

WOLKITE UNIVERSITY

COLLEGE OF SOCIAL SCIENCE AND HUMANITIES

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

SOIL CONSERVATION TECHNIQUES IN ENHANCING FOOD SECURITY;THE CASE OF AWADA KEBELE DALE WOREDA SIDAMA REGION-ETHIOPIA

A SENIOR ESSAY SUBMITTED TO THE DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR B.A DEGREE IN GEOGRAPHY AND ENVIRONMENTAL STUDIES.

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APRIL,2024

WOLKITE, CENTRAL-ETHIOPIA

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A senior essay submitted to the department of Geography and Environmental studies in the partial fulfillment of the degree of bachelor of art in Geography and Environmental Studies entitled,Assess of soil conservation techniques to enhance food security.In case of Awada Keble, Dale Woreda - Sidama,National Regional State, Ethiopia.

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Declaration

Aynalem Seyoum and Muse Bekele do here by declare to Wolkite University Department of Geography and Environmental Studies that this thesis is a product of our original research work, and it has not been submitted to any other university for any academic degree. Any materials and information in a report other than our own are duly acknowledged.

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Acknowledgement

First of all, we would like to express our great thanks to Almighty God for his support of us throughout our lives. Secondly, we would like to express our deepest and heartfelt gratitude to our advisor Habtamu G/Tsadik.(MA) for his enthusiastic support, exhaustive review, and constructive comments right from the inception up to the successful completion our research.Finally,we would like to express our deepest acknowledgement to our family for their moral and financial support. We would also like to thank all those who contributed their valuable assistance to the accomplishment of this study. Finally, we would like to thank all our resourceful informants who provided useful and relevant information about the study.

Table of Contents

Declaration ii

Acknowledgement iii

List of Table viii

Listof Figure ix

Acronym x

ABSTRACT xi

CHAPTER ONE 1

1. INTRODUCTION 1

1.1. Background of the Study 1

1.2. Statement of problem 2

1.3. Objectives of the study 4

1.3.1. General Objectives 4

1.3.2. Specific objectives 4

1.4. Basic Research Question 4

1.5. Significance of the study 5

1.6. Scope of study 5

1.7. Limitation of the study 5

1.8. Definitions of key terminologies 6

1.9. Organization of paper 6

CHAPTER TWO 7

2. REVIEW OF RELATED LITERATURE 7

2.1. Concept and Definition of Soil Conservation 7
2.2. Causes of Land Degradation and Problem of Crop Productivity in Africa 7
2.3. Farmer participation on soil conservation practices 9
2.4. Soil conservation practices in Ethiopia 9
2.5 .Soil Conservation Techniques 10
2.5.1. Crop Residue and weed burning 10
2.5.2.Cover crops 10
2.5.3. Organic soil amendments 10
2.5.4 .Mixed cropping 10
2.5.5. Agro-Forestry and Plant Tree 11
2.5.6. Mulching 11
2.5.7. Contour Plowing 11
2.5.8. Terracing and crop rotation 11
2.6. Role of soil conservation Practice to Agricultural Productivity 12
2.7. Concepts and definitions in Food security 12
2.7.1 .Food security at national level 13
2.7.2 .Food security in Ethiopia 13
2.7.3. Food security at household level 13
2.7.4. Household food security in rural level 14
2.8. Major Challenges of soil conservation 14
CHAPTER THREE 15
3. Description of the study area and research methodology 15
3.1. Description of the study area 15
3.1.1. Location 15
3.1.2 Map of the study area 16

3.1.3 .Topography....17
3.1.4. Soil of Study Area....17
3.1.5.Population and demographic characteristics....17
3.1.6. Economic activities....17
3.2. Research Methodology....18
3.2.1. Research design....18
3.3.2. Research Approach....18
3.4.Sample techniques and Sample size determinations....18
3.4.1 Sampling techniques....18
3.4.2. Sample Size Determination....19
3.5. Type and Source of Data....21
3.6. Methods of data collection....21
3.6.1. Questionnaire....21
3.6.2. Interview....21
3.6.3. Field observation....21
3.6.4. Focus Group Discussions....22
3.7. Method of data analysis and presentation....22
CHAPTER FOUR....23
4. DATA ANALYSIS AND INTERPRETATION....23
4.1 Socio-Demographic Characteristics of Respondents....23
4.1.1 Sex Composition of the Respondents....23
4.1.2 Age Distribution of the Respondent....24
4.1.3. Educational Status of the Respondents....25
4.1.4 . Occupational Status of the Respondents....25
4.1.5 Marital Status of the Respondents....26

4.1.6.Livelihood and Income Activities of the Respondents.....26
4.1.7.Land Ownership of the Respondents.....27
4.2. Status and Causes of Soil Erosion in the Study Area.....28
4.2.1. Decline productivity because of soil erosion in study area 29
4.3.The Importance of Soil Conservation Techniques to Enhance Food Security in the Study Area.....30
4.3.1 Soil Conservation Techniques and their Importance.....30
4.3.2. Important of Soil Conservation Techniques in the Study Area.....31
4.3.3. Food Security and Factors that Affect Food Production 32
4.4. The Major Challenges of Soil Conservation in the Study Area.....33
4.5 Results from Interview of Agricultural and Rural Development Office Workers of Study Area.....34
4.5.1. The Cause of Soil Conservation in the Study Area 34
4.5.2 .The Importance of Soil Conservation Techniques to Enhance Food Security in the Study Area 34
4.5.3 The Major Challenges of Soil Conservation in the Study Area 35
CHAPTER FIVE 36
5. CONCLUSION AND RECOMMENDATION.....36
5.1.Conclusion.....36
5.2. Recommendation.....37
Reference 38
APPENDIX 1.....42
APPENDIX 2.....42
APPENDIX 3.....43

List of Table Page

Table 3.1.Households of Awada Kebele.....20
Table 4.1 Age Distribution of the Respondents.....24
Table 4.2 Educational Status of the Respondents.....25
Table 4.3 Occupational Status of the Respondents.....25
Table 4.4.Marital Status of the Respondents.....26
Table 4.5.Sources of Income of the Respondents.....26
Table 4.6 .Land Ownership of the Respondents.....27
Table 4.7. Status and Causes of Soil Erosion in the Study Area.....28
Table 4.8.Extent of soil Erosion Decline Crop Productivity.....29
Table 4.9 Applicability and Types of Soil Conservation Method.....30
Table 4.10.Important of soil conservation techniques in the study area.....31
Table 4.11.Food Security and Factors that affect Food Production.....32
Table 4.12.Major Challenges of Soil Conservation in The Study Area.....33

List of Figure Page

Figure 3.1. Study Area Map.....16
Figure 4.1. Sex Composition of the Respondents.....24

Acronyms and Abbreviations

AKAO.....Awada Kebele Agriculture Office

DWAO.....Dale Woreda Agriculture Office

DWMO.....Dale Woreda Municipality Office

FAO.....Food and Agricultural Organization

FGD.....FocusGroup Discussion

GDP.....Gross Domestic Product

GIS.....Geographic Information System

MDG.....Millennium Development Goal

NGO.....Non-Governmental Organization

SC.....Soil Conservation

SCT.....Soil Conservation Techniques

UNEP.....UnitedNationEnvironmental Program

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

WKU..... Wolkite University

ABSTRACT

Land degradation was a significant global issue during the 20th century and remains of high importance in the 21st century as it affects the environment, agronomic productivity, food security, and quality of life. About 99.7% of food is produced from the soil; thus, food security depends directly on soil productivity.Accelerated soil erosion is among the principal causes of the decrease in soil productivity and the increase in risks of global food insecurity.This study aimed to analyze the role of soil conservation practices in household food security in Awada Kebele, Dale Woreda-Sidama Region, Ethiopia. A research methodology, a cross-sectional and descriptive survey involving a qualitative and quantitative approach, was used by the researchers. Using the simple random sampling technique employed for this study,85 respondents were selected as the sample size. The primary data were obtained through a questionnaire, personal observation, a focus discussion group,and an interview. Secondary sources of data were collected from different published as well as unpublished documents, the internet, and reports available in the study area. The quantitative data were presented through the use of percentages, frequencies, tabulations, distributions, figures, and simple descriptive methods, and the qualitative data were interpreted using different words in order to achieve the end objectives of the study and answer the formulated research questions. The study confirmed that the predominant activities commonly identified as contributing to land resource degradation through anthropogenic and topographic factors. Even though soil conservation has many challenges, including the severity of soil erosion due to climatic factors, a lack of management skills and technical support, the steep topography of the land, and the lack of capital for practicing SCT, this study finally recommends that soil conservation is a multidimensional impact worthy of consideration to be incorporated into policy interventions by NGOs or government-designed projects. Development agents of the woreda or other project officers should give maximum attention to the dissemination of information about soil conservation technology to combat food insecurity.

Keywords: Soil Conservation Techniques, Food Security

CHAPTER ONE

Introduction

This chapter includes the following:background of the study, statement of problem, objectives of the study, specific objectives, basic research question, significance of the study, scope of the study, and limitations of the study.

1.1. Background of the Study

Land degradation was a significant global issue during the 20th century and remains of high importance in the 21st century as it affects the environment, agronomic productivity, food security, and quality of life (Smith..et al, 2023).

In most developing countries, agriculture remains one of the largest sectors in the economy both in terms of its contributions to the GDP and generating employment (Haregeweyn, 2015).Efficient soil management is a must not only for agriculture, but, also in development, as it can have a huge impact on addressing issues of poverty and food security. Therefore, it is essential to exercise environmental rehabilitation, such as reducing soil erosion, for survival and development by implementing appropriate approaches and technology (Yitagesu, 2021) .

Soil erosion hampers agricultural productivity by deteriorating soil quality. Even though the effects of soil erosion vary by management and location, soil erosion deteriorates the chemical property of soil by loss of organic matter and loss of minerals containing plant nutrients (Zougmore, 2009).Soil erosion also exposes subsoil minerals with low fertility or high acidity. Soil erosion causes changes in physical properties of soil such as texture, infiltration rate, bulk density, available water holding capacity, depth of favorable root growth (Balasubramanian, 2017).

There are many physical and social factors which are responsible for different extent of land degradation some of the factors are improper land use, excessive cleaning of vegetation, poor farming practice and overgrazing (Gedamu, 2020).Africa is characterized by high land degradation and soil nutrient depletion which results in average crop yield to decline and food insecurity (Eswaran et al., 2001).

In fact, agricultural land in Ethiopia is not only an economic activity but also a way of life for which agricultural land is an indispensable resource on which the welfare of the society built-up on. Land provides a means of livelihood for the majority of the population but land resources are

facing increased degradation mainly due to water erosion, sheet erosion, gully erosion and over cultivation (Gomiero, 2016).

In general, a low productivity characteristic of agriculture has made it difficult to attain food self-sufficient at national level. In Ethiopia, significant soil conservation were implemented during the 1970 and 1980s by mobilizing farmers through their peasant associations, mainly in food for work programs (Bewuket, 2007).This approach was criticized for its top down approach. In many parts of the country, the current government has also been undertaking soil conservation through integrated and participatory watershed development approaches to improve rural livelihood with sustainable natural resource management (Bewuket, 2007)

In Awada Kebele, land degradation a form of gully erosion problems are common because Farmers' lack of knowledge about the importance of soil quality and their limited understanding of modern agricultural technology have led to their underdevelopment in this area (AKAO, 2023).The study area focuses on the role of introducing soil conservation techniques on reducing soil erosion by farmers.The research would also try the experience of other countries to get important erosion, retaining moisture and improving crop yield, factors contributing to poor adaptation of lessons for the existing real situation of the study area.

1.2. Statement of problem

Land degradation has affected a large number of people over a significant portion of the earth‘s surface which has led to extreme poverty and hunger. Around the world, land degradation can be viewed as any change or disturbance to land perceived to be undesirable that affects human activities like agriculture and settlements (Mohammed, 2022).

About 99.7% of food is produced from the soil; thus, food security depends directly on soil productivity. Accelerated soil erosion is among the principal causes of the decrease in soil productivity and the increase in risks of global food insecurity (Pimentel, 2013).

Ethiopia has been renowned for famine and food insecurity for more than 200 years (Beyene, 2010).Currently food security is highly affected by land degradation in Ethiopia.Land degradation in the form of soil erosion is negatively affecting the performance of agricultural sectors as well as the overall economy, and accordingly, the livelihood of the people is threatened by land degradation, so that people are suffering from food shortages and exposed to severe famine. (Amsalu & Habtamu, 2006).

Land degradation causes food malnutrition. crop production is reduced by ten to twenty per cent because of the depletion of forest products and as the result food insecurity is its final outcome (Tefera, 2002).

According to the FAO (2015), more than half of the rural population and over one-third of the urban population do not consume the recommended minimum 2100 kilocalorie daily intake. The major challenge for Ethiopia in order to alleviate poverty and food insecurity is the land degradation and low agricultural productivity (Atnafe, 2015).

Currently, soil erosion is the most serious problem in Dale Woreda. Because of rainfall, steep slopes, and traditional farming systems, it is highly affected by land degradation due to the midlands,which is barren land without trees. As a result, soil erosion is the primary cause of agricultural productivity decline and food insecurity in this study area. The large population in this Woreda has no sufficient capital to optimize agricultural productivity, and they suffer from a lack of sufficient food (DWAO, 2023).

Different researchers and authors have conducted or written articles or papers about soil conservation techniques and its related issues in different parts of the country. Among these, the challenges in the Amhara region have been conducted by Kassaye; the assessment of the adoption of soil conservation techniques in south-western Ethiopia has been conducted by Birhane; and the assessment of indigenous soil conservation techniques in the Oromia region of Ethiopia has been conducted by (Girma,2008) and by other individuals and organizations. As an output, those previous studies identified different issues related to the challenges of soil conservation techniques, the causes of soil erosion, the adaptability of traditional and modern and its challenges, and the role of soil and water conservation techniques for agricultural production. However, it is not possible to generalize that similar issues are possible in other areas of the country, like Awada Kebele in Dale Woreda, where the problem is also serious. Therefore, they do not fully address the role of soil conservation techniques in increasing food security in the study area; as a result, the researchers have identified this problem as a gap, and are motivated to do so too.

1.3. Objectives of the study

1.3.1. General Objectives

The main objective of this study is to examine the role of soil conservation techniques to enhance food security in Awada, Kebele, Dale Woreda -Sidama Region.

1.3.2. Specific objectives

This study attempted to address the following specific objectives.

1. To assess the causes of soil erosion in the study area.
2. To identify the major challenges of soil conservation techniques in the study area.
3. To analyze the role of soil conservation techniques to enhance food security in the study area.

1.4. Basic Research Question

This study attempted to answer the following questions:

1. What are the major causes of soil erosion in the study area?
2. What are the major challenges of soil conservation techniques in the study area?
3. What is the importance of soil conservation techniques to enhance food security in the study area?

1.5. Significance of the study

Since unwise utilization of resources and many other factors related to human activities cause environmental problems like soil erosion, deforestation, and water loss, the sustainability of human life, the economy, and development will face some critical challenges in the near future unless and otherwise, human beings are aware of the positive attitude towards conserving resources (Rega & Yadeta, 2019).The findings of this study at the grass-roots level would make a significant contribution. Most importantly, it would be helpful for development agents and agricultural offices in the Kebele to see what the degradation of the land would be. It helps policymakers develop workable conservation techniques that are complementary at the local level. Finally, it would provide chances for farmers to share what they know and view to conserve soil, water, and forests, and lastly, it would call the attention of different stakeholders, like researchers, for further broad and detailed investigation on the issues of land resource management. This study would also be of great importance to future students who conduct research in fields related to soil conservation techniques and other related issues.

It would be the researcher's knowledge and skills related to the concepts of SCT and their role in improving food security in the real world. Farmers will benefit from this study in that they will be enlightened on the water and soil conservation practices to use to ensure adequate food production in the country.

1.6. Scope of study

The study was delimited to Awada Kebele in Dale Woreda to assess the role of soil conservation techniques to enhance food security, the causes of soil erosion, and the challenges of soil in the selected area of Awada Kebele.

1.7. Limitation of the study

Some many factors or limitations affect the study. Some of these were: the respondent's unwillingness to give wide information:Researchers employed various strategies such as ensuring the anonymity and confidentiality of respondents ,provided incentives for participation , a shortage of time:Researchers managed this constraint by setting realistic goals and timeline,prioritized the most important aspects of the study,and allocated time efficiently for data collection and analysis. financial problems:Researchers face budget constraints that limit their ability to conduct a comprehensive study ,researchers can seek funding from grants ,organizations, or partnerships with other researchers . and a lack of access to internet service due to infrastructure:These methods for data collection that did not rely on internet access instead these researchers used paper-based surveys.

CHAPTER TWO

2.REVIEW OF RELATED LITERATURE

This chapter focused on soil conservation, causes of land degradation and Problem of crop Productivity in Africais, major challenges of soil conservation ,and soil conservation techniques.Soil erosion is one of the major root causes of poverty and decline productivity in Africa. Therefore, soil conservation is vital to the achievement of food security, poverty reduction, and environmental sustainability in the country. Ethiopia is engaged in massive soil and water conservation activities in many degraded parts of the highland.

2.1. Concept and Definition of Soil Conservation

Soil conservation is defined planned management of all-natural resource of total environment particular soil nutrient prevent explosion, pollution, distraction and neglected and to ensure the future use of land resource minimizing erosion and other form of land degradation helps to enhance productivity.Highly degraded and fragile land is not effective to agricultural productivity (Hudson, 2015).

Today land degradation is the serious problem to attain sufficient agricultural productivity and healthy life. Soil conservation is a set of management strategies for prevention of soil being eroded from the earth surface of becoming chemical altered user acidification, Stalinization or other chemical contamination. Environmental soil science decisions regarding appropriate cover crop planted trees and the windbreak are the major types of soil conservation techniques (Dawit , 2013).

Soil conservation is a combination of all methods of management and land use that safeguard the soil against depletion or deterioration by natural or man induced factors. It most often attempts to ensure that soil does not erode and wash into streams and lakes or blow away in the wind and it also involves the protection of the soil damaged and compaction. Soil conservation practice refers to the protection of all soil deposits and organic layers not subject to erosion (Smith et al, 2019).

2.2. Causes of Land Degradation and Problem of Crop Productivity in Africa

The ecology or environment is under serious pressure today with land degradation in many areas of soil erosion,overgrazing, deforestation and frequent flood hazard, change local climate, shortage of fuel energy and growing economic activities falling productive capacity of the land

and the decrease in biodiversity are the main causes for land degradation (Lewis, 2006). Uncertain ecological zones particularly in tropical Africa have a special problem of considerable effects: the sale and area bordering the face of expanding desertification and soil degradation due to drought (Johnson et al., 2007).

Number of studies has proved that the decline in the quality of the environment has been tremendous.One of the major root causes of poverty and decline productivity in Africa is land degradation.This problem challenges the continent and imposes great cost to the Africa economy caused by land degradation (Wagayehu, 2003).

Agricultural productivity seriously affects many countries. Reliable resources indicate that the decline in Africa per capita crop productivity started as early 1960 (Wagayehu, 2003).

Land degradation in the Sahel is characterized by soil degradation, mainly due to wind erosion. This is favored by climatic factors such as drought and diminishing rainfall, compounded by anthropogenic factors, including population growth, agricultural intensification and overgrazing. Climatic and anthropogenic factors may act independently or have effects on each other. These factors result in the reduction of vegetation cover, decrease in fallow periods and a reduction in the balance between fallow areas and cultivated fields, which are vital to maintaining soil fertility and reducing losses from erosion (Stephen etal., 2014).

Land degradation in many countries of the world are limited land resources and population increase which has given rise to food insecurity.The resultant effect is small farms, low production per person and increasing landlessness.Land shortage and productivity decrease, taken together,lead to unsustainable land management practices, the direct causes of degradation.Poor farmers are led to clear forest, cultivate steep slopes without conservation, overgraze rangelands (Ekong et al., 2015).

Asia experienced an upward trend in crop production between 1971 and 1984 (Akbar et al., 2020).Africa tendency that reversed itself between 1971 and 1974 In contrast to this, comparable data for Asia over a comparable period of time should have increased crop output per capita by one percent annually.

Africa's average per capita crop output was a rate (Akbar et al., 2020).In Africa, Production of crops decreased considerably in Africa, especially in Angola, Mauritania, and Somalia. Between 1970 and 1985, cereal imports increased by thirty-seven percent and fifty-seven percent, respectively, providing food assistance. (Berhanu, 2021).

Deforestation is one of the causes for soil erosion which means the felling and cleaning of forest cover or trees in order to accommodate agriculture, industrial or for urban use. According to the United Nations food and agricultural organization, 18 hectares of forest are lost every year around the world. A number of studies also established that the increased demand for food, livestock and agriculture expansion is the direct cause of deforestation (Clement , 2011).

These were efforts at food production, which were unsuccessful and caused environmental damage. The consequences of deforestation, soil erosion, land degradation, nutrient loss, and disruption of the equilibrium among the soils directly reduce the productivity capacity of the land. (Akbar et al., 2020).

2.2.1. Major Challenges of soil conservation

Soil degradation is a broad term that encompasses a range of negative impacts on soil health, including erosion, compaction, nutrient depletion, and salinization. Soil conservation practices such as crop rotation, organic farming, and integrated pest management can help to prevent or mitigate soil degradation (Lal, 2015)

Soil erosion is one of the major challenges of soil conservation. It occurs due to water and wind erosion, which can lead to loss of topsoil, reduced soil fertility, and decreased crop yields. Soil conservation practices such as contour farming, terracing, and cover cropping can help to reduce soil erosion (Montgomery, 2007).Soil compaction occurs when soil particles are compressed, leading to reduced pore space and decreased water infiltration and air exchange. Soil conservation practices such as reduced tillage and cover cropping can help to alleviate soil compaction (Hamza etal., 2005).

A lack of awareness or knowledge about the importance of soil conservation is also a challenge. Many farmers may not be aware of the benefits of soil conservation practices or may not have access to information or resources to implement these practices.Education and outreach programs can help to address this challenge (Marshall et al., 2006).

2.3. Soil Conservation Techniques

In Ethiopia soil conservation has been carried out with limited success. There is less-willingness to accept and maintain the extensively introduced practices of soil conservation.Besides, soil erosion is a major contributor to the prevailing food insecurity of Ethiopia.Thus, soil conservation is vital to the achievement of food security, poverty reduction and environmental sustainability in the country (Woldeamlak, 2007).

As a response to the problem of land degradation due to soil erosion, Ethiopia is engaged in massive soil and water conservation activities in many degraded parts of the highland (Wagayehu, 2003).

New political approach was developed to increase interest in SCT to increase the food resources that were made available to Ethiopia mainly through the world food program. Food for work programs play a significant role in the development of soil conservation programs to stop further land degradation (welde Amlak, 2005).

The government of Ethiopia has initiated a number of projects including soil and water conservation practice work and establishment of area enclosure that has been an important strategy for the rehabilitation of degraded hillside forest restoration to facilitate this soil and water conservation practice with the financial donor mainly the world food program (Hailu, 2012).

Nowadays Ethiopia has expanded SCT to protect soil against chemical deterioration and physical degradation. Combination of all management techniques like use of local renewable energy, source of composting and waste recycling, agro-forestry especial the use of multi-functional trees maintaining and improve soil fertility through nitrogen fixation, enhance soil structure, modifies micro climatic and small-scale irrigation allow specially (Hailu, 2012).

2.3.1. Crop Residue and weed burning

Burning crop residue and weed is traditional methods fertilizing particularly in bare land. During the dry summer season farmers collect maize and millet stubble left paddy straw, dried weeds and wood plants grown in bare terrace they collect biomasses burned when sign of rainfall appears so as to control the fire from spreading into another plot. Farmers spread the ash all over the plot to enhance soil fertility (FAO, 2005).

2.3.2.Cover crops

Cover crops are grown between periods of normal crop production to reduce soil erosion by wind and water, enrich it with nitrogen and other nutrients, increase organic matter and biological activity, conserve water, and suppress weeds (Fageria et al, 2005).

2.3.3. Organic soil amendments

Organic matter content is an important factor determining overall soil health, including abundance, diversity, and activity of soil-dwelling organisms. Soils that are rich in organic

matter usually support complex food webs that extend well above the ground. They also provide a favorable environment for the growth of cultivated crop plants (Fred & Harold , 2000).

2.3.4 .Mixed cropping

Mixed cropping is an agricultural practice that involves planting two or more crops in the same field at the same time.This practice is often used in small-scale farming systems in developing countries, where farmers have limited resources and need to maximize their yields (Ankita Begamet al., 2020).It is the traditional and very old practice in the watershed. Advantage of this type of cropping is crop feeding different soil layers and under rained condition.The main crop maize and other crops are scattered in small quantities over the whole field.In some cases intercropping is applied with several small rows of the secondary crop; the main purpose of mixed different crops is diversifying agricultural productivities (Swinnen, 2011).

2.3.5. Agro-Forestry and Plant Tree

The multi-function of the agro-forest system has been realized in the watershed over the last decades.The agro-forest system is observed to accelerate the nutrient cycling, increase soil fertility and productivity and it also conserves soil and water (Kaushal, 2021).We all know that roots of trees firmly hold on to the soil. As trees grow tall, they also keep rooting deeper into the soil. As the roots of trees spread deep into the layers of soil, they hold it tightly, thus preventing soil erosion. Soil under a vegetative cover is saved from erosion due to wind as this cover acts as a wind (Kaushal, 2021).

2.3.6. Mulching

Mulching plays a role in reduction of soil and water loss. Farmers considered mulching an effective means of moisture conservation in farm land which are vulnerable to a lot of moisture saving during winter and dry season. Mulching also prevents seed beds from getting exposed to the sun and rain. The leaves after decomposing help to fertility of the soil in general mulching considerably reduce the soil erosion and run off from the field (Audrey, 2012).

2.3.7. Contour Plowing

Contour plowing is an agricultural practice where crops are cultivated along the contour lines of a slope rather than vertically up and down. This technique helps to prevent soil erosion by reducing water runoff and promoting water infiltration into the soil, contour farming reduces

runoff and soil erosion largely, but when it's combined with other conservation tillage such as no-tillage or minimum tillage can be more effective. Contour farming on permanent raised beds combined with residue retained on the soil surface (Farahani et al., 2016).This practice of farming on slopes considers the slope gradient and the elevation of soil along the slope.It is the method of plowing across the contour lines of a slope. This method helps in slowing the water runoff and prevents soil from being washed away along the slope. Contour plowing also helps in percolation of water in the soil (Audrey, 2012).

2.3.8. Terracing and crop rotation

It is an agricultural technique for collecting surface runoff water, thus increasing infiltration and controlling water erosion, known from an ancient history, and used to transform landscapes into steeped agro-systems in many hilly (Widomski, 2011).Crop rotation is the practice of growing a sequence of plant species on the same land. This is in contrast to intercropping, which is the practice of growing two or more crops simultaneously on the same land (Bullock, 2008) .

2.4. Role of soil conservation Practice to Agricultural Productivity

People restore the function and productivity of degraded agricultural land through traditional and modern soil conservation techniques. Tillage practices started from the pre-colonial era with the use of simple farm tools such as hoe in tilling the ground. Strip cropping is a farming technique that involves planting different crops in alternating strips or bands across a field.The purpose of strip cropping is to reduce soil erosion and improve soil health by slowing down the flow of water and trapping sediments (Ahamefule, 2020).

Intensive tillage operations for the preparation of fine seedbed for sowing to ensure proper seed germination, improved moisture conservation, weed control and other pests and also application of organic and inorganic fertilizer.Continuous mono cropping system which led to the degradation of soil fertility (Agnival & Pabitra , 2020).

There is growing recognition that agricultural land restoration can be an important strategy for improving food security (Wegayehu, 2003).

Several example from west Africa Sahel region exist of using agricultural land restoration approach has result improve soil and water conservation soil fertility; increase soil fertility this increase crop yield and income helping household to gain more access to food and better nutrition. Efficient land use and healthy soil are important for agricultural productivity.Integrated

land management practice in agricultural productivity and its resilience against desertification and other impacts of agriculture (Stewart, 2022).

2.5. Concepts and definitions in Food security

Food security is defined according to the (Simon, 2012) world food as existing when all people at all-time have sufficient nutritional food to maintain an active and healthy life. This commonly refers to people at all-time have sufficient safe nutrition needs and food preferences which are directly related with agricultural productivity. Also food security means that all people at all-time have physical economical access to adequate amounts of nutrition which produces environmental sustainability (FAO, 2005)

2.5.1 .Food security at national level

At national level food security is the capacity of a country to provide sufficient food for their population and it depends on such factors as food production, import food aid and with country food distribution ability to absorb the shock of such a system from drought, flood, civil war, and etc. (FAO, 2016).

2.5.2 .Food security in Ethiopia

Ethiopia has a long history of hunger emergencies and the country is closely mentioned by international humanitarian agencies. There are 8.3 million Ethiopia classed as chronically food insecure being unable to overcome persistent drought conditions.2000-2015 about 15.2 million people lost their residential area because of food insecurity (FAO, 2009).

They are assisted by government's product-able safety net production (PSNP) which provides cash in turn for labor on community projects or food unable to work .Despite these support mechanisms, UNICEF report that 38% of children less than five years old were underweight in 2008. Still far above that millennium development goal (MDG) target for 2015.

According to an early 2014 report of the World Bank ,15.2 million people in Ethiopia face precarious food security The worsening food security situation is attributed primarily to the lack of rainfall (FAO, 2009).

At present about 14.6 million people are food insecure in Ethiopia. Moreover, the pastoralist and marginal agricultural areas of eastern Ethiopia are extremely food insecure because of conflict, successive years below average and low agricultural production from the 2014 harvest.The hunger sanitation in a country is extremely alarming at a significant high value of 30.97 on the global hunger index (Swinnen, 2011).

2.5.3. Food security at household level

At household level food security is when it has access to the needed food for the healthy life of its entire member, adequate in terms of quality, quantity and safety actually acceptable and when not undermined the risk of losing such access. Food security as household discussion policies for food consumption and reducing the risk of poor access to the accessory to food and purchasing power are central and both transitory. The community participation in the process is successful capacity building of women in ensuring food security in each household level (Audrey, 2012) .

2.5.4. Household food security in rural level

Rural households produce their own food, but also sometimes they purchase food from the market. Basically, they are not food buyers .But, in the case of urban dwellers, this is not the case; rather the majority of households are food purchasers, some engage in urban agriculture (mainly livestock and animal products) for their own consumption and for the market. Urban and pre- urban agriculture is intensive in nature and plays an important role in ensuring food security. (Audrey, 2012)

CHAPTER THREE

Description of the study area and research methodology

This chapter includes description of the study area, the research methodology is a cross-sectional research design by considering the time and finances of the researchers. To achieve the end objectives of the study and to answer the formulated research questions, a mixed research approach , Sampling techniques were used a simple random sampling The primary data were collected using a questionnaire, personal observation, and interview. The secondary data sources were collected through interviews, questionnaires, field observations, and a focus discussion group. Qualitative data were presented through the use of percentages, frequencies, tabulations, distributions, figures, and simple descriptive methods, and qualitative data were interpreted using different words to achieve the ends of the research and answer the questions of the study area and research methodology

3.1. Description of the study area

3.1.1. Location

Dale is one of the largest woreda in the Central Zone of the Sidama Region; it includes 36 rural kebeles and two urban towns. It is found within the Great Rift Valley. The absolute location is 6° 45′ 0″ N latitude and 38° 20′ 0″ E longitude. The relative location of Dale is bordered on the south by Aleta Wendo and Chuko, on the west by Loka Abaya woreda and Kege kebele, on the North by Boricha, on the north by Shebedino-Lako town, and on the east by Wensho first and second fero kebeles. The major town in Dale is Yirgalem. Awada Kebele is one part of Dale Woreda that was located in the central part of Sidama Region, The relative location is by south Mesinch, North to Aposto,by the Eastern border Gane and to Western, Bera Chale.

3.1.2 Map of the study area

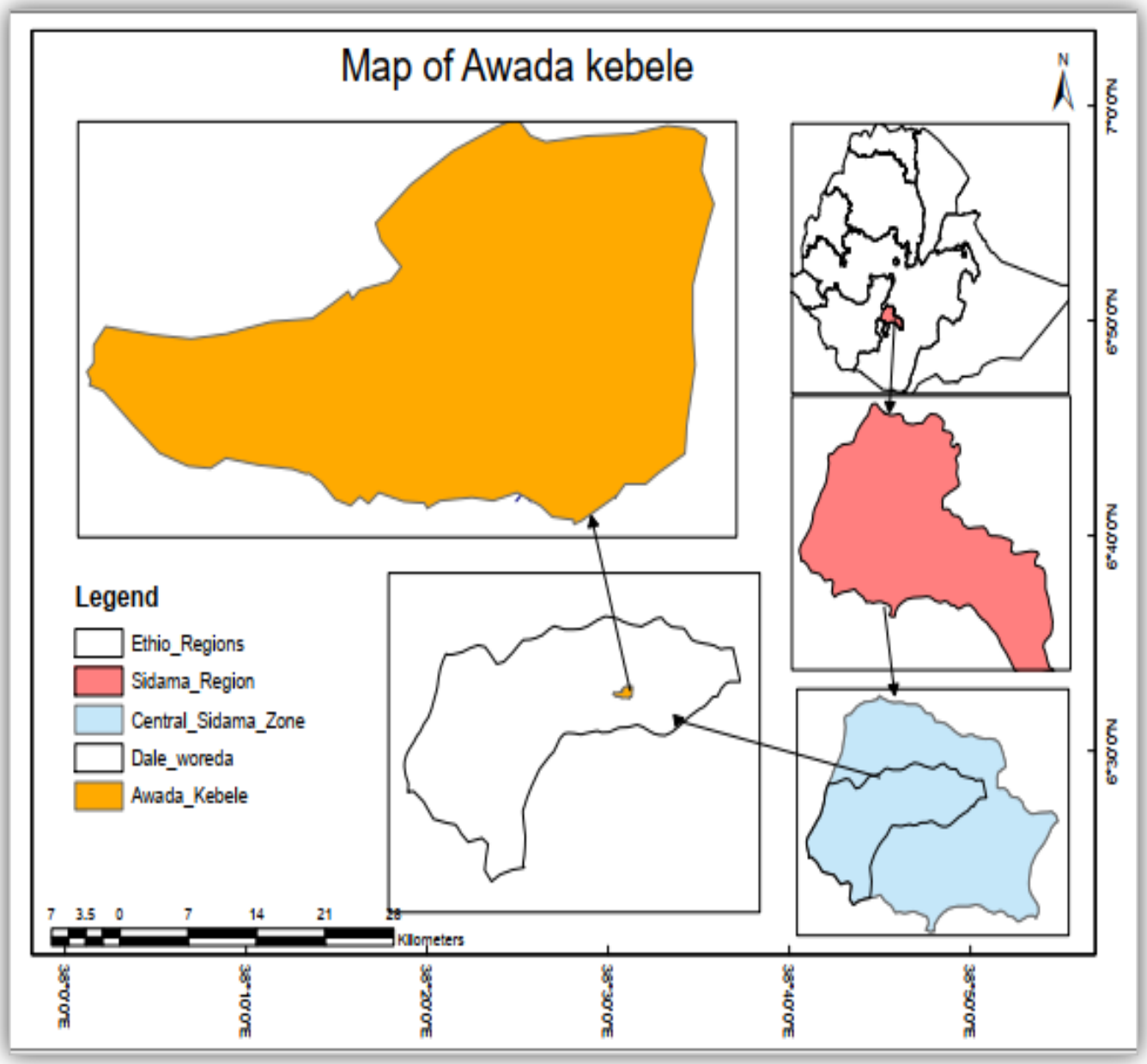


Figure 3.1.Study Area Map

Source: Reference system: UTM zone 37^0_N; Ellipsoid: WGS_1984; Projection: Transverse Mercator

3.1.3 .Topography

According to the agroecological zone of Ethiopia, the climate is classified as Bereha, is usually characterized by strong wind, high temperature, low relative humidity, and little cloud cover. Evapotranspiration is always in excess of rainfallin some places.Kolla refers to lowlands between 500 and 1,500 meters. Predominant crops are sorghum, finger millet, sesame, cowpeas, and groundnuts.Dega refers to highlands between 2,300 and 3,200 meters. Predominant crops include barley, wheat, highland oilseeds, and highland pulses. Wurch refers to highlands between 3,200 and 3,700 meters. Barley is a common crop. Kur refers to highland areas above 3,700 meters, which are primarily used for grazing pasture. (Dereje & Eshetu, 2011).Woina Dega is in the midlands between 1,500 and 2,300 meters, where it is the predominant agro-ecological zone in the study area, and crops include inset, coffee, wheat, teff, barley, maize, sorghum, chickpeas, and haricot beans. This is a temperate region ranging from an elevation of 1500 m to 2300 m above sea level. The mean annual rainfall of the area is between 1200 mm and 1599 mm, with a 150c-200c average annual temperature (DWAO, 2023).

3.1.4. Soil of Study Area

The soils of the study area are clay(40%),and sandy soils(15%), but loam soils(45%) are the most common soil in the study area. The farmers are not able to protect the soils from erosion. Therefore, the fertility of the soil is gradually decreased from time to time (AKAO, 2023).

3.1.5.Population and demographic characteristics

According to statistical records obtained from the Dale Woreda administration and health office, the total population of Dale Woreda is 357,733; males (179,748) and females (177,985), and the area covered by land is 276.9km2.The population density is 1,292/km2. (DWAO, 2023).

3.1.6. Economic activities

The most commonly used economic activities that were practiced in the Awada Kebele agricultural production. The farming methods of the study area contain traditional farming methods, including oxen-drawn farming and hand tools such as hoes.The types of crops that are largely produced in the area were coffee, inset (false banana), wheat, barley, maize, teff, and different oil seeds. Almost all of the products are used for consumption. On the other hand, cattle, goats, sheep, and donkeys are the most domestic animals reared by the farmers. (DWAO, 2023).

3.2. Research Methodology

3.2.1. Research design

This study assessed soil conservation techniques to enhance food security. For this study, the researchers applied a cross-sectional research design by considering the time and finances of the researchers. So, a cross-sectional research design better considers the research problem. Because this study was applied based on the data that was collected in a limited time frame, the researchers used a cross-sectional and descriptive survey involving a qualitative and quantitative approach.

3.3.2. Research Approach

To achieve the objectives of this study and to answer the research questions, a mixed research approach was used by the researchers. Both quantitative and qualitative research methods were employed.The quantitative method is an objective and systematic process in which parts of numerical data are used to obtain information. The qualitative design approach was used because it enables the description of phenomena, meanings, concepts, and definitions of data, which are words unsteady of number, amount, or measurement.

3.4.Sample techniques and Sample size determinations

3.4.1 Sampling techniques

In this study, simple random techniques were used to select an appropriate sample size. The reason for using simple random sampling was the populations were homogenous with respect to socio- economic activities,and every individual's unit (number) of the population has an equal probability of being included in the sample.

3.4.2. Sample Size Determination

The study area has a total population of 5,453; of this total population, 2,126 were females and 3,327 were male.According to the Kebele office reported (Awada,2024),there were 108 household heads; from these 66 male and 42 female habitable. Researchers used simple random sampling techniques to select an appropriate sample size, used the Yemen formula with a confidence interval of 95%.Our sample size 85 respondents.The reason we took this sample is because of a shortage of time and a lack of finance to assess the total population of the kebele**.**

n=N/1+N(e)2 ,Source.....: (Yamane, 1967)

n=sample size

N=number of households

e = Margin error of the limit

N= 108

e = 5% = 0.05

Then n=N/1+N (e) 2

n= N/1+N (0.05)2

n=108/1+108(0.05)2

n=108/1+108(0.0025)

n=85

From these total samples, to select the desired proportional household sample from respective *gote,* the researchers used another Kothari formula i.e.

$$n_j = \frac{N_1 x n}{N}$$

Where, n_j = Number of sample to be selected from J stratum

N_1= total population in strata one

N = total population of the studied area

n = selected total population

Table 3.1.Households of Awada Kebele

Name of the *Kebele*	Name of the Gote	Number of Households			Sample Size
		Male	Famel	Total	
Awada	Dama	16	9	25	20
	Gissa	12	7	19	15
	Ebalo	14	12	26	20
	Hara	11	6	17	13
	Gono	13	8	21	17
Total		66	42	108	85

Source : (Own processed Based on the Data Gained from Dale Woreda, Awada Kebele, (2024)

3.5. Type and Source of Data

The data were collected from both primary and secondary data sources. Primary data sources were collected through open and closed-ended question types. In addition, we collected those using interviews, questionnaires, field observation, and a focus discussion group. Woreda agricultural experts, Kebele administration, and soil and water conservation supervisors provided primary information. In addition, secondary sources of information were used in this study. The secondary sources used for this study were written documents, published research, books, and other related sources.

3.6. Methods of data collection

The data would be collected from both primary and secondary sources. The secondary source of data would be collected from different published as well as unpublished documents, the internet, and reports available in the study area. The primary data was gathered using a questionnaire, personal observation, and interview.

3.6.1. Questionnaire

To collect appropriate data, the researchers used self-administered questionnaires. These are open-ended and closed-ended questionnaires. Open-ended questionnaires asked the respondents to express their ideas in an unlimited and reasonable manner, whereas closed-ended questionnaires provided “yes” or “no” answers. The researchers used both types of questionnaires to collect information about soil conservation techniques and their contribution to food security.

3.6.2. Interview

The researchers were prepared with interview questions that apply to face-to-face communication with the Awada Keble agricultural official workers and local communities. The type of interview that the researchers would employ is a semi-structured interview; because of this, the interview allows respondents to express their impressions and ideas about the issue.

3.6.3. Field observation

The researchers would observe the phenomena of soil conservation techniques in the Kebele, especially to protect soil resources by tracing matching systems. On the other hand, the researchers were focused on getting reliable information about the farming systems of local

farmers, how they initiate and conserve soil resources, and what types of techniques they use to conserve soil fertility**.**

3.6.4. Focus Group Discussions

It is the most important data collection technique used to collect qualitative data by preparing discussion questions related to the relationship between the implementation of farmers towards SC practices and the food security situation of households. The participants in the focus group discussions were farmers consisting of two elders, three agriculture extension workers, and two SC supervisors.Discussions were made among three groups of different individuals within the community.

3.7. Method of data analysis and presentation

After the data were collected from primary and secondary sources, the researchers summarized and presented the data using both qualitative and quantitative data analysis methods. Quantitative data was presented through the use of percentages, frequencies, tabulations, distributions, figures, and simple descriptive methods, and qualitative data was interpreted using different words to achieve the end objectives of the study and answer the formulated research questions.

CHAPTER FOUR

4. DATA ANALYSIS AND INTERPRETATION

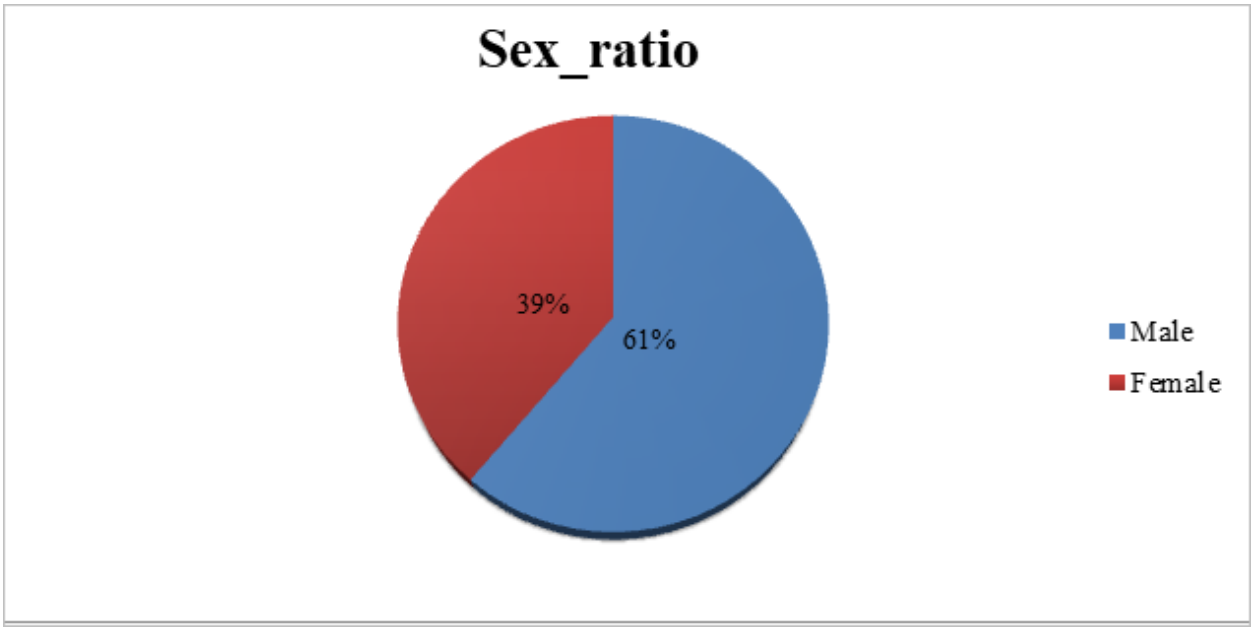
This chapter includes the analysis and interpretation of the main findings generated by different data-gathering instruments, like interviews, questionnaires, FDG ,and observation. The results of the analysis data presented are descriptive, such as percentages, concerning explanatory.

4.1 Socio-Demographic Characteristics of Respondents

In the following section of the paper, demographic characteristics such as sex ratio, age, educational status, occupational status, and marital status are briefly discussed. An analysis and comprehension of the socio-economic and demographic composition of the respondents were essential for the basic reason that they attempted to answer the question, ‘’ which section of the community serves the dwelling units’’? More and more, the socio-economic and demographic features of the occupant were important for further investigation. Since these factors impose a direct influence on the pattern of production and other activities in the study area, this section attempted to highlight some of the basic socio-economic characteristics of the sampled households.

Based on the collected data from the study area different demographic characteristics of the respondent were presented as follow

4.1.1 Sex Composition of the Respondents



Source:Processed by Researchers based on data gained from Awada Kebele,(2024)

Figure 4.1 Sex Composition of the Respondents

As figures indicate that out of 85 respondents account for about 52(61%) of male respondents and for about 33(39%) of female respondents. Based on the prevalence of the labor force on investing soil conservation activities to alleviate the problem of soil erosion both sexes have responsibility.Though,males are expected to have a probable get-up-and-go towards the structural soil conservation activities.

4.1.2 Age Distribution of the Respondent

Table 4. 1.Age Distribution of the Respondents

Age	Frequency	Percentage (%)
18-30	35	41
31-40	23	27
41-50	17	20
Above 50	10	12
Total	85	100

Source: Field Survey, (2024).

Table 4.2 shows that 41% of the respondents are in the adult age group, ranging from 18 to 30 years old; 27% are between 31 and 40 years old; and 12% of the respondents were over the age of 50. From this table, the researchers can conclude that the majority of respondents in the study area were in the productive age group. In addition, those who are over fifty years old less invested in such activities as soil conservation. They argued that older farmers couldn't did activities that require hard work, and they were not accomplished by old people to reduce soil erosion, such as soil bunds. The adult-aged farmers have a strong force in practicing soil conservation on their fields, and those farmers could do soil conservation activities that require hard work.

4.1.3. Educational Status of the Respondent

Educational status usually predates the status of the population. The educated people have ability to do more things with better understanding on manner of gratified thinking and the more educated people have more experience on family plan, better means of income and with calculated manner of income expenditure pattern

Table 4.2. Educational Status of The Respondents

Education	Frequency	Percentage (%)
Read and write	44	52
Primary school	12	14
Secondary school	21	25
Diploma	8	9
Collage and above	0	0
Total	85	100

Source: Field survey, (2024).

Table 4.2 shows that the educational status of the respondents were about 52%; they can read and write; 25% were from secondary school; 14% from grades 5-8; and 9% were attending a diploma or certified. In general, the majority of the respondents can read and write, which accounts for 52% of the respondents.Education is a human asset that also plays a significant role in increasing households' opportunities and their ability to engage in a wide range of organized soil conservation activities.

4.1.4 . Occupational Status of the Respondents

The occupational status of respondents can provide valuable insights into the composition of the workforce and the distribution of different occupations within a particular study or survey.

Table 4.3. Occupational Status of The Respondents

Occupational status	Frequency	Percentage (%)
Trader	7	8
Farmer	62	73
Government employee	10	12
Others	6	7
Total	85	100

Source: Field Survey, (2024)

Table 4.3 shows ,8% of the respondents are engaged in trade activity, 73% of the respondents were engaged in farming activity, 12% of the respondents were government employees, and 7% of the respondents were engaged in other activities. As generally understood from the table, the highest number of respondents were engaged in farming activities. These results help to strengthen the study, which means SCT is mostly practiced by farmers, so it helps to assess their function in enhancing production.

4.1.5 Marital Status of the Respondents

Marital status refers to the legal or social relationship status of an individual with respect to their marriage or partnership. It indicates whether a person is single, married, divorced, widowed, or in a domestic partnership. Marital status is often collected as a demographic variable in surveys, studies, and official records for several reasons: demographic analysis, social and economic implications, relationship dynamics,and policy and planning.

Table 4.4.Marital Status of The Respondents

Marital Status	Number of respondents	Percentage (%)
Married	56	66
Single	17	20
Divorced	12	14
Total	85	100

Source: Field Survey, (2024).

Table 4.4 shows the marital statuses of the respondents. It indicates that of the total respondents, 66% were married, 20% were single, and 14% were divorced.Therefore,when we compared married groups with the single and divorced, it was a high percentage of married respondents.

4.1.6.Livelihood and Income Activities of the Respondents

The livelihood and income activities of respondents refer to the means through which individuals or households generate income and sustain their livelihoods. These activities can vary widely depending on factors such as geographic location, economic context, cultural practices, and individual skills and resources.

Table 4.5.Sources of Income of The Respondents

Source of income	Frequency	Percentage (%)
Crop production	27	32
Animal rearing and selling	12	14
Trade	3	4
Mixed agriculture	41	48
Handcraft	2	2
Total	85	100

Source: Field Survey, (2024).

Table 4.5 shows the income source of the respondents, which indicates that most distribution of household heads were largely constituted by agricultural activities, which include 48% of the respondents finding their income from mixed agriculture, which means crop production and animal rearing. 32% of the respondents find their income from crop production, and the other 14% benefit from livestock farming and participate in animal rearing and selling activities. Respondents who engaged in trading activities were 4%, and professional handcrafts were 2% of the respondents.It indicates that the majority of the respondents gain their source of income from mixed agricultural activities.

4.1.7.Land Ownership of the Respondents

Land ownership refers to the legal rights and ownership status individuals or households have over land. It is an important aspect of land tenure, which determines who has the rights to use, control, and benefit from land resources. Understanding the land ownership status of respondents can provide insights into land distribution, land tenure systems, and access to resources.

Table 4.6.Land Ownership of The Respondents

Items	Response	Frequency	Percentage
Ownership of the land	Yes	70	82
	No	15	18
	Total	85	100
Amount of land in hectare	0.5-1 hectare	59	69
	1-1.5 hectare	8	9
	1.5-2 hectare	3	4
	Above 2 hectare	0	0
	Not have land	15	18

Source: Field Survey, (2024).

Table (4.6),out of the respondents, approximately 18% were landless, while 82% owned land, with 69% having 0.5–1 hectare, 9% having 1-1.5 hectare, and 4% having 1.5–2 hectares. From these, the researchers understand that the majority of respondents have a land area of 0.5–1 hectares. The majority of the respondents have land, but the size of the land is not similar; it varies from one farmer to another. This shows that in Kebele, land scarcity was the major

problem in producing sufficient food, or land scarcity was the major challenge in producing enough food for their family.

4.2. Status and Causes of Soil Erosion in the Study Area

It is important to note that these percentages are specific to the study area and the respondents surveyed. The causes of soil erosion can vary depending on the local context, land use practices, and environmental conditions.

Table 4.7. Status and Causes of Soil Erosion in The Study Area

Items	Response	Frequency	Percentage
Soil erosion in Study area	Yes	75	88
	No	10	12
	Total	85	100
Cause of soil Erosion	Deforestation	37	44
	Overgrazing	30	35
	Climate	7	8
	Topography	11	13
	Total	85	100

Source: Field Survey, (2024).

As shown table 4.7, the majority of the respondents (88%) believed that soil erosion is common in their locality, but 12% gave the reverse response. Regarding factors that affect soil erosion, 35% of respondents responded that the cause of soil erosion was overgrazing, and 44% of respondents stated that the major cause of soil erosion was deforestation. Related to climate, the study area receives much rainfall during the summer season, and the amount of rainfall reached 550–700 mm exposed to soil erosion. Related climates account for 8% of the respondents, particularly rainfall, and topography was also a factor in soil erosion, accounting for 13% of the respondents. Overgrazing, deforestation, frequent flood hazards, changing local climates, shortages of fuel and energy, growing economic activities, falling productive capacity of the land, and a decrease in biodiversity were the main causes of land degradation and soil infertility.

4.3. The Major Challenges of Soil Conservation in the Study Area

Soil conservation is the practice of preventing or reducing soil erosion and degradation while preserving its fertility and productivity. However, there are several challenges associated with soil conservation efforts.

Table 4.8.Major challenges of soil conservation in the study area

Items	Response	Frequency	Percentage
Have challenges for soil conservation	Yes	85	100
	No	0	0
	Total	85	100
Major challenges of soil conservation	Topography of the land being steep	21	25
	Severity of soil erosion	32	38
	Lack of capital	12	14
	Lack of management and technical support	20	23
	Total	85	100

Source: Field Survey, (2024).

Table 4.8 indicates that the major challenges of soil conservation in the study area are: severity of soil erosion due to climatic factors, which means the occurrence of soil erosion repeatedly by different climatic factors, which accounts for 38%; lack of management and technical support, also one of the challenges of soil conservation, which accounts for 23%; lack of capital to build SCT, especially materials that require money, like gallon and check dams, which account for 14%; and the topography of the land being steep or the topography of the land becoming exposed

to soil erosion, which accounts for 25% of the respondents. To cross-check the respondents' responses, the researchers asked what the challenges that affect soil conservation in your area. This question was asked by agricultural office workers and some respondents. They said that the major problems that hinder soil conservation activities were the nature of topography, unskilled manpower towards soil conservation practices, unorganized soil conservation strategies, and the nature of topography, which is up-and-down relief features. From these, the researchers understand that the major challenges for soil conservation are affected by severity of soil erosion due to climatic factors, a lack of management and technical support, the nature of topographic factors..

4.3.1. Food Security and Factors that Affect Food Production

Food security is achieved when people have access to enough food that is safe, nutritious, and meets their dietary requirements. Food production is a fundamental component of food security because it involves the cultivation, harvesting, processing, and distribution of food to meet the population's needs. Without adequate food production, it becomes challenging to ensure that everyone has enough food to lead a healthy and active life.

Table 4.9.Food Security and Factors That Affect Food Production

Items	Response	Frequency	Percentage
Produce enough food for family	Yes	56	66
	No	29	34
	Total	85	100
Factors that affect food production	Shortage of income	21	25
	Shortage of soil fertility	64	75

Source: Field Survey, (2024)

Table 4.9 shows food security and factors that affect food production. Respondents (66%) produce more or less sufficient food for their family, and 34% cannot provide enough food for their family because of different factors. The most dominant factor was a shortage of soil

fertility. According to information from Awada Kebele agricultural and rural development office workers interviewed, the level of soil productivity declined due to soil erosion. At this time, different activities have been done by the government and people to increase farmers' crop productivity by returning soil fertility. Activities performed by the government include ensuring soil and water conservation, supplying tree planting, and restoring and reserving degraded areas. The researchers gained information from FDG participants said,food security of households who adopt SC practice were food secured; households that did not adopt SC practice on their farms were food in-secured households were adopted SC practice which shows the advantage of SC practice to increase productivity by this to be food secured (Agriculture extension workers, 2024).According to the response of agriculture extension workers, to ensure food security, in this Kebele employs professionals that assist the farmer by supplying high-breed seeds and facilitating adequate fertilizer to enhance food security and conserve soil resources

4.3.1. Decline productivity because of soil erosion in study area

Soil erosion is a pressing issue that poses significant challenges to agricultural productivity around the world. As soil erodes, it takes with it the vital components necessary for healthy plant growth, resulting in a decline in crop productivity. The loss of topsoil, depletion of essential nutrients, compromised water infiltration and drainage,

Table 10. Soil erosion decline crop productivity

Extent of soil erosion	Number of informants	Percentage (%)
Very high	26	31
High	34	40
Moderate	14	16
Low	7	8
Very low	4	5
Total	85	100

Source: Field Survey, (2024).

According to table (4.10), 31% and 40% of respondents confirm that the extent of soil erosion is very high to high. While 16%, 8%, and 5% of the respondents confirm moderate, low, and very low levels of erosion across their farming zones, respectively.As the researchers observed and discussed with key informants in the study area, soil erosion seriously reduced soil fertility and causing the formation of gullies in many places across the study area, and because of informants perceived decline annual crop productivity.

4.4.The Importance of Soil Conservation Techniques to Enhance Food Security in the Study Area

4.4.1 Soil Conservation Techniques and their Importance

Soil conservation techniques play a vital role in preserving and protecting one of our planet's most valuable resources – the soil. As the foundation for agriculture and an essential component of ecosystems, maintaining healthy soil is crucial for sustainable food production, biodiversity, and environmental stability. Soil erosion, degradation, and loss have far-reaching consequences, including reduced crop productivity, water pollution, and increased vulnerability to climate change

Table 4.11. Applicability and Types of Soil Conservation Method

Items	Response	Frequency	Percentage
Use soil conservation techniques	Yes	68	80
	No	17	20
	Total	85	100
Types of soil conservation techniques employ in the study area	Contour plowing and crop rotation	16	19
	Terracing	26	30
	Mulching	12	14
	Organic soil amendments	10	12
	Tree planting	4	5
	No use of conservation	17	20
	Total	85	100

Source: Field Survey, (2024).

As shown in table 4.11, the majority of the respondents use SCT because farmers who participate in soil conservation can achieve a good change in their soil fertility and increase productivity. Among the major soil conservation techniques used, some of them were terracing (30%), crop rotation and contour plowing (19%), organic soil amendments (12%), mulching (14%), and tree planting (5% of total respondents). The analysis shows that 17 (20%) of the respondents did not participate in modern or traditional soil conservation techniques. From this, the researchers can understand that Kebele's lack of effective land management is a major cause of declining agricultural productivity. Farmers who participate in soil conservation can achieve good change or increase productivity, but farmers who did not participate in soil conservation and land management cannot improve their productivity. FGD participants also support the above idea by stating that most of the time, soil conservation techniques were made in a way that enhanced food security in societies (supervisors, 2024).In general,the researchers possibly understood in the study area that the majority of farmers were conducting different SCTs. Spatial terracing is a mostly practiced method in the study area.

4.4.2. Important of Soil Conservation Techniques in the Study Area

Table 4.12.Important of soil conservation techniques in the study area

Items	Response	Frequency	Percentage
Have Important of soil conservation techniques	Yes	85	100
	No	0	0
	Total	85	100
Importance of using SCT	To increase crop production	61	72
	To increase soil fertility	19	22
	To increase farm plot size and sustain the land for the future	5	6
	Total	85	100

Source: Field Survey, (2024).

As shown table 4.12, all of the respondents know and understand the importance of SCT, and it used to increase crop production and become food secure (72%), increase soil fertility (22% of the respondents), and increase farm plot size (6%). From these tables, the researchers understand that SCT were the most important factors in increasing our production, and they were used to directly or indirectly enhance food security. This analysis was similar to the idea of Wegayehu (2006); who said soil conservation and the growing recognition of agricultural land restoration has an important strategy for increasing agricultural production, which leads to improved food security.

4.5 Results from Interview of Agricultural and Rural Development Office Workers of Study Area

4.5.1. The Cause of Soil Conservation in the Study Area

According to the responses of the agricultural and rural development office workers, different causes of soil erosion lead to soil conservation.These factors include deforestation, overgrazing, topography, climate, traditional farming practices, and steep cultivation. The climatic factors that affect soil erosion are precipitation, wind, humidity, and rain falling on the soil surface. Depending on the size of the drop, the bigger drops of rainfall have a greater impact, which strikes the land, detaches, and splashes.

A response from the interview stated that one of the causes of soil erosion was overgrazing. Even if Kebele has a small number of livestock, poor management of grazing land is one factor in land degradation and soil erosion. From these, the researchers understand the main causes of soil erosion that lead to soil conservation. Respondents said,the main causes of soil erosion were deforestation and overgrazing.

4.5.2 .The Importance of Soil Conservation Techniques to Enhance Food Security in the Study Area

Interviewee responded, soil conservation has the most important factor, and it must be practiced by every person. The main purposes of SCT were to increase farm plot size, increase soil fertility, and increase crop production, which means directly or indirectly, it helps to increase the food security of the people, generally soil conservation techniques used to conserve our environment and biodiversity, which means soil or land is the base for all life. So when we apply SCT and conserve our soil from erosion, we also conserve our environment and save lives that are lived in, on, and by soil.

Based on the interviewee's response about the food security condition of the study area, it appears that the majority of the Kebele households produce enough food for their families, and they are models for other Kebele’s in the Woreda. Because they have the habit of hard work, they used different SCTs to increase the fertility of their soil, and they produce crops throughout the year by using irrigational activities. Whereas in these Kebele’s, who did not produce enough food for their families, they became the poorest of the poor. They did not use SCT properly, and they were also the weakest and oldest people. For these people, the government provides safety net programs by providing food and other materials necessary for them. This indicates that all

people in the study area are not producing enough food for their families because of landlessness, loss of soil fertility, and other related factors.

CHAPTER FIVE

5. CONCLUSION AND RECOMMENDATION

5.1.Conclusion

According to the above findings, the researchers conclude that the assessment of soil conservation techniques to enhance food security in the case of Awada Kebele.

The main objective of conducting this research is to assess soil conservation techniques to enhance food security in the study area. In this regard, the study confirmed that soil conservation techniques have a great role or advantage in increasing food security by increasing soil fertility, increasing farm plot size, and increasing the sustainability of the land for future generations.

The causes of soil erosion that led to soil conservation in the study area were deforestation, overgrazing, climate, topography, traditional farming practices, and steep cultivation. Soil is an eroded resource due to the above factors, and these factors lead to the application of soil conservation techniques to save or conserve soil fertility.

Soil conservation techniques are the key or most important tools to enhance food security, directly or indirectly. This means soil conservation techniques are important to increase farm plot size, increase soil fertility, sustain our land for future generations, and increase agricultural production.

In Ethiopia, agricultural productivity is declining mainly due to resource degradation from these soil resources, highly degraded weather conditions, and ineffective agricultural practices. The predominant activities commonly identified as contributing to land resource degradation in Ethiopia through infrastructural development and topographic factors. Similarly, in the study area, farmers were putting excessive pressure on the land using traditional farming methods and intensive cultivation. Agricultural productivity falls, and a large proportion of the population becomes food insecure.

Some different challenges or problems hinder the development or applicability of soil conservation techniques. Even though soil conservation has many challenges, including the severity of soil erosion due to climatic factors, a lack of management skills and technical support, the steep topography of the land, and a lack of capital for practicing SCT, which requires money, they must be applied and practiced widely to conserve our soil.

5.2. Recommendation

Based on the major findings of this study, the following suggestions were forwarded by the researchers:

- Development policy and program intervention should be designed to improve agricultural productivity through advancing conservation strategies for land in the study area.
- The adoption of soil conservation technologies has a great impact on the enhancement of farm productivity and alleviating the food insecurity experience. Its multidimensional impact is worthy of consideration when incorporated into policy interventions by NGOs or government-designed projects. It is evident that the integrated and quality SC technological dissemination has been insufficient in the study area.
- The government should settle the farmer's shortage of farmland in areas where sufficient potential exists. In addition to the root cause problem (high population density), extension workers should teach farmers about family planning.
- The farmer in the study area was advised to ignore the up-and-down farming system or traditional ways of farming, which accelerate soil erosion. Thus, agricultural offices and development agents have a responsibility to develop awareness about the impact of up-and-down farming through education.
- The Keble agricultural office and farmers cooperate in the afforestation and reforestation programs, which help improve and increase soil fertility in degraded areas.
- There was low agricultural production because of low conservation mechanisms. Hence, the local government and community should apply soil conservation techniques such as afforestation programs, planting of crops along the contours, mixed cropping, and agroforestry practices. Besides, terracing, check dams, and other conservation mechanisms should be applied.
- Farmland was seriously affected by soil erosion in the study area, and this in turn led to the decline of soil fertility and low production, which led to food being insecure. Therefore, with the initiative of the local government, local communities should be involved in soil conservation to reduce the level of soil erosion on their farmland and increase the productivity of the land.

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APPENDIX 1

WOLKITE UNIVERSITY

COLLEGE OF SOCIAL SCIENCES AND HUMANITIES

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

The researchers are very grateful for your cooperation, participation and precious time!!!Instruction

1. No need to write your name

2. Your response is kindly requested to fill out the questionnaire freely

3. Encircling an alternative which corresponds to your preference and putting a mark ("X") in the box

4. Write your suggestions and ideas in the free space provided

Part One:-Socio-Demographic Characteristics of the Respondents

1. Sex: Male □ Female □

2. Age: 18-30 □ 31-40 □ 41-50 □ Above 50□

3. Academic status: Read and write□ Primary school□ Secondary school□ Diploma□ College and above □

4. Professional status: Trader□ Farmer□ Work at government employment Other□

5. Marital status: Married □ Single□ Divorced □

APPENDIX 2

Part Two: -The Cause of Soil Erosion in the Study Area

1. Do you think soil erosion is common in your locality?

A. Yes □ B. No □

2. If your answer to question number 4 is "yes", what are the factors for soil erosion?

A. Deforestation B. Climate C. Overgrazing

D. Topography E. If others specify

APPENDIX 3

Part Three:-The Importance of Soil Conservation Techniques to Enhance Food Security in the Study Area

1. Do you use soil conservation techniques?

   A . Yes B. No

2. If your answer to question number 1 is 'yes", what techniques do you employ?

   A. Contour Plowing and crop rotation B. Terracing C. Tree planting

   D. Cover crops E. Mulching F. No use of conservation G.Others

3. Do you think soil conservation techniques are important?

   A .Yes B .No

4. If your answer to question number 3 is "yes", what are the most important?

   A. Increase crop production B. Increase soil fertility

   C. Increase farm plot size and sustain the land for the future

   D. If others, Specify ——————

5. Do you produce enough food for your family?

   A .Yes B .No

6. If the answer to question number 5 is "no", why?

   _____

   _____

   _____

7. If there is not enough food for your families, how do you feed your families?

   _____

   _____

Part Four:-The Major Challenges of Soil Conservation in the Study Area

1. If your answer to question number 1 is" no", what are the causes for you not using soil conservation techniques?

   A. Topography of the land is steep B. Severity of soil erosion C. Lack of capital

   D. Lack of management skills and lack of technical support

   E.If others specify_____

2. Do you think there are challenges for soil conservation techniques in our community?

   A. Yes B. No

3. If your answer for question number 2 is "yes", describe what are the challenges.

   _____

   _____

   _____

Part Five:-Interview Questions

1.What is the role of soil conservation techniques to enhance food security?

_____

_____

2.What are the major challenges of soil conservation techniques in the study area?

_____

_____

3. What are the major causes of soil erosion in your area?

_____

_____

_____

Part Six: Questions for Focus Group Discussion

1. What are you familiar with erosion control practices and technologies?
2. Is soil erosion caused by overgrazing, topography, climate and deforestation?
3. What level of safety is the food supply for households among farmers who use and don't utilize soil erosion prevention techniques?
4. Do you think soil erosion is reducing crop productivity?