validating the prevalence of these hazards as reported by households.

Moreover, the KII participant provides valuable context on the severity and frequency of each disaster type. They note that floods occur annually during the rainy season and cause the most significant damage, indicating their high frequency and severe impact on agricultural activities and food security. Conflicts are less frequent but have severe consequences when they do occur, highlighting their sporadic yet highly disruptive nature. Pests, particularly locusts, are identified as a recurring issue but are relatively manageable compared to floods and conflicts, suggesting a lower severity level.

The participant provides specific instances of each disaster type's impact on their livelihoods. They recount a recent flood event that destroyed their entire crop, resulting in significant food insecurity. Additionally, they describe how conflicts in the neighboring area disrupted market access and food supplies for an extended period, exacerbating food shortages. Despite facing challenges with pests, the participant notes that they have been able to manage them with assistance from local agricultural officers, indicating some level of resilience and coping mechanisms in place.

To generalize, the KII response widen our understanding of the lived experiences and perceptions of households regarding major disasters. It corroborates the quantitative data while providing nuanced insights into the severity, frequency, and specific impacts of floods, conflicts, and pests on food security and livelihoods in the study area. This information is invaluable for informing targeted interventions and resilience-building efforts tailored to the community's needs and vulnerabilities.

Thus, for drought and floods, targeted interventions such as improved water management, drought-resistant crop varieties, and effective flood control measures are necessary to protect vulnerable households. Additionally, integrated pest management programs are needed to safeguard crops and ensure a stable food supply. In conclusion, addressing the diverse range of disasters affecting households is critical for enhancing food security. Implementing comprehensive disaster risk reduction strategies,

improving agricultural practices, and ensuring timely support during and after disasters can help build resilience and secure livelihoods for affected communities.

4.3.1. Analysis of Major Disasters by Household Food Security Status

Table 11: Cross tabulation of flood by households food security status

Flood * Household food security status cross tabulation				
Disaster		Household food security status		Total
		Food insecure	Food secured	
Flood	No	53	90	143
	Yes	50	143	193
Total		103	233	336
(χ2=2.155, df=1, p=0.142)				

Source: Own study result (2024)

The cross-tabulation of flood experience by household food security status highlights the impact of experiencing floods on food security outcomes. Among households that did not experience floods, 90 out of 143 (62.9%) are food secure, while 53 out of 143 (37.1%) are food insecure. Conversely, households that experienced floods show a higher proportion of food security, with 143 out of 193 (74.1%) being food secure and 50 out of 193 (25.9%) being food insecure. Overall, of the total 336 households surveyed, 69.3% are food secure, and 30.7% are food insecure. These results suggest that while flood experience is associated with a higher absolute number of food-secure households, the proportion of food-insecure households is also notable among those affected by floods, indicating that while some households may be resilient, others remain vulnerable to food insecurity following flood events.

Based on the chi-square test of independence, there is no significant association between floods and household food security status (χ2=2.155, df=1, p=0.142). The p-value exceeds the common significance level of 0.05, indicating that the occurrence of floods does not have a statistically significant impact on whether a household is food secure or insecure.

These results suggest that households that experienced a flood were more likely to be food-secured compared to those that did not, which may be due to factors such as the availability of aid and resources for flood-affected households.

Table 12: Drought by household food security status

Drought * Household food security status cross tabulation				
		Household food security status		Total
		Food Insecure	Food Secured	
Drought	No	102	223	325
	Yes	1	10	11
Total		103	233	336
(χ2=0.8362, df=, p=0.360				

Source: Own study result (2024)

Analysing the cross tabulation of drought occurrence and household food security status reveals stark disparities between the two conditions. The table depicts counts of households categorized by whether they experienced a drought and their food security status. Notably, among households unaffected by drought, a substantial portion, 102 out of 325 (approximately 31.4%), are food insecure, while the majority, 223 out of 325 (approximately 68.6%), are food secured. Conversely, among households affected by drought, the situation is significantly more dire, with only 1 out of 11 (approximately 9.1%) being food insecure, and the remaining nine out of 10 (approximately 90.9%) being food secured.

This data suggests a paradoxical phenomenon: despite experiencing a drought, a condition typically associated with reduced agricultural productivity and heightened food insecurity the proportion of food insecure households is notably lower among those affected by drought compared to those unaffected by it. Such a discrepancy may be attributed to various factors, including access to external aid, government interventions, or community resilience strategies in drought-prone regions.

However, it is crucial to interpret these findings with caution and conduct further investigation to understand the underlying dynamics comprehensively. These insights could inform targeted policies and interventions aimed at addressing food insecurity, particularly in regions vulnerable to droughts.

Finally, based on the chi-square test of independence, there is no significant association between drought and household food security status (χ2=0.8362, df=, p=0.360). The p-value exceeds the common significance level of 0.05, indicating that the occurrence of

drought does not have a statistically significant impact on whether a household is food secure or insecure.

Table 13: Landslide by household food security status

Landslide * Household food security status cross tabulation				
		Household food security status		Total
		Food insecure	Food secured	
Landslide	No	98	208	306
	Yes	5	25	30
Total		103	233	336
(χ2=0.1219, df=1 p=0.727).				

Source: Own study result (2024)

In table above, analysing the cross, tabulation of landslide occurrence and household food security status sheds light on the relationship between these variables. The table presents counts of households categorized by whether they experienced a landslide and their food security status. Among households unaffected by landslides, 98 out of 306 (approximately 32%) are classified as food insecure, while the majority, 208 out of 306 (approximately 68%), are food secured. Conversely, among households affected by landslides, the 5 out of 30 (approximately 16.7%) being food insecure and 25 out of 30 (approximately 83.3%) being food secured. These findings indicate a relatively similar distribution of food insecurity between households affected and unaffected by landslides.

However, it is important to consider potential confounding variables and regional disparities that may influence these results. Further analysis, such as examining the severity of landslides, socioeconomic factors, and access to aid and resources, could provide a more nuanced understanding of the relationship between landslides and household food security. This insight could inform disaster response strategies and targeted interventions to mitigate food insecurity in landslide-prone areas.

Based on the chi-square test of independence, there is no significant association between landslides and household food security status (χ2=0.1219, df=1 p=0.727). The p-value exceeds the common significance level of 0.05, indicating that the occurrence of landslides does not have a statistically significant impact on whether a household is food secure or insecure.

Table 14: Conflict by household food security status

Conflict * Household food security status cross tabulation				
		Household food security status		Total
		Food insecure	Food secured	
Conflict	No	41	198	239
	Yes	62	35	97
Total		103	233	336
$\chi 2$=1.368,df =1 and p=0.242)				

Source: Own study result (2024)

As far as Analysing the cross tabulation of conflict occurrence and household food security status is concerned, it clearly stated that the impact of conflict on food security. The table presents counts of households categorized by whether they experienced conflict and their food security status. Among households unaffected by conflict, 41 out of 239 (approximately 17.2%) are classified as food insecure, while the majority, 198 out of 239 (approximately 82.8%), are food secured. Conversely, among households affected by conflict, the situation is significantly more dire, with 62 out of 97 (approximately 63.9%) being food insecure, and 35 out of 97 (approximately 36.1%) being food secured.

The chi-square test yielded a chi-square value ($\chi 2$) of approximately 1.368 with 1 degree of freedom (df), and a corresponding p-value of about 0.242. This indicates that, based on the observed frequencies, there is no significant association between conflict and household food security status at the 0.05 significance level.

These findings highlight the profound impact of conflict on food security, with a slightly lower proportion of food insecurity observed among households affected by conflict compared to those unaffected. This disparity may be attributed to various factors, including disrupted access to food supply chains, displacement, loss of livelihoods, and restricted access to humanitarian aid in conflict-affected regions. Additionally, it is essential to recognize the complex relationships between conflict and food security, as conflicts can exacerbate pre-existing vulnerabilities and inequalities, further compromising household food security.

Thus, to sustainably address food insecurity in conflict-affected areas, holistic approaches that prioritize peacebuilding, conflict resolution, and humanitarian

assistance are imperative. Additionally, targeted interventions aimed at improving food access, livelihood opportunities, and social protection mechanisms for conflict-affected households are crucial for mitigating the adverse impacts of conflict on food security. These insights underscore the importance of addressing the root causes of conflict and implementing sustainable solutions to achieve lasting improvements in food security outcomes.

Table 15: Pest disaster by household food security status

Pest * Household food security status cross tabulation				
		Household food security status		Total
		Food insecure	Food secured	
Pest	No	83	192	275
	Yes	20	41	61
Total		103	233	336
$\chi 2$=13.513, df =1 and p= 0.001)				

Source: Own study result (2024)

As shown above, the cross tabulation of pest occurrence and household food security status briefly stated the impact of pests on food security. The table presents counts of households categorized by whether they experienced pest infestation and their food security status.

Among households unaffected by pests, 83 out of 275 (approximately 30.2%) are classified as food insecure, while the majority, 192 out of 275 (approximately 69.8%), are food secured. Conversely, among households affected by pests, the situation is notably more dire, with 20 out of 61 (approximately 32.8%) being food insecure, and only 41 out of 61 (approximately 67.2%) being food secured.

The chi-square test was conducted to explore the relationship between pest disasters and household food security status, utilizing the provided cross-tabulated data. The analysis revealed a chi-square value ($\chi 2$) of approximately 13.513 with 1 degree of freedom (df), resulting in a very small p-value (<<0.001). This indicates a significant association between pest disasters and household food security status at the 0.05 significance level. The observed frequencies suggest that households experiencing pest disasters are more likely to face food insecurity compared to those not affected by such disasters.

These findings implies that the significant impact of pest infestation on food security, with a notably higher proportion of food insecurity observed among households affected by pests compared to those unaffected. Pest infestations can lead to crop damage, reduced agricultural productivity, and increased food prices, all of which contribute to food insecurity. Additionally, households affected by pests may face challenges in accessing nutritious food and may resort to coping strategies such as reducing the quantity or quality of their meals, further exacerbating food insecurity.

To address food insecurity exacerbated by pest infestations, integrated pest management strategies that combine cultural, biological, and chemical methods to control pests while minimizing environmental and health risks are essential. Furthermore, investments in agricultural research and extension services to promote resilient farming practices and pest-resistant crop varieties can help mitigate the impact of pests on food security.

In conclusion, addressing pest infestations and their implications for food security requires a multi-faceted approach that integrates pest management strategies with broader efforts to enhance agricultural productivity, promote food access, and strengthen social safety nets for vulnerable households.

4.4. The Impacts of Disaster Risk Management Practices on Households' Food Security.

Disaster Risk Management (DRM) practices play a crucial role in mitigating the adverse impacts of natural and manmade disasters on households, particularly in regarding to food security. Households in disaster-prone areas often face significant challenges in maintaining food security due to recurrent events such as floods, conflicts, and pest infestations. Effective DRM practices, including early warning systems, emergency response mechanisms, and resilience-building measures, are essential in helping these households cope with and recover from such events.

This analysis aims to examine the impact of various DRM practices on the food security status of households in the study area. To achieve this, we employ a logistic regression model, which is well suited for understanding the relationship between a binary dependent variable household food security status (food secure vs. food insecure) and a set of independent variables representing different DRM practices. The logistic

regression model allows us to quantify the influence of DRM interventions on the likelihood of a household being food secure, while controlling for other relevant factors.

By analyzing data collected through household surveys and key informant interviews, the study has tried to identify which DRM practices are most effective in enhancing food security. The insights gained from this analysis will inform policymakers and practitioners on the best strategies to implement and prioritize in order to improve the resilience of households to disasters and ensure sustainable food security in vulnerable communities.

Thus, to analyze and interpret the impacts of Disaster Risk Management (DRM) practices on households' food security using the provided model summary, in the results presented in the table below;

The model summary appears to be from a logistic regression analysis, given the Cox & Snell R Square and Nagelkerke R Square values, which are measures of how well the independent variables predict the dependent variable in logistic regression.

Table 16: Result of Model Summary

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	359.270[a]	.147	.207
2	337.858[b]	.199	.282
3	325.156[b]	.229	.324
4	316.436[b]	.249	.352
5	311.817[b]	.259	.366
a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.			
b. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.			

Source: Own study result (2024)

As shown in the table above, the model summary provides a general overview of the statistical performance and explanatory power of the logistic regression model at each step of the analysis.

Step 1 focuses on households' planning status before a disaster, resulting in a -2 Log Likelihood value of 359.270. The Cox & Snell R Square of 0.147 and the Nagelkerke R Square of 0.207 indicate that planning status accounts for about 20.7% of the variation in food security outcomes.

Step 2 adds participation in social protection programs (SPP) to the model, improving the fit as evidenced by the -2 Log Likelihood value reducing to 337.858. The Cox & Snell R Square increases to 0.199, and the Nagelkerke R Square rises to 0.282, showing that these two variables together explain 28.2% of the variation in food security outcomes.

Step 3 incorporates the practice of planting drought-resistant crops, further enhancing the model's explanatory power. The -2 Log Likelihood value decreases to 325.156, with the Cox & Snell R Square increasing to 0.229 and the Nagelkerke R Square to 0.324. This step indicates that the inclusion of drought-resistant crops explains 32.4% of the variation in food security outcomes.

Step 4 introduces the usage of early warning and information methods, resulting in an improved model fit with a -2 Log Likelihood value of 316.436. The Cox & Snell R Square increases to 0.249, and the Nagelkerke R Square to 0.352, indicating that these combined variables explain 35.2% of the variation in food security outcomes.

Step 5 adds early warning and information training, achieving the best model fit with a -2 Log Likelihood value of 311.817. The Cox & Snell R Square increases to 0.259, and the Nagelkerke R Square to 0.366, demonstrating that the comprehensive model explains 36.6% of the variation in food security outcomes.

In summary, the progressive reduction in -2 Log Likelihood values and the increasing values of Cox & Snell R Square and Nagelkerke R Square across the steps indicate that each variable added to the model significantly improves its explanatory power. The final model, which includes all five variables, explains a substantial 36.6% of the variation in food security outcomes among households. This underscores the significant impact of disaster risk management practices, such as planning, social protection, resilient agricultural practices, early warning usage, and training, on enhancing food security in the face of disasters

the data analysis of the impacts of Disaster Risk Management (DRM) practices on households' food security shows significant findings across multiple variables, as revealed by the Omnibus Tests of Model Coefficients.

Step 1 focuses on households' planning status before a disaster, which alone significantly improves the model fit. The Chi-square value of 53.244 ($df = 1$, $p < .001$) indicates that planning status is a strong predictor of food security outcomes, explaining approximately 20.7% of the variation.

Step 2 incorporates participation in social protection programs, further enhancing the model's explanatory power. The addition of this variable yields a Step Chi-square of 21.412 ($df = 1$, $p < .001$), with the overall model Chi-square increasing to 74.656 ($df = 2$, $p < .001$). This step highlights the critical role of social protection programs in improving food security, explaining about 28.2% of the variation.

Step 3 introduces the practice of planting drought-resistant crops, significantly contributing to the model with a Step Chi-square of 12.702 ($df = 1$, $p < .001$). The overall model fit improves, with the Chi-square value rising to 87.358 ($df = 3$, $p < .001$), showing that resilient agricultural practices are crucial in enhancing food security, accounting for 32.4% of the variation.

Step 4 includes the usage of early warning and information methods, which significantly affects food security outcomes. The Step Chi-square of 8.719 ($df = 1$, $p < .003$) and the overall model Chi-square of 96.078 ($df = 4$, $p < .001$) indicate that timely and accurate information plays a vital role, explaining 35.2% of the variation in food security.

Step 5 adds early warning and information training, resulting in a Step Chi-square of 4.620 ($df = 1$, $p = .032$). Although the significance level is slightly lower, it still shows a meaningful improvement in model fit. The cumulative model Chi-square reaches 100.697 ($df = 5$, $p < .001$), highlighting that training in information methods significantly contributes to food security, explaining 36.6% of the variation.

Therefore, each step in the model demonstrates a significant improvement in predicting food security outcomes. The results underscore the critical contributions of various DRM practices, including proactive planning, social protection participation, resilient

agricultural practices, early warning usage, and information training, in significantly enhancing food security for households facing disaster risks.

Table 17: Result of Goodness-of-Fit Tests

Hosmer and Lemeshow Test			
Step	Chi-square	Df	Sig.
1	.000	0	.
2	.012	1	.911
3	3.429	3	.330
4	1.417	3	.702
5	5.389	5	.370

Source: Own study result (2024)

In table 5 above, the Hosmer and Lemeshow Test results indicate a good fit for the logistic regression models across all steps of the analysis. In Step 1, the test could not be performed due to insufficient degrees of freedom, likely because the model was too simplistic or the data points perfectly separated the outcomes. In Step 2, the test yielded a Chi-square value of 0.012 with a significance level of .911, indicating an excellent fit as the high p-value suggests that the model's predictions align well with the observed outcomes.

In Step 3, the Chi-square value was 3.429 with a significance level of .330, again showing a good fit. Step 4 also demonstrated a strong model fit with a Chi-square value of 1.417 and a significance level of .702. Finally, in Step 5, the Chi-square value was 5.389 with a significance level of .370, confirming that the final model fits the data well.

Overall, the high p-values across all steps indicate that there is no significant difference between the observed and predicted values, reinforcing the reliability of the models in predicting food security outcomes based on the included variables. This consistent good fit across each step highlights the robustness of the model in capturing the relationship between Disaster Risk Management practices and household food security.

Table 18: Result of variables in the equation

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Households planning status before disaster occurred	2.446	.371	43.409	1	.000	11.540
	Constant	-1.213	.343	12.476	1	.000	.297
Step 2[b]	Households planning status before disaster occurred	2.305	.383	36.138	1	.000	10.025
	Participation status in social protection programs (SPP)	2.608	.662	15.518	1	.000	13.566
	Constant	-3.542	.731	23.487	1	.000	.029
Step 3[c]	Households planning status before disaster occurred	2.118	.389	29.638	1	.000	8.313
	Planting drought resistant crops	1.364	.431	10.015	1	.002	3.913
	Participation status in social protection programs (SPP)	2.348	.663	12.543	1	.000	10.462
	Constant	-3.373	.728	21.463	1	.000	.034
Step 4[d]	Early warning and Information methods usage status	1.366	.466	8.590	1	.003	3.919
	Households planning status before disaster occurred	2.025	.399	25.778	1	.000	7.575
	Planting drought resistant crops	1.322	.433	9.325	1	.002	3.751
	Participation status in social protection programs (SPP)	2.033	.693	8.598	1	.003	7.634
	Constant	-4.214	.847	24.759	1	.000	.015
Step 5[e]	Early warning and Information methods usage status	1.247	.472	6.970	1	.008	3.479
	Early Warning and Information training taking status	.626	.290	4.668	1	.031	1.870
	Households planning status before disaster occurred	1.907	.402	22.559	1	.000	6.734
	Planting drought resistant crops	1.305	.437	8.924	1	.003	3.688
	Participation status in social protection programs (SPP)	1.752	.705	6.179	1	.013	5.764
	Constant	-4.079	.844	23.335	1	.000	.017
Y (dependent variable) = households' food security							

Source: Own study result (2024)

In the table above, the analysis of the impacts of Disaster Risk Management (DRM) practices on households' food security reveals significant findings across several variables.

The provided table presents the results of a logistic regression analysis examining the influence of various variables on a particular outcome, possibly related to disaster preparedness or response. Each step in the regression represents the addition of new predictor variables to the model.

At each step, the table provides information on the coefficients (B), standard errors (S.E.), Wald statistics, degrees of freedom (df), significance levels (Sig.), and odds ratios (Exp(B)) for the included variables. The significance levels indicate the probability of observing the results if the null hypothesis (no effect of the predictor variable) were true.

The table presents the results of a stepwise logistic regression analysis, which sequentially adds predictor variables to the model to understand their influence on the outcome, likely related to disaster preparedness or response.

In Step 1, "Households planning status before disaster occurred" emerges as a significant predictor ($B = 2.446$, $p < 0.001$), suggesting that households with pre-disaster planning are substantially more likely to exhibit the outcome. The odds ratio of 11.540 indicate a strong association.

Step 2 introduces "Participation status in social protection programs (SPP)", revealing its significance ($B = 2.608$, $p < 0.001$) and a high odds ratio of 13.566, implying a notable impact on the outcome.

In Step 3, "Planting drought-resistant crops" joins the model as a significant predictor ($B = 1.364$, $p = 0.002$), indicating that households engaging in this practice are more likely to experience the outcome. The odds ratio is 3.913.

Step 4 includes "Early warning and Information methods usage status", which proves significant ($B = 1.366$, $p = 0.003$), implying that households utilizing such methods are more likely to exhibit the outcome. Other predictors from previous steps also retain significance.

Finally, Step 5 incorporates "Early Warning and Information training taking status", which demonstrates significance ($B = 0.626$, $p = 0.031$), suggesting that households

undergoing this training are associated with the outcome. Notably, all previously significant predictors remain influential.

Throughout the steps, variables like pre-disaster planning, social protection program participation, and certain adaptive measures consistently emerge as significant predictors, emphasizing their importance in shaping outcomes related to disaster resilience or response within households.

Collectively, these findings highlight the significant contributions of various DRM practices towards fortifying households' food security in the face of disasters. Proactive planning, participation in social protection programs, adoption of resilient agricultural practices, utilization of early warning systems, and training in information methods all play crucial roles in enhancing food security outcomes for households facing disaster risks.

The study conducted in Tarmaber Woreda reveals that the impact of disaster risk management practices on households' food security. critical insights into the factors affecting household food security and the role of DRM practices. This section compares the findings with previous studies to highlight consistencies and discrepancies, providing a comprehensive understanding of the study.

First, the identification of major disasters affecting household food security aligns with existing literature on the subject. Floods, identified as the most significant threat affecting 57.4% of households in Tarmaber, corroborate findings from studies in other regions where floods disrupt agricultural productivity and access to food (Mishra et al., 2020). Conflicts and pest infestations, impacting 28.9% and a substantial portion of households respectively, also reflect global patterns where socio-political instability and agricultural pests are major threats to food security (FAO, 2018). This consistency emphasizes the need for targeted interventions to mitigate these common risks.

Second, the impact of DRM practices on household food security reveals that proactive and participatory measures significantly enhance resilience. Households with pre-disaster planning were more likely to be food secure, supporting findings from studies by Twigg (2007) and Cutter et al. (2012), which emphasize the importance of preparedness in disaster resilience. Participation in social protection programs (SPP) showed a marked improvement in food security, aligning with evidence from Sub-

Saharan Africa where SPP participation has been linked to better food outcomes (Devereux et al., 2013). The adoption of drought-resistant crops also significantly enhanced food security, similar to findings in semi-arid regions where such practices are crucial for maintaining crop yields (Morton, 2007).

Third, the use of early warning systems and training in early warning methods showed a substantial positive impact on food security, consistent with studies highlighting the effectiveness of early warning systems in reducing disaster impacts (Basher, 2006). This study found that households using early warning systems had significantly better food security, echoing the success stories from Bangladesh and the Philippines where early warning systems have dramatically reduced disaster-related food insecurity (Paul, 2009; Gaillard & Cadag, 2009).

Fourth, the categorization of households by food security status based on socio-demographic factors such as marital status, education, and income levels provides nuanced insights. The finding that married households and those with higher incomes are more likely to be food secure is consistent with studies indicating that stable household structures and economic stability enhance food security (Smith et al., 2000). Similarly, the significant influence of literacy on food security supports the broader literature that education improves household resilience and adaptive capacity (Bank & Gilligan, 2012).

Finally, the age of household heads also played a role in food security, with the 30-40 years age group showing the highest food security levels. This could be due to their better physical ability and access to resources compared to older age groups, a finding supported by studies in rural settings where middle-aged household heads are often at the peak of their economic productivity (Hoddinott & Yohannes, 2002). However, this contrasts with some studies suggesting that older heads with more experience might manage resources more effectively (Zimmerman, 2006), highlighting the need for context-specific analysis.

Generally, the results underscore the importance of disaster preparedness, participation in social protection programs, education, and income in enhancing household food security. The findings align with and contribute to the broader discourse on food security and disaster resilience, providing valuable insights for policy-making and targeted interventions in Tarmaber Woreda and similar study areas.

CHAPTER 5

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

This study aimed to investigates the impact of disaster risk management strategies and the food security status of households in Ethiopia, focusing on the Amhara Regional State, North Shewa Zone, Tarmaber Woreda. By employing a mixed research methodology involving 336 sampled households, the study employs both descriptive and inferential analyses to explore this critical nexus. Data collection methods, including survey questionnaires, key informant interviews, and observations, provide a comprehensive understanding of the dynamics shaping household resilience amidst diverse challenges. Thus, based on the study findings the research draws the following conclusion.

The study identified floods as the most significant disaster affecting household food security in Tarmaber Woreda, affecting over half of the surveyed households. This implies that the urgent need for effective flood management and mitigation strategies to safeguard agricultural productivity and ensure stable food access. Additionally, conflicts and pest infestations are notable threats, indicating a multifaceted approach to disaster risk management is necessary.

Households that engaged in pre-disaster planning and participated in social protection programs demonstrated significantly higher levels of food security. Therefore, it can be concluded that critical role of proactive disaster preparedness and the integration of social safety nets in enhancing community resilience. Policies aimed at increasing household participation in such programs can effectively mitigate the adverse effects of disasters.

The use of drought-resistant crops significantly improved food security among households. This aligns with global evidence suggesting that agricultural adaptation strategies are vital in regions prone to climatic variability. Encouraging the adoption of resilient crop varieties can be a key intervention for improving food security in Tarmaber Woreda and similar environments.

The study reveals that households utilizing early warning systems and participating in early warning training had better food security outcomes. This emphasizes the importance of disseminating timely and accurate disaster information to communities. Strengthening early warning systems and ensuring widespread training can enhance preparedness and reduce the impact of disasters on food security.

The research demonstrates that marital status, income levels, educational status, and age of household heads significantly influence food security. Married households, those with higher incomes, and literate individuals were more likely to be food secure. Additionally, households headed by individuals aged 30-40 years showed the highest levels of food security. These findings suggest that socio-economic development initiatives, including education and income-generating activities, are essential components of strategies to enhance food security.

As a conclusion, the study's key findings highlight critical areas for policy intervention to improve household food security and resilience against disasters in Tarmaber Woreda.

5.2 Recommendations

Based on the study findings and conclusion, the researcher has established the following recommendations;

- As a disaster, flood significant impact on household food security, urgent action should be taken to develop and implement effective flood management and mitigation strategies. This includes infrastructure development, early warning systems, and community preparedness initiatives.
- Households should be encouraged to engage in pre-disaster planning and participate in social protection programs. These initiatives have shown to significantly enhance food security levels and community resilience. Policy measures should focus on increasing household participation in such programs.
- There should be promotion of the adoption of drought-resistant crop varieties to improve food security in Tarmaber Woreda and similar environments prone to

climatic variability. Agricultural adaptation strategies, such as this, are vital for ensuring stable food access amidst changing environmental conditions.

- Early warning systems should be strengthened, and widespread training on disaster preparedness should be ensured. Timely and accurate dissemination of disaster information is crucial for community preparedness and reducing the impact of disasters on food security.
- Socio-economic development initiatives should be implemented, targeting factors such as marital status, income levels, educational status, and age of household heads. Investing in education, income-generating activities, and support for vulnerable demographics can significantly improve household food security levels.

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Appendixes

Appendix A. Omnibus Tests of Model Coefficients

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	53.244	1	.000
	Block	53.244	1	.000
	Model	53.244	1	.000
Step 2	Step	21.412	1	.000
	Block	74.656	2	.000
	Model	74.656	2	.000
Step 3	Step	12.702	1	.000
	Block	87.358	3	.000
	Model	87.358	3	.000
Step 4	Step	8.719	1	.003
	Block	96.078	4	.000
	Model	96.078	4	.000
Step 5	Step	4.620	1	.032
	Block	100.697	5	.000
	Model	100.697	5	.000

Appendix B. Research Questionnaires

Addis Ababa University

College of development Studies

Center for Food Security Studies

Research title: Impacts of Disaster Risk management on Household Food Security in Ethiopia: The Case of Amhara Regional State, North Shewa Zone, tarmaber Woreda

Dear respondents,

This questionnaire is designed to study "Determinants of Disaster Risk Management Practice on household Food Security at Tarmaber woresda, Ethiopia" as requirement for the MSc thesis in Food Security and Development Study. The purpose of the questionnaire is to collect data that helps to know the determinants of Disaster Risk Management Practices and based on that to determine the food security status of households using scientific techniques, procedures and methods. By doing this, it is possible to draw recommendation and then to put valuable future researchable directions so as to bring food security changes at household and as well as community level.

Dears, Moreover, different stakeholders and/or policy makers will use this research findings so as to design policies, strategies, and guidelines to alleviate the major bottlenecks of food security and also, it is important to make an awareness about the purpose of this is purely for academic purpose where results and any other details will not be used for other means. Thus, kindly allocated a few minutes to provide genuine data and make sure that be frank and complete in concentration. The responses that you will make are summarized in a collective manner and will be kept confidential and anonymous.

Appendix B1: Demographic, Socio-economic and Disaster Risk Management (DRM) Questionnaire

S/no	Question	Response
1	Sex of respondent	1 = Male 0 = Female
2	Age of respondent	1. 18 – 30 2. 31 – 40 3. 41 – 50 4. 51 – 60 5. > 60
3	Marital status of respondent	1 = Married 0 = Not married
4	Family size of the household	|...|
5	Religion of the household head	1 = Orthodox 2 = Muslim
6	Educational status of household head	1 = Educated 0 = Not educated
7	Household's annual income from on-, off-, and non-farm activities	|...|
8	Have you ever been affected by natural and human disasters in this year?	1 = Affected 0 = Not affected
9	If your answer is "Yes" for question number 8, have you ever been affected by **drought**?	1 = Affected 0 = Not affected
10	If your answer is "Yes" for question number 8, have you ever been affected by **landslide**?	1 = Affected 0 = Not affected
11	If your answer is "Yes" for question number 8, have you ever been affected by **flood**?	1 = Affected 0 = Not affected
12	If your answer is "Yes" question number 8, have you ever been affected by **conflict**?	1 = Affected 0 = Not affected
13	If your answer is "Yes" for question number 8, have you ever been affected by **pest**?	1 = Affected 0 = Not affected

14	If you affected by disaster/s, how much money you lost in terms of ETB?	|...|
15	Did you had credit access before disaster/s happened?	1 = Access 0 = No access
16	Have ever been used early warning and information gathering methods like TV, radio, mobile FM, community meeting, informal talk, etc.?	1 = Used 0 = Not used
17	Were you trained about early warning and information related trainings?	1 = Trained 0 = Not trained
18	Did you had/have experiences DRR planning in order to minimize the impact/s of disaster/s?	1 = Experienced 0 = Not experienced
19	Do you have money saving experience so far before disaster happened?	1 = Saves 0 = Does not save
20	Have you ever been practiced preparedness/mitigation measures so far?	1 = Practices 0 = Does not practiced
21	Were you used pesticide chemicals during pest infestation times?	1 = Uses 0 = Does not use
22	Were you practiced the soil and water conservations (both physical and biological)?	1 = Practices 0 = Does not practice
23	Were you used drought/frost resistant crops during shortage or abundant of rainfall?	1 = Uses 0 = Does not use
24	Had you got the access to be supported by somebody else during disaster?	1 = Access 0 = No access
25	Did you have a chance to participate on social protection programs like PSNP, health insurance, etc.?	1 = Participated 0 = Not participated

Appendix B2: Household Food Insecurity Access Scale (HFIAS) questionnaire

No	Questions	Response	Code
1	In the past four weeks, did you worry that your household would not have enough food?	0 = No (skip to Q2) 1 = Yes	0 1
1a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks 3 = Often (more than ten times in the past four weeks)	1 2 3
2	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0 = No (skip to Q3) 1 = Yes	0 1
2a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks 3 = Often (more than ten times in the past four weeks)	1 2 3
3	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0 = No (skip to Q4) 1 = Yes	0 1

3a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks 3 = Often (more than ten times in the past four weeks)	1 2 3
4	In the past four weeks, did you or any household member have to eat some foods that you really did not want to eat because of a lack of resources to obtain other types of food?	0 = No (skip to Q5) 1 = Yes	0 1
4a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks 3 = Often (more than ten times in the past four weeks)	1 2 3
5	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0 = No (skip to Q6) 1 = Yes	0 1
5a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks	1 2 3

		3 = Often (more than ten times in the past four weeks)	
6	In the past four weeks, did you or any other household member have to eat fewer meals in a day because there was not enough food?	0 = No (skip to Q7) 1 = Yes	0 1
6a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks 3 = Often (more than ten times in the past four weeks)	1 2 3
7	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0 = No (skip to Q8) 1 = Yes	0 1
7a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks 3 = Often (more than ten times in the past four weeks)	1 2 3
8	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0 = No (skip to Q9) 1 = Yes	0 1

8a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks 3 = Often (more than ten times in the past four weeks)	1 2 3
9	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0 = No 1 = Yes	0 1
9a	How often did this happen?	1 = Rarely (once or twice in the past four weeks) 2 = Sometimes (three to ten time in the past four weeks 3 = Often (more than ten times in the past four weeks)	1 2 3

Appendix B3: Key Informants Interview (KII) Questionnaire

Questionnaire 6: KII questionnaire (revised)

1. What are the major disasters occurred so far the study areas (Adokie, Sina, and Wanzaberet kebeles)? List the most five disasters (in order of from most to least damage that they occurred)?
    a) _____
    b) _____
    c) _____
    d) _____
    e) _____

2. Do you think the disasters that you mentioned previously have significant impact on the food security situation of the households? How and to what extent?

    _____
    _____
    _____
    _____
    _____
    _____
    _____

3. Did the community members took training on early warning and information mechanism? How often they trained per a year?

    _____
    _____
    _____
    _____
    _____
    _____
    _____

4. What actions are accomplished or being implemented before the disaster occurred?

_____

_____

_____

_____

_____

_____

_____

5. What actions are accomplished or being implemented during the disaster occurring?

_____

_____

_____

_____

_____

_____

_____

6. What actions are accomplished or being implemented after the disaster occurred?

_____

_____

_____

_____

_____

7. What social protection programs are existed within the community and how these social protection programs are effective mechanisms of disaster risk management? Which part of the community members are participating in the existing social protection programs?

_____

_____

_____

_____