DETERMINANTS OF RURAL HOUSEHOLDS' POVERTY IN SHEIKH DISTRICT OF SAHIL REGION, SOMALILAND

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I hereby certify that I have read this thesis entitled **"Determinants of Rural Households' Poverty in Sheikh District of Sahel Region, Somaliland**" prepared under my guidance by Mona Ahmed Suleiman**.** I recommend that the thesis be submitted as fulfilling the thesis requirement for the award of the degree of Master of Science in Agricultural and Applied Economics.

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DEDICATION

Beyond everything the dedication of this work must goes to my creator, ALLAH, SWA. Next, this thesis is dedicated to my father Dr. ***Ahmed Suleiman Jama.***

STATEMENT OF THE AUTHOR

By my signature below, I declare and affirm that this thesis is my own work. I have followed all ethical and technical principles of scholarship in the preparation, data collection, data analysis and compilation of this Thesis. Any scholarly matter that is included in the thesis has been given recognition through citation.

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BIOGRAPHICAL SKETCH

The author was born on April, 1999 at Maroodi-Jeex Region, Hargeisa City, Republic of Somaliland. She successfully completed her primary and high school education in School of Tomorrow Primary School in 2014 and Noradin Girls Secondary School in 2018. As soon as she completed her preparatory educations, the author joined University of Hargeisa in 2018 and graduated with BSc in Economics in 2022. After graduation, the author joined Haramaya University in 2022 to pursue her MSc degree in Agricultural and Applied Economics.

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ACRONYMS AND ABBREVIATIONS

AE	Adult Equivalent
FAO	Food and Agriculture Organization of the United Nations
FGT	Foster Greer and Thorbecke
GDP	Gross Domestic Product
IDPs	Internally Displaced Persons
MDGs	Millennium Development Goals
MOI	Ministry of Interior, Somaliland
MoPND	The Ministry of Planning and National Development of the Republic of Somaliland
MPI	Multidimensional Poverty Index
NDP	National Development Plan
NGOs	Non-Governmental Organizations
OECD	Organization for Economic Cooperation and Development
SDGs	Sustainable Development Goals
TLU	Tropical Livestock Units
UNDP	United Nations Development Programmed

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ABSTRACT

Poverty remains a critical global issue, but despite extensive research at national and regional levels, there is a lack of micro-level, district-specific studies on rural poverty in areas like Sheikh District, Somaliland. This study analyzes rural poverty levels in Sheikh District, Sahil Region of Somaliland. It focuses on poverty incidence, depth, severity, and its key determinants. A multi-stage sampling technique was used to select 200 households in Sheikh District, with four Tuulos randomly selected from the district's 43 agro-pastoral Tuulos. The study utilized both primary and secondary data. Primary data were gathered through household surveys, key informant interviews, focus group discussions, and direct field observations, while secondary data were obtained from published and unpublished sources, including government reports, international NGOs, regional studies, and existing surveys. Descriptive, inferential, and econometric models were employed to analyze cross-sectional data collected from the region. The Foster-Greer-Thorbecke (FGT) index was used to measure rural poverty level of households, while a logit model was used to identify the main drivers of rural poverty level. The FGT analysis found that 46.5% of the households live below the poverty line, 26.65% experience significant poverty gaps, and 16.27% show high poverty intensity. The logit econometric model result indicates that access to education, household size in terms of adult equivalent ration, off-farm income, total livestock units (TLU), and on-farm income are crucial factors influencing household level poverty. Education of household head, TLU, off-farm, and on-farm income reduce probability being poor (poverty level), while larger household size increases being poor. Total livestock units (TLU), household size in terms of adult equivalent ration, and on-farm income were significant factors affecting rural household poverty at 1% level of precision whereas education level is significant at 5% level of precision. Off-farm income was less significantly affecting rural household poverty at 10% level of precision. The study recommends improving education, diversifying income sources, and enhancing livestock management, o improve rural household income and reduce poverty level in the study area.

Keywords: Logit; poverty; Foster Greer Thorbecke; Sheikh District; Sahel region; Somaliland

1. INTRODUCTION

1.1. Background of the Study

Poverty is among one of the wicked problems of the world (Pradilla, *et al*., 2022). Poverty is a major global issue that has attracted significant attention on a local and international level. Every year, countries try to reduce poverty in their country by measuring poverty indicators, and in this regard, the international community tries to play its role in eradicating global poverty by considering various policies and programs. The tools used to reduce this phenomenon in different societies have diversified over the past century and include a wide range of activities such as emergency relief, social security coverage, educational and cultural programs, and empowerment programs (Ochilov, 2021). Poverty remains a pervasive global issue, with the World Bank reporting that approximately 689 million people lived on less than $1.90 per day in 2022, and nearly 3.3 billion or 43% of the world's population lived on less than $5.50 per day (World Bank, 2022). While progress has been made in reducing poverty, the scale of the challenge is still immense, underscoring the urgent need for coordinated global action (United Nations, 2015).

A Disproportionate Burden Sub-Saharan Africa (SSA) has the highest rates of poverty globally, with almost 55% of its population living on less than $1.90 per day (World Bank, 2021). Poverty in this region is exacerbated by factors such as political instability, lack of economic diversification, limited access to education and healthcare, and the impact of climate change (Ndulu *et al.,* 2007). This persistent poverty has had far-reaching consequences, including high unemployment, limited educational opportunities, and poor access to basic services (World Bank, 2021).

As part of the broader regional context, Somaliland has faced significant challenges in addressing poverty, which is a widespread concern across the country (Bradbury, 2008). Somaliland's unrecognized status has hindered its ability to access international aid and development resources, further exacerbating the issue (Bradbury, 2008).

However, the country has made progress in achieving some of the Millennium Development Goals, such as reducing child mortality and increasing primary school enrollment (NDP, 2020). Despite these achievements, the national poverty rate in Somaliland is estimated to be around 43%, which is higher than the world average and the average for sub-Saharan Africa (World Bank, 2022). Examining the Determinants In many parts of Somaliland, including Sheikh District in the Sahil Region, rural poverty remains a significant challenge. While efforts have been made to combat poverty, it is crucial to understand the unique factors that contribute to poverty in rural regions to develop and implement effective policies (Osman, 2018).

There is a pressing need for comprehensive data and analysis on the determinants of rural poverty in Sheikh District, as this understanding is crucial for guiding targeted interventions and improving the quality of life for the local population. Importance of Understanding Rural Poverty in Sheikh District Examining the determinants of rural poverty in Sheikh District is of paramount importance, as it can provide valuable insights to guide the development and implementation of effective policies and interventions to alleviate poverty in the region. By understanding the specific factors contributing to poverty in this rural area, policymakers and development organizations can tailor their efforts to address the unique challenges faced by the local population, ultimately improving their overall well-being, health, and access to essential services (Osman, 2018; NDP, 2020).

1.2. Statements of the Problem

Poverty is a significant challenge facing both urban and rural communities in Somaliland. According to the National Development Plan (NDP) of Somaliland in 2017, the overall poverty rate in the country stood at 29.6% in 2020. This means that nearly one-third of the population in Somaliland lives below the poverty line. In the urban areas of Somaliland, the poverty rate is estimated to be around 25.8%. On the other hand, the rural areas of Somaliland experience an even higher poverty rate of 32.1%. This can be largely attributed to the reliance on subsistence agriculture and livestock rearing, which are highly vulnerable to climate change, drought, and other environmental factors (NDP, 2021). In Somaliland, rural poverty is a serious and persistent issue that affects the rural population of the nation deeply. The National Development Plan (NDP) of Somaliland states that the proportion of poverty in rural areas compared to urban

centers is disproportionately higher (NDP, 2017). To address the issue of rural poverty in Somaliland, a comprehensive and coordinated approach is required. The NDP outlines several strategies, including investments in rural infrastructure, the promotion of diversified and sustainable livelihoods, and the strengthening of social safety nets and basic service delivery in rural communities.

Even though the government, the international community, and non-governmental organizations have been trying to reduce poverty and disparity in the distribution of the benefits of economic growth across geographic areas and social groups, rural poverty has still not been reduced (NDP, 2023). While research on poverty in Somaliland has covered important issues, much of it looks at broader national or regional trends. Ahmed (2020) studied income and wealth gaps between urban and rural areas, Mohamoud (2018) focused on access to essential services like healthcare, education, and water, and Osman (2019) examined how gender roles affect poverty. However, these studies don't really address the unique challenges faced by rural households in Sheikh District.

Moreover, existing studies often overlook how key poverty-related factors interact with local socioeconomic conditions. For example, Abdi (2017) focused on the impact of remittances on absolute and subjective poverty, while Mohamoud and Bulut (2020) emphasized the need for updated data and deeper analysis of regional disparities, especially regarding gender and socioeconomic characteristics. Empirically, there is limited evidence on how core poverty-related variables such as livestock ownership, land use, education, and market access influence poverty outcomes in rural Somaliland, particularly at the district level. Methodologically, most previous studies employ generalized national-level approaches that do not capture local-level nuances. Analytically, there is a gap in examining how multiple variables interact simultaneously to shape poverty outcomes in specific rural settings such as Sheikh District.

Although livestock ownership and land use are recognized as important determinants of rural poverty, there is a lack of research examining their specific impacts within Sheikh District. Existing studies often discuss these variables in broader contexts without analyzing their effects locally. This study aims to address this gap by investigating how livestock ownership and land use, along with variables such as education, family size, and market access, influence poverty

levels in Sheikh District. By providing a detailed analysis of these factors, the study will contribute to a more nuanced understanding of poverty determinants in this area.

1.3. Research Questions

This study was aimed to answer the following research questions:

1. How widespread is household poverty in rural Sheikh District areas, and how severe is it in terms of its scope, intensity, and severity?
2. What are the key determinants of poverty in rural households in the study area?

1.4. Research Objectives

1.4.1. General objective

The general objective of this study was to analyze the determinants of households' poverty in rural areas of Sheikh District.

1.4.2. Specific objectives

Specifically, this study aimed to achieve the following objectives:

1. To assess household poverty level in rural Sheikh District areas in terms of its scope, intensity, and severity; and
2. To analyze the determinants of rural household poverty in the study area.

1.5. Significance of the Study

The study's potential to offer important insights into the variables influencing rural poverty levels makes it significant. The study can provide a thorough understanding of the economic issues that the local population faces by evaluating the extent, intensity, and severity of household poverty in Sheikh District. In order to reduce poverty and enhance the general well-being of rural communities in the area, policymakers, development practitioners, and NGOs can use this information to create targeted interventions and policies. Also, a review of the factors that contribute to rural household poverty in the research region will improve the present body of information regarding the nature of poverty in Somaliland. By assessing the primary determinants of poverty in Sheikh District, the study can shed light on the structural problems

that sustain poverty in rural areas. This knowledge may guide efforts toward sustainable development strategies that tackle the underlying causes of poverty and inform evidence-based decision-making processes. In conclusion, the results of this research may promote inclusive growth and productive change in rural areas, which would eventually raise the standard of living for people living in Sheikh District.

1.6. Scope and limitations of the Study

This study explored key environmental, demographic, and socioeconomic factors influencing poverty in Sheikh District, focusing specifically on four out of the district's 43 tuulos. While these selected communities are intended to represent the broader challenges encountered by rural populations in the region, the research is not exhaustive of all tuulos in the district. By addressing a significant knowledge gap, this study aims to provide a comprehensive empirical analysis of the determinants of rural poverty in Sheikh District. Existing research often focuses on broader contexts, neglecting the specific effects of livestock ownership and land size on poverty in Sheikh District. This study aims to address this gap by examining how these factors influence poverty levels in the district. The results are expected to offer valuable insights to inform targeted interventions and policies designed to alleviate rural poverty and support sustainable development in Sheikh District. The study's methodology and framework may serve as a model for similar rural research. Limitations include constraints in labor, time, and finances, which restricted the study to four tuulos within Sheikh District and may affect generalizability. The accuracy of the results depends on data quality, respondent cooperation, and research oversight. Despite these limitations, efforts were made to minimize biases and ensure reliable outcomes.

1.7. Organization of the study

This thesis is organized into five chapters, each building upon the previous one. The first chapter introduces the background, research questions, objectives, significance, scope, and limitations of the study. The second chapter presents a comprehensive literature review, including relevant concepts, theoretical frameworks, analytical framework, empirical studies, and the conceptual framework. The third section outlines the research methodology, description of the study area, data collection methods, and data analysis techniques. The fourth section presents and discusses the study's key findings. Finally, the last section draws conclusions, and recommendations for future research and practice, culminating in a comprehensive exploration of the research topic.

2. LITERATURE REVIEW

This chapter presents the research on poverty, which includes definitions and concepts, approaches and techniques for quantifying poverty, empirical research, and a conceptual framework for understanding poverty.

2.1. Definitions of Basic Terms and Concepts

The conceptualization of poverty has evolved significantly over time. Dixon *et al*. (2002) note that poverty is a persistent issue posing political and moral challenges across societies. The term "poverty" is commonly understood but varies in meaning based on underlying concepts. At its core, poverty denotes a lack of basic survival means individuals who cannot secure adequate food, clothing, or shelter face this extreme form of deprivation. In regions with extreme poverty, such as Sub-Saharan Africa, this definition remains relevant. However, in different contexts, poverty might be defined differently.

Poverty can be seen as social exclusion, where individuals or families are unable to fully participate in societal activities or access necessary services due to various barriers beyond financial constraints (Lister, 2023). This perspective emphasizes how poverty intersects with social isolation and limited opportunities. Capability deprivation is another definition which has been updated to emphasize the broad range of human capabilities that impact poverty. According to recent research, capability deprivation refers to the limitations on individuals' abilities to achieve various life outcomes, including health, education, and overall well-being (Alkire and Robles, 2021). This definition incorporates contemporary understandings of poverty as a multidimensional issue affecting various aspects of human functioning. For this research, the definition of poverty adopted will be "Capability Deprivation", which emphasizes the lack of opportunities and freedom to achieve basic human functioning. This approach aligns with the multidimensional perspective of poverty and allows for a comprehensive analysis of various factors contributing to poverty beyond just income levels.

Poverty can be measured in two main ways: absolute and relative. Absolute poverty refers to the inability to meet basic living standards, often defined by a threshold such as the UN’s $1.90 per day for extreme poverty. This threshold varies by region due to differing living costs. Relative

poverty, on the other hand, is contextual and depends on the economic climate. It is measured as a percentage of the average income within a society, such as households earning below 60% of the median income, which can affect their access to normal opportunities and activities. This measure reflects social exclusion rather than just financial limitations (United Nations,2023).

Poverty measurement involves two fundamental steps: identification and aggregation (Sen, 1976). Traditionally, unidimensional measures, focusing solely on income or consumption, were used. However, these often-missed broader aspects of human well-being like education and healthcare. In contrast, the multidimensional approach encompasses various factors including education, health, and living standards, offering a more comprehensive view of poverty (Alkire and Santos, 2014). This approach helps in identifying root causes and crafting more effective poverty alleviation strategies. Poverty is complex and extends beyond mere financial deprivation to include factors like education, healthcare, and social inclusion (Alkire and Santos, 2018). Definitions may vary, but there's consensus on poverty's negative impacts on both individuals and society (Banerjee and Duflo, 2019). The UNDP views poverty as a deprivation of choices and opportunities, while the FAO defines it as an inability to achieve a basic standard of living (UNDP, 2022; FAO, 2022).

In rural areas, poverty is influenced by factors such as household size, education levels, access to resources, infrastructure, and environmental conditions (Diao *et al.,* 2020; Ferreira *et al.,* 2021; Asfaw *et al.,* 2021; Hallegatte *et al.,* 2020). Geographic factors and inadequate infrastructure play a crucial role, with isolated areas facing higher poverty due to poor market access and lack of essential services (Asfaw *et al.,* 2021). Environmental issues like climate change and natural disasters further exacerbate poverty (Hallegatte *et al.,* 2020). Addressing rural poverty requires a comprehensive, evidence-based approach that considers these unique challenges. Effective strategies should focus on improving education, healthcare, infrastructure, and sustainable livelihoods to promote overall progress and alleviate rural poverty (Castañeda *et al.,* 2019).

2.2. Theoretical Framework of the Study

Poverty is a complex phenomenon that has been examined through various theoretical lenses. Each theory provides unique insights into the causes and persistence of poverty, shaping policy

and intervention strategies. This review covers classical, Keynesian, Marxist, human capital, and structural theories, highlighting their contributions and limitations.

2.2.1. Classical Theory

Classical economic theory, articulated by economists such as Adam Smith and David Ricardo, suggests that poverty is a natural outcome of market economies. This theory argues that poverty results from individual choices and market dynamics rather than systemic failures. Classical economists believe that self-interest and competition drive economic growth, which in turn improves living standards and reduces poverty over time through the market's "invisible hand." While classical theory emphasizes the role of economic growth in reducing poverty, it has been criticized for neglecting structural inequalities and the persistence of poverty despite overall economic expansion (Smith, 1976; Ricardo, 1817). Critics argue that the theory fails to address income inequality and systemic barriers that perpetuate poverty.

2.2.2. Keynesian Theory

John Maynard Keynes introduced a transformative perspective with his theory of aggregate demand. Keynesian theory posits that economic downturns and unemployment can lead to widespread poverty, and government intervention is necessary to stabilize the economy. Keynes argued that insufficient demand for goods and services can cause unemployment and reduced income, exacerbating poverty. His approach advocates for fiscal policies, such as government spending and tax cuts, to boost aggregate demand and stimulate economic growth (Keynes, 1936). The Keynesian model has significantly influenced public policy, particularly in the mid-20th century, but it faces criticism for potential inflation and the argument that government intervention may distort market mechanisms and create inefficiencies (Blinder, 2021).

2.2.3. Marxist Theory

Marxist theory provides a critical view of poverty, attributing it to the capitalist economic system. Karl Marx argued that poverty is a fundamental feature of capitalism, driven by labor exploitation and the concentration of wealth among capitalists. According to Marxist theory, poverty arises from the unequal distribution of resources and the class struggle between the bourgeoisie (capitalists) and the proletariat (working class) (Marx, 1867). This perspective

highlights systemic exploitation and inequality as key factors in perpetuating poverty. However, Marxist theory has been critiqued for its deterministic view of economic systems and its limited consideration of non-economic factors affecting poverty (Harvey, 2018).

2.2.4. Human Capital Theory

Human capital theory, developed by economists such as Gary Becker, emphasizes the role of education and skills in determining income and poverty. This theory suggests that investments in education and training enhance productivity and earning potential, thereby reducing poverty (Becker, 1964). Human capital theory underscores the importance of education in mitigating poverty by improving individuals' market competitiveness. However, it has been criticized for overlooking structural barriers to education and job opportunities, such as discrimination and socioeconomic inequalities (Mincer, 1974; Heckman, 2020).

2.2.5. Structural Theory

Structural theories focus on systemic and institutional factors that contribute to poverty. These theories argue that poverty results from broader social and economic structures rather than individual or familial issues alone. Structural theories examine how economic inequality, inadequate social safety nets, and institutional discrimination perpetuate poverty (Piven & Cloward, 1971). For instance, structural theories might explore the impact of labor market changes, housing policies, and welfare systems on poverty rates. They emphasize the need for comprehensive policy reforms to address the root causes of poverty rather than just its symptoms.

While all five theories offer important insights, they differ in focus and applicability. Classical and Keynesian theories concentrate on macroeconomic processes, such as market forces and aggregate demand, but offer limited explanation for persistent rural poverty at the household level. Marxist and structural theories effectively highlight systemic inequality, but they are broad and more suited to critiques of large-scale socio-political systems. In contrast, Human Capital Theory is more applicable to micro-level analysis, particularly in the context of rural households where access to education, skills, and resources plays a central role in income generation and poverty reduction.

For this study, Human Capital Theory is selected as the primary framework due to its focus on education and skill development, which are critical in understanding and addressing rural poverty in Sheikh District. This theory helps explore how improvements in education and skills can enhance economic mobility and reduce poverty levels. By applying Human Capital Theory, the study aims to identify key determinants of poverty and inform targeted interventions and policies to foster sustainable development in the region. Integrating this theory will offer valuable insights into the economic challenges faced and guide effective policy recommendations.

2.3. Approaches to Measuring Poverty

The three, major, school of thought in literature concerning the definition and measurement of poverty are; the welfare school, the basic needs school and the capability school. Even if each of the thoughts perceive poverty differently, there are areas in which they share some common meaning and all of them judge a person to be poor whenever he/she is lacking a reasonable minimum standard of living (Woldie, 2019).

2.3.1. The Welfarist approach

The welfarist approach to poverty assessment, rooted in classical microeconomics, assumes individuals are rational actors who aim to maximize their own utility. According to this view, if individuals have the freedom to choose, their choices will result in a Pareto-efficient outcome, where no one's utility can be improved without diminishing someone else's. Thus, if an individual voluntarily chooses a lifestyle with lower consumption, they should be considered non-poor, as their choices reflect their utility-maximizing behavior (Stiglitz, Sen, and Fitoussi, 2022). However, this approach faces practical challenges, such as accurately measuring subjective utility and revealed preferences. It also struggles with the limitations of income and consumption proxies, which do not fully capture non-market factors or public goods that impact well-being. Additionally, ethical concerns arise in making meaningful comparisons of utility across individuals (Fleurbaey and Blanchet, 2021).

2.3.2. Non-welfarist approach

2.3.2.1. Basic needs and functioning

Non-welfarist approaches to poverty assessment include the basic needs and capability approaches. The basic needs approach focuses on ensuring individuals can meet essential outcomes such as adequate nutrition, health, literacy, and social empowerment. This approach defines poverty in terms of achieving specific, essential functioning's rather than merely measuring commodities or resources. In contrast, the capability approach, developed by Amartya Sen, emphasizes the importance of individuals' freedoms or "capabilities" to choose lives they value. It recognizes that even if basic needs are met, disparities in capabilities can lead to different outcomes in well-being (Sen, 2021).

2.3.2.2. The capability approach

The capability approach highlights the freedoms and opportunities individuals have to pursue valued life paths, beyond just their achieved outcomes. It focuses on the "capabilities" or real opportunities available to individuals to choose their way of living. Unlike the basic needs approach, which looks at specific outcomes, the capability approach values the freedom to choose among different potential ways of living. It distinguishes between capabilities (the freedom to achieve various outcomes), functioning's (the actual achievements), and the resources required to achieve them. This multidimensional framework provides a broader perspective on poverty and well-being by emphasizing personal agency and the quality of choices available (Robeyns, 2023). This study used the Capability Approach to explore factors influencing poverty levels in Sheikh District, focusing on individuals' freedoms and opportunities rather than solely on material resources. By emphasizing what people were able to do and be, this approach provided a comprehensive understanding of how capabilities affected poverty. The goal was to offer insights that would guide effective policy recommendations for poverty alleviation.

2.4. Analytical Framework of the Study

2.4.1 Poverty Measurements

The understanding of poverty as a universal phenomenon can misguide its identification and measurement by relying on preconceived notions and solutions, rather than local definitions and needs. This approach can result in ineffective external interventions and sectoral strategies that overlook the complex trade-offs in poverty reduction (Carr, 2008). Measuring poverty is challenging because it involves more than just financial resources; it includes access to essential needs like healthcare, education, and housing. Traditional methods like the poverty line are criticized for oversimplification and regional insensitivity (Haughton and Khandker, 2018; Ravallion, 2019). Alternative measures, such as the Multidimensional Poverty Index (MPI) and the Capability Approach, offer a more comprehensive view by incorporating factors like health, education, and personal freedoms, thus enabling more effective and targeted poverty alleviation strategies (Alkire and Jahan, 2021; Sen, 2020).

2.4.1.1 Poverty line

Poverty is a complex issue affecting individuals and societies globally. Key to addressing poverty is understanding the poverty line and its types. The poverty line is a statistical measure defining the minimum income or resources needed to meet basic needs. This threshold varies across regions due to differences in living costs, cultural norms, and welfare policies (World Bank, 2022). Absolute poverty line is a measure which defines the minimum income required for basic survival needs like food, shelter, and clothing. It provides a consistent metric for comparing poverty across regions and time periods. However, it does not account for the broader aspects of well-being, such as access to education and healthcare (World Bank, 2022; United Nations, 2020).

Relative poverty line is a measure which assesses poverty based on an individual's income in relation to the overall standard of living within a society, typically set at a percentage of the median income (OECD, 2019). It reflects not only basic needs but also the ability to participate fully in social and economic life. Although it provides a more comprehensive view of poverty, it can vary significantly across different contexts, making cross-country comparisons

challenging (OECD, 2019; United Nations, 2020). In poverty analysis, three indices are commonly used: the headcount poverty index, the poverty gap index, and the severity of poverty index. These indices, developed by Foster, Greer, and Thorbecke (1984), help measure various dimensions of poverty. The choice of measure and the creation of poverty lines depend on the goals of the analysis and data availability (WBI, 2005).

2.4.1.2. Headcount index (Incidence of poverty)

The headcount is the simplest and best-known poverty measure. It identifies the share of a population whose income is less than the poverty line. It is, not surprisingly, the most commonly calculated poverty measure. The measure literally counts heads, allowing policymakers and researchers to track the most immediate dimension of the human scale of poverty. The headcount is calculated by comparing the income yi of each household to the poverty line z. (The index i = 1…M, where M is the total number of households in the sample.) Concretely, an indicator variable is constructed for each household, taking the value 1 when income falls below the poverty line or 0 if income is greater:

$$I(y,z) = 1 \; if \; y_i \leq z$$

$$I(y,z) = 0 \; if \; y_i > \mathrm{z} \qquad (1)$$

The headcount index is simply the sample average of the variable I(y, z), weighted by the number of people in each household ni. The measure is calculated by first counting the number of poor individuals, G:

$$G = \sum_{i=1}^{M} I(y,z) n_i \qquad (2)$$

Total population of the sample can be calculated similarly as

$$N = \sum_{\mathrm{i}=1}^{\mathrm{M}} \mathrm{n_i} \qquad (3)$$

and the overall headcount is then the ratio of the two numbers:

$$H = \frac{G}{N} \qquad (4)$$

When the sample is not representative of the population, such as with random stratification, population weights should be included in calculations. The headcount poverty measure is a valuable descriptive tool but has limitations as a sole guide for resource allocation. It does not reflect changes in poverty levels if a very poor person becomes less poor or if a poor person becomes poorer. This limitation is noted by Watts (1968) and Sen (1976), who argue that

changes in income distribution below the poverty line have moral significance. A major issue with the headcount measure is that it can lead policymakers to prioritize improving the situation of those just below the poverty line, as small increases in their income can quickly reduce the poverty headcount. This focus may overlook the needs of those who are extremely poor, requiring larger income increases to move them above the poverty line. Despite these issues, the headcount remains a valuable measure. To enhance its utility, it can be complemented by calculating headcounts for "sub-poverty" lines, which reflect lower thresholds, such as the income required for basic food needs (Jonathan, 2013).

2.4.1.3. Poverty gap (Depth of poverty)

The difference between the mean income or consumption of the poor households expressed as a percentage of the poverty line and the poverty line itself determines the depth of poverty, which is represented by the poverty gap index. Said another way, the measure of the poverty gap represents the population-wide mean aggregate income or consumption shortfall in relation to the poverty line. It is calculated by dividing the total by the population after adding up all of the impoverished households' shortfalls (assuming that these households have no shortfalls at all). This index is referred to as a modest measure of poverty analysis because it is based on the total poverty deficit of the poor relative to the poverty line, which makes it far superior to the head count index. More specifically, poverty gap (Gi) is the poverty line (z) less actual consumption expenditure (xi) for poor individuals; the gap is considered to be zero for everyone else (non-poor). Using the index, we have

$Gi = (z - xi).\ (xi < z)$ *(5)*

More formally, the poverty gap index ($P1$) can be computed as:

$$P_1 = \frac{1}{N}\sum_{i=1}^{n}\left(\frac{G_i}{z}\right) \quad (6)$$

The distribution of income among the poor is not taken into account by the poverty gap index, despite the fact that it can be used as a measure of the possibility of eradicating poverty by focusing on the poor households (Kimalu *et al.*, 2002). This is the third measure of poverty.

2.4.1.4. Poverty severity (squared poverty gap)

This considers both the inequality within the poor, i.e., a greater weight is given to those households further away from the poverty line, as well as the distance separating the poor from the line (the poverty gap).

More precisely, these measures can be defined in terms of the well-known Foster, Greer, and Thorbecke (1984) Pα class of poverty measures. When real per-adult (per capita) household expenditure, Yi, is ranked as:

Y1≤Y2≤…Yq≤Z≤q+1…≤Yn

Where Z is poverty line, N is the total population, and q is the number of poor, then Pαis given by:

$$P\alpha = 1/N \sum_{i=1}^{q} \left(\frac{Z-Y_i}{Z}\right)^{\alpha} ;\ \alpha \geq 0\ for\ Y < \mathrm{Z} \qquad (7)$$

In this case, the policymaker's degree of distaste for poverty inequality is indicated by the parameter α. When α = 0, the headcount index, which corresponds to the level of poverty, is used and there is no need to worry about it. Therefore, it represents the percentage of people living below the poverty line. Although the head-count index is simple to use and convey, it is unaware of variations in the severity of poverty. It doesn't account for how much a person's income (or spending) falls below the poverty line.

When α = 1, the poverty index is referred to as the poverty gap index (P1), which calculates the total amount of poverty that the impoverished have in comparison to the poverty line. This ratio is also known as the poverty gap index. Targeting transfers to the impoverished can also be used to determine the likelihood of eradicating poverty, as indicated by the poverty gap ratio. The total of all the poverty gaps in a population – (Z-i0)*q – is the minimal cost of eradicating poverty through targeted transfer. The poverty gap measure's shortcoming is that it fails to account for variations in the degree of poverty among the impoverished, or the distribution of income among them. The poverty gap index will remain constant if income is moved from the poor to the least poor. In the Pα computation, the average income deficit of the poorest of the poor is given greater weight when α≥1. As an indicator of the degree of poverty, P2 (where α = 2) calculates the squared proportional shortfalls from the poverty line. That is difficult to understand, though.

2.4.2. Determinants of Poverty

The problem of poverty is complex and multifaceted, leading economists, sociologists, and politicians to extensively study its underlying causes. Effective poverty alleviation strategies depend on understanding these root causes. To analyze the determinants of poverty, researchers use various analytical models, each with its own strengths and limitations. This section reviews three commonly employed models: binary choice models, ordered models, and multivariate regression models. These models offer different perspectives on how socioeconomic, demographic, and environmental factors influence poverty, providing valuable insights into this intricate relationship.

Binary choice models, including logit and probit models, are commonly used to analyze factors influencing the likelihood of an individual or household living in poverty. These models classify poverty as a binary outcome either poor or not poor allowing researchers to identify significant variables such as household characteristics, work status, and education that affect this likelihood (Wooldridge, 2010). A key advantage of these models is their ability to provide clear and interpretable results, such as the marginal impacts of each variable on the probability of poverty, which can be valuable for policymakers when designing targeted interventions. However, a notable limitation is that these models do not capture the depth or severity of poverty, focusing only on the binary classification without considering variations in the level of deprivation among the poor.

Researchers have created ordered models, such as ordered logit and ordered probit models, to overcome this restriction. In these models, the state of poverty is viewed as an ordered categorical variable, with people or households categorized as "not poor," "moderately poor," or "extremely poor." Compared to binary choice models, ordered models have a number of advantages. They can offer deeper insights into the elements that contribute to the degree or severity of poverty by taking into account the various levels of poverty (Greene, 2018). Politicians may find this information especially helpful in developing focused interventions and more efficient resource allocation. Moreover, the fundamental ordering of the poverty levels can be captured by ordered models, which is not achievable with binary choice models. This makes it possible to depict the underlying reality more accurately and may produce estimates of

the factors that determine poverty that are more trustworthy. Ordered models, however, may be more difficult to interpret and may need larger sample sizes in order to produce accurate results. The assumptions and potential biases connected to these models, like the proportional odds assumption, must also be carefully taken into account by researchers.

Researchers frequently use multivariate regression models, such as ordinary least squares (OLS) regression, in addition to binary choice and ordered models to examine the causes of poverty. These models look at how several independent variables relate to a continuous dependent variable, like an income or poverty measure. Multivariate regression models provide a deeper comprehension of the variables that influence changes in income or poverty (Gujarati & Porter, 2009). These models can provide information about the relative importance and impact magnitude of various determinants by taking into account the combined effect of multiple variables. The flexibility of multivariate regression models is one of their main benefits. When accounting for the impact of additional variables, they can be used to calculate the impact of each independent variable on the dependent variable. This makes it possible for researchers to sort through the intricate web of connections and pinpoint the main causes of poverty. Multivariate regression models do present certain difficulties, though. They require careful consideration of assumptions and potential biases and may be more sensitive to problems like multicollinearity, where independent variables have a high degree of correlation with one another.

For examining the determinants of poverty in rural areas, I prefer the logit model, or logistic regression, due to its effectiveness in handling binary classification tasks. Logistic regression is well-suited for predicting binary outcomes, such as whether a household is below or above the poverty line, by modeling the probability of such outcomes with precision. It allows for the inclusion of multiple explanatory variables, providing odds ratios that help in understanding how various factors influence poverty status. This feature is particularly useful for analyzing complex relationships between poverty and its determinants. Additionally, logistic regression is robust and often produces reliable insights even when some model assumptions are not fully met. Specifically, logistic regression assumes a linear relationship between the log-odds of the outcome and the predictor variables, and it requires the specification of a link function. While these assumptions may not always perfectly align with real-world data potentially affecting

model accuracy logistic regression's flexibility and robustness generally outweigh these limitations. Overall, logistic regression offers a valuable approach for identifying and understanding the factors contributing to poverty in rural areas, making it a suitable choice for my analysis.

Poverty is influenced by a range of determinants that significantly affect rural households. Key factors include the education level of the household head, which is crucial for enhancing economic opportunities and overall welfare. Demographic aspects such as age, household size, and the number of dependents also play a vital role in shaping poverty levels. Access to resources, including land ownership, contributes to a household's economic stability. Engagement in agricultural activities, such as livestock farming and farm forestry, can enhance income generation. Environmental conditions and geographic factors, including infrastructure and market access, are critical in determining poverty, particularly in rural areas where isolation and environmental challenges can exacerbate economic difficulties. Drought, in particular, has a severe impact on poverty by diminishing agricultural productivity, depleting essential water resources, and severely disrupting livelihoods for household's dependent on farming (Mastrorillo *et al*., 2016; Moutinho and Nunes, 2020). Addressing these determinants requires a comprehensive approach that incorporates education, healthcare, sustainable agricultural practices, and robust infrastructure to effectively alleviate poverty in these communities.

2.5. Empirical Literature

In the most recent research on international development, poverty alleviation is a major policy topic. People who are given political, social, and economic authority will experience all-inclusive progress (World Bank, 2020). Developing measures to reduce poverty necessitates a methodical understanding of the issue of poverty. Summarizing data on poverty and defining characteristics of the impoverished is crucial given the increased interest in reducing poverty (UNDP, 2021). Numerous research studies have been carried out globally to determine the causes of poverty and deprivation of well-being in this regard.

Imam *et al.* (2018) examined factors affecting poverty in rural Bangladesh. The result reveals that the potential factors having significant association with poverty were found to be age and education of household head, division, household size, household types, number of dependents,

per capita income, household own land, access to electricity, amount of cultivable land, engagement in livestock and farm forestry, household non-agricultural assets, number of male earner and number of female earners in the family. Biyase and Zwane (2018) conducted a study about an empirical analysis of the determinants of poverty and household welfare in South Africa. The result indicates that levels of education of the household head, some province dummies, and race of the household head, dependency ratio, and gender of the household head, employment status of the household head and marital status of the household head are statistically significant determinants of household welfare. Specifically, the study found that compared to traditional rural areas, households living in urban and farms are less likely to be poverty stricken. Moreover, the study found that, educational levels of the household head reduce the probability of being poor.

Lekobane and Seleka (2017) examined determinants of household welfare and poverty in Botswana. The result indicates that education level and employment status of the household head are among the key determinants of household welfare and poverty. Moreover, residing in rural areas increases the likelihood of being poor and negatively relates with welfare. Another study shows that family size, dependency ratio and age of the household head were found to be significant and positively related to poverty. However, farm income, off-farm income, education of the household head, and cultivated land size were found to be significant and negatively associated with poverty status (Ahmed, 2017).

A study by Mango *et al.* (2018) examined the determinants of rural poverty in Kenya using both descriptive statistics and logistic regression. The study measured poverty using household consumption expenditure and found that education level, household size, access to extension services, and ownership of productive assets significantly influenced poverty status. Households with higher educational attainment and diversified income sources were less likely to be poor. These findings reinforce the importance of human capital and access to resources in shaping rural poverty outcomes, which aligns with the current study's aim to assess the intensity and determinants of household poverty in Sheikh District.

The result of this study conducted by Adeoye *et al.* (2019) reveals that sex, age, number of adults, formal credit access, access to extension services and location characteristics are key

determinants of multi-dimensional poverty. The result of this study Jula and Beriso (2023) shows that educational level of the household head, family size, dependency ratio, residence of the household, the region in which household resides, ownership of non-farm enterprises, economic status of the household (high), source of start-up enterprises, and lack of supporting institutions were the factors affecting the probability that a household is poor.

A study conducted by Ahmed *et al*. (2020) titled "Poverty and Inequality in Somaliland" examined the socioeconomic conditions of Somaliland. Scholars from the University of Hargeisa, located in Somaliland, conducted this research project. Using a household survey approach, the researchers gathered all of the socioeconomic metrics, income, and consumption patterns from a representative group of households spread throughout Somaliland. The main findings indicated that the rate of poverty in Somaliland is roughly 60%, with significant differences between urban and rural areas. Significant levels of income inequality were additionally revealed by the investigation, with the wealthiest 20% of households contributing to more than half of total consumption. The scholars recommend that the government of Somaliland implement policy interventions with the objective of strengthening social safety nets, improving the availability of essential services, and promoting a more equitable path towards economic progress.

Mohamed *et al.* (2018) examined poverty in pastoral communities in Togdheer, Somaliland, and found that the main causes were livestock losses, limited access to water and healthcare, and lack of income diversification. They recommend improving livestock production, expanding basic services, and supporting alternative livelihoods to reduce poverty.

2.6. Conceptual Framework of the Study

A conceptual framework serves to organize and analyze ideas and information related to a specific issue. In this study, various factors affecting rural poverty are explored, including demographic factors (such as family size, age, sex, education level of the household head, and dependency ratio), socio-economic factors (like livestock ownership, land ownership, and off-farm income and on-farm income), institutional factors (including distance from the nearest markets and extension services). By categorizing these factors, the framework helps in formulating hypotheses and guiding the analysis. It is hypothesized that these factors influence

the level of poverty experienced by household heads. Using real-life data, the study aims to identify which factors significantly contribute to the rural poverty status in the Sheikh District. This approach seeks to provide a comprehensive understanding of the determinants of poverty in the study area. The figure 1 below shows the conceptual framework of the proposed study.

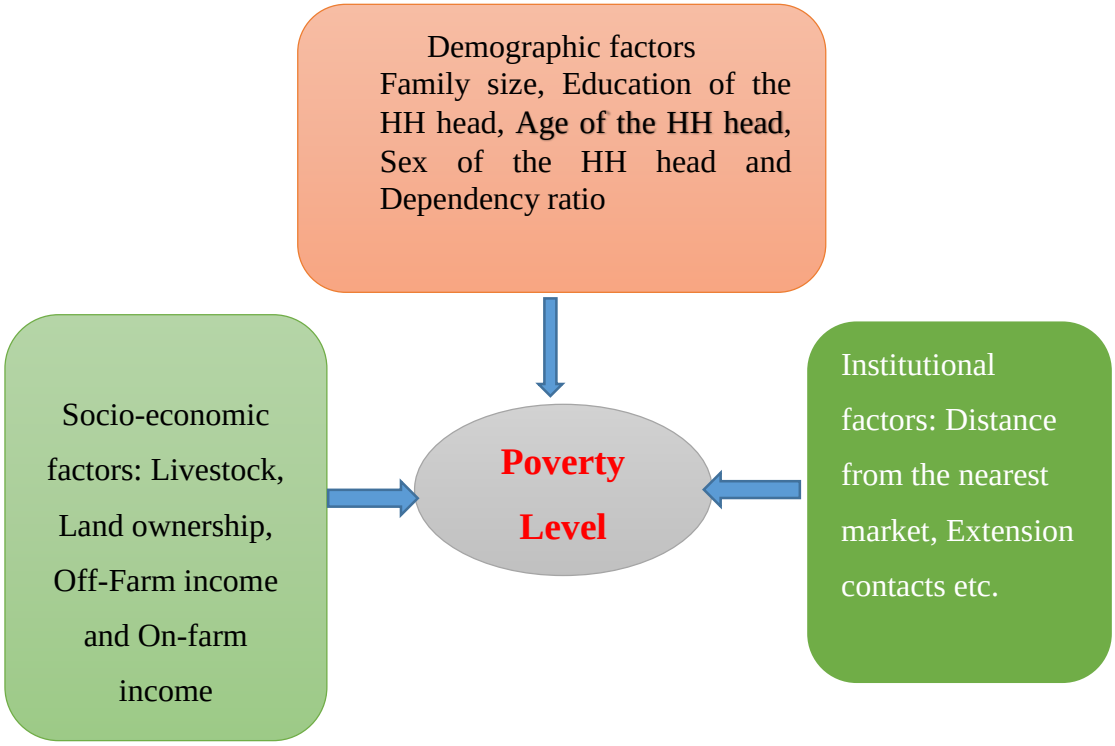

Figure 1: Conceptual framework of the study. Source: Own Construction based reviewed literature

3. RESEARCH METHODOLOGY

The research methods used to effectively carry out the research objectives are presented in detail in this chapter. The description of the study region comes first, then the steps for sampling, data collection, and data analysis, and lastly, valuable definitions and hypotheses.

3.1. Description of the Study Area

The population of Somaliland was estimated to be 3.6 million in 2014 (47.9 percent of male and 52.1 percent female) and projected to increase to 4.2 million in 2020, using a growth rate of 2.93 percent, with the bulk of the population living in urban centers. The population of Somaliland has an average household size of six with 48 percent of the population being under the age of 15 roughly 72 percent of the population being under 30 years. Similarly, 48 percent of the population is within the working age group (15-64) (MPND, 2011 and2023). Sheikh district is located along the main Berbera-Burao route, approximately 60 kilometers from the sea, which gives it good accessibility and presents opportunities for development. Its favorable climate conditions have established Sheikh as a place of retreat from the arid lowlands and coastal areas during the hot season. (UN-Habitat, 2008). Sheikh is a district in the heart of Somaliland and part of the Sahil region. It is one of the earliest settlements of the British Somaliland protectorate. Its existence is estimated to be over 150 years old. (MOI, Somaliland 2009).

It has two seasonal rains a) March to June – spring time b) September to November – fall time, hence, its average rainfall is estimated to be 523mm annually. It is suitable for livestock grazing and agricultural farming. During the rainy season, its temperature ranges from 24c up to 36c, however, in the winter season it varies from 5.5 c to 20 c and the average humidity is 40 percent. Most people say it has such a nice weather and describe it a good place for tourism and relaxation (MoI, Somaliland 2009). As ministry of interior, Somaliland mentions in 2009 the main livelihood sources are divided into four and is ranked as per their importance, Livestock 45%, Agriculture 30%, Remittance 15% and Petty trades 10%. The population of Sheikh was estimated 33,625 in 2005, 75,904 in 2014. Sheikh District, with an area of 2,960 km², is a region characterized by its vast expanse and low population density of 30.56/km² as of 2019.

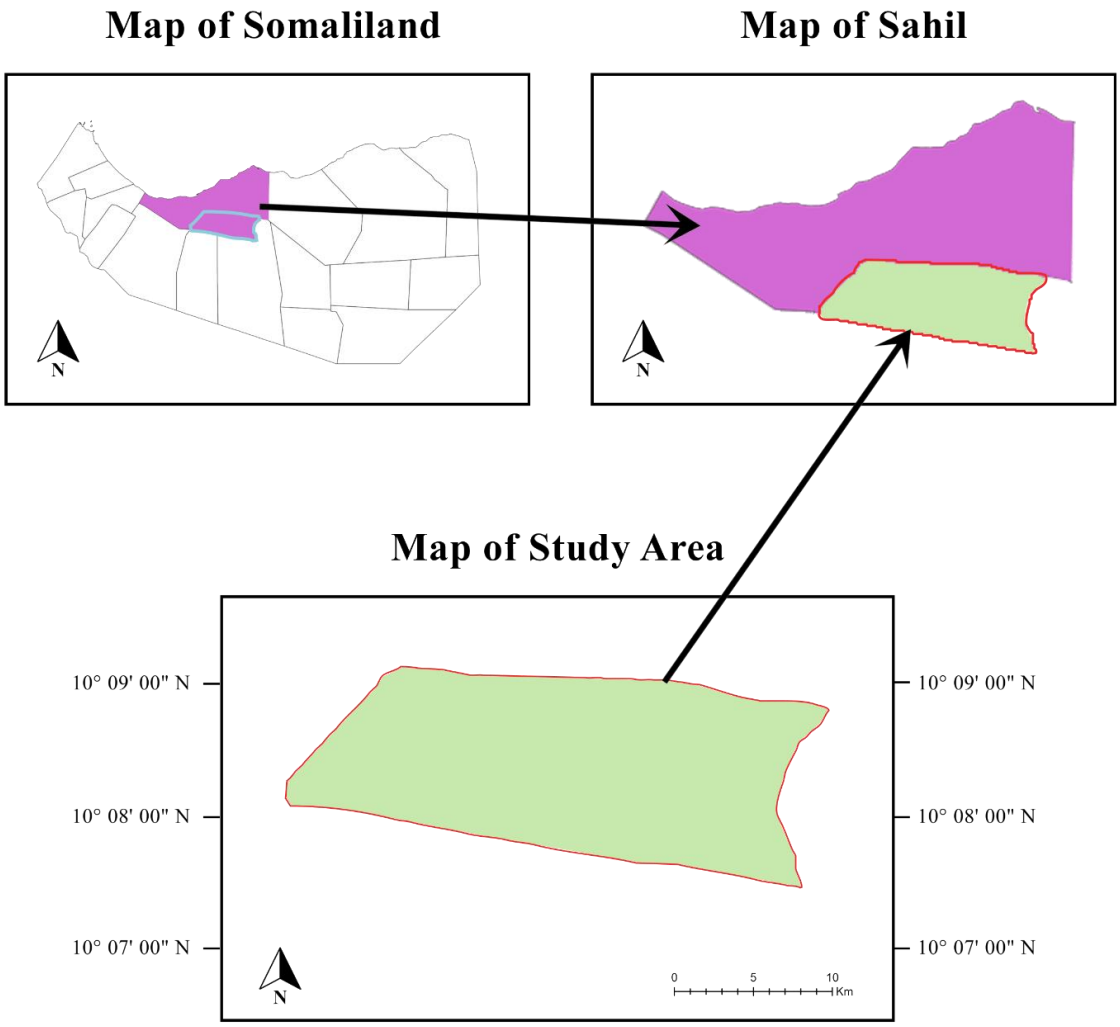

Figure 2: Map of the study area

Source: MPND, 2023

3.2. Data Types, Sources and Methods of Data Collection

For this study, primary and secondary data was used. Key informant interviews, focus groups, field observations, and household surveys was among the primary sources from which the primary data collected. The secondary data collected from information sources that are available, such as documents that are published and those that are not. These include government, international non-governmental organizations, regional reports, and surveys.

3.3. Sampling Procedures and Sample Size Determination

3.3.1. Sampling procedures

Multi-stage sampling approaches was used to select representative sample respondents. In the first stage, Sheikh District was selected from five total districts of agro-pastoral households, purposefully. Sheikh district was considered as representative of the agro-pastoral households of Somaliland. In the second stage, four Tuulos were chosen randomly from among the district's 43 agro-pastoral Tuulos (which are the lowest administrative unit at the village level"). In the third stage, a total of 200 sample households were chosen at randomly using proportional to the size of each Tuulos.

3.3.2. Sample size determination

The sample size is determined using Yamane (1967) formula to determine sample size at 93% confidence level, with 0.07 (7%) level of precision.

Hence, Yamane formula is given as follows: $\boldsymbol{n = \frac{N}{1+N(e)^2}}$ (8)

$$n = \frac{11250}{1 + 11250(0.07)^2} = \frac{11250}{56.125} = 200.44 \approx 200$$

Where:

n=is the sample size

N = is the population size of study area

e =is the level of precision (=0.07).

Table 1. Distribution of sample households across different villages

Village	Frequency	Percent
Suuq-sade	47	23.5
Gidhays	53	26.5
Hudisa	51	25.5
Laalays	49	24.5
Total	200	100

Source: Computed from Sample data collected (2025)

3.4. Methods of Data Analysis

Descriptive statistics and econometric methods were used to analyze data collected from sample households of study area. To describe and analyze the association between poverty level and categorical variables, chi2 test was used. To assess then mean difference between continuous variable t-test was used.

3.4.1. Descriptive Statistics

The collected data from the sample households was analyzed using different descriptive statistics, including percentages, frequencies, minimums, maximums, means, and standard deviations. Additionally, the study was employed inferential statistics, specifically the independent sample t-test (for continuous variables) and chi-square test (for discrete variables), to compare various household, demographic, and socio-economic variables between poor and non-poor households.

This study was used the Cost of Basic Needs Approach, which included both food and nonfood consumption at local prices, to determine the poverty line at which a given household is classified as poor or non-poor. The study was employed the most widely used method of Foster *et al.* (1984) to calculate indices in order to determine the magnitude of poverty in terms of incidence, depth, and severity. Due to its ability to capture the most desirable properties of a poverty index, its decomposability across subgroups, consistency within subgroups, ethical flexibility (captured by the parameter α), and understandability, the Foster-Greer-Thorbecke (FGT) measure of poverty is highly dominant and preferred over other ones. So, the Foster-Greer-Thorbecke (FGT) index, which measures poverty, can give us information about its incidence (measured by the headcount ratio, α = 0), depth (measured by the poverty gap index, α = 1), and severity (measured by the squared poverty gap index, α = 2).

Mathematically, the FGT index can be computed;

$$P\alpha = \frac{1}{N}\sum_{i=1}^{n}\left(\frac{Z-x_i}{Z}\right)^{\alpha} \quad (9)$$

Where, α = 0, 1, 2

$P\alpha$, poverty measure

Z, poverty line

Xi, consumption expenditure of the household per adult equivalent

N, number of sample household's; n, number of poor households; α, measure of sensitivity of the index to poverty.

The weight given to a gain by the poorest is represented by the parameter α. The values of α that are frequently used are 0, 1, and 2. The above equation reduces to the headcount ratio, or FGT (0), which measures the incidence of poverty, when we set α equal to 0. Setting α to 1 result in FGT (1), also known as the poverty deficit. FGT (1) measures the depth of poverty by accounting for the average distance that the poor fall below the poverty line, a concept also known as the "poverty gap." When α is set to 2, the FGT (2) index, or the degree of poverty, is obtained. This poverty index places more focus on the gap between the poor, which requires resource redistribution among them.

3.4.2. Econometric Model

The poverty status (PVi) of rural households was recorded as a binary variable, where PVi = 0 denotes non-poor and PVi = 1 indicates poor. The binary Logit model was used to estimate the factors influencing a binary dependent variable. Because of its simplicity of interpretation, the Binary Logistic model was applied to identify the key factors influencing poverty among rural households, while disregarding factors considered to have an insignificant effect. The study assumed the assumption that rural household's likelihood of being poor or not (PVi) depends on its socioeconomic, institutional, and psychological characteristics (Xi), as shown by the next Equation. (Williams, 2019; Long and Freese, 2021).

$$\text{Prob}(poor = 1) = X_i\beta_i + \varepsilon_i \quad (10)$$

The state of poverty can be represented by an underlying unobserved or latent variable (PVi), and this unobservable variable has an association to the characteristics (Xi) of the rural household. If ties don't exist, then we have:

$$PV_i^* = X_i\beta_i + \varepsilon_i \quad (11)$$

Where εi is the error term that captured unobserved variations in the poverty status of rural households, and βi represents the estimated parameters. Usefully, this is provided as:

$$E(PV_i|X_i) = F(\beta`X_i) = \frac{e^{\beta`X_i}}{1+e^{\beta`X_i}} \quad (12)$$

An analytical solution exists if the residuals are identically distributed and independent, with an accumulative distribution function of F(εi< E) = exp(-e-E) and a probability density function of F(εj) = exp(-exp(-εi,j). The probability of a given choice alternative for the ith rural household is given as follows:

$$prob(poor = 1) = \frac{e^{(X'ij\beta j)}}{1+\sum ke^{(X'ij\beta j)}} \quad (13)$$

Prob (Poor = 1) represents the likelihood that rural household i is poor, Xi is a vector of the characteristics of the rural household, and βj are the estimated parameters of the exogenous variables. The maximum likelihood (ML) method will be employed to estimate the parameters.

The results of binary logistic regression can be either marginal coefficients or the odds ratio. Odds ratios indicate that a unit change in an exogenous variable causes a factor of expβ to change in the likelihood that rural households will be poor (Prob (Poor = 1)). However, marginal coefficients, which are typically beta coefficients in a linear regression model, show the impact of each exogenous variable on the likelihood that rural household will be poor, ceteris paribus (Gujarati, 2004). He says that when the explanatory variables change, the slope of a logistic regression function indicates how the log odds ratio in favor of not being poor changes. For example, since Prob (Poor = 1) denotes the likelihood of being poor, (1-Prob (Poor = 1)) denotes the likelihood of being non-poor.

Mathematically this is given as:

$$1 - prob(poor = 1) = {1 - e^{z_i}}/{1 + e^{z_i}} \quad (14)$$

$${e^{-z_i}}/{1 + e^{-z_i}}$$

$${1}/{1 + e^{z_i}}$$

Given the equations above, the odds ratio equation is given as:

Prob (Poor = 1)/1− Prob (Poor = 1) = 1+eZi/1+e-Zi = Zi

Such that the odds ratio in favor of not being poor is Prob (Poor = 1)/1− Prob (Poor = 1). This represents the ratio of the likelihood that rural households will be poor to the likelihood that they will not be. As in Norton and Dowd (2018), we use odds ratio in this study to interpret the effects of change in an explanatory variable on the dependent variable.

3.5. Definition of Variables and Hypotheses

Determining the dependent and potential explanatory variables that are expected to influence poverty, along with describing their unit of measurement, is essential once the analytical procedure and its requirements are known. Based on the numerous studies that have already been reviewed, a hypothesis has been put on that a number of explanatory variables, such as the household head's personal and demographic characteristics, the household's financial resources, and institutional support systems, influence the likelihood that the household will be classified as poor.

3.5.1. Dependent variable

The dependent variable for this study is the respondents' poverty level (POVLV). The rural households' poverty status, which serves as the dependent variable in the logit analysis, is a binary measure indicating whether a household is considered poor or not. To determine poverty status, households are categorized based on their total consumption expenditure per adult equivalent (AE) per day. This threshold is set by considering the minimum expense required to meet both calorie needs (2200 Kcal/AE/day) and basic non-food necessities. Households with a daily expenditure per AE below this threshold are classified as poor, while those with expenditures above the threshold are deemed non-poor. In the model, this is coded as 1 for poor households and 0 for non-poor households.

3.5.2. Independent variables

It is hypothesized that a number of factors work together to determine the poverty status of agro-pastoral households. Family size, dependency ratio, sex of the household head, age of the household head, education level of the household head, livestock owned, land ownership, distance from the nearest market center, extension contact and off-farm/non-farm income were identified and included in this study based on reviewed literatures.

Household Size (HHSIZE): This variable represents the total number of household members living under the same roof, adjusted to adult equivalents (AEs). Larger household sizes are often associated with increased demand for food, education, healthcare, and other essential resources. As the number of adult equivalents rises, the per capita availability of resources tends to decline, which can increase the household's vulnerability to poverty (Fayokun et al., 2020; Wang *et al*., 2021). Therefore, it is hypothesized that in the study area, larger household sizes are positively related to higher levels of poverty.

Dependency Ratio (DPNRIO): This continuous variable measures the proportion of economically inactive family members (those under 15 and over 65 years old) relative to the economically active labor force (those between 15 and 65 years old) within a household. An increasing dependency ratio indicates a higher burden on the working-age members to support the non-working-age members, which can escalate the household's need for basic subsistence and reduce its ability to meet these needs. Households with a higher dependency ratio, meaning more non-active family members, are likely to experience greater poverty due to the increased financial strain and higher demand for resources (Fagbenie *et al.*, 2022; Woldemichael and Bekele, 2023). Thus, it is hypothesized that a higher dependency ratio is positively associated with household poverty status.

Sex of the Household Head (HSEX): This is a dummy variable that takes a value of 1 if the household head is male and 0 otherwise. It is commonly believed that female-headed households face higher poverty rates compared to male-headed ones (Adebayo *et al.*, 2018). This study hypothesizes that female-headed household are more likely to be poorer than male-headed households.

Age of the Household Head (HAGE): This variable, measured in years, reflects the age of the household head. Age often correlates with poverty, as older household heads might face declining productivity and income (Babatunde *et al.*, 2020). However, in Somali contexts, older household heads are perceived to have better resource management skills. This study hypothesizes that as the age of the household head increases, the likelihood of poverty decreases, reflecting improved resource management with age.

Education Level of the Household Head (EDULVL): This continuous variable represents the education level of the rural household head, measured in years of schooling completed. Households led by individuals with higher education levels are generally more likely to be non-poor compared to those led by individuals with minimal or no formal education. Education enhances individuals' ability to make informed decisions, access better job opportunities, and utilize information effectively, which can significantly influence household economic well-being (Gonzalez and Lima, 2021; Liu *et al.*, 2022). Therefore, it is anticipated that a higher level of education among household heads is negatively associated with poverty, reflecting the positive impact of education on economic stability and resource management.

Livestock owned (LVSTOWN): Livestock owning refers to the total number of livestock holding of the household per AE measured in tropical livestock units (TLU). In Somalia, livestock such as camels, cattle, donkeys, goats, and sheep play vital roles, including providing food, income, transportation, and agricultural labor (Blench, 2020). For pastoralists and agro-pastoralists, livestock ownership is a key indicator of wealth. The presence of a significant livestock stock is generally associated with reduced poverty, as it provides essential resources and economic stability (Hussein *et al.*, 2022). Therefore, it is hypothesized that a larger stock of livestock has a negative relationship with poverty, helping to lower household poverty levels.

Land Ownership (LOWN): This is a dummy explanatory variable that represents whether a household owns or has access to agricultural land. It is coded as 1 if the household owns or utilizes any land, and 0 otherwise. Land ownership is widely recognized as a key asset that enables agro-pastoral households to engage in productive agricultural activities, contributing to income generation and food security. Households with access to land are generally better positioned to cultivate crops or rear livestock, which can lead to a reduction in poverty levels (Mekonnen and Hailu, 2021; Tesfaye *et al.*, 2023). Therefore, it is hypothesized that land ownership is associated with a lower likelihood of poverty among agro-pastoral households.

Distance from the Nearest Market Center (MRKD): This continuous variable measures the distance from a household to the nearest market center, expressed in kilometers. Proximity to market centers is critical for rural households as markets provide essential opportunities to purchase inputs and sell livestock and agricultural products. Being closer to a market center

typically facilitates easier access to these economic opportunities, potentially leading to increased income and reduced poverty (Kebede *et al.,* 2021; Olanya *et al.,* 2022). Therefore, it is hypothesized that households located nearer to market centers are more likely to be non-poor compared to those further away.

Access to Extension Services (EXTS): This is a dummy explanatory variable that indicates whether the household head had any access to agricultural extension services during the year. This includes at least one interaction with development agents, visits to demonstration sites such as Farmer Training Centers (FTCs), or consultations with veterinary technicians. Access to extension services equips households with essential knowledge about improved technologies, farming practices, and input use, which can enhance agricultural productivity and contribute to poverty reduction (Feng *et al.,* 2020; Zhang *et al.,* 2021). Therefore, it is hypothesized that access to extension services is positively associated with the likelihood of escaping poverty.

Off-Farm/Non-Farm Income (OFFFARM): This continuous variable represents the total amount of income earned by a household from off-farm or non-farm activities over the past year, measured in dollars. Engaging in non-farm income-generating activities can provide additional financial resources and reduce reliance on agriculture alone, which may help mitigate poverty (Carter *et al.,* 2021; Hossain *et al.,* 2023). Therefore, it is hypothesized that higher non-farm income is negatively associated with poverty, reflecting its role in improving overall household economic stability.

4. RESULTS AND DISCUSSIONS

This chapter presents the results and discussion of the study's main findings, organized into two sections. The first section provides a descriptive and inferential analysis of a socio-economic, demographic, and institutional characteristics of the sampled household's poverty level. The second section focuses on the econometric analysis, employing a binary logistic regression model to identify factors associated with households' poverty level in the study area.

4.1. Socio-economic, Demographic and Institutional Characteristics of Sample Households

4.1.1. Descriptive Statistics of Dummy Explanatory Variables

The results of dummy explanatory were presented in the table 2 below. Frequencies and their respective percentage for each category was presented as well as Chi- squared test with its probability values also presented as well. Based on this Chi-square test results, none of the variables have a p-value less than the commonly used significance level of 0.05.

However, sex of household and extension services has low p-values, which is close to significance: Sex of household head with p-value 0.09, although not statistically significant at the 0.05 level, but significant at (0.1) 10 percent probability level. It implies that the sex of the household head may be associated with rural poverty level. The observed frequencies show differences between poor and non-poor classes. Similar to the sex of the household head, access to extension services shows a near-significant p-value. This suggests a potential relationship between having access to extension services and the poverty level.

Table 2: Summary of categorical explanatory variables on rural poverty

Variables		Rural poverty level					
		Poor classes (n=93)		Non-poor (n=107)		χ2-test	
		Frequency	%	Frequency	%	χ2	P-Value
Sex of HH head	Male	48	24	53	26.5	2.86	0.09
	Female	45	22.5	54	27		
Marital-status	Single	0	-	0	-	2.42	0.29
	Married	79	39.5	89	44.5		
	Divorced	10	5	8	4		
	Widowed	4	2	10	5		
Land ownership	Owned	71	11	91	45.5	2.44	0.11
	Non-owners	22	35.5	16	8		
Access to extension	Access	41	20.5	60	30	2.86	0.09
	Not access	52	26	47	23.5		

Source: Computed from own survey data (2025)

4.1.2. Descriptive Statistics for Continuous Variables

The socio-economic characteristics of households for continuous variables are summarized in Table 3 below, which shows the mean, standard deviation, and extreme values (maximum and minimum) of the continuous explanatory variables. The average age is significant at 5% level of significance which shows the average age of household is different from poor to non-poor of household head for poor class was 47.9 years, with a standard deviation of 1.33, while the average age of household head for non-poor class was 44.3 with 1.3 the chi-squared result of this variable shows that their strong mean difference between the age of poor class and non-poor class because it is significant at 5% level of significance. indicating a diverse age range from 20 to 75 years. Household sizes it is highly significant at 1% level of significance. It shows that there is strong mean difference between household size of poor and non-poor classes. average 5.81 in Adult Equivalent Ratio (AER), with considerable variability in terms of standard deviation with 2.2. This variable is significant at 1% level of significance which shows the

household size is different from poor to non-poor. Off/non-farm income it is also significant at 5% level of significance it indicates that there is mean difference for off/non-farm income of both classes. averages 17.98 dollar, with substantial variation in terms of standard deviation with 83.87 dollar, ranging from 29.33 to 482.4 dollar. The results were summarized in below.

Table 3: Mean comparisons of continuous variables for sampled households

Variables	Rural poverty level					
	Poor classes (n=93)		**Non-poor (n=107)**		**t-test**	
	Mean	SD	Mean	SD	$\chi 2$	P-value
Age of household head	47.9	1.33	44.3	1.3	-1.9	0.05**
Household Size in AER	6.87	1.87	4.9	2.04	-7.1	0.00***
Dependency ratio (DEPR)	1.66	1.64	1.51	1.42	-0.7	0.50
Total Livestock unit (TLU)	3.38	2.77	3.94	3.4	1.27	0.20
Distance from Market	119.3	68.8	115.02	78.5	-0.4	0.64
Off/Non-farm Income	17.98	50.36	34.67	67.25	1.96	0.05**
On-farm income	163.27	71.02	181.1	93.16	1.5	0.13

Source: Computed from own survey data (2025)

4.2. Measurement of Rural Poverty Status of Households

As presented in out of a total of two hundred (200) sampled rural households in the study area, 46.5% were classified as poor, while 53.5% were classified as non-poor households. This classification is based on each household's total consumption expenditure per adult equivalent (AE) per day. The poverty threshold was set by considering the minimum expenses required to meet both calorie needs (2200 Kcal) and basic non-food necessities. Households with a daily expenditure per AE below this threshold were classified as poor, and 93 households fell into this category, while those with expenditures above the threshold were classified as non-poor, with 107 households in this group. In the model, poor households are coded as 1 and non-poor households as 0. This distribution of poverty levels can be attributed to various factors, which need to be identified and analyzed by using logistic regression model (in next section) further to better understand the underlying causes of poverty in the study area.

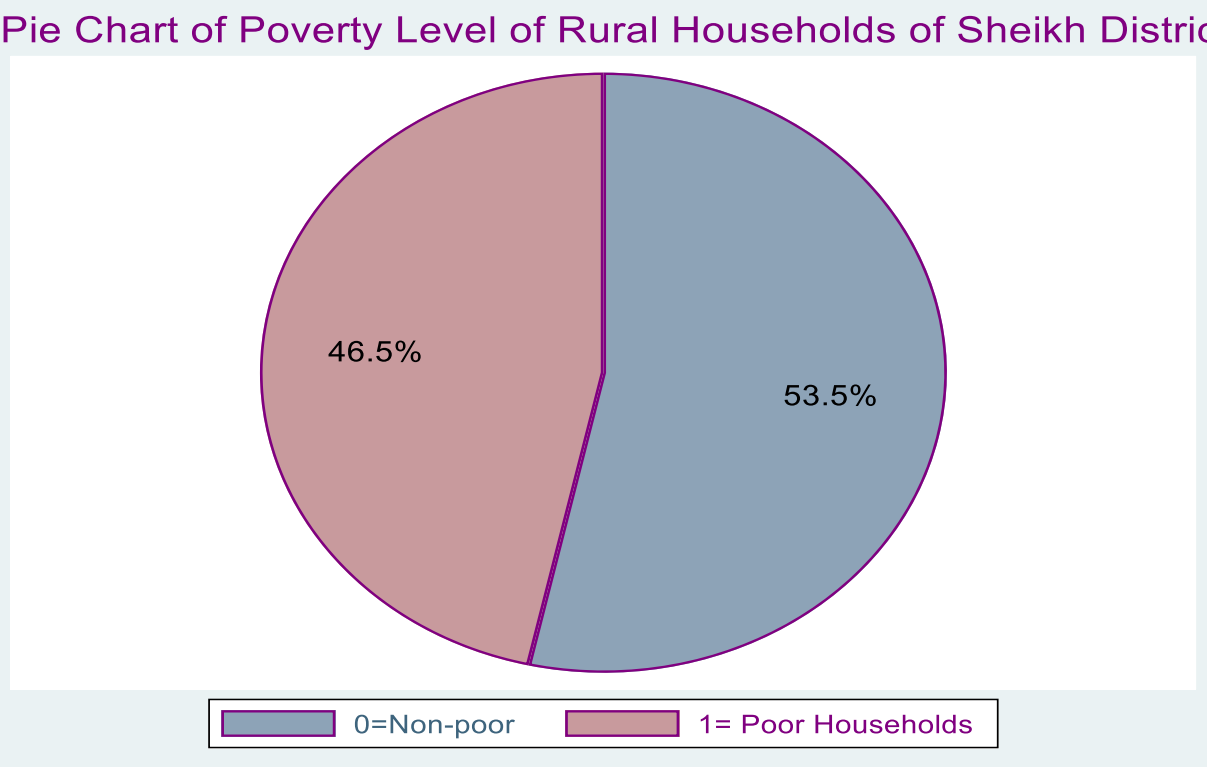

Figure 3: Pie Chart of Poverty level of Rural Households in the study area

Here as presented in the table 4 below is the results of FGT and interpreted in the next section

Table 4: Result of Foster Greer Thorbecke (FGT) and its Implications

Poverty Index Indicators	Calculated Values (FGT)	Implications
Headcount ratio (α=0)	46.5%	46.5% of HH is poor
Poverty depth (α =1)	26.65%	26.65 implies poverty gap
Severity (α =2)	16.27%	Shows relatively high intensity

Source: Computed from sample data collected (2025)

FGT (Foster-Greer-Thorbecke), which measures poverty in terms of three key components: headcount ratio, poverty depth, and poverty severity. Here's an implication of the results:

Headcount Ratio (α = 0):

The headcount ratio represents the head count ratio result indicates that 46.55 of the sampled households are poor, meaning that nearly half of the sampled individuals are unable to meet the minimum income threshold set for basic living standards. This significant proportion of the

sampled households indicates that poverty is widespread within the community, affecting a substantial portion of the population.

Poverty Depth (α = 1):

A value of 26.65% suggests that, on average, poor households in this area are falling short by 26.65% of the income required to escape poverty. This deeper analysis reveals not only the prevalence of poverty but also the severity of deprivation experienced by those below the poverty line. While many households are poor, this measure highlights how far they are from reaching a basic standard of living, providing a more nuanced understanding of the poverty condition.

Poverty Severity (α = 2):

With a value of 16.27%, this indicates that poverty is not just widespread but also deep and severe for a significant portion of the population. A higher value means that the gap between the poor and the poverty line is large, leading to intense deprivation. This measure underscores the inequality within the poor population, showing that while not everyone is equally impoverished, those who are suffering tend to experience more extreme poverty.

These indices, when interpreted together, suggest that poverty is widespread, deep, and severe in the study area.

4.3. Econometrics Results

The econometric analysis is discussed in this section. It is classified into two sections. The first subsection discusses the logistic regression model's diagnosis. The second section presents logistic regression model result used to identify factors affecting poverty level of the rural households in the study area.

4.3.1. Logit Model Diagnosis

Before directly embarking into running the logistic regression model, the presences of strong multicollinearity among continuous and discrete explanatory variables were checked using the Variance Inflation Factor and Correlation matrix, respectively (table 5).

Table 5: Multicollinearity Test results

Variable	VIF	1/VIF
Household head in adult equivalent ratio	1.42	0.706221
On farm income	1.34	0.747021
Education level of the household head	1.30	0.771778
Tropical livestock unit	1.29	0.776384
Distance from the nearest market	1.28	0.780163
Sex of the household head	1.25	0.799639
Age of household head	1.24	0.809166
Off/non-farm income	1.22	0.821996
Dependency ratio	1.15	0.872782
Land ownership	1.08	0.929835
Mean VIF	1.25	

The mean VIF was 1.25 and Correlation matrix was not exceeded 0.5. The results revealed that there is no strong multicollinearity problem. Similarly, the Breusch-Pagan test was used to assess heteroscedasticity. The test result support a rejection of the existence of heteroscedasticity hypothesis as (p= 0.1123). Moreover, Hosmer-Lemeshow (H-L) test was used to assess the model's goodness of fit. The Hosmer-Lemeshow Chi-Square was 8.53; with a probability of 0.3835. Since the P value was statistically insignificant. Therefore, we concluded that the model fit the data well.

4.3.2. Determinants of Rural Households Poverty Level

Based on the logistic regression model results presented in table 7 below, the significant variables were interpreted as follows: Among ten variables hypothesized, five variables were found significant variables affecting rural poverty level in the study area. The hypothesized variables were: Sex of household head, age of household head, education level of household head, household size as adult equivalent ratio, dependency ratio, land ownership, income from off-farm and non-farm, tropical livestock unit, on-farm income and distance from the nearest market. From these variables' education level of household head, household size as adult equivalent ratio, off-farm income, Tropical Livestock Unit and On-Farm Income were significant factors affecting rural poverty level in the study area.

Education Level: The marginal effect of -0.25 means that for one year increase in education level, the probability of being in rural poverty reduces by 25% holding all other factors constant. This result aligns with the hypothesis and supports previous studies. For example, Geda. (2020) found a negative relationship between education and rural poverty in Ethiopia, arguing that education opens up opportunities for higher income and off-farm income sources, helping households escape poverty. However, Mujeeb and Akram (2023) in Pakistan found a positive relationship between education and rural poverty. They attributed this to factors such as limited market access, poor infrastructure, and a lack of job opportunities for educated individuals. This contrast may stem from differences in context. In Somaliland, for example, the lack of relevant skills and knowledge about job opportunities could be a key factor, as highlighted in Focus Group Discussions (FGD) and Key Informant Interviews (KII), where respondents pointed to

education, prolonged drought, and poor infrastructure as major causes of poverty. Thus, the findings here are context-dependent and may differ due to these specific challenges in the region.

Household Size: The marginal effect of 0.26 means that for each additional family member, the probability of being in rural poverty increases by 26% holding all other factors constant. This finding aligns with several previous studies. For instance, Geda (2020) and Dercon (2021) found a positive relationship between household size and poverty in Ethiopia, concluding that larger families tend to face more significant challenges in terms of resource allocation, leading to higher poverty risks. Larger households, with more dependents and fewer income-generating opportunities, are often unable to provide adequately for all members, resulting in increased vulnerability to poverty (Geda, 2020; Dercon, 2021).

In contrast, studies in other contexts have shown mixed results. For example, in some regions of Asia and Latin America, larger household sizes were associated with more robust social networks, which could provide financial and material support, thereby buffering against poverty (Alderman *et al*., 1997). In these contexts, the extended family system often plays a role in sharing resources and mitigating the negative effects of a large household size on poverty. However, this is not always the case in rural areas of Sub-Saharan Africa like in Somaliland, where limited resources and inadequate social safety nets may mean that larger households are more likely to experience higher poverty rates (Bukenya *et al*., 2012; Kakwani, 2000). Thus, while the positive relationship between household size and poverty is consistent with many studies in Africa, it is important to consider the broader context of social networks, available resources, and family structures when interpreting these results. In rural Somaliland, where resources are scarce, larger households may be more vulnerable, and this is reflected in the study's findings.

Off-Farm Income: The marginal effect of -0.002 indicates that for each additional dollar of off-farm income, the probability of being in rural poverty decreases by 0.2% holding all other factors constant. The negative relationship between off-farm income and rural poverty aligns with the hypothesis that diversifying income sources through off-farm activities can alleviate poverty by providing additional resources for households.

Off-farm income refers to any income earned from activities outside of primary agricultural production. This can include both non-farm and non-agricultural sources. A significant source of off-farm income in many rural areas is livestock trade, such as the trade of livestock to Buro, a market known for its demand for animals. Livestock trade, while rooted in agriculture, is considered an off-farm activity because it involves selling livestock or livestock products rather than directly cultivating crops. Engaging in livestock trade provides rural households with an additional income stream that helps to mitigate the risks associated with crop production, such as crop failure or price volatility.

On the other hand, non-agricultural off-farm activities are income sources that are completely separate from agriculture, such as wage labor, trade in non-agricultural products, or another craftwork. These activities, often involving small businesses or informal labor markets, provide households with supplementary income that can be used to offset the risks associated with agriculture, such as crop failure or fluctuating market prices.

The positive impact of off-farm income on poverty reduction aligns with previous studies. For instance, Haggblade *et al*. (2019) found that off-farm income, including both agricultural and non-agricultural income, was a key factor in helping rural households escape poverty. In particular, off-farm income provides an important cushion against agricultural risks such as droughts, floods, and price volatility. By engaging in off-farm income activities, rural households are better able to cope with agricultural shocks and maintain a minimum standard of living.

However, contrasting findings have been observed in certain contexts. For example, Ellis (2021) in his study on rural Ethiopia argued that off-farm income may not always have the same poverty-reducing effect, especially when the income generated from off-farm activities is not substantial or when households are not fully integrated into the off-farm labor market. In these cases, off-farm income may not be enough to lift households out of poverty or may not be sustainable in the long term. Additionally, Barrett *et al*. (2022) suggested that the relationship between off-farm income and poverty can be conditional on access to markets, infrastructure, and other resources. In remote rural areas with limited market access or where off-farm opportunities are scarce, even those who engage in off-farm work may not generate enough

income to escape poverty. Thus, while off-farm income is generally associated with poverty reduction, the extent of its impact can vary depending on the availability of off-farm opportunities, the amount of income generated, and the broader socio-economic context in which households operate.

Tropical Livestock Unit: The marginal effect of -0.07 means that for each additional TLU, the probability of being in rural poverty decreases by 7% holding all other factors constant. This finding aligns with several studies that highlight the importance of livestock in rural poverty reduction. For instance, Barrett *et al*. (2022) argue that livestock can serve as a critical asset for smallholder farmers, particularly in arid and semi-arid regions where livestock provide the primary source of income and food. Livestock ownership can also contribute to better food security and enhance households' capacity to cope with climate-related shocks, which are common in rural areas.

Conversely, some studies have suggested that the relationship between livestock ownership and poverty reduction is not always straightforward. For example, Fafchamps *et al*. (2020) found that while livestock ownership can help reduce poverty, it may also lead to inequalities, especially when wealthier households control the majority of livestock. In such cases, the benefits of livestock may not be distributed equally, and poorer households may still struggle to accumulate sufficient livestock or to derive substantial benefits from their holdings. Additionally, Reardon *et al*. (2022) argue that livestock ownership alone may not be enough to overcome poverty, particularly when there is limited access to markets, veterinary services, and land, which restricts households' ability to fully exploit the potential of their livestock.

On-Farm Income: The marginal effect of -0.004 implies that for each additional unit of on-farm income, the probability of being in poverty decreases by 0.4% holding all other factors constant. This finding aligns with a number of studies that emphasize the critical role of on-farm income in rural poverty alleviation. For example, Gertler *et al*. (2010) found that households with higher agricultural income are less likely to experience poverty, as they can reinvest earnings in improving farm productivity, access to markets, and purchasing essential goods.

Additionally, Janvry and Sadoulet (2018) highlight that rural households dependent on farming face reduced vulnerability to poverty when they can generate a stable and significant income from their agricultural activities. These studies reinforce the idea that an increase in on-farm income strengthens a household's economic base, leading to greater resilience to shocks and improved living standards.

However, contrasting perspectives exist that suggest the positive relationship between on-farm income and poverty alleviation may not be universally applicable. Ellis (2021) notes that while agricultural income can reduce poverty, it is highly sensitive to external factors such as market prices, weather patterns, and access to credit, which may limit the effectiveness of on-farm income in poverty reduction. For instance, households in regions prone to drought or with limited access to markets might struggle to increase their on-farm income, even if they are working hard to produce more. Similarly, Ruben *et al*. (2021) argue that when smallholder farmers lack access to essential inputs such as modern technology or sufficient land, their ability to increase on-farm income is constrained, and they may still remain in poverty despite efforts to improve agricultural productivity.

Moreover, studies such as Dorward *et al*. (2022) suggest that rural households may be limited by the small scale of their agricultural activities, which often cannot generate sufficient income to escape poverty. In such cases, farmers might need to diversify their income sources by engaging in off-farm activities or accessing social safety nets to improve their livelihoods. Therefore, while on-farm income is indeed a key factor in poverty reduction, its impact may be constrained by broader structural factors that limit agricultural productivity and income generation. In general, although the negative relationship between on-farm income and rural poverty is well supported in the literature, its effectiveness as a poverty reduction strategy can vary depending on external factors such as access to resources, markets, and the vulnerability of agricultural systems to climate change and price volatility.

Table 6: Logistic regression model result for the determinants of rural poverty

Variables	Parameters of interest			
	Coefficient	**P-value**	**Standard Errors**	**Marginal effects**
Sex	-0.028	0.950	0.45	0.007
Age	0.026	0.103	0.016	0.007
Education	-1.06**	0.013	0.45	-0.25**
Household size	1.05***	0.000	0.15	0.26***
Dependency ratio	0.17	0.229	0.14	0.043
Land ownership	-0.03	0.94	0.52	-0.0085
Off-farm income	-0.009*	0.056	0.005	-0.002*
Tropical Livestock unit	-0.28***	0.000	0.08	-0.07***
On-farm income	-0.016***	0.000	0.003	-0.004***
Distance from the nearest market	-0.001	0.94	0.002	0.0003
Constant	-3.08	0.005	1.01	

Note: ***, ** and *significant at 1, 5 and 10 percent probability levels, respectively

Source: Computed from sample data collected (2025)

4.4. Discussions of Focus Group Discussions (FGDs) and Key Informants (KIIs)

The Focus Group Discussions (FGDs) conducted in rural area of Sheikh District stated several determinants of poverty. The primary causes of poverty include droughts, dependency on imported food, minimal local production, soil erosion, and the lack of agricultural equipment. Drought was found as the most prevalent factors affecting crop and animal production in the study. Access to land and income-generating activities is crucial for reducing poverty, but the community struggles due to limited opportunities and the absence of collective farming. Social factors such as the lack of secondary schools, unaffordable education, and the absence of local health facilities further exacerbate the situation. The local government's support is inconsistent, with occasional training, seeds, and fertilizers provided, but public services are limited and not

guaranteed. Environmental challenges like droughts and soil erosion pose significant threats to agriculture. Suggested solutions by the participants include providing agricultural equipment, training, and seeds, controlling soil erosion, building water dams, and establishing local health centers to improve medical care access.

The Key Informant Interviews (KIIs) with three community heads in the study area indicated several critical issues related to poverty and planning. All three heads reported the absence of long-term plans, primarily due to a lack of resources and active government participation. There are no strategic plans for poverty reduction, with individual efforts existing but lacking coordination. The responsibility for planning lies with the community heads and local government, but their roles are largely symbolic, as meetings often fail to translate into actionable plans due to insufficient facilities and support. Community plans are not integrated with non-governmental organizations (NGOs), and although NGOs provide occasional assistance, there is no formal alignment, resulting in disjointed efforts.

The community's role in planning is minimal, as the lack of infrastructure and government support limits their involvement. There are no formal policy framework prioritizing poverty-related issues, and no system to measure the performance of policies or initiatives. Poverty is broadly defined as the lack of essential resources like food, shelter, and education, but it is not formally measured. Estimates of poverty levels are based on perception rather than data, and there is no clearly defined poverty line. That is why we used standards used by World healthy organizations (WHO).

Proposed measures to reduce poverty emphasized the need for government support and infrastructure development. While collaboration with NGOs is beneficial, the heads stressed that meaningful poverty reduction requires government-led initiatives and resources. They highlighted the importance of better infrastructure, healthcare services, and effective planning mechanisms to address the community's needs comprehensively.

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary and Conclusions

Poverty is a major global issue that has attracted significant attention on a local and international level. It can be measured in two ways, relative and absolute. In rural areas, poverty is influenced by several factors such as household size, education levels, and access to resources, infrastructure, and environmental conditions. The main goal of this study was to identify the determinants of rural poverty of households in Sheikh District, Sahel Region of Somaliland. To achieve the stated objective, the study used different analytical methods, including Foster Greer Thorbecke (FGT) and logistic regression model. Foster Greer Thorbecke (FGT) was used to analyze the magnitude of poverty in the study area in terms of incidence, depth, and severity of the poverty of rural households.

The result of FGT indicates that 46.5 percent of households are below the poverty line, while 26.65 percent of households are far from the poverty line as per the poverty gap, and 16.27 percent show relatively high poverty intensity or severity. The result of logistic regression found that access to education, household size as adult equivalent ratio, off-farm income, total livestock units (TLU), and on-farm income are key drivers of poverty levels in the study area. Access to education, total livestock units (TLU), off-farm income, and on-farm income are negatively significant variables, while household size as adult equivalent ratio is a positively significant variable.

The education of household heads was negatively and statistically significant at a five percent level of significance. This means that as more household heads get access to education, the probability of being in the poor category tends to be less. In contrast, household size as adult equivalent ratio was positively associated with poverty levels, meaning that as family size increases, the probability of being in the poor category also increases. This was a highly significant variable at a one percent level of significance and hence requires due attention for policy making. On-farm income was another highly negatively significant variable affecting poverty levels in the study area. Off-farm income is a less significant variable at a 10 percent probability level, negatively associated with poverty levels. In conclusion, rural poverty of farm

households should be managed or alleviated by improving access to education, managing family size, diversifying income sources, and improving livestock management systems. In deed policy makers or any stockholders should give due attention to these key drivers of rural poverty of farm households in the study area.

5.2. Recommendations

Based on the findings of the study, the following concluding remarks and recommendations can be made to reduce rural poverty among households in the Sheikh District, Sahel Region of Somaliland:

Education is significant at the 5% level; therefore, enhancing access not only to formal schooling but also to informal learning opportunities such as literacy programs and skill development initiatives can substantially increase household capacity, empower individuals, and ultimately contribute to the reduction of poverty within the community.

At the 1% probability level, household size is significant; therefore, efforts should focus on raising awareness about how household size impacts poverty and the distribution of resources. Encouraging the availability of reproductive health education, family planning services, and community awareness initiatives can support households in making well-informed decisions regarding family size, which in turn helps to reduce poverty by improving resource allocation and overall living conditions.

On-farm income is significant at the 1% probability level; therefore, enhancing farm productivity should be prioritized to effectively reduce poverty. This can be achieved by improving access to agricultural inputs, irrigation, and modern farming techniques. Strengthening farmers' capacity to increase crop yields and sustain agricultural livelihoods leads to greater food security, higher incomes, and improved resilience to economic shocks, all of which contribute to long-term poverty reduction.

Off-farm income is significant at the 10% probability level; thus, promoting income diversification through off-farm activities is also crucial in addressing poverty. Encouraging participation in small businesses, handicrafts, and other non-agricultural enterprises by

enhancing access to skills training, microfinance, and market linkages can reduce households' dependence on farming alone. This diversification helps stabilize household income streams, improves financial stability, and broadens economic opportunities, thereby playing an essential role in alleviating poverty.

Total Livestock Units (TLU) is significant at the 1% probability level, highlighting its crucial role in household income and poverty reduction. Therefore, interventions should prioritize increasing livestock ownership and enhancing herd productivity through improved access to quality feed, veterinary care, and sustainable grazing practices. Promoting the accumulation of livestock assets not only strengthens household resilience but also improves economic stability by providing a reliable source of income and food security, ultimately contributing to the reduction of poverty.

By implementing these recommendations, the government, non-governmental organization and large community can make strides in reducing poverty and improving the livelihoods of rural households in the study area. Strong collaboration between the government, NGOs, and community members will be essential to ensure the success of these initiatives.

Efforts to address poverty will need to focus not only on lifting the poor above the poverty line but also on reducing the intensity of poverty to ensure better quality of life for the disadvantaged population of the study area.

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7. APPENDICES

Appendix Table 1: Adult equivalent conversion factors

Age group (Years)	Male	Female
<10	0.6	0.6
10-13	0.9	0.8
14-16	1.0	0.75
17-50	1.0	0.75
>50	1.0	0.75

Source: WHO and FAO (1985)

Appendix Table 2: Total livestock conversion factors

Animal Category	TLU	Animal Category	TLU
Calf	0.50	Donkey (Young)	0.35
Weaned calf	0.34	Camel	1.25
Heifer	0.75	Sheep and Goat (Adult)	0.13
Cow	1.0	Sheep and Goat (Young)	0.06
Ox	1.0	Chickens	0.013
Donkey (Adult)	0.70		

Appendix Table 3. Summary of Definitions of variables and working hypotheses

Variable code	Variable type	Variable definition	Measurement	Hypotheses
Dependent variable				
POVLV	Dummy	Poverty level of the respondents.	0 represents non-poor households and 1 represents the poor households.	
Independent variables				
HHSIZE	Continuous	Household size	AE	+
HAGE	Continuous	Age of the household head	Years	-
HSEX	Dummy	Sex of household head	1 if male and 0 if female	+/-
DPNRIO	Continuous	Dependency ratio	Number	+
EDULVL	Continuous	Education level of the household head	years of schooling	-
LVSTOWN	Continuous	Total number of livestock owned by the HH	TLU	-
LOWN	Dummy	Land ownership	1 if yes; 0 otherwise	-
OFFFARM	Continuous	Off-farm income	Dollar	-
MRKD	Continuous	Distance of the local market	Number (Km)	-
EXTC	Dummy	Access to extension	1 if yes; 0 otherwise	-

Figure 4: STATA result for logistic regression model as picture

```
. logit POVL SexHH AgeHH EduLHH HHAER DPRATIO TLU OffINC LOWN DFNM ONFARMINC

Iteration 0:   log likelihood = -138.13904
Iteration 1:   log likelihood =   -87.2322
Iteration 2:   log likelihood = -86.058514
Iteration 3:   log likelihood = -86.033373
Iteration 4:   log likelihood = -86.033355
Iteration 5:   log likelihood = -86.033355

Logistic regression                             Number of obs     =        200
                                                LR chi2(10)       =     104.21
                                                Prob > chi2       =     0.0000
Log likelihood = -86.033355                     Pseudo R2         =     0.3772

------------------------------------------------------------------------------
      POVL_01 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
--------------+---------------------------------------------------------------
        SexHH |  -.0280327    .450129    -0.06   0.950    -.9102693    .8542039
        AgeHH |   .0268983   .0164559     1.63   0.102    -.0053547    .0591512
       EduLHH |  -1.061308   .4518235    -2.35   0.019    -1.946866   -.1757503
        HHAER |   1.050812   .1535833     6.84   0.000     .7497943    1.35183
      DPRATIO |   .1746999   .1453275     1.20   0.229    -.1101367    .4595365
          TLU |  -.2842932   .0814234    -3.49   0.000      -.44388   -.1247064
       OffINC |  -.0094489   .0049793    -1.90   0.058    -.0192082    .0003104
         LOWN |  -.0345026   .5268979    -0.07   0.948    -1.067204    .9981983
         DFNM |  -.0013235   .0028809    -0.46   0.646    -.0069698    .0043229
     ONFARMINC |  -.0162937   .0034666    -4.70   0.000    -.0230882   -.0094992
        _cons |  -3.088785   1.018741    -3.03   0.002     -5.08548   -1.092089
------------------------------------------------------------------------------
```

```
. mfx

Marginal effects after logit
      y  = Pr(POVL_01) (predict)
         =   .4586388
```

variable	dy/dx	Std. Err.	z	P>|z|	[95% C.I.]		X
SexHH*	-.0069599	.11176	-0.06	0.950	-.226006	.212086	.49
AgeHH	.0066786	.0041	1.63	0.103	-.001353	.01471	45.975
EduLHH*	-.2537676	.10198	-2.49	0.013	-.453648	-.053887	.37
HHAER	.2609054	.0384	6.79	0.000	.185638	.336173	5.8195
DPRATIO	.0433761	.03605	1.20	0.229	-.02728	.114032	1.58499
TLU	-.0705869	.0201	-3.51	0.000	-.10999	-.031184	3.68135
OffINC	-.0023461	.00123	-1.91	0.056	-.004756	.000064	26.91
LOWN*	-.0085738	.13104	-0.07	0.948	-.265412	.248265	.81
DFNM	-.0003286	.00072	-0.46	0.646	-.001731	.001074	117.005
ONFARM~C	-.0040456	.00086	-4.69	0.000	-.005736	-.002355	172.81

(*) dy/dx is for discrete change of dummy variable from 0 to 1

Table 5: Multicollinearity Test results

```
. vif
```

Variable	VIF	1/VIF
HHAER	1.42	0.706221
ONFARMINC	1.34	0.747021
EduLHH	1.30	0.771778
TLU	1.29	0.776384
DFNM	1.28	0.780163
SexHH	1.25	0.799639
AgeHH	1.24	0.809166
OffINC	1.22	0.821996
DPRATIO	1.15	0.872782
LOWN	1.08	0.929835
Mean VIF	1.25	

```
. corr POVL_01 SexHH AgeHH EduLHH HHAER DPRATIO LOWN OffINC TLU DFNM ONFARMINC
(obs=200)
```

	POVL_01	SexHH	AgeHH	EduLHH	HHAER	DPRATIO	LOWN	OffINC	TLU	DFNM	ONFARM~C
POVL_01	1.0000										
SexHH	-0.0114	1.0000									
AgeHH	0.1346	0.0648	1.0000								
EduLHH	-0.1123	0.3261	-0.1126	1.0000							
HHAER	0.4496	0.2064	0.2515	0.0894	1.0000						
DPRATIO	0.0480	-0.2017	-0.2698	-0.0366	-0.0735	1.0000					
LOWN	-0.1106	0.0923	-0.0849	0.1864	-0.0504	0.0773	1.0000				
OffINC	-0.1381	0.2553	0.0891	0.2805	0.0388	-0.1372	0.1139	1.0000			
TLU	-0.0900	-0.0204	0.0540	-0.2220	0.1958	0.0746	0.0116	-0.1861	1.0000		
DFNM	0.0289	0.0772	0.2432	-0.0990	0.2509	-0.1025	-0.0987	-0.0707	0.3713	1.0000	
ONFARMINC	-0.1063	0.1936	0.2104	0.1075	0.4442	-0.0828	0.0539	0.2181	0.0714	0.0887	1.0000

APPENDIX 2. QUESTIONNAIRE

Household Survey Questionnaire

I. Introduction

Dear Sir/Madam, we are MSc research team from School of Agricultural Economics and Agribusiness, Haramaya University interested to identify '**The Determinants of Rural Households Poverty in Sheikh District, Somaliland'**. The questionnaire aims to collect data on demographic characteristics rural farming households, their socio-economic status, their agricultural and non-agricultural activities, and access to various institutional services. We would like to ask you some questions and your cooperation is vital for the success of this study. The information you provide us will remain confidential and only used for academic purposes. Thank you for your full cooperation in advance.

II. Background Information/Identification.

- Code number: _____
- Name of the enumerator: _____
- Date of interview: _____
- Name of the district: _____
- Name of the Tuulo: _____

Section 1: Household Demographic Information

1.1. Name of the household head: _____

1.2. Sex of the household head? (*Circle the answer*) 1. Male 0. Female

1.3. Age of the household head (in years): _____

1.4. Marital status of the household head (*Circle the answer*)? 1. Married 2. Divorced 3. Widowed 4. Single

1.5. Education status of the household head? 1. Unable to read and write 2. Able to read and write 3. Religious education 4. Formal education (years of schooling) _____

1.6. If your answer for ≠1.5 is 4, what is your formal schooling _____ (in years)?

1.7. Family size of the household (*in number*): _____ (fill the information on **Table 1)** Table 1. Basic Household information (please refer the notes below the table for the responses)

No	Name of the household Member	Age	Sex[1]	Relationship with the household head[2]	Marital status[3]	Education Level[4]
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

1- **Sex:** 1. Male 0. Female

2- **Relationship:** 1. Husband/wife 2. Child 3. Brother 4. Sister 5. Grandchild 6. Daughter in law/son in law 7. Other relative 8. Other non-relative

3- **Marital status:** 1. Married 2. Divorced 3. Widowed 4. Single

4- **Education:** 1. Unable to read and write 2. Able to read and write 3. Religious education 4. Formal education (years of schooling) _____

Section 2: HOUSEHOLD INCOME AND LIVELIHOOD ACTIVITIES

Table 2. This section establishes the activities undertaken to get means of livelihoods between now and same time last year.

Livelihood Activity	Did anyone in your HH do this activity in the last year? (Circle one)	Which Member of HH MAINLY	Average income earned per month (In Dollar)
LIVESTOCK PRODUCTION			
Rearing & selling animals (camels, cattle, sheep, goats)	Yes---1 N0---0		
Selling dairy products (milk, butter, ghee, cheese)	Yes---1 N0---0		
Selling meat (from own livestock)	Yes---1 N0---0		
CROP FARMING			
Selling Cereal food crops (sorghum, maize, wheat, barley)	Yes---1 N0---0		
Selling Vegetables (onion, tomato, cabbage, pumpkin, etc.)	Yes---1 N0---0		
Selling Chat	Yes---1 N0---0		
SALE OF NATURAL PRODUCTS			
Charcoal	Yes---1 N0---0		
Firewood	Yes---1 N0---0		
Incense, frankincense, and natural gum (myrrh)	Yes---1 N0---0		
Animal feed (grass, fodder, forage, salty sand, etc.)	Yes---1 N0---0		
EMPLOYMENT / LABOUR			

Salaried job (specify:)			
Daily labourer	Yes---1 N0---0		
Farm worker	Yes---1 N0---0		
Animal herder	Yes---1 N0---0		
TRADING (buying and selling)			
Livestock (cattle, sheep, goats, camels)	Yes---1 N0---0		
Livestock products (hides, butter, etc.)	Yes---1 N0---0		
Food crops (grains, pulses, vegetables)	Yes---1 N0---0		
Other foods (sugar, flour, coffee, etc.)	Yes---1 N0---0		
Other commodities	Yes---1 N0---0		
SERVICES			
Religious teacher (Koranic)	Yes---1 N0---0		
Circumciser	Yes---1 N0---0		
Traditional healer	Yes---1 N0---0		
Traditional birth attendant (TBA)	Yes---1 N0---0		
RENTS			
Farm-land rent or sharecropping	Yes---1 N0---0		

Codes: Member of HH	
01= Household head 02=Spouse 03=Son/daughter	04= Grandson/ daughter 05= Father/mother of HH head or spouse 06= Brother/sister of HH head/spouse 07= Other relative of HH head/spouse

Section 3. CONSUMPTION

3.1 Have you eaten these foods at home in this month? Fill answers in this table (Table.3)

Food	**Yes**	**No**	**If YES, where did you get this food from?** *(Circle all that apply)*					
	(Circle one only)		Own production/livestock	Purchased	Food Aid	Gift from relative/friend	Amount Kg/Lt	Price
Sorghum	1	0	1	2	3	4		
Maize	1	**0**	1	2	3	4		
Rice	1	**0**	1	2	3	4		
Pasta	1	**0**	1	2	3	4		
Wheat	1	**0**	1	2	3	4		
Bread	1	**0**	1	2	3	4		
Beans	1	**0**	1	2	3	4		
Meat	1	**0**	1	2	3	4		
Milk	1	**0**	1	2	3	4		
Eggs	1	**0**	1	2	3	4		
Vegetables	1	0	1	2	3	4		
Salt	1	0	1	2	3	4		
Oil	1	0	1	2	3	4		
Sugar	1	0	1	2	3	4		
Flour	1	0	1	2	3	4		

(For those items that they cannot give monthly figures, collect daily figures, or year)

3.4. How many times do you eat per day most of the time

a. once b. twice c. three times

3.5. How much do you spend monthly on the following**? Fill answers in this table (Table.4)**

Expenditure	Who is responsible (write code)	Amount (In Dollar)

School fees		
Food		
Water		
Medicine (for livestock)		
Saka		
Clothing		
Record other expenditure mentioned		

(For those items that they cannot give monthly figures, collect daily figures, or year)

Codes for who is responsible

1= HH head alone 2= Spouse alone 3=Both HH head and spouse 4=Son 5=Daughter 6= others (specify)

Section 4. CROP FARMING

4.1. Do you (or any other member of your household) own any land? (Circle one) Yes=1 No=0

4.2. Who has the right of ownership of the land (title deed or any other legal document showing ownership of the land)? Man=1 Woman=2 Both=3

4.3. If your answer for #4.1 is yes what is the type of use for this land?

a. agricultural land b. non-agricultural land

4.4. Did you (or any member of your household) farm during the last farming season? (Circle one)

Yes---1=Ask Next question No---0=skip

4.5. If your answer for ≠4.4 is yes, fill the information in **Table.5**

Access to land		If "YES" how many acres (unit or measure)?
Farmed own land	Yes---1 No—0	
Sharecropped in land	Yes---1 No—0	
Rented in land	Yes---1 No—0	
Free access to someone's land	Yes---1 No—0	

4.6. Did the house hold used or have got agricultural extension services Yes---1 No---0

4.7. What type of extension service did the household used

1. Fertilizer 2. Pesticides 3. Trainings

4. Food security 5. If other (please specify): _____

4.8. Did you contact/visit any extension agent during the last cropping season?

Yes = 1, No =0

4.9. If yes, for how many days per month you frequently visited extension agents for Receiving agricultural advice from them? _____

Section 5. LIVESTOCK REARING

5.1. For each of the following livestock, please indicate how many are owned by the family. Include those animals that belong to you, but are being raised by other households. **Table 6**

Livestock	Number owned by your household today
Goats	
Cattle	
Sheep	
Donkeys	
Camels	

5.2. Has the number of livestock owned by your household changed over the last 10 years? (Circle one)?

Yes----1=Ask Next question No----0=Skip

5.3. If your answer for ≠5.2 is yes, how do you rate the change in the livestock number you owned in the last 10 years?

1. Highly increasing 2. Increasing 3. Moderate 4. Decreasing 5. Highly decreasing

5.4. If your answer for ≠5.3 is 4 or 5, what are the possible reasons? (Fill your answer in Table 7)

Reasons for decrease					
Drought	1. Strongly agree	2. Agree	3. Do not know	4. Disagree	5. Strongly disagree

Disease	1. Strongly agree	2. Agree	3. Do not know	4. Disagree	5. Strongly disagree
Sold for food	1. Strongly agree	2. Agree	3. Do not know	4. Disagree	5. Strongly disagree
Sold (not for food)	1. Strongly agree	2. Agree	3. Do not know	4. Disagree	5. Strongly disagree
Gave out for charity (Zakaat) Dowry payment (Yarad) Offering (Allah bari)	1. Strongly agree	2. Agree	3. Do not know	4. Disagree	5. Strongly disagree
Others	1. Strongly agree	2. Agree	3. Do not know	4. Disagree	5. Strongly disagree

5.6. For what purpose you use livestock? Fill in the following table 9

Classes of livestock	**Reasons for keeping**							
	Milk	Meat	Prestige	Income	Transportation	breeding	Riding	others
Camel								
Cattle								
Goat								
Sheep								
Donkey								
Others								

Section 6. ACCESS TO MARKETS

7.1. Do you have access to markets? Yes=1 No=0

7.2. If yes, how long do you take to access markets? (Record in minutes) _____

7.3. What means do you use to get to the market?

1. Walk----------Yes=1 No=0

2. Camel/donkey ----------Yes=1 No=0

3. By car

Other specify----------

7.4. Do you sell any items at the market? YES=1…if yes ask following questions NO=0…if no skip

7.5. Where did you get market price information?

a. family members b. neighbors

c. peer farmers d. local or district leaders/experts.

7.6. Indicate the type and amount of items you sell for the last year for livestock and crops? Fill this information in **table 11.**

	Amount	Price
Maize		
Cattle		
Sheep and goat		
Donkey		
Tomato		
Others		

7.7. Do you get reasonable prices both your livestock and crops?

1. Yes 2. No 3) to some extent

7.8. If no, what are the reasons? (Multiple answers are possible)

a. Lack of access to potential markets b. More supply of livestock and crop

c. Lower or no demand for either livestock or crop d. Others (specify)

7.9. What is the reason you sell?

a. To settle debts b. Social obligations

c. Family consumption d. Others (specify)

7.10. Do you take them there yourself or use an intermediary to sell them?

a. Take myself----------1 b. Intermediary----------2

c. Both self and intermediary------3

7.11. What are some of the problems you encounter in accessing the market?

a. Too far----------1

b. Roads are in a terrible state----------2

c. Transport cost is too expensive----------3

d. Insecurity on the route to the market----------4

e. There is nowhere to store my goods overnight at the market----------5