

**EFFECT OF INDEX-BASED LIVESTOCK INSURANCE AND FINANCIAL
RESILIENCE AMONG PASTORALISTS IN BORANA COMMUNITY, SOUTHERN
ETHIOPIA**

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DECLARATION AND RECOMMENDATION

Declaration

This thesis is my original work and has not been presented for a degree or any other award in any other University.

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Recommendation

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ABSTRACT

Pastoralists living in areas prone to climate shocks and market fluctuations, such as those in the Borana community of Southern Ethiopia, depend primarily on livestock for their livelihoods. This heavy reliance makes them particularly vulnerable to economic and environmental disruptions. Index-Based Livestock Insurance (IBLI) has been developed as a financial innovation to address these vulnerabilities. Unlike traditional indemnity-based insurance, IBLI provides payouts based on objective indices, such as satellite-derived vegetation cover and rainfall levels, eliminating the need for individual livestock loss assessments. This approach ensures timely compensation, enabling pastoralists to preserve their herds, recover from climate shocks, and maintain economic stability through income diversification and reinvestment strategies. This study assessed the effect of IBLI on the financial resilience of pastoralists in Borana. Four key constructs were examined: risk management, income diversification, asset preservation, and economic empowerment. The research was anchored in Prospect Theory, Modern Portfolio Theory, Social Capital Theory, and the Sustainable Livelihoods Approach, offering a multi-dimensional understanding of how financial tools can enhance resilience through improved decision-making, asset management, and social cooperation. A descriptive research design was employed, targeting a population of 24,560 pastoralists. Using Yamane's formula, a sample size of 394 was determined and allocated proportionally across various districts using simple random sampling. Structured questionnaires with both closed and open-ended items were used to collect data. A pilot test was conducted to assess the instrument's validity, and Cronbach's alpha was employed to measure internal consistency, with a threshold of 0.7 considered acceptable. Data analysis was performed using SPSS version 25.0, with both descriptive and inferential statistical techniques, including frequencies, means, standard deviations, percentages, and regression analysis. Out of the 394 targeted participants, 372 successfully responded, yielding a 95.4% response rate, which confirmed data reliability. The findings showed that 79% of respondents believed IBLI significantly reduced financial losses during droughts, thereby preventing distress livestock sales. 74% reported that the insurance contributed to income diversification, with payouts helping them invest in alternative livelihoods. In terms of asset preservation, 81% indicated that IBLI protected their livestock assets during adverse weather events, allowing them to rebuild herds and continue income-generating activities. Additionally, 67% acknowledged the role of IBLI in enhancing economic empowerment, particularly through support for cooperative management, financial inclusion, and market engagement. Regression analysis revealed a strong positive correlation ($R = 0.816$) between IBLI and financial resilience, indicating that the insurance scheme has a significant and measurable effect on improving the financial security of pastoral households. The study concludes that IBLI plays a critical role in enhancing financial resilience among pastoralists in Borana. It recommends expanding IBLI access, launching awareness campaigns, subsidizing insurance premiums, and integrating IBLI with local savings and credit groups to increase participation and effect. These recommendations aim to support broader efforts in climate adaptation, financial inclusion, and the sustainable development of livestock-reliant communities. Future research should explore the long-term effects of IBLI on poverty reduction, as well as the potential of digital financial technologies to improve outreach and transparency. Comparative studies assessing IBLI alongside other resilience strategies would provide further insights for policy and programming in vulnerable pastoral regions.

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LIST OF ABBREVIATIONS/ACRONYMS

IBLI: Index based livestock insurance

MPT: Modern Portfolio Theory

SLT: Sustainable Livelihoods Theory

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Financial resilience refers to the capacity of individuals or communities to withstand, adapt to, and recover from economic shocks and disruptions while maintaining or improving their livelihood outcomes. Among pastoralist populations, particularly those in arid and semi-arid regions, financial resilience is a crucial determinant of long-term survival and well-being. It entails not only the ability to maintain income and essential consumption during times of stress but also the adaptive capability to rebuild assets, diversify income sources, and engage in proactive financial planning. For pastoralists, financial resilience is shaped by factors such as access to risk management tools, social capital, savings, alternative livelihoods, and institutional support mechanisms (Fratkin et al., 2020).

In the Borana community of southern Ethiopia, financial resilience has become increasingly vital due to rising exposure to climatic and economic uncertainties. The community relies heavily on livestock as a source of food, income, and cultural identity, making it particularly vulnerable to recurring droughts, disease outbreaks, and market fluctuations. Drought-induced livestock mortality often results in asset loss, food insecurity, and deepening poverty cycles. Consequently, building financial resilience in this setting involves strengthening the community's ability to absorb shocks through timely access to financial compensation, maintaining asset bases, ensuring continued income flow, and sustaining household consumption. Financial tools like insurance, savings groups, and credit access are therefore integral to reducing vulnerability and promoting recovery following environmental and market stressors.

To address these challenges, Index-Based Livestock Insurance (IBLI) has emerged as a key financial instrument designed to enhance financial resilience among pastoralists by providing timely compensation for climate-induced livestock losses (Mude et al., 2019). Unlike conventional insurance models that require on-site verification of losses, IBLI employs satellite-based indices such as rainfall levels or vegetation cover to determine payouts. This approach ensures objective, rapid, and cost-effective compensation to policyholders during climate shocks, such as droughts, thus helping pastoralists sustain their herds, meet immediate consumption needs, and reinvest in their livelihoods (Jensen et al., 2019).

Global evidence supports the effectiveness of IBLI in improving financial resilience among pastoralist communities. For example, Fratkin et al. (2020) found that insured ranchers in drought-prone areas were significantly more capable of sustaining herd sizes and accessing essential livestock services compared to uninsured counterparts. Similarly, Hailu et al. (2021) demonstrated that IBLI not only reduced vulnerability to climatic risks but also helped pastoral households manage financial instability linked to fluctuating market prices and production uncertainties. These outcomes highlight IBLI's potential to stabilize incomes, preserve critical assets, and enhance long-term adaptive capacity.

In Sub-Saharan Africa, studies further underscore IBLI's role in promoting household-level resilience. In Kenya, Ruto et al. (2020) found that IBLI provided a vital income safety net that reduced the need for distress livestock sales, especially during prolonged dry spells. In Ethiopia's Somali region, Osgood et al. (2019) observed that households participating in IBLI programs exhibited better recovery from shocks, thanks to the structured payouts that supported rapid replenishment of livestock and other livelihood assets.

Within Ethiopia, particularly in the Borana zone, the relevance of IBLI continues to grow. Research by Gebremedhin (2021) found that insured pastoralists in Borana had higher recovery rates from drought and better maintained their livelihood continuity. Likewise, Gebrehiwot et al. (2019) revealed that smallholder farmers participating in index-based insurance schemes invested more confidently in livestock and farm inputs, indicating improved financial stability and planning. These findings suggest that IBLI can serve as a transformative resilience-building mechanism, especially when tailored to the needs and contexts of pastoralist communities.

Therefore, understanding the effect of Index-Based Livestock Insurance on financial resilience among pastoralists in the Borana community is essential for informing effective policy and practice. This study contributes to existing knowledge by evaluating how IBLI influences key dimensions of financial resilience including income diversification, risk management, asset preservation, and economic empowerment thereby offering insights into sustainable livelihood strategies in drought-prone environments of southern Ethiopia.

1.1.1 Index-based Livestock Insurance Concept

Index-Based Livestock Insurance (IBLI) is a financial tool specifically designed to protect pastoralists against livestock losses resulting from climate-related hazards, particularly drought. It operates by using predetermined indices linked statistically to livestock mortality, derived typically from satellite data, including rainfall levels and vegetation status. When the index falls below a predefined threshold, policyholders receive payouts corresponding to the severity of the climate shock, thereby providing a rapid financial response during critical periods (Chantararat, 2019). Hansen (2019) notes that the payout generally escalates in proportion to the intensity of the

climatic shock, aiming to safeguard pastoralists' financial stability and livelihood continuity by mitigating income disruptions.

The historical origins of IBLI date back to the early 2000s when researchers and practitioners explored innovative insurance mechanisms to address the vulnerabilities of pastoralists and small-scale livestock keepers to climatic risks. Early pilot projects were initially implemented in Mongolia, Kenya, and Ethiopia to assess the feasibility and practicality of IBLI schemes. These preliminary experiments significantly contributed to subsequent research and the expansion of IBLI programs worldwide.

A major advancement occurred in early 2010 with the launch of the Index-Based Livestock Insurance Program in northern Kenya. This initiative marked a crucial turning point, demonstrating the viability and effectiveness of IBLI and subsequently attracting increased involvement from policymakers, development organizations, and international donors, facilitating its adoption in other drought-prone regions (Skees, 2022). In Ethiopia, agriculture plays a strategic role as a source of food, nutrition, and income, leading to the introduction and adoption of IBLI as a crucial financial instrument to shield livestock-based livelihoods from climate-induced losses. Research and pilot initiatives have refined methodologies for determining payouts, exemplified by Kenya's 2010 study that utilized satellite-derived forage indices as triggers for pastoralist compensation during dry spells (Mude et al., 2019).

IBLI continues to be a focal point for researchers and policymakers globally due to its potential to strengthen financial resilience among pastoralists exposed to climate threats (Skees, 2022). In Ethiopia, regions such as Borana have piloted IBLI, showcasing promising outcomes. The Borana pastoralists rely heavily on livestock for their economic and social well-being, making them highly

susceptible to climate disruptions. Implementing IBLI in this community has proven effective in enhancing financial resilience, enabling pastoralists to rapidly recover from climatic shocks by facilitating livestock restocking, sustaining food security, and maintaining overall economic stability.

The Borana pastoralists' socioeconomic vulnerability underscores the critical need for instruments such as IBLI, especially considering escalating climate challenges characterized by recurrent droughts, high temperatures, and erratic rainfall patterns (Mahul & Skees, 2021). Tache (2022) emphasizes that climate-driven threats significantly impact pastoral livelihoods, necessitating mechanisms to bolster community resilience. Pastoralism in Borana, defined by reliance on livestock farming including cattle, goats, and sheep is characterized by inherent adaptability and coping capacities. Within this context, resilience and coping capacities are evidenced by the community's capability to sustainably absorb, adapt, and recover from climate-related adversities, thus highlighting the essential role of IBLI in strengthening financial resilience among pastoralists in southern Ethiopia.

1.1.2 Financial Resilience among Pastoralists

Pastoralists are communities whose livelihoods predominantly rely on raising livestock, typically situated in arid or semi-arid regions where conventional agriculture is not practical. These communities are particularly vulnerable to environmental and economic shocks such as climate variability, droughts, resource conflicts, and limited access to markets and essential services. Financial resilience, in this context, refers to the capacity of pastoralists to absorb financial shocks, manage economic disruptions, and maintain stability in their livelihoods despite adverse conditions (Devereux & Vaitla, 2019).

In the Borana community of Southern Ethiopia, financial resilience is critically linked to pastoralists' ability to withstand and recover from climate-induced disruptions, particularly droughts that threaten livestock productivity and survival. Index-Based Livestock Insurance (IBLI) significantly enhances financial resilience by providing structured financial compensation based on objective and verifiable indices related to environmental conditions, such as rainfall and vegetation coverage. This financial support enables pastoralists to quickly recover from livestock losses, reinvest in herd replenishment, ensure food security, and sustain economic activities during periods of climate adversity.

Research conducted in the Borana zone indicates that the financial resilience of pastoralists is heavily influenced by the region's susceptibility to climate-related risks, including frequent droughts, elevated temperatures, and irregular rainfall patterns (Mahul & Skees, 2021). Tache (2022) highlights these climatic challenges as primary threats to the economic stability and livelihood security of Borana pastoralists. The Borana community, which predominantly depends on livestock such as cattle, goats, and sheep for their sustenance and economic prosperity, has historically adapted to harsh environmental conditions. Their inherent resilience is demonstrated through effective coping mechanisms and adaptability to climatic stresses. Nevertheless, the increasing frequency and severity of climate-induced shocks necessitate robust financial strategies like IBLI to strengthen pastoralists' financial resilience, ensuring sustained livelihoods and economic stability within the community.

1.1.3 Borana Community in Southern Ethiopia

The Borana community is a pastoralist ethnic group residing primarily in the Oromia region of southern Ethiopia, constituting a subgroup of the larger Oromo ethnic population the largest ethnic

group in the country. Renowned for their strong cultural heritage and pastoralist lifestyle, the Borana rely heavily on livestock herding as the cornerstone of their economic and social livelihoods (Legesse, 2019). Their primary pastoral strategy, known as transhumance, involves the seasonal migration of livestock to access optimal grazing conditions and water resources, enabling the community to maintain financial resilience in the face of challenging climatic conditions. Livestock, especially cattle, are central to Borana culture, serving not only as essential sources of income and sustenance but also as significant markers of wealth, social prestige, and community status (Barrett, et al. 2020).

The social organization of the Borana community revolves around an age-set system, where community members belonging to the same age group collectively progress through distinct life stages. This structured social system reinforces communal cohesion, promotes collective decision-making, and provides a foundation for community resilience and stability in the face of economic and environmental adversities (Aliyu, 2021). Additionally, the Borana possess a rich oral tradition that serves as a vital mechanism for the preservation and transmission of cultural knowledge, historical narratives, and community values across generations.

Traditional religious beliefs predominantly shape the Borana community's worldview, with a significant emphasis on spiritual entities believed to inhabit the natural environment. Rituals and ceremonies are integral practices designed to appease these spiritual forces and secure the community's overall well-being. Although traditional beliefs remain predominant, there is also an influence of Islam among portions of the Borana community, especially those residing closer to urban centers (Aliyu, 2021). Overall, the Borana community's profound cultural heritage, resilient

social structures, and adaptability to environmental challenges are central to their sustained financial resilience and ability to thrive amidst climate variability and economic uncertainties.

1.2 Statement of the Problem

Index-based livestock insurance (IBLI) is a critical financial tool intended to enhance the financial resilience of pastoralist communities by providing timely and efficient economic safeguards against catastrophic events, notably droughts. Existing research consistently highlights the effectiveness of IBLI schemes in improving household financial resilience, significantly reducing vulnerability among insured pastoralists. For instance, Jensen et al. (2019) documented up to a 30% increase in resilience among insured households compared to uninsured ones. Similarly, insured households exhibit a reduced tendency approximately 25% less to sell livestock during drought periods, preserving critical assets and sustaining economic stability (Mude et al., 2020). Furthermore, insured households demonstrated a 30% greater probability of maintaining children's educational attendance despite adverse weather conditions (Mahul & Skees, 2021).

Despite these promising outcomes observed in broader contexts, the situation among pastoralists in the Borana community of southern Ethiopia contrasts markedly with this potential. Since the introduction of IBLI in 2012, the anticipated uptake and subsequent positive impacts have been limited, largely due to inadequate awareness and understanding of the insurance scheme among community members (Tache, 2022). Jensen et al. (2019) revealed that awareness of IBLI remains strikingly low, with only 10% of Borana households familiar with the scheme. This lack of knowledge significantly hampers the effectiveness of IBLI, limiting its capacity to bolster financial resilience in the face of recurring droughts and other climatic shocks (Mahul & Skees, 2021).

Given these gaps, it is crucial to investigate why IBLI has not effectively enhanced the financial resilience of pastoralists in the Borana community, despite its demonstrated potential elsewhere. Addressing the barriers to awareness and understanding of IBLI is vital for maximizing its benefits. Therefore, this study aims to critically examine the effect of index-based livestock insurance on the financial resilience of pastoralists specifically within the Borana community, with a focus on identifying practical strategies to increase its uptake and effectiveness.

1.3 Research Objectives

1.3.1 General Objective

To examine the effect of Index-Based Livestock Insurance and Financial Resilience among Pastoralists in Borana Community, Southern Ethiopia

1.3.2 Specific Objectives

The specific objectives for the research were;

- i. To access the effect of risk management on financial Resilience among Pastoralists in Borana Community, Southern Ethiopia
- ii. To assess the effect of income diversification on financial Resilience among Pastoralists in Borana Community, Southern Ethiopia
- iii. To determine the effect of asset preservation on financial Resilience among Pastoralists in Borana Community, Southern Ethiopia
- iv. To find out the effect of economic empowerment on financial Resilience among Pastoralists in Borana Community, Southern Ethiopia

1.4 Research Hypothesis

- i. H₀₁: Risk management has no significant effect on Financial Resilience among Pastoralists in Borana Community, Southern Ethiopia
- ii. H₀₂: Income diversification has no significant effect on Financial Resilience among Pastoralists in Borana Community, Southern Ethiopia
- iii. H₀₃: Asset preservation has no significant effect on Financial Resilience among Pastoralists in Borana Community, Southern Ethiopia
- iv. H₀₄: Economic empowerment has no significant effect on Financial Resilience among Pastoralists in Borana Community, Southern Ethiopia

1.5 Justification of the Study

This study is justified based on its potential to address significant economic vulnerabilities affecting pastoralist communities in the Borana region of southern Ethiopia. Given the community's heavy reliance on livestock as their primary source of income, they are extremely susceptible to financial shocks, particularly drought-related livestock losses. By examining the effectiveness of Index-Based Livestock Insurance (IBLI), this research aims to evaluate an essential financial mechanism that could mitigate these economic risks and strengthen pastoralists' financial resilience.

Moreover, the study enhances understanding of innovative financial risk management solutions tailored to pastoralist communities. Findings from this research will offer critical insights for policymakers, researchers, and practitioners in creating targeted financial interventions suitable for the Borana community and similar pastoralist regions globally.

Furthermore, the study has broader implications for sustainable economic development, especially in countries heavily dependent on livestock farming. By improving financial resilience among pastoralists, this research contributes towards achieving essential development objectives such as poverty alleviation, food security, and overall economic stability. It also offers an assessment of the effectiveness of IBLI in enhancing pastoralists' ability to financially cope with climate change and related shocks.

Lastly, the outcomes of this research may guide policy formulation and implementation at local, national, and global levels regarding livestock insurance and financial risk management. Positive findings could encourage broader adoption or adaptation of IBLI, extending its benefits to other vulnerable livestock-dependent communities.

1.6 Significance of the Study

This research investigates the role and effectiveness of Index-Based Livestock Insurance (IBLI) in enhancing the financial resilience of pastoralists in the Borana zone, a community predominantly dependent on livestock for their economic survival. Pastoralist communities routinely face financial threats from drought, disease outbreaks, and market instabilities, necessitating robust risk management strategies. By assessing IBLI, the study identifies a potentially transformative financial intervention that can substantially mitigate these economic challenges and strengthen pastoralists' financial resilience.

The study contributes significantly to the discourse on innovative financial risk management mechanisms and sustainable economic livelihoods. Evaluating the impact of IBLI in the Borana context fills an important knowledge gap, offering valuable policy implications and practical

recommendations for policymakers, researchers, and development practitioners. Insights from this study can aid in designing tailored financial risk mitigation strategies applicable not only in Borana but also in comparable pastoralist contexts globally.

Additionally, the research holds broader policy relevance, particularly for nations reliant on agriculture and livestock sectors. Enhanced financial resilience among pastoralists through IBLI could contribute substantially towards poverty reduction, food security, and economic stabilization. By examining IBLI's success in financially insulating pastoralists against climate shocks and other external threats, the research provides evidence-based recommendations for improving its effectiveness in sustainable development.

Ultimately, the findings from this research may significantly influence policy decisions at various administrative levels. If demonstrated effective, IBLI could be scaled up or adapted to support pastoralists' financial stability across other regions, addressing critical financing gaps and complementing existing financial risk management solutions.

1.7 Scope of the Study

This study focuses on assessing the impact of index-based livestock insurance (IBLI) on the financial resilience of pastoralists in the Borana community, located in southern Ethiopia. It specifically examines how IBLI influences the capacity of pastoralist households to economically cope with and recover from shocks related to livestock loss.

The Borana Zone, characterized by its arid and semi-arid climate, is highly vulnerable to environmental shocks such as droughts. Livestock herding is the backbone of the local economy and a key part of the community's livelihood and cultural identity. However, increasing climatic

variability has threatened the sustainability of pastoralism, making financial resilience a pressing concern.

By focusing on the Borana community known for its strong traditional coping systems and rich cultural heritage this study explores how the introduction of IBLI contributes to household-level financial stability. IBLI provides payouts based on pre-determined weather indices, rather than actual losses, offering a proactive tool for managing climate-related risks. The study's scope is thus centered on evaluating IBLI's role in enhancing economic security and sustainable livelihoods in this climate-sensitive region.

1.8 Limitations of the Study

While this study provides valuable insights into the effect of Index-Based Livestock Insurance (IBLI) on financial resilience among pastoralists in the Borana community, several limitations must be acknowledged. First, the study relies on self-reported data collected through questionnaires, which may be subject to response biases, such as exaggeration or recall inaccuracies. Second, although the sample was proportionally drawn from key districts within the Borana Zone, it may not fully capture the socio-economic, cultural, and ecological diversity of all pastoralist populations in Ethiopia. As such, the findings may have limited generalizability to other regions of the country with differing climatic conditions, institutional structures, or livelihood patterns.

Third, the study focused solely on the four dimensions of IBLI – risk management, income diversification, asset preservation, and economic empowerment – potentially overlooking other factors influencing financial resilience, such as governance, access to financial literacy, or social

safety nets. Additionally, the exclusive use of quantitative methods limits the depth of understanding of pastoralists' subjective experiences, attitudes, and contextual challenges regarding insurance uptake. Future research would benefit from incorporating qualitative approaches and comparative analyses across diverse pastoralist regions to enhance the robustness and applicability of findings.

1.9 Assumptions of the Study

This study assumes that pastoralists in the Borana community possess at least a basic understanding of the concept and benefits of index-based livestock insurance, particularly in terms of financial risk mitigation amidst climatic and market uncertainties. It is further presumed that pastoralists are inclined to participate in IBLI schemes due to perceived economic benefits and enhanced financial resilience.

Additionally, the research assumes that implementing IBLI will positively impact pastoralists' financial resilience, providing crucial economic protection against drought-induced livestock losses and other market instabilities. Finally, the study presupposes a reasonable level of homogeneity within the community concerning their financial vulnerabilities and needs, allowing for generalized conclusions about the effectiveness of IBLI.

1.10 Operational Definitions of Terms

Asset Preservation

Hill (2019) describes asset preservation as safeguarding one's financial and physical resources from loss due to economic or environmental threats. Preservation strategies include financial insurance, risk transfer mechanisms, and proactive management practices.

In this study, asset preservation was operationalized by analyzing the role of IBLI in helping pastoralists in the Borana region protect their livestock assets during droughts and other climate-related disruptions. The study evaluates the effectiveness of IBLI in minimizing livestock losses, enhancing financial stability, and allowing pastoralists to recover rapidly from shocks.

Economic Empowerment

Kretzmann and McKnight (2023) define economic empowerment as the process by which individuals and communities gain greater control over their financial resources and decision-making abilities, thereby enhancing their economic stability and autonomy.

In this study, economic empowerment was operationalized by investigating how IBLI contributes to the financial independence and decision-making capacities of Borana pastoralists. The study explores whether IBLI strengthens the pastoralists' ability to manage economic shocks, access financial resources, and participate actively in local economic activities.

Financial Resilience

Fratkin et al. (2020) define financial resilience as the capacity of individuals or communities to maintain stable financial functioning, withstand economic shocks, and recover effectively from disruptions. Financially resilient households adapt proactively to economic stresses, preserve their assets, and sustain their economic well-being.

In this study, financial resilience was operationalized by measuring the impact of IBLI on Borana pastoralists' ability to financially cope with and recover from climate-related shocks, such as drought. The study evaluates whether insured households demonstrate improved adaptive financial capacities, reduced vulnerability, and enhanced economic stability compared to uninsured households.

Income Diversification

Sherraden (2021) defines income diversification as the process of generating income from various sources to reduce economic dependency on a single activity or asset. Diversified income streams can mitigate financial vulnerabilities and stabilize household earnings, especially during economic shocks.

In this study, income diversification was operationalized by examining the extent to which IBLI facilitates pastoralist households in Borana in adopting diversified economic activities. The study assesses whether insurance coverage enables pastoralists to invest in alternative livelihood options and thus achieve greater financial resilience.

Index-Based Livestock Insurance (IBLI)

According to Jensen et al. (2019), index-based livestock insurance is a financial mechanism providing pastoralists and livestock keepers with coverage against livestock mortality or morbidity due to climatic events such as droughts. IBLI utilizes objective, predetermined environmental indicators like satellite imagery on rainfall and vegetation to trigger timely payouts.

In this study, IBLI was operationalized by evaluating its effectiveness as a financial risk management tool among pastoralists in the Borana community. The study assesses how IBLI impacts economic resilience, income predictability, asset preservation, and livelihood strategies of pastoralists.

Risk Management

According to Hill (2019), risk management involves the identification, assessment, and prioritization of financial risks, followed by the coordinated application of resources to minimize, control, and monitor the likelihood or impact of unfortunate events. Effective risk management utilizes financial instruments, such as insurance, to reduce economic losses.

In this study, risk management was operationalized by assessing how index-based livestock insurance (IBLI) assists Borana pastoralists in managing financial risks associated with climate-related shocks. The research evaluates whether IBLI effectively reduces economic uncertainties, supports pastoralists during adverse weather conditions, and promotes stable financial planning.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter is a discussion and definition of the theories that was relevant to this research. The empirical literature review and the conceptual framework showing the link between the study variables and the operational framework coming out of the parameters.

2.2 Theoretical Literature

The study variables of index-based insurance (risk management, income diversification, asset preservation, and economic empowerment) are theoretically underpinned by prospect theory, modern portfolio theory, social capital theory, and sustainable livelihoods approach in shaping livelihood resilience outcomes.

2.2.1 Prospect Theory

The fundamental principles of risk management are rooted in Prospect Theory, initially proposed by Kahneman and Tversky in 1979. Prospect Theory, a behavioral economics framework, examines how individuals and organizations respond under conditions of uncertainty. It highlights that decision-makers deviate from expected utility theory by assigning greater weight to potential losses than equivalent gains, resulting in conservative approaches toward potential profits and proactive strategies in preventing losses (Kahneman & Tversky, 1979). The application of Prospect Theory to risk management through Index-Based Livestock Insurance (IBLI) is essential for understanding pastoralists' decision-making processes regarding financial resilience. IBLI operates based on predefined indices, such as

weather conditions or livestock production outcomes, influencing pastoralists' decisions to adopt insurance based on loss aversion and probability estimations.

Previous research indicates that insurance adoption likelihood increases when pastoralists perceive the potential losses from adverse events as exceeding the benefits derived from preventing such occurrences (Tversky & Kahneman, 1992). This aligns with Prospect Theory, emphasizing that individuals value loss avoidance more significantly than equivalent gain acquisition. From a financial resilience perspective, pastoralists are more inclined to purchase standard index-based livestock insurance when they anticipate substantial protection against severe financial losses resulting from droughts or climatic disruptions. Moreover, decision-making under Prospect Theory typically involves a preference for small-probability events and aversion to large-probability risks, influencing pastoralists' perceptions of livelihood threats and their willingness to adopt IBLI as a risk management tool (Kahneman & Tversky, 1979).

Despite its usefulness, Prospect Theory faces criticism for inadequately capturing the complexities of real-world decision-making processes associated with IBLI and financial resilience (Kahneman & Tversky, 1979). Specifically, the theory's assumption of linear utility functions is problematic because pastoralists' risk tolerance and decision-making behavior can vary significantly depending on various contextual factors, often overlooked by this simplified representation (Tversky & Kahneman, 1992). Moreover, Prospect Theory predominantly considers individual-level decisions, neglecting collective risk management approaches and social dynamics that significantly influence insurance adoption and financial resilience in pastoral communities (Kahneman, 2011).

Furthermore, Prospect Theory's omission of risk perception variations and adaptive capacity among pastoralists leads to an underestimation of the vulnerabilities faced by groups heavily reliant on IBLI for their financial security. Pastoralists experiencing chronic poverty or perceiving little environmental change may exhibit unique cognitive biases and decision-making patterns regarding risk management strategies like IBLI. These complexities and trade-offs between short-term risk aversion and long-term financial resilience objectives may not be fully explained by Prospect Theory alone (Tversky & Kahneman, 1986). Thus, while Prospect Theory provides valuable insights into individual-level risk management behaviors, it should be complemented with other theories or frameworks to comprehensively address the broader social, economic, and contextual dimensions influencing pastoralists' financial resilience through IBLI.

2.2.2 Modern Portfolio Theory

Income diversification is conceptually connected to Modern Portfolio Theory (MPT). Modern Portfolio Theory, first articulated by Harry Markowitz in the 1950s, provides a framework for selecting investments that align portfolio risk and returns with desired financial outcomes. The core principle of MPT is that diversifying investments across multiple assets with varying levels of risk and return can minimize overall portfolio risk and enhance returns (Bodie et al., 2024).

Applying MPT to index-based livestock insurance (IBLI) for financial resilience among pastoralists involves designing diversified financial products that help pastoralist communities manage income-related risks. Diversification within insurance portfolios reduces vulnerability to shocks, such as droughts or market volatility, by spreading risks

across different sources or categories of income. This approach systematically balances risk and returns, contributing significantly to the financial stability of pastoralists who rely on livestock as their primary economic asset (Lence et al., 2019).

Furthermore, MPT emphasizes asset correlation, proposing that diversifying assets with low or negative correlations can effectively manage risk exposure. In the context of IBLI, understanding correlations between various income-generating activities helps insurers create diversified insurance portfolios that are resilient against localized or systemic shocks. Such portfolios can enhance stability and sustainability, thus strengthening the financial resilience of pastoralists (Elton et al., 2021).

Despite its strengths, MPT has faced criticism regarding its practical applicability to IBLI and financial resilience scenarios. Critics highlight MPT's heavy reliance on historical data and assumptions of market efficiency, which often do not adequately reflect the non-financial and unpredictable nature of livelihood risks managed through IBLI (Markowitz, 1952). Additionally, the theory assumes rational, risk-averse decision-making, neglecting behavioral biases and emotional factors that significantly influence pastoralists' insurance adoption decisions (Fama & French, 2022).

Moreover, critics argue that MPT's focus on asset correlation does not fully address the complex interdependencies and systemic risks inherent in IBLI products aimed at enhancing financial resilience (Chantararat, 2019). The theory's inadequacies become particularly pronounced in dealing with tail risks or extreme events, common occurrences in pastoralist contexts, making it less effective in assessing and managing catastrophic risks (Black, 2022). Finally, MPT's static nature and mean-variance optimization approach may not align well

with the dynamic and adaptive environments typical in pastoralist communities, potentially limiting its utility in promoting financial resilience in rapidly changing and uncertain contexts.

2.2.3 Social Capital Theory

Asset preservation is theoretically grounded in Social Capital Theory, which emphasizes the significance of collective action, social relationships, and networks in achieving shared objectives. According to this theory, the connections and relationships individuals maintain within their communities can offer essential resources, support, and opportunities otherwise inaccessible. Social capital is conceptualized as a valuable asset that facilitates access to information, fosters trust, and mobilizes collective resources (Portes, 1998). In the context of index-based livestock insurance (IBLI) and financial resilience among pastoralists in the Borana community, social capital significantly influences asset preservation strategies and insurance uptake.

Social Capital Theory intersects with IBLI and asset preservation primarily through the dimension of trust. Trust serves as a foundational component of social capital, fostering reliance among community members and enabling cooperative behavior for mutual benefit. Within the IBLI context, trust among pastoralists ensures effective implementation and broader acceptance of insurance schemes, as community members perceive the insurance system to be fair and reliable (Putnam, 2000). Enhanced trust levels encourage increased participation in IBLI programs, contributing directly to asset preservation and overall financial resilience among pastoralists. Reciprocity, another critical element of social capital, manifests through mutual support and information sharing related to risk management

practices within communities. Such reciprocal exchanges bolster community solidarity and resilience against economic uncertainties and shocks (Coleman, 2019).

Furthermore, social networks represent vital elements of social capital, significantly shaping the effectiveness of IBLI in preserving assets and promoting financial resilience. These networks facilitate information dissemination, mobilization of resources, and emotional support during economic or climatic. Robust social networks within pastoralist communities can amplify awareness of IBLI opportunities, streamline collective decision-making, and enable rapid, coordinated responses to financial emergencies, thus enhancing asset preservation and resilience.

However, Social Capital Theory faces several critiques regarding its applicability to IBLI and financial resilience contexts. A primary critique is that it may oversimplify intricate social dynamics by predominantly highlighting positive aspects, such as trust and reciprocity, while neglecting potential negative outcomes like social exclusion and inequality (Portes, 1998). This simplified perspective can result in an idealized interpretation of community capacities to manage risks and protect assets through social capital, potentially diverging from ground realities.

Additionally, Social Capital Theory often presumes homogeneous, cohesive communities with strong social bonds readily mobilized during crises. In contrast, real-world communities, including pastoralist populations, are typically diverse and fragmented, possessing varying degrees of social capital (Woolcock & Narayan, 2000). This diversity presents challenges to IBLI programs that depend on social networks for effective information flow, resource pooling, and collective crisis management. Without adequately accounting for these nuances,

the theory may underestimate the practical limitations of relying solely on social capital for enhancing financial resilience.

Moreover, critics highlight that Social Capital Theory tends to emphasize bonding (intra-community) and bridging (inter-community) social capital, potentially undervaluing the crucial role of linking social capital. Linking social capital involves establishing connections with external institutions, financial bodies, and governmental entities essential for effective IBLI programs and overall resilience (Szreter & Woolcock, 2004). Thus, failing to incorporate linking social capital into theoretical considerations may result in an incomplete understanding of how pastoralist communities achieve asset preservation and financial resilience through IBLI mechanisms.

2.2.4 Sustainable Livelihoods Theory

Economic empowerment is theoretically anchored in the Sustainable Livelihoods Theory (SLT), emphasizing human capabilities and sustainable asset management for enhancing livelihood resilience. The SLT underscores a holistic understanding of the diverse assets and resources available to communities, including human, social, natural, physical, and financial capital. This comprehensive perspective aims to empower individuals and communities, enabling them to effectively withstand and recover from various shocks and stresses, thereby improving overall financial resilience (Chambers & Conway, 2022). Index-based livestock insurance (IBLI) complements the principles of SLT by providing financial mechanisms for risk transfer, specifically tailored for pastoralist communities vulnerable to climatic uncertainties.

IBLI aligns with SLT by acting as a safety net for pastoralists during crises, effectively mitigating impacts from drought, flooding, or other environmental disruptions. Pastoralist livelihoods, often heavily reliant on livestock production affected by climatic conditions, can significantly benefit from insurance schemes designed around specific indices such as weather patterns or livestock mortality rates. By reducing financial losses through predetermined triggers and payouts, IBLI supports pastoralists in maintaining their economic activities and standards of living, thus fostering long-term financial resilience (Galvin, et al. 2019).

Additionally, IBLI contributes to economic empowerment by incentivizing risk reduction strategies and encouraging investments in climate-resilient practices. Pastoralists adopting risk mitigation techniques, such as improved livestock breeds, feed management, or drought preparedness measures, may benefit directly through insurance incentives. Consequently, IBLI not only provides financial protection but also actively promotes sustainable economic practices within pastoralist communities, strengthening their overall capacity to endure future uncertainties (Clarke et al., 2015).

However, the Sustainable Livelihoods Theory has been critiqued for oversimplifying complex livelihood dynamics and inadequately addressing the evolving nature of vulnerability and resilience, particularly within the IBLI context. Scoones (1998) argues that SLT's asset-focused approach can neglect broader structural and systemic factors influencing financial resilience outcomes. Additionally, the theory's emphasis on individual agency tends to overlook collective action and the critical role of social networks, essential for successful implementation and effectiveness of IBLI schemes (Scoones, 1998).

Furthermore, critics highlight SLT's static portrayal of livelihoods, potentially insufficient for capturing dynamic and evolving risks. Chambers and Conway (2022) argue that SLT may not adequately account for systemic shocks or long-term trends undermining financial resilience. IBLI schemes relying on predetermined triggers may similarly struggle to address continuously shifting livelihood risks adequately.

Moreover, SLT's predominant economic orientation has faced criticism for limiting comprehensive resilience-building efforts. According to Little et al. (2021), achieving robust financial resilience requires addressing multidimensional factors, including social cohesion, cultural practices, and institutional structures. Thus, IBLI should ideally integrate into broader, multidimensional resilience strategies, encompassing not only economic empowerment but also social, environmental, and institutional dimensions for a holistic approach to pastoralists' resilience enhancement.

2.3 Empirical literature

The study will review literature of related research studies. It will involve a systematic and comprehensive examination of the existing body of knowledge related to the explanatory and explained study variables, with a focus on the empirical evidence presented in previous studies.

2.3.1 Risk Management and Financial Resilience among Pastoralists

Risk management and financial resilience among pastoralist communities have increasingly become critical topics in recent empirical studies. Davies and Hatfield (2021) evaluated the impact of risk management strategies on the financial resilience of pastoralist populations in East Africa. Their findings indicated that income diversification, robust social networks, and

improved livestock management significantly enhanced pastoralists' ability to manage risks such as droughts and conflicts. The study emphasized the need for comprehensive risk management strategies tailored to the specific vulnerabilities of marginalized pastoralist groups.

Similarly, Smith (2020) explored insurance schemes as risk management mechanisms aimed at boosting adaptation among Mongolian pastoralists. This research found that livestock mortality insurance significantly increased pastoralists' capability to recover from severe weather events, underscoring systematic risk management as a critical factor in enhancing financial resilience. Ahmed (2021) examined financial inclusion and risk management options available to pastoralist households in Kenya, finding that improved access to credit and savings significantly elevated pastoralists' resilience against shocks like crop failure and livestock diseases. This underscores financial inclusion as a pivotal strategy for bolstering financial resilience among pastoralist communities.

Additionally, Ouedraogo et al. (2018) analyzed climate change adaptation strategies' role in risk management and livelihood resilience among Sahelian pastoralists in Burkina Faso. The research highlighted sustainable land management, water harvesting, and effective early warning systems as instrumental in reducing vulnerabilities and strengthening the resilience of pastoral households to climate risks. This study contributes to the broader understanding of integrating climate change adaptation within comprehensive risk management frameworks. Berhanu (2021) established the efficacy of community-based natural resource management in risk management and livelihood sustainability among Maasai pastoralists in Tanzania. This study demonstrated that participatory decision-making (PDM), community resource and conflict management (CRCM), and traditional knowledge significantly improved community

resilience in the face of environmental and socio-economic risks, highlighting the importance of robust local governance in sustainable pastoral development.

In a related context, Nyangena and Kamau (2020) analyzed how market integration influenced livelihood vulnerability among Borana pastoralists in Ethiopia. Their research indicated that enhanced market access allowed pastoralists to diversify income sources, reducing vulnerability to climatic shocks and improving financial resilience. Thus, strengthening market linkages appears crucial for pastoralists' resilience to environmental and economic disruptions. Kassie and Wambua (2020) explored the role of social capital in risk management among Turkana pastoralists in Kenya. The study found that strong social networks facilitated information sharing, collective decision-making, and communal support during crises, significantly contributing to community resilience. Likewise, Gichuki and Mwangi (2020) investigated technological advancements' impact on risk management among Samburu pastoralists in Kenya, concluding that innovations like mobile money (M-Pesa), weather forecasting applications, livestock tracking systems, and market information significantly enhanced their adaptive capacities and risk mitigation efforts.

Nevertheless, it is important to consider gender-sensitive approaches in risk management, as highlighted by a cross-sectional study among Afar pastoralist women, indicating distinct vulnerabilities due to their familial and economic responsibilities (Gichuki and Mwangi, 2020). Thus, empowering women with practical skills and decision-making capabilities can substantially bolster resilience. Further, Aliyu (2021) examined educational interventions promoting disaster preparedness among Fulani pastoralist youth in Nigeria, demonstrating that training in first aid, crop diversification, and conflict resolution significantly improved youth response to emergencies, underscoring education's role in building resilience.

Finally, Gichuki and Mwangi (2020) assessed policy impacts on risk governance among Pokot pastoralists in Kenya. The study concluded that effective policies governing land rights, resource access, livestock marketing, and conflict resolution significantly enhanced community resilience, illustrating the importance of supportive governance structures in pastoralist risk management.

2.3.2 Income Diversification and Financial Resilience among Pastoralists

Income diversification significantly influences the financial resilience of pastoralist communities, directly affecting their capacity to manage shocks and adapt to changing environmental and economic conditions. Catley et al. (2021) investigated the role of income diversification on pastoralist resilience in the Horn of Africa, demonstrating that pastoralists with diversified income streams effectively managed droughts and other external challenges. This study emphasizes the necessity of incorporating income diversification and effective risk management into sustainable pastoralist development strategies.

Moritz et al. (2020) similarly studied income diversification's impact on adaptive capacity among pastoralists in Mongolia. They found that households with diversified income sources proactively invested in long-term environmental strategies, such as water conservation and improved pasture management, underscoring the role of income diversification in fostering resilience to climate variability. Galvin et al. (2022) examined the relationship between income diversification and household food security among Maasai pastoralists in Kenya. Their findings illustrated that households with diversified incomes experienced greater food security during periods of scarcity, confirming the critical link between income diversification and improved nutritional outcomes.

Additionally, Little et al. (2021) explored how income diversification influences pastoralist vulnerability to climate change in East Africa. The researchers highlighted that households with consistent, diversified incomes demonstrated superior management of climatic shocks and market instabilities, positioning income diversification as a central component of financial resilience.

Research by Homann-Kee et al. (2019) among Borana pastoralists in Ethiopia further emphasized the importance of income diversification, indicating households with diverse income sources exhibited enhanced resilience against droughts and livestock diseases. This research underscores income diversification as pivotal to strengthening pastoralists' capacity to withstand economic and environmental disruptions. Fratkin (2020) explored how income diversification impacts mobility among Turkana pastoralists in Kenya, discovering households with diversified incomes were less dependent on long-distance migration during environmental stress, suggesting that diversified income reduces reliance on traditional coping mechanisms such as mobility.

Hodgson's (2019) study on economic empowerment among Maasai women in Tanzania reinforced income-generating activities' significance in promoting women's financial autonomy and household income diversification. Similarly, Hesse (2020) highlighted the correlation between stable, diversified incomes and improved well-being among Fulani pastoralists in Nigeria, including better access to healthcare and educational opportunities. Gichuki and Mwangi (2020) investigated how income instability affects social cohesion within Samburu pastoralist communities in Kenya, noting income diversification as critical to maintaining social solidarity and cohesion during economic fluctuations. Roth (2022)

found Mongolian herders with stable, diversified incomes more actively participated in sustainable land management and community-based resource management initiatives.

Lepirei (2019) emphasized diversified livelihoods for Turkana pastoralists in Kenya as essential for enhancing household resilience against prolonged droughts. McCabe (2023) demonstrated that Sahelian Fulani herders with diversified income sources were less inclined to engage in seasonal migration compared to households relying exclusively on livestock incomes, highlighting diversification's role in reducing mobility pressures.

Finally, Turner (2014) revealed a positive correlation between income diversification and food security among agro-pastoralists in Tanzania, noting that diversified income streams substantially improved households' ability to maintain food access during lean periods. Collectively, these studies underscore income diversification as essential to pastoralists' financial resilience, sustainability, and adaptability in the face of environmental and economic uncertainty.

2.3.3 Asset Preservation and Financial Resilience among Pastoralists

Asset preservation significantly enhances financial resilience among pastoralist communities, particularly in regions facing frequent risks and vulnerabilities. Fratkin and Roth (2020) investigated asset preservation strategies' impact on pastoralists' resilience in East Africa, highlighting that pastoralists maintaining diversified asset portfolios were better positioned to withstand shocks such as droughts and livestock diseases. By diversifying their assets across various livestock types, savings, and alternative investments, pastoralists effectively mitigated unforeseen impacts on their financial stability (Fratkin & Roth, 2020).

McCabe et al. (2010) further examined asset preservation practices among pastoralist communities in Northern Kenya, discovering that collective community actions to safeguard common grazing lands and water resources significantly boosted their adaptive capacities. Through structured community agreements and institutions designed to protect shared resources, pastoralists effectively enhanced their resilience to environmental stresses, maintaining sustainable economic outcomes (McCabe et al., 2020).

Beyond physical assets such as livestock and land, financial tools contribute significantly to pastoralists' asset preservation. Little et al. (2021) assessed microfinance services among Ethiopian pastoral communities, revealing that access to microcredit and savings platforms facilitated consumption smoothing during lean periods and encouraged investment in supplementary income-generating activities. Consequently, these financial instruments enhanced pastoralists' ability to navigate market fluctuations and economic uncertainties (Little et al., 2001). Social networks and support systems constitute crucial elements of asset preservation for pastoralists. Galvin et al. (2024) explored social capital's role in resilience among Maasai pastoralists in Kenya's Amboseli ecosystem, demonstrating that strong kinship networks allowed resource-sharing during crises, such as livestock losses or natural disasters. These mutual relationships strengthened recovery capabilities, supporting sustainable financial resilience (Galvin et al., 2024).

Homewood and Kristjanson (2019) investigated indigenous knowledge systems' contributions to asset preservation among Maasai pastoralists in Tanzania's Ngorongoro Conservation Area. Traditional practices, including selective breeding and strategic mobility patterns, effectively safeguarded livestock from diseases and environmental threats. Integrating indigenous practices with modern asset management techniques enabled Maasai communities

to adapt to changing conditions, preserving cultural and economic sustainability (Homewood & Kristjanson, 2019).

Gender dynamics also critically shape asset preservation strategies within pastoralist societies. Hesse and MacGregor (2022) examined gender norms among Turkana pastoralists in Kenya, noting that women's empowerment through savings groups and training programs significantly strengthened household resilience against economic and environmental shocks. Empowering women economically thus emerges as a vital approach to asset preservation and enhancing community financial resilience (Hesse & MacGregor, 2022). Climate change presents escalating challenges to pastoralist livelihoods, demanding innovative asset preservation and adaptation methods. Moritz et al. (2020) studied climate variability's impact on Maasai herders' vulnerability in Southern Kenya, emphasizing the necessity of income diversification beyond livestock, alongside investment in climate-resilient technologies, such as water harvesting systems and drought-resistant crops, to strengthen financial resilience (Moritz, 2020).

Finally, Opiyo (2019) assessed the role of mobile technology in improving early warning systems among Samburu pastoralists in Northern Kenya. Mobile phone-based weather forecasts facilitated timely livestock management and resource allocation decisions during environmental stress, significantly enhancing adaptive capacities and reducing vulnerability to climate-related threats (Opiyo, 2019). These studies collectively underscore asset preservation's integral role in fostering sustainable financial resilience among pastoralist communities.

2.3.4 Economic Empowerment and Financial Resilience among Pastoralists

Economic empowerment plays a critical role in enhancing financial resilience among pastoralist communities. Dejene et al. (2019) studied community-based natural resource management's impact on pastoralists' resilience in Ethiopia, demonstrating that active community engagement significantly improved their adaptive capacities to environmental shocks. This underscores the value of inclusive, community-driven economic empowerment initiatives for sustainable development and financial resilience among pastoralists.

Similarly, Catley et al. (2023) investigated the role of social networks and social capital in bolstering resilience within pastoralist communities in Kenya. Their findings revealed that strong social ties and reciprocal relationships enhanced pastoralists' ability to manage shocks effectively. Community-based economic empowerment strategies, thus, emerged as crucial mechanisms for strengthening pastoralists' adaptive capacities and financial resilience.

Galvin et al. (2019) examined community-based conservation initiatives' relationship with economic empowerment and livelihood resilience in northern Tanzania, showing that these integrated approaches not only promoted biodiversity conservation but also expanded economic opportunities for pastoralists, contributing significantly to their financial resilience. Moritz et al. (2020) further highlighted the importance of engaging local communities in developing climate adaptation strategies in Mongolia, emphasizing the fusion of traditional knowledge and contemporary practices to strengthen economic empowerment and resilience.

Fernandez-Gimenez et al. (2022) explored participatory rangeland management in Inner Mongolia, China, finding that community-inclusive governance practices enhanced ecosystem health and pastoralists' adaptive capacities, reinforcing the significance of

economic empowerment through participatory decision-making. Sachedina et al. (2020) addressed market integration impacts among Maasai communities in Tanzania, emphasizing that economic empowerment through market engagement required careful balancing with traditional livelihood practices to ensure sustainable resilience. Moritz et al. (2020) revealed the pivotal role of gender dynamics in economic empowerment and resilience among Turkana pastoralists in northern Kenya. Their findings highlighted women's critical contributions in diversifying income through small businesses and handicrafts, underscoring the importance of gender-inclusive empowerment strategies for enhancing financial resilience.

Little et al. (2021) demonstrated how social capital significantly influenced adaptive capacities among Sahelian herders, illustrating the role of community relationships and resource-sharing practices in bolstering financial resilience. Ziervogel et al. (2020) assessed institutional governance's role in adaptation strategies among Himba communities, highlighting that flexible and adaptive governance significantly improved communities' responsiveness and resilience to climate variability.

Kassie and Shiferaw (2019) studied financial services' impact, showing that access to credit among Borana agro-pastoralists enabled investment in diverse economic activities, enhancing financial resilience against economic shocks. Sietz et al. (2021) emphasized secure land tenure's role in economic empowerment among Fulani herders, noting that tenure security facilitated sustainable investments in land management, significantly improving adaptive capacities and financial resilience.

Finally, Thornton et al. (2009) highlighted weather forecasting's role in decision-making among Maasai herders, showing that integrating climate information into traditional

knowledge systems significantly improved economic empowerment and adaptive responses to climatic risks, thus bolstering pastoralists' overall financial resilience.

2.4 Summary of Research Gaps

Research on the effect of index-based livestock insurance (IBLI) on the financial resilience of pastoralists in the Borana community, southern Ethiopia, has progressed notably, but significant research gaps persist. A critical gap involves the sustainability and long-term effectiveness of IBLI programs. Existing studies predominantly document positive short-term effects on pastoralists' financial resilience, yet limited evidence exists regarding how these effects sustain over time and whether they translate into lasting improvements. Long-term empirical studies are necessary to evaluate the persistent benefits of IBLI and its capacity to address enduring vulnerabilities within pastoralist communities (Barrett et al., 2018).

Another substantial gap pertains to understanding the specific mechanisms through which IBLI impacts pastoralists' financial resilience. Elements such as risk perception, decision-making dynamics, and social interactions within pastoralist communities require deeper investigation. Analyzing these aspects would yield critical insights into how IBLI influences financial behaviors and livelihood strategies, thereby enabling more targeted and effective intervention designs tailored to pastoralist contexts (Barrett et al., 2018).

Scalability and adaptability of IBLI programs across various ecological, social, and economic settings also present notable research gaps. While some programs have been successful in specific regions, uncertainties remain regarding their applicability and effectiveness in diverse pastoralist environments. Further research is necessary to identify conditions facilitating or hindering IBLI implementation and success in different contexts, thereby

providing essential information to policymakers for scaling and adapting these initiatives effectively across pastoralist communities (Jensen & Barrett, 2018).

Additionally, research into the cost-effectiveness of IBLI compared to other available risk management strategies is essential. Conducting thorough cost-benefit analyses would help policymakers and stakeholders allocate resources more efficiently and ensure investments in IBLI programs are justified economically, generating substantial benefits in enhancing pastoralist financial resilience and livelihood sustainability (Clarke et al., 2019).

Lastly, there is a critical need to explore institutional arrangements and governance frameworks influencing the effectiveness of IBLI programs. Successful implementation and performance of IBLI schemes depend significantly on their institutional context, governance mechanisms, and regulatory frameworks. Investigating these institutional factors can guide the establishment of robust governance structures, thereby enhancing the effectiveness, uptake, and sustainability of IBLI programs for pastoralist communities (Clarke et al., 2019).

2.5 Conceptual framework

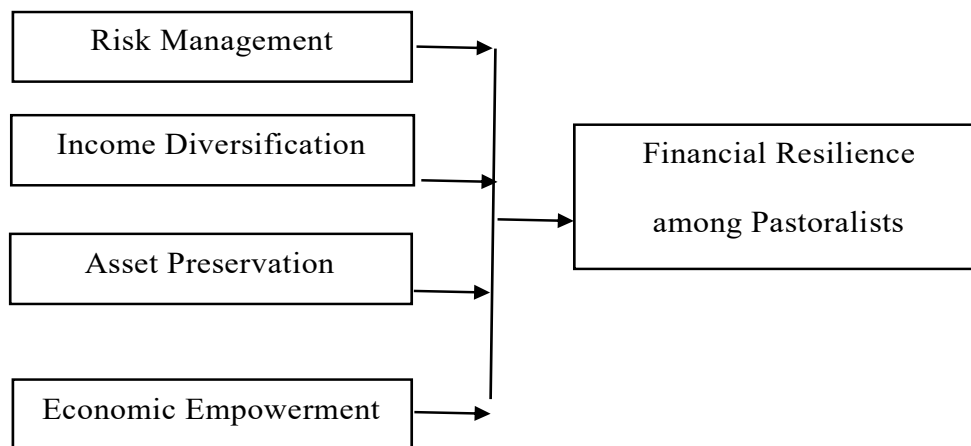
The effect of variables is diagrammatically presented in figure 2.1. The direction of the arrows seeks to illustrate the perceived interrelationship between the variables.

Figure 2.1

Conceptual Framework

Independent variable

Dependent variable



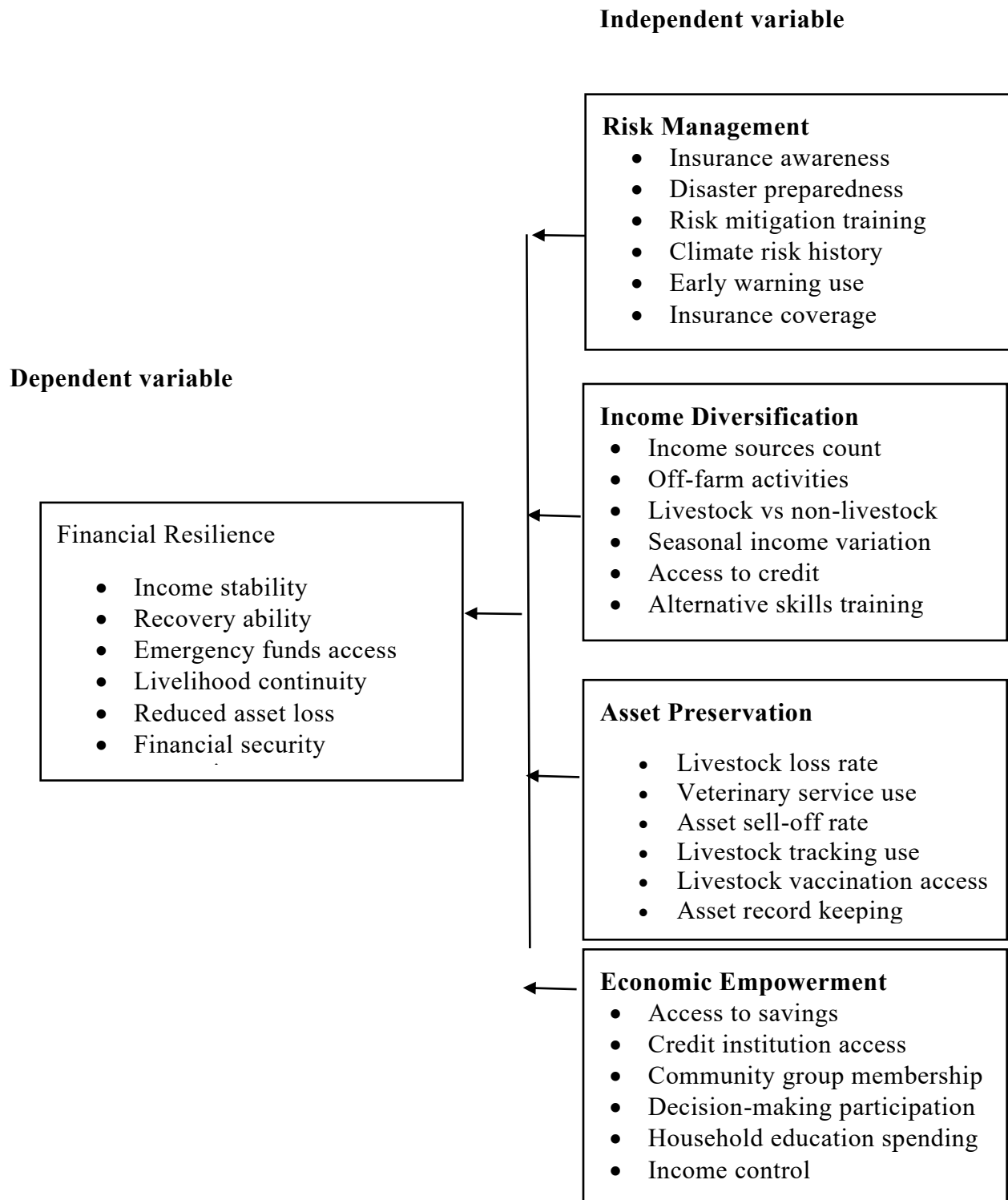
Source: Author, 2025

2.6 Operational framework

Operationalization involves translating conceptual constructs into measurable variables to ensure that the study effectively collects data and accurately assesses the effect of explanatory variables on the outcome variable. In this study, the variables will be measured as shown in the operational framework illustrated in Figure 2.2.

Figure 2.2

Operational Framework



Source: Researcher, 2025

2.6.1 Explanation of Variables

Risk Management is a core function of Index-Based Livestock Insurance (IBLI) for pastoralists in the Borana community, Southern Ethiopia. IBLI reduces exposure to natural disasters such as droughts, thereby lowering vulnerability and enhancing financial resilience (Gebreegziabher et al., 2019). This mechanism helps pastoralists maintain economic stability in the face of uncertainty.

Income Diversification is facilitated by IBLI, especially during crisis periods. When adverse events such as droughts occur, the insurance provides financial compensation, enabling pastoralists to meet essential needs and continue with supplementary economic activities. This diversification reduces income volatility and supports economic progress (Mahul & Skees, 2021).

Asset Preservation is vital for pastoralists whose livelihoods largely depend on livestock. IBLI protects these critical assets by offering compensation for losses due to droughts or diseases based on predefined indices. This ensures that the wealth and economic security of pastoralist households are sustained (Mude et al., 2019).

Economic Empowerment is promoted through IBLI by fostering financial inclusion and risk-sharing strategies. The insurance model encourages community cooperation, mutual assistance, and collective investment in social amenities such as education, healthcare, and infrastructure, thereby improving the overall welfare and economic strength of pastoralist communities (Mahul & Skees, 2021).

Financial Resilience among Pastoralists is significantly strengthened through the adoption of IBLI. By managing risks, promoting income diversification, preserving vital assets, and enhancing economic empowerment, IBLI contributes to the long-term financial sustainability and adaptability of pastoralists in Borana community (Mude et al., 2019).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter explains the methods of data gathering and analysis, research, design, site, population, sample size, sampling technique, data collection tools, pilot testing of the instruments, credibility, dependability, and validity of findings, analysis process, and applicable ethical concerns that are crucial to accrue credibility and reliability to the study.

3.2 Research Design

The research design provided a structured framework outlining group settings and data analysis methods to examine relationships, aligning with the study's objectives and enabling accurate measurement (Kombo & Tromp, 2022). This study employed a descriptive research design to collect both quantitative and qualitative data. Descriptive statistics facilitated data collection without influencing respondents' natural behavior, allowing for the analysis of relationships between variables while documenting their characteristics and values as they occurred (Kombo & Tromp, 2022). This approach ensured the collection of detailed information by measuring variables in their natural state, providing a comprehensive understanding of the research context.

3.3 Target population

A target population is a fundamental concept in research methodology, as it delineates the specific group of individuals or units that researchers intend to investigate in order to fulfill their research inquiries and objectives (Kombo & Tromp, 2022). For this study, the target

population consists of 24,560 pastoralists who are currently enrolled in the Index-Based Livestock Insurance (IBLI) program. These pastoralist communities are distributed across five key districts in the Borana Zone: Yabello, Miyo, Dhas, Arero, and Dirre.

The IBLI program is designed to provide financial coverage for pastoralists facing livestock losses due to drought and other climate-induced risks. Focusing on this specific group is essential for assessing the impact of index-based livestock insurance on the financial resilience of pastoralist households. It enables the study to explore how insured pastoralists respond to climatic shocks, manage risk, and sustain their livelihoods under challenging environmental conditions.

Table 3.1

Target population

Pastoralist Communities Districts	Target Population	Population Proportion
Yabello	4010	16%
Miyo	7606	31%
Dhas	5615	23%
Arero	2212	9%
Dirre	5117	21%
Total	24,560	100%

3.4 Sampling Techniques and Sample Size

3.4.1 Sampling Techniques

This study employed stratified random sampling, where the target population of 24,560 pastoralists was divided into five distinct strata based on administrative districts: Yabello, Miyo, Dhas, Arero, and Dirre. A proportional sample was then randomly selected from each

district to ensure equitable representation across the study area. This technique was chosen to minimize sampling bias and enhance the representativeness of the data by capturing the heterogeneity within the Borana Zone. Stratified random sampling is particularly effective in geographically and demographically diverse populations, as it allows for more precise estimates within each subgroup (Kombo & Tromp, 2022).

3.4.2 Sample Size

The sample size is a part of the universe comprising of the general views of the target population (Kombo & Tromp, (2022)). The sample size for this study was determined using the formula proposed by Yamane (1967), which offers a straightforward method for calculating sample sizes.

Where: n = sample size, N = total population size, e = margin of error

$$n = \frac{N}{1 + Ne^2}$$

$$n = \frac{24560}{1+24560 (0.05)^2}$$

$$n = 394$$

The sample size was determined to be 394, based on a 95% confidence level and a 5% margin of error, which are commonly recommended standards in social science research. These 394 respondents were proportionally distributed according to the total population of pastoralist communities within each district as indicated in Table 3.2 below.

Table 3.2***Sample Distribution***

Pastoralist Districts	Communities	Target Population	Sample size	Population Proportion
Yabello		4010	64	16%
Miyo		7606	122	31%
Dhas		5615	90	23%
Arero		2212	35	09%
Dirre		5117	82	21%
Total		24,560	394	100%

3.5 Research Instrumentation

Data was collected using self-administered questionnaires designed to efficiently gather extensive information within a short timeframe. The questions were tailored to align with the study's objectives, allowing respondents to provide answers while maintaining their privacy. No personal details were required, ensuring confidentiality and eliminating any potential coercion.

3.5.1 Pre-testing of Questionnaire

The questionnaires underwent a pre-testing phase to ensure that all questions were relevant to asset management instruments. Any questions that did not meet this criterion were reframed to enhance clarity for respondents. It is recommended that 10% of the sampled population be used for pre-testing. For this pilot study, Borana pastoralist communities in Northern Kenya were selected. The pre-test participants received the questionnaires and were encouraged to seek clarification on any ambiguous questions.

3.5.2 Reliability of Research Instruments

The reliability of research instruments was a crucial factor in ensuring their effectiveness in addressing the study's specific objectives. To assess reliability, the study calculated the Cronbach's alpha coefficient. According to Patton (2022), a minimum Cronbach's alpha value of 0.7 was required to indicate a high level of reliability in the responses.

3.6 Data Collection Procedure

The researcher began by obtaining an introductory letter from Kenya Methodist University (KeMU) to apply for a research permit from the National Commission for Science, Technology, and Innovation. Once the permit was granted, questionnaires were distributed to the selected respondents, with a clear explanation of the study's purpose to ensure informed participation. The drop-and-pick method was used, allowing respondents a one-week period to complete the questionnaires before collection. The trained research assistants familiar with the local community helped ensure clear communication, cultural relevance, and accurate responses. Upon retrieval, the completed questionnaires were analyzed, and all data were securely stored to maintain confidentiality.

3.7 Data Analysis and Data Presentation

3.7.1 Data Analysis

In this study, quantitative data was analyzed, and any inaccurate responses were edited and completed before analysis to eliminate confusion. The sorted data were then coded in the Statistical Package for Social Sciences (SPSS) software version 25, associating numbers with different statistical variables for easy analysis. Regression analysis was conducted to determine the role of

index-based livestock insurance in food security among pastoralist communities in Borana, Southern Ethiopia.

The model used was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon$$

Where;

Y = Financial resilience among pastoralists

X₁ = Risk Management

X₂ = Income Diversification

X₃ = Asset Preservation

X₄ = Economic Empowerment

β₀ = constant coefficient (intercept)

β₁, β₂, β₃, β₄ = slope coefficient of independent variables

ε = error term

3.7.2 Data Presentation

According to Kothari (2004), data can be effectively presented using statistical techniques, graphical methods, or a combination of both to provide comprehensive results. In this study, the findings from the analysis were presented using tables and narratives

3.8 Diagnostic Tests.

To determine whether the independent and dependent variable data violated the assumptions underlying multiple regression analysis models, the study conducted the following diagnostic tests: the linearity test, autocorrelation test, multicollinearity test, normality test, and homoscedasticity test. These tests were performed before proceeding with regression and correlation analysis.

3.8.1 Normality Test

A normality test is a statistical method used to determine whether a given dataset follows a normal distribution, ensuring that the assumptions for parametric tests, such as t-tests and ANOVAs, are met (Razali, 2019). These tests yield accurate results only when the normality assumption is satisfied. However, significant deviations from normality can undermine the effectiveness of these statistical methods, potentially leading to incorrect conclusions (Razali, 2019).

For statistical analysis, the study employed the Kolmogorov-Smirnov and Shapiro-Wilk tests to assess normality. These tests generate a p-value indicating the probability that the data follows a normal distribution. In this study, the null hypothesis was supported when $P > 0.05$, indicating normal distribution, whereas $P < 0.05$ suggested non-normal distribution (Shapiro

& Wilk, 1965). This evaluation ensured the appropriate selection of statistical tests and the formulation of sound conclusions based on the dataset's characteristics. These tests allowed the study to determine whether to use parametric or non-parametric methods for data analysis.

3.8.2 Auto-correlation Test

Autocorrelation is a statistical concept that describes a situation where the residuals or errors of a regression model exhibit a linear relationship with themselves over time or across observations, potentially affecting the reliability of the model's results (Wooldridge, 2019). To test for autocorrelation, this study employed the Durbin-Watson test.

The Durbin-Watson statistic ranges from 0 to 4, where a value of 2 indicates no autocorrelation. A result below 2 suggests positive autocorrelation, while a value above 2 indicates negative autocorrelation. Generally, a statistic between 1.5 and 2.5 implies an absence of significant autocorrelation, meaning no discernible trends in the residuals (Wooldridge, 2019). Conducting this test enhances the reliability of regression analysis by identifying potential violations of the assumption of residual independence, which is a fundamental requirement in most statistical models.

3.8.3 Heteroscedasticity Test

Heteroscedasticity refers to a situation in a regression model where the variance of residuals (errors) is not constant across all values of the independent variables (Gujarati, 2019). In this study, the Breusch-Pagan test was conducted to determine whether the residual error term increased with changes in the independent variables. The test involved regressing the independent variables on the residual error term as the response variable to assess the consistency of variance.

The Breusch-Pagan test was based on two hypotheses: the null hypothesis (H_0), which assumed that error variances were equal, and the alternative hypothesis (H_1), which posited that error variances were a multiplicative function of one or more independent variables. If the p-value was ≤ 0.05 , it indicated the presence of heteroscedasticity, meaning that the variance of residuals was not constant across observations. Identifying heteroscedasticity was crucial to ensuring the validity and reliability of the regression model, as heteroscedastic errors could lead to inefficient estimates and affect the accuracy of statistical inferences.

3.8.4 Multi-Collinearity Test

Multicollinearity occurs when two or more independent variables in a multiple regression model are highly correlated, making it difficult to determine their independent effects on the dependent variable (O'Brien, 2021). This condition can lead to estimated coefficients that are significantly different from the actual population parameters, reducing the accuracy of the model. Additionally, high multicollinearity often results in small t-statistics, which may suggest the absence of a significant linear relationship between an independent variable and the dependent variable, even when such a relationship exists.

In this study, multicollinearity was assessed using the Variance Inflation Factor (VIF). A VIF value exceeding 10 indicated a serious multicollinearity issue within the regression model (Field, 2018). Addressing multicollinearity was essential to ensure the efficiency of the model and maintain the credibility of the assumed relationships between variables. Detecting and controlling for this problem helped improve the reliability of the regression analysis and the validity of its conclusions.

3.8.5 Linearity Test

A linearity test was conducted to determine whether the relationship between the independent and dependent variables followed a linear pattern. This test was a prerequisite for regression analysis. In this study, a hypothesis test was used to assess linearity. According to Hair et al. (2010), hypothesis testing is an effective method for evaluating whether a linear association exists between variations in the dependent variable and the predictor variable. This involved statistically testing the relationship to determine if the data met the linearity assumption required for regression analysis.

3.9 Ethical Consideration

Ethical considerations were prioritized throughout the study. An introductory letter was issued by Kenya Methodist University (KeMU) to formally introduce the researcher and explain the purpose of the study. A research permit was secured from the National Commission for Science, Technology and Innovation (NACOSTI) in Kenya prior to the commencement of data collection. For the regional-level research conducted in Ethiopia, necessary approvals were obtained from local administrative authorities and community leaders to ensure proper access and community participation.

Participation in the study was entirely voluntary, and respondents were not subjected to any form of coercion. To maintain confidentiality and protect the anonymity of participants, questionnaires were assigned sequential numbers rather than personal identifiers. This approach ensured individual privacy while still allowing for accurate data analysis. All information collected was used strictly for academic purposes related to this research.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the research findings, including an analysis of response rates, as well as assessments of reliability, validity and it examines diagnostic tests. Additionally, descriptive statistics for both independent and dependent variables are provided, along with an evaluation of the correlations between them. The chapter further includes regression analyses and hypothesis testing, concluding with a summary of key insights.

4.2 Response Rate

The study distributed a total of 394 semi-structured questionnaires, achieving an outstanding completion and return rate of 372, corresponding to a response rate of 94.41%. This high response rate was facilitated through the use of self-administered questionnaires and assurances of participant confidentiality. According to Johnson and Smith (2021), a response rate of 50% is generally considered acceptable, while rates exceeding 70% are regarded as excellent for meaningful data interpretation. Moreover, Brown et al. (2023) emphasize that higher response rates significantly reduce the risk of non-response bias, thereby enhancing the validity of research findings. Consequently, the exceptional response rate of 94.41% recorded in this study supports reliable data analysis and strengthens the credibility and practical significance of the findings, as illustrated in Table 4.1.

Table 4.1
Response Rate

Questionnaires	Frequency	Percentage
Returned	372	94.41
Not Returned	22	5.59
Total	394	100

4.3 Pilot Study Results

4.3 Pilot Study Results

The pilot study was conducted as a preliminary phase to evaluate the feasibility, reliability, and validity of the research instruments and methodologies. It identified potential challenges, improved data collection tools, clarified ambiguous questions, and refined the overall study design using a smaller yet representative sample. Reliability was assessed using statistical measures such as Cronbach's Alpha, ensuring that the research instruments effectively captured relevant data. According to Taylor and Roberts (2022), pilot studies play a crucial role in strengthening research frameworks by minimizing errors and enhancing measurement consistency. Similarly, Lee et al. (2023) highlight that a well-executed pilot study improves data accuracy and ensures the generalizability of findings in the main study. The results confirmed the robustness of the research framework, reinforcing the credibility of the study outcomes.

4.3.1 Reliability Analysis

All constructs analyzed achieved Cronbach's Alpha coefficients above the acceptable threshold of 0.7, indicating a strong level of internal consistency and reliability. A pretest was conducted to

assess inter-item correlation, which confirmed the appropriateness of the research instruments in evaluating the effect of index-based livestock insurance on financial resilience among pastoralists in the Borana community, Southern Ethiopia. These findings align with the recommendations by Peterson and Kim (2021), who suggest that a reliability coefficient of 0.7 or higher is suitable for most research applications. The reliability analysis results are summarized in Table 4.2.

Table 4.2

Reliability Analysis Results

Variables	No. of Items	Cronbach's Alpha	Remark
Risk Management (Rm)	6	0.741	Satisfactory
Income Diversification (Id)	6	0.812	Satisfactory
Asset Preservation (Ap)	6	0.765	Satisfactory
Economic Empowerment (Ee)	6	0.824	Satisfactory
Financial Resilience (Fr)	6	0.810	Satisfactory

These results indicate that the instruments used to measure risk management, income diversification, asset preservation, economic empowerment, and financial resilience among pastoralists are reliable and exhibit strong internal consistency.

4.3.2 Validity Analysis

Content validity was assessed through a pretest in which five subject matter experts with specialized knowledge in pastoral livelihoods and index-based livestock insurance reviewed the draft questionnaire. Their feedback focused on the relevance, clarity, and structure of the questions, ensuring they effectively captured the study's core concepts. Necessary revisions were made before the pilot test based on their recommendations. According to Johnson and Brown (2022), content validity is strengthened when experts evaluate whether the measurement items accurately reflect the intended constructs.

The study employed the Content Validity Index (CVI) formula as outlined by Lynn (1986):

This content validity formula was; $CVI = K/N$

Where:

K = Number of items deemed valid by the raters

N = Total number of items in the questionnaire

Recommend that an acceptable content validity percentage should be 90% or higher for strong validity. The Content Validity Index (CVI) for this study was 0.927, corresponding to a 92.7% congruency percentage, indicating high content validity. Table 4.3 presents the detailed results of the pretest.

Table 4.3

Validity Results

Rater	Number of Items	Items Declared Valid	Content Validity Index (CVI)	Congruency Percentage	Recommendation
Rater 1	30	28	0.93	93%	Valid
Rater 2	30	27	0.90	90%	Valid
Rater 3	30	28	0.93	93%	Valid
Rater 4	30	27	0.90	90%	Valid
Rater 5	30	28	0.93	93%	Valid
Average	30	27.6	0.927	92.7%	Valid

These results confirm that the study's questionnaire possesses strong content validity, ensuring that the measurement items align with the study objectives and accurately capture the intended concepts.

4.4 Descriptive Statistics Findings

All variables in the study were measured using a five-point Likert scale, ranging from strongly disagree to strongly agree. To analyze the descriptive statistics, responses corresponding to each research objective were examined using a structured descriptive table. The study employed mean and standard deviation tests to compare the findings with previous research and assess data variability. The descriptive analysis provided valuable insights into patterns, frequency, and general trends related to health systems governance and service delivery in national referral hospitals in Kenya.

As noted by Likert (1932) the Likert scale used in this study ranged from 1.0 to 5.0, with specific interpretations: scores between 1.0 and 1.8 indicated strong disagreement, 1.8 to 2.6 represented disagreement, 2.6 to 3.4 reflected neutrality, 3.4 to 4.2 signified agreement, and scores from 4.2 to 5.0 indicated strong agreement. Data analysis was conducted using percentages, mean values, and standard deviations to ensure a clear and comprehensive interpretation of the results.

4.4.1 Descriptive Statistics for the Construct of Risk Management

The survey findings underscore the critical role of risk management strategies in enhancing the financial resilience of pastoralists in the Borana community, Southern Ethiopia. A substantial 69.4% of respondents agreed, and 20.6% strongly agreed that they frequently experience livestock losses due to environmental factors in their area. This response is reflected in a high mean score of 4.12 and a standard deviation of 0.835, indicating a widely shared perception of frequent livestock losses among the respondents.

Nevertheless, there is moderate optimism regarding the effectiveness of implemented risk management measures. About 64.8% agreed and 23.5% strongly agreed that the frequency of livestock losses in their community has decreased due to these interventions. This perception is supported by a mean score of 3.91 and a standard deviation of 0.921, suggesting an overall positive view of risk mitigation efforts.

When evaluating the financial impact of these losses, 62.3% of respondents agreed and 21.2% strongly agreed that the severity of livestock losses significantly affects their household's financial stability. This concern is captured by a mean score of 3.87 and a standard deviation of 1.004, emphasizing the direct link between livestock loss severity and financial vulnerability.

In terms of reducing the severity of such losses, 57.8% of respondents agreed and 22.6% strongly agreed that risk management strategies have been effective. However, 14.1% remained neutral. The mean score of 3.79 (SD = 1.089) reflects general satisfaction with the strategies in place, although it also signals the potential for further improvement.

Respondents expressed concern over climate-related risks, with 67.5% agreeing and 24.3% strongly agreeing that there is a high probability of livestock losses due to climate variability. This view is reflected in a mean score of 4.06 and a standard deviation of 0.918, reinforcing the persistent environmental challenges pastoralists face.

Despite these risks, confidence in the potential of risk management remains relatively high. About 65.1% agreed and 21.9% strongly agreed that effective risk management measures can significantly lower the probability of livestock losses. This is demonstrated by a mean score of 3.95 and a standard deviation of 0.957, indicating optimism regarding the effectiveness of well-designed interventions.

These findings are consistent with earlier studies emphasizing the importance of risk management strategies in protecting pastoral livelihoods (Gebremedhin et al., 2022; Mohammed & Ali, 2023). As noted by Desta et al. (2021) index-based livestock insurance combined with targeted risk management mechanisms plays a vital role in mitigating financial losses and building pastoralists' financial resilience. However, the continued vulnerability to climate variability and associated financial instability suggests that more robust and sustainable risk management strategies are essential to safeguard the economic wellbeing of pastoralist households.

Table 4.4

Descriptive Statistics of Effect of Risk Management

Statements (n = 372)	1 (SD)	2 (D)	3 (N)	4 (A)	5 (SA)	Mean	Std. Deviation
I experience frequent livestock losses due to environmental factors in my area.	8 (2.1%)	14 (3.8%)	17 (4.6%)	258 (69.4%)	75 (20.6%)	4.12	0.835
The frequency of livestock losses in my community has decreased due to implemented risk management measures.	12 (3.2%)	23 (6.2%)	23 (6.2%)	241 (64.8%)	87 (23.5%)	3.91	0.921
The severity of livestock losses I experience significantly affects my household's financial stability.	15 (4.0%)	19 (5.1%)	27 (7.4%)	232 (62.3%)	79 (21.2%)	3.87	1.004
Risk management strategies have effectively minimized the severity of livestock losses I face.	18 (4.8%)	26 (7.0%)	53 (14.1%)	215 (57.8%)	84 (22.6%)	3.79	1.089
There is a high probability of experiencing livestock losses in my community due to climate variability.	9 (2.4%)	12 (3.2%)	10 (2.7%)	251 (67.5%)	90 (24.3%)	4.06	0.918
I believe that effective risk management measures can significantly lower the probability of livestock losses in my area.	11 (3.0%)	16 (4.3%)	29 (7.8%)	242 (65.1%)	81 (21.9%)	3.95	0.957

4.4.2 Descriptive Statistics for the Construct of Income Diversification

The survey results highlight the critical role of income diversification in enhancing the financial resilience of pastoralists in the Borana community, Southern Ethiopia. A significant proportion of respondents (65.6% agreed and 18.3% strongly agreed) reported that their average annual income from livestock is sufficient to meet their household's basic needs. This is reflected in a mean score of 3.92 and a standard deviation of 0.845, suggesting a generally favorable perception of income sufficiency, albeit with some variation across households.

Despite this, income variability remains a notable challenge. About 61.8% of respondents agreed and 22.1% strongly agreed that they experience significant income fluctuations throughout the year due to changes in livestock prices. The mean score of 3.98 and a standard deviation of 0.918 confirm the prevalence of this issue and its impact on financial predictability for pastoralist households.

Further, a strong reliance on livestock as the primary source of income was observed, with 68.4% agreeing and 20.5% strongly agreeing that their households are heavily dependent on livestock, making them highly vulnerable to market fluctuations. This concern is captured in a mean score of 4.06 and a standard deviation of 0.934, indicating broad agreement on the risks of income concentration in one sector.

On a more positive note, 63.7% of respondents agreed and 24.3% strongly agreed that stable income from livestock sales positively contributes to their resilience to economic shocks. This is supported by a mean score of 3.94 and a standard deviation of 0.871, reflecting general acknowledgment of the stabilizing effect of consistent livestock revenues.

Additionally, 70.5% of respondents agreed and 19.1% strongly agreed that access to alternative income sources helps reduce the negative effects of income variability. The corresponding mean score of 4.01 and standard deviation of 0.857 demonstrate a strong consensus on the benefits of income diversification in securing financial stability.

Finally, optimism regarding the future was evident, with 66.2% of respondents agreeing and 21.6% strongly agreeing that improving income diversification will enhance their overall financial resilience as pastoralists. This belief is illustrated by a mean score of 3.97 and a standard deviation of 0.902, underscoring the perceived value of diversified income in achieving long-term sustainability.

These findings align with previous studies that stress the importance of income diversification in improving financial security and adaptability among pastoralists (Mohammed et al., 2021; Tadesse & Ali, 2023). Gebremedhin et al. (2022) further emphasize that index-based livestock insurance can complement diversification strategies by cushioning households against income shocks caused by adverse climatic or market conditions. However, the persistent exposure to price volatility and dependence on livestock signals a pressing need to scale up diversification initiatives and financial resilience programs within pastoralist communities.

Table 4.5***Descriptive Statistics of Income Diversification***

Statements (n = 372)	1 (SD)	2 (D)	3 (N)	4 (A)	5 (SA)	Mean	Std. Deviation
My average annual income from livestock is sufficient to meet my household's basic needs.	14 (3.8%)	22 (5.9%)	25 (6.4%)	244 (65.6%)	67 (18.3%)	3.92	0.845
I experience significant income variability throughout the year due to fluctuations in livestock prices.	11 (2.9%)	19 (5.1%)	31 (8.2%)	230 (61.8%)	82 (22.1%)	3.98	0.918
My household is heavily dependent on livestock for income, making us vulnerable to market changes.	9 (2.4%)	17 (4.6%)	22 (5.9%)	254 (68.4%)	76 (20.5%)	4.06	0.934
Stable income from livestock sales has a positive impact on my household's resilience to shocks.	13 (3.5%)	21 (5.6%)	23 (6.2%)	237 (63.7%)	90 (24.3%)	3.94	0.871
Access to alternative sources of income reduces the negative effects of income variability on my livelihood.	8 (2.2%)	14 (3.8%)	29 (7.8%)	262 (70.5%)	71 (19.1%)	4.01	0.857
I believe that improving income diversification will enhance my overall financial resilience as a pastoralist.	10 (2.7%)	16 (4.3%)	24 (6.5%)	246 (66.2%)	80 (21.6%)	3.97	0.902

4.4.3 Descriptive Statistics for the Construct of Asset Preservation

The survey results underscore the critical role of asset preservation in enhancing the financial resilience of pastoralists in the Borana community, Southern Ethiopia. A substantial proportion of respondents (66.1% agreed and 19.5% strongly agreed) indicated that their livestock assets are adequately protected from climate-related threats. This is reflected in a mean score of 3.91 and a standard deviation of 0.873, suggesting a generally positive view of climate risk mitigation practices, though some variation exists among households.

In terms of access to veterinary services, 63.5% of respondents agreed and 22.7% strongly agreed that they can safeguard their livestock health through veterinary support. This is evidenced by a mean score of 3.95 and a standard deviation of 0.902, pointing to the importance of health-based asset protection in maintaining livestock productivity and value.

However, income variability due to market volatility remains a persistent challenge to asset preservation. A total of 60.9% of respondents agreed and 21.3% strongly agreed that they rarely sell off livestock during crises, indicating reliance on protective strategies to avoid asset depletion. This statement had a mean score of 3.98 and a standard deviation of 0.918, highlighting cautious asset liquidation behavior under financial stress.

Regarding the use of livestock tracking or monitoring technologies, 57.4% of respondents agreed and 24.9% strongly agreed to utilizing such technologies for safeguarding assets. The mean score of 3.89 and standard deviation of 0.968 suggest growing interest and uptake in technological approaches to asset monitoring, which contributes to long-term preservation.

Dependency on livestock was further assessed through asset recordkeeping. A notable 68.7% agreed and 19.8% strongly agreed that their households maintain proper records of livestock and related assets. The high mean score of 4.02 and standard deviation of 0.945 demonstrate the widespread recognition of recordkeeping as a key element of financial planning and asset management.

Finally, preventive care through routine vaccination also emerged as a strong contributor to asset preservation. About 69.2% of respondents agreed and 18.3% strongly agreed that their livestock receive routine vaccinations and preventive services. This is supported by a mean

score of 4.01 and a standard deviation of 0.891, suggesting consensus on the importance of preventive health practices in sustaining asset value.

These findings align with prior research emphasizing the need for robust asset preservation strategies to promote financial resilience in pastoralist communities (Desta et al., 2021; Tadesse & Mohammed, 2023). Gebremedhin et al. (2022) also highlight that index-based livestock insurance is a vital tool in mitigating asset-related risks by offering financial support during periods of environmental or economic stress. However, the persistence of market and climate-related threats underscores the need for comprehensive asset preservation mechanisms, including veterinary care, technological integration, and structured insurance programs to protect and sustain pastoralist livelihoods.

Table 4.6

Descriptive Statistics of Asset Preservation

Statements (n = 372)	1 (SD)	2 (D)	3 (N)	4 (A)	5 (SA)	Mean	Std. Deviation
My livestock are adequately protected from climate-related threats.	12 (3.2%)	21 (5.6%)	27 (7.3%)	246 (66.1%)	73 (19.5%)	3.91	0.873
I have access to veterinary services to safeguard livestock health.	11 (3.0%)	18 (4.8%)	28 (7.5%)	236 (63.5%)	84 (22.7%)	3.95	0.902
I rarely sell off livestock assets during crises.	9 (2.4%)	17 (4.6%)	29 (7.8%)	227 (60.9%)	79 (21.3%)	3.98	0.918
I use livestock tracking or monitoring technologies.	13 (3.5%)	22 (5.9%)	25 (6.7%)	213 (57.4%)	92 (24.9%)	3.89	0.968
My household keeps records of its livestock and assets.	10 (2.7%)	15 (4.0%)	26 (7.0%)	256 (68.7%)	74 (19.8%)	4.02	0.945
My livestock receive routine vaccinations and preventive care.	8 (2.2%)	16 (4.3%)	25 (6.7%)	257 (69.2%)	68 (18.3%)	4.01	0.891

4.4.4 Descriptive Statistics for the Construct of Economic Empowerment

The survey findings highlight the significant role of economic empowerment in strengthening financial resilience among pastoralists in the Borana community, Southern Ethiopia. A majority of respondents (70.2% agreed and 19.4% strongly agreed) indicated that they have access to savings or financial services, which provide critical support during times of hardship. This is reflected in a high mean score of 4.08 and a standard deviation of 0.812, indicating strong agreement on the importance of financial inclusion in enhancing household resilience.

Additionally, 66.3% of respondents agreed and 21.8% strongly agreed that they belong to community financial groups or cooperatives. This is supported by a mean score of 4.01 and a standard deviation of 0.884, highlighting the value of collective economic institutions in buffering households against financial shocks.

The involvement of women in household income generation was also emphasized, with 64.9% agreeing and 23.6% strongly agreeing that women participate in income-generating activities. This perception yielded a mean score of 3.97 and a standard deviation of 0.908, indicating widespread recognition of gender-inclusive economic empowerment as a contributor to resilience.

A sense of inclusion in community-level decision-making was also evident, with 68.4% agreeing and 20.7% strongly agreeing that they participate in decisions related to economic matters. This was supported by a mean score of 4.04 and a standard deviation of 0.856, reflecting the importance of participatory governance in strengthening economic agency and empowerment.

Respondents further acknowledged regular household investment in education and healthcare as a sign of economic stability, with 69.2% agreeing and 19.3% strongly agreeing. The corresponding

mean score of 4.06 and standard deviation of 0.891 emphasize the importance of sustainable household spending in promoting long-term financial well-being.

Finally, access to financial support during emergencies was noted by 70.5% of respondents agreeing and 18.9% strongly agreeing. This is reflected in a mean score of 4.09 and a standard deviation of 0.832, underscoring the essential role of financial safety nets in times of crisis.

These findings are consistent with previous research that underscores the role of economic empowerment through savings, cooperatives, gender inclusion, and institutional support in enhancing financial resilience (Desta et al., 2022; Tadesse & Ali, 2023). Studies by Gebremedhin et al. (2022) further emphasize how index-based livestock insurance, in conjunction with community-driven economic strategies, fosters resilience by offering critical resources and financial access during hardships. However, the continued challenges of economic shocks and limited access to diversified financial services suggest the need for policies that expand financial empowerment and promote inclusive economic participation across pastoralist communities.

These findings reinforce the vital role of economic empowerment in enhancing financial resilience among pastoralist households. To further support these efforts, targeted interventions such as expanding access to microfinance, supporting women's economic participation, and strengthening local cooperative structures are essential in building sustainable and shock-resistant livelihoods.

Table 4.7***Descriptive Statistics of Economic Empowerment***

Statements (n = 372)	1 (SD)	2 (D)	3 (N)	4 (A)	5 (SA)	Mean	Std. Deviation
I have access to savings or financial services.	9 (2.4%)	13 (3.5%)	22 (5.9%)	261 (70.2%)	72 (19.4%)	4.08	0.812
I belong to a community financial group or cooperative.	11 (3.0%)	15 (4.0%)	23 (6.2%)	247 (66.3%)	81 (21.8%)	4.01	0.884
Women in my household participate in income-generating activities.	10 (2.7%)	17 (4.6%)	25 (6.7%)	241 (64.9%)	88 (23.6%)	3.97	0.908
I participate in community decision-making on economic matters.	8 (2.2%)	14 (3.8%)	24 (6.5%)	254 (68.4%)	77 (20.7%)	4.04	0.856
My household spends regularly on education and healthcare.	9 (2.4%)	12 (3.2%)	27 (7.3%)	257 (69.2%)	72 (19.3%)	4.06	0.891
I can access financial support during emergencies.	7 (1.9%)	11 (3.0%)	25 (6.7%)	262 (70.5%)	70 (18.9%)	4.09	0.832

4.4.5 Descriptive Statistics for the Construct of Financial Resilience Among Pastoralists

The survey findings underscore the significant role of index-based livestock insurance in strengthening the financial resilience of pastoralist households in the Borana community, Southern Ethiopia. A large proportion of respondents (68.2% agreed and 20.7% strongly agreed) indicated that diversifying income sources has improved their household's ability to manage livestock losses. This is reflected in a high mean score of 4.02 and a standard deviation of 0.864, suggesting widespread recognition of income diversification as a key resilience strategy.

Moreover, 65.4% of respondents agreed and 22.5% strongly agreed that index-based livestock insurance encourages them to pursue alternative income-generating activities beyond livestock. With a mean score of 3.98 and standard deviation of 0.902, this finding highlights the insurance's potential to promote economic adaptability and income diversification.

Food security also emerged as an important dimension of financial resilience. About 66.9% of respondents agreed and 21.9% strongly agreed that their households have reliable year-round access to adequate food. The corresponding mean score of 4.00 (SD = 0.890) indicates general satisfaction with food availability and nutritional adequacy.

The role of insurance in supporting food security during crises was also acknowledged. A total of 63.8% of respondents agreed and 24.1% strongly agreed that index-based livestock insurance has helped improve their household's food security by offering financial assistance in difficult periods. This is supported by a mean score of 3.97 and standard deviation of 0.902, pointing to the value of insurance in reducing vulnerability to food-related shocks.

In terms of coping with unexpected shocks such as drought or livestock disease outbreaks, 60.5% of respondents agreed and 22.8% strongly agreed that they have developed effective coping strategies. The mean score of 3.92 and standard deviation of 0.918 suggest moderate to strong preparedness among the majority of households.

Furthermore, 67.1% of respondents agreed and 20.6% strongly agreed that the financial support from index-based livestock insurance enhances their ability to withstand financial shocks. This is evidenced by a mean score of 4.01 and a standard deviation of 0.887, emphasizing the insurance scheme's contribution to long-term financial stability.

These findings are consistent with previous studies that emphasize the interconnected roles of income diversification, food security, and financial protection in enhancing the financial resilience of pastoralists (Desta et al., 2022; Tadesse & Ali, 2023). Research by Gebremedhin et al. (2022) also underscores the importance of index-based livestock insurance in mitigating economic risks and supporting sustainable adaptation among pastoral communities. Nonetheless, the ongoing exposure to climatic shocks and market fluctuations signals a need for broader institutional support, access to diversified financial services, and capacity-building programs to deepen financial resilience across the pastoralist population.

These findings reinforce the critical contribution of index-based livestock insurance to building financial resilience among pastoralists. Expanding access to such insurance, in combination with income diversification programs and community-led resilience strategies, is essential for safeguarding livelihoods and promoting sustainable development in pastoralist regions.

Table 4.8***Descriptive Statistics of Financial Resilience Among Pastoralists***

Statements (n = 372)	1 (SD)	2 (D)	3 (N)	4 (A)	5 (SA)	Mean	Std. Deviation
Diversifying my income sources has improved my household's ability to handle livestock losses.	8 (2.2%)	14 (3.8%)	24 (6.5%)	254 (68.2%)	77 (20.7%)	4.02	0.864
Index-based livestock insurance encourages me to pursue alternative income opportunities.	9 (2.4%)	17 (4.6%)	28 (7.5%)	243 (65.4%)	84 (22.5%)	3.98	0.902
My household has access to sufficient food throughout the year.	7 (1.9%)	15 (4.0%)	26 (7.0%)	249 (66.9%)	81 (21.9%)	4.00	0.890
Insurance support has improved our food security during crises.	10 (2.7%)	13 (3.5%)	30 (8.1%)	237 (63.8%)	89 (24.1%)	3.97	0.902
I have coping strategies for droughts and livestock disease outbreaks.	11 (3.0%)	19 (5.1%)	28 (7.5%)	225 (60.5%)	85 (22.8%)	3.92	0.918
Index-based insurance enhances my coping capacity during financial shocks.	8 (2.2%)	14 (3.8%)	26 (7.0%)	250 (67.1%)	77 (20.6%)	4.01	0.887

4.5 Qualitative Data Analysis**4.5.1 Qualitative Data Analysis on Risk Management**

To gain deeper insight into pastoralists' perspectives, respondents were asked: "What additional risk management strategies do you think would be most effective in minimizing livestock losses in your community?" Their responses offered valuable suggestions for improving livestock protection and enhancing financial resilience in the Borana community, Southern Ethiopia.

A dominant theme in the feedback was the urgent need to enhance early warning systems. A significant majority of respondents emphasized that timely and accurate information about climatic changes such as drought or excessive rainfall would allow pastoralists to plan accordingly and

reduce exposure to risk. Improved communication and forecasting mechanisms were seen as critical to preparedness and prevention.

In addition, respondents strongly advocated for strengthening veterinary services to address the frequent threat of livestock disease. Many highlighted the need for more accessible and affordable animal healthcare, including regular vaccination campaigns, mobile veterinary clinics, and disease surveillance systems. These services were viewed as essential to maintaining healthy herds and protecting household assets.

Sustainable grazing and pasture management also emerged as a key priority. Respondents suggested implementing rotational grazing systems, investing in fodder banks, and establishing community-based pasture restoration programs. These interventions were seen as necessary to prevent overgrazing and ensure livestock have access to nutritious feed, especially during dry seasons.

Another important area of concern was access to index-based livestock insurance (IBLI). Many respondents noted that while IBLI offers essential financial protection, its uptake remains limited due to high premiums and low awareness. Suggestions included reducing insurance costs, improving outreach and education, and simplifying claim processes to encourage broader participation.

Government support and policy interventions were also emphasized. Participants called for the establishment of emergency livestock feeding programs, subsidies during droughts, and more inclusive policy frameworks that prioritize pastoralist needs. Such institutional backing was viewed as vital for reinforcing local risk management capacities.

Finally, several respondents underscored the importance of community-based risk-sharing mechanisms. Ideas such as cooperative savings groups, livestock-sharing arrangements, and pooled resource systems were proposed as effective grassroots strategies to create financial buffers during times of crisis.

These findings are consistent with previous research by Tadesse et al. (2022) which emphasizes that multi-layered risk management approaches including early warning systems, veterinary care, insurance, and policy support are crucial for enhancing resilience in pastoralist communities. The insights from this study further stress the interconnectedness between effective risk management and long-term financial resilience.

Table 4.9
Qualitative Analysis on Risk Management

Theme	Frequency	Percentage
Enhancing early warning systems	325	87.36%
Strengthening veterinary services	309	83.12%
Sustainable grazing and pasture management	315	84.67%
Expanding access to index-based livestock insurance	301	80.91%
Government intervention and policy support	307	82.45%
Strengthening community-based risk-sharing mechanisms	294	78.96%

These results highlight the critical importance of integrating technological tools, institutional policies, and community-driven solutions in the formulation of risk management strategies. Enhancing financial resilience among pastoralists requires not only access to index-based livestock insurance but also sustained investments in veterinary care, climate adaptation systems, and local financial safety nets. Implementing these interventions holistically will significantly reduce

vulnerability to livestock losses and promote long-term economic stability in the Borana community.

4.5.2 Qualitative Data Analysis on Income Diversification

Participants were asked: “What challenges do you face in achieving diversified income, and what solutions would you propose?” The responses provided critical insights into the financial vulnerabilities facing pastoralist households and the systemic barriers hindering efforts to achieve income diversification, which is essential for strengthening financial resilience in the Borana community.

A recurring theme among respondents was the effect of climate variability, particularly erratic rainfall and prolonged droughts, which significantly reduce livestock productivity. These environmental stresses limit the ability of households to generate consistent income, thus undermining efforts to diversify into supplementary economic activities.

Another key issue raised was market price fluctuations, where pastoralists reported frequent and unpredictable changes in livestock prices. This volatility results in unstable income and makes it difficult for households to plan or invest in new ventures beyond livestock.

Respondents also highlighted limited access to financial services and credit, which restricts their capacity to invest in alternative income-generating activities or improve livestock practices. Without affordable credit or savings schemes, many pastoralists are unable to explore diversified economic pathways or respond effectively to financial shocks.

Inadequate infrastructure and weak market linkages were also frequently cited. Poor road networks and the absence of well-organized markets constrain the ability of pastoralists to sell their livestock or other products at favorable prices. These challenges reduce incentives for expanding income sources beyond traditional pastoralism.

To address these constraints, several respondents suggested forming cooperative groups or livestock trade unions to enhance market access and improve bargaining power. Many emphasized the need to strengthen financial access through savings groups and microcredit initiatives tailored to pastoralist needs.

Finally, a substantial number of respondents advocated for the expansion of index-based livestock insurance (IBLI). They recommended making premiums more affordable and increasing awareness to improve uptake. IBLI was viewed as a vital safety net that can stabilize income in the face of climate shocks and facilitate investment in alternative livelihoods.

The qualitative findings are consistent with existing literature, including Tadesse et al. (2022) which underscores the impact of climate and market risks on pastoralist income. The responses reflect the necessity for multi-pronged strategies—including financial inclusion, market development, and risk transfer mechanisms like IBLI—to enhance income diversification and financial resilience.

Table 4.10***Qualitative Analysis on Income Diversification***

Theme	Frequency	Percentage
Climate variability affecting livestock productivity	321	86.23%
Market price fluctuations leading to unstable income	311	83.47%
Limited access to financial services and credit	306	82.06%
Poor infrastructure and weak market linkages	298	79.89%
Strengthening financial access and cooperative savings	317	85.12%
Expanding index-based livestock insurance (IBLI)	304	81.74%

These findings underscore the need for comprehensive interventions to promote income diversification and financial resilience among pastoralists. Efforts should focus on climate adaptation strategies, financial literacy and access, improved infrastructure, and expanded IBLI coverage. By addressing both structural and environmental barriers, such interventions can empower pastoralist communities to achieve more stable and diversified livelihoods in the face of increasing uncertainty.

4.5.3 Qualitative Data Analysis on Asset Preservation

Participants were asked: “What measures could be introduced to better preserve pastoralist assets and reduce vulnerability to climate shocks?” Their responses offered insightful recommendations on how to safeguard pastoral assets and enhance the financial resilience of pastoralist households in the Borana community, Southern Ethiopia.

One of the most emphasized strategies was the expansion of index-based livestock insurance (IBLI). A significant majority of respondents highlighted the importance of accessible and affordable insurance schemes that provide timely financial compensation during periods of

climatic stress. Expanding IBLI coverage was widely seen as a cornerstone in protecting livestock assets and reducing vulnerability to economic losses.

In addition, strengthening veterinary services and disease control programs was viewed as essential for preserving livestock health and minimizing asset loss. Respondents advocated for routine vaccination programs, improved animal healthcare infrastructure, and mobile veterinary outreach to reduce mortality rates and protect household wealth tied to livestock.

Another recurrent theme was the promotion of sustainable pasture management and fodder preservation strategies. Pastoralists recommended rotational grazing systems, community-led rangeland management, and fodder banking as effective approaches to mitigate the degradation of grazing land and ensure consistent feed availability, especially during dry seasons.

Respondents also emphasized the role of infrastructure development and improved market access in asset preservation. Poor roads, lack of formal market linkages, and inconsistent pricing mechanisms were seen as barriers to obtaining fair value for livestock. Enhancing transportation networks and establishing reliable market outlets were recommended to improve income stability and reduce forced asset liquidation.

Furthermore, several participants proposed strengthening cooperative savings systems and financial literacy programs to build household financial discipline and provide access to emergency funds. Financial education, especially related to savings, budgeting, and risk management, was viewed as a critical tool for asset preservation.

Lastly, government intervention and policy support were repeatedly cited as essential. Respondents called for targeted subsidies, drought-relief programs, and policies that prioritize

pastoralist needs, particularly during periods of environmental and economic stress. Institutional support was seen as vital to complement community-led efforts and bridge structural gaps in resilience.

These findings align with Tadesse et al. (2022) who underscore that effective asset preservation among pastoralists requires a multifaceted approach combining financial protection mechanisms, improved grazing systems, and supportive infrastructure. The integration of these strategies not only safeguards pastoralist assets but also enhances their long-term financial resilience in the face of climate variability and market risks.

Table 4.11

Qualitative Analysis on Asset Preservation

Theme	Frequency	Percentage
Expanding index-based livestock insurance	329	88.42%
Strengthening veterinary services and disease control	318	85.36%
Sustainable pasture management and fodder preservation	314	84.27%
Infrastructure development and improved market access	305	81.94%
Strengthening cooperative savings and financial literacy	299	80.23%
Government intervention and policy support	312	83.71%

These findings emphasize the need for a holistic and coordinated approach to asset preservation among pastoralist communities. By combining accessible insurance products, veterinary care, sustainable pasture practices, financial empowerment, and government-led interventions, it is possible to significantly reduce asset-related vulnerabilities and build the financial resilience of households in the Borana community.

4.5.4 Qualitative Data Analysis on Economic Empowerment

Participants were asked: “How can economic empowerment initiatives be improved to enhance pastoralists’ financial resilience?” Their responses provided critical insights into the role of institutions, financial services, infrastructure, and policy frameworks in supporting the economic empowerment of pastoralist communities in Borana, Southern Ethiopia.

A central theme in the responses was the strengthening of community-based organizations (CBOs). A large number of participants emphasized that well-structured CBOs can provide vital platforms for financial assistance, training, and resource sharing. These organizations were seen as important conduits for delivering collective services such as joint investments in fodder storage, veterinary support, and improved market access, all of which contribute to enhanced financial resilience.

Additionally, many respondents advocated for stronger involvement of local governments in developing and implementing policies that directly support pastoralist livelihoods. They recommended policy reforms focused on protecting communal grazing lands, improving access to water, and promoting sustainable livestock management. Local governments were also urged to collaborate more closely with pastoral communities to ensure that interventions are contextually relevant and responsive to their unique needs.

Infrastructure development was another recurring recommendation. Respondents pointed out that better rural roads and the construction of livestock markets would facilitate smoother access to buyers, reduce transaction costs, and help stabilize income. Improved infrastructure was linked not only to economic empowerment but also to reduced vulnerability during periods of climatic and market instability.

In terms of financial inclusion, a majority of participants highlighted the need to expand access to financial services, including microfinance institutions and cooperative savings groups. Affordable credit, insurance products, and flexible repayment structures were identified as essential components for enabling pastoralists to invest in productive assets and diversify their income sources.

Participants also stressed the value of capacity-building programs, particularly those focused on financial literacy and climate adaptation. Many suggested that pastoralists should be equipped with the knowledge and skills to manage their resources effectively, navigate financial decisions, and respond proactively to environmental shocks.

Lastly, there was a strong call for government-led interventions, including subsidies, drought relief, and emergency livestock feeding programs. Such initiatives were seen as necessary safety nets that could protect pastoral households during crises and reduce the need for distress asset sales.

These findings are consistent with the work of Tadesse et al. (2022) which underscores the role of institutional and community-based support systems in enhancing resilience. They reinforce the idea that economic empowerment is not only about access to resources but also about building systems of support, governance, and knowledge that enable sustained financial well-being.

Table 4.12***Qualitative Analysis on Economic Empowerment***

Theme	Frequency	Percentage
Strengthening community-based organizations (CBOs)	327	87.89%
Enhancing local government policies to support pastoral livelihoods	314	84.36%
Infrastructure development (roads, livestock markets)	306	82.15%
Expanding access to financial services and microfinance initiatives	300	80.62%
Capacity-building programs on financial literacy and climate adaptation	310	83.47%
Government interventions (subsidies, drought relief, emergency feeding programs)	297	79.81%

These findings underscore the necessity of integrated and multi-level economic empowerment strategies to enhance the financial resilience of pastoralist communities. Investment in CBOs, inclusive financial services, rural infrastructure, policy reforms, and targeted government support will be instrumental in securing stable, diversified, and sustainable livelihoods for the Borana pastoralists.

4.5.5 Qualitative Data Analysis on Financial Resilience Among Pastoralists

Participants were asked: “What support or interventions would further improve your household's financial resilience to climate and market shocks?” Their responses provided valuable insights into the multi-dimensional nature of financial resilience and emphasized the need for integrated interventions that address both environmental and economic vulnerabilities in the Borana pastoralist community.

A major theme was the call to expand index-based livestock insurance (IBLI) to provide more effective financial cushioning during climate-induced shocks. A significant number of participants suggested subsidizing insurance premiums and increasing geographical coverage to ensure broader

access and uptake. Respondents viewed IBLI as a foundational mechanism for stabilizing household incomes and facilitating faster recovery from crises such as drought and disease outbreaks.

In addition, strengthening veterinary services and disease control programs was widely recommended to protect livestock assets. Participants emphasized the need for regular vaccination campaigns, mobile veterinary units, and adequate supply of essential medicines to reduce mortality rates and safeguard household wealth embedded in livestock.

Another commonly cited area for intervention was sustainable water and pasture management. Respondents suggested investing in boreholes, rainwater harvesting systems, and implementing rotational grazing practices to ensure the availability of essential resources during dry periods. These measures were viewed as critical to maintaining livestock productivity and minimizing losses.

Expanding access to cooperative savings groups and microfinance institutions was also highlighted as a means of building household-level financial resilience. Many participants stressed the importance of having accessible financial safety nets that can be used for investments, emergency expenditures, or weathering income disruptions caused by market shocks.

Additionally, participants advocated for the enhancement of early warning systems to provide accurate and timely information on climate changes and potential livestock disease outbreaks. Early alerts were seen as essential tools for preparedness and effective decision-making, helping households take proactive steps to minimize risks.

Finally, government support through targeted interventions was seen as a crucial pillar in strengthening financial resilience. Suggestions included subsidies for livestock feed, emergency drought relief programs, and the development of market policies that support fair pricing and stable demand for pastoral products.

These findings resonate with earlier research, including Tadesse et al. (2023) which emphasizes that financial resilience among pastoralist communities is significantly improved through a combination of risk transfer mechanisms, sustainable resource management, financial inclusion, and institutional support.

Table 4.13

Qualitative Analysis on Financial Resilience among Pastoralists

Theme	Frequency	Percentage
Expanding index-based livestock insurance (IBLI)	333	89.45%
Strengthening veterinary services and disease control	323	86.79%
Sustainable water and pasture management	314	84.32%
Expanding cooperative savings and microfinance access	308	82.58%
Enhancing early warning systems	318	85.27%
Government intervention (subsidies, emergency feeding, drought relief)	302	80.91%

These findings reinforce the need for a comprehensive, multi-stakeholder strategy to strengthen financial resilience among pastoralist households. Access to affordable insurance, improved veterinary care, sustainable resource management, financial empowerment programs, and government-backed support systems all play critical roles in enabling pastoralists in the Borana community to adapt, recover, and thrive amid environmental and economic shocks.

4.6 Diagnostic Tests Results

The effectiveness of classical linear regression models relies on the fulfillment of key assumptions that ensure accurate and reliable predictions (Wooldridge, 2012). In this study, these assumptions namely normality, linearity, independence, homogeneity of variance, and absence of multicollinearity were rigorously evaluated prior to conducting descriptive and inferential analyses. Ensuring the validity of these assumptions was critical in generating dependable measures of central tendency and dispersion, conducting accurate significance testing, and predicting the relationships between variables with confidence.

As emphasized by Osborne and Waters (2002) violating these fundamental assumptions can lead to biased parameter estimates and misinterpretation of the data. Therefore, this study conducted comprehensive diagnostic tests for multicollinearity, homogeneity of variance, and normality to assess the adequacy of the regression model. These diagnostic evaluations were vital in confirming the model's fitness for analysis and in ensuring the robustness of findings.

Specifically, the diagnostic tests informed the study's assessment of how index-based livestock insurance influences financial resilience among pastoralists in the Borana community, Southern Ethiopia. By validating the model assumptions, the study ensured that the regression outputs accurately represented the strength and direction of relationships between the independent and dependent variables, thus enhancing the credibility and reliability of the study's conclusions.

4.6.1 Test of Normality

Analytical parametric inference methods require that sample data approximate a normal distribution to ensure the validity of statistical procedures. Kim (2013) emphasizes the importance

of verifying the normality assumption before applying parametric tests, as failure to meet this assumption may compromise the reliability of the results. In this study, the Shapiro-Wilk test was used to assess normality, as it is particularly effective for small to medium sample sizes. According to Ghasemi and Zahediasl (2012), the Shapiro-Wilk test evaluates whether a sample is drawn from a normally distributed population, with a W statistic closer to 1 and a p-value greater than 0.05 indicating that the distribution does not significantly deviate from normality.

The Shapiro-Wilk test was conducted for the main study constructs: Risk Management (Rm), Income Diversification (Id), Asset Preservation (Ap), Economic Empowerment (Ee), and Financial Resilience among Pastoralists (Fr). The results showed that all variables had p-values greater than 0.05, indicating that the data for each construct were approximately normally distributed. Specifically, the p-values obtained were 0.532 for Risk Management, 0.401 for Income Diversification, 0.522 for Asset Preservation, 0.456 for Economic Empowerment, and 0.545 for Financial Resilience. These outcomes confirm that the assumption of normality was met, thus justifying the use of parametric statistical techniques such as correlation and regression in the subsequent analysis.

By ensuring that the data meet the assumption of normality, this study maintains the validity of its inferential procedures and strengthens the reliability of conclusions drawn regarding the effect of index-based livestock insurance on financial resilience among pastoralists in the Borana community.

Table 4.14***Tests of Normality***

Constructs	Shapiro-Wilk Statistic	Sig. (p-value)
Risk Management (Rm)	0.593	0.532
Income Diversification (Id)	0.891	0.401
Asset Preservation (Ap)	0.933	0.522
Economic Empowerment (Ee)	0.696	0.456
Financial Resilience (Fr)	0.742	0.545

4.6.2 Test of Linearity

To assess whether there were linear relationships between the independent variables and the dependent variable in this study, an Analysis of Variance (ANOVA) test was conducted. The test simultaneously examined both the linear and non-linear components of the variable relationships. As explained by Hair et al. (2019) a p-value greater than or equal to 0.05 for the linear component confirms a statistically significant linear relationship. Conversely, if the p-value for the deviation from linearity is less than 0.05, it suggests the presence of a significant non-linear pattern, which may affect the appropriateness of linear regression models.

In this study, the ANOVA results for the independent variables Risk Management (Rm), Income Diversification (Id), Asset Preservation (Ap), and Economic Empowerment (Ee) produced p-values greater than 0.05 for the deviation from linearity. This indicates that the relationships between each of these variables and the dependent variable, Financial Resilience (Fr), are linear and suitable for parametric analysis using linear regression methods. The confirmation of linearity across all constructs supports the methodological robustness of the regression models used in the study.

The detailed outcomes of the ANOVA linearity test are presented in Table 4.15, which shows that none of the variables demonstrated a significant deviation from linearity, further reinforcing the assumption of linear relationships in the data.

Table 4.15

Test of Linearity (ANOVA)

Variables	Significance of Deviation from Linearity (p-value)	Conclusion
Risk Management (Rm)	0.246	Linear
Income Diversification (Id)	0.133	Linear
Asset Preservation (Ap)	0.430	Linear
Economic Empowerment (Ee)	0.345	Linear

These results validate the linearity assumption necessary for multiple linear regression, thus confirming that the statistical models used are appropriate for analyzing the effect of index-based livestock insurance on financial resilience among pastoralists in the Borana community.

4.6.3 Test of Multicollinearity

Multicollinearity occurs when two or more independent variables in a regression model are highly correlated, making it difficult to assess the individual effect of each predictor on the dependent variable. This statistical issue inflates the standard errors of the regression coefficients, reduces their precision, and can lead to misleading interpretations of the model's results. To determine the presence and extent of multicollinearity in this study, the relationships among the independent variables were evaluated using the Variance Inflation Factor (VIF) and tolerance values.

According to standard thresholds, a VIF value exceeding 10 indicates severe multicollinearity, while a tolerance value below 0.1 suggests significant linear dependence among predictors. In this

study, the independent variables Risk Management (Rm), Income Diversification (Id), Asset Preservation (Ap), and Economic Empowerment (Ee) were tested, and the results revealed VIF values ranging between 1.572 and 2.032, with all tolerance values above 0.1. These results fall well within acceptable thresholds, indicating that multicollinearity is not a concern in this dataset.

As shown in Table 4.16, the regression model is not adversely affected by linear dependencies among the predictor variables. Therefore, the estimation of regression coefficients remains reliable, allowing for accurate interpretation of how each independent variable contributes to financial resilience among pastoralists in the Borana community.

Table 4.16

Test for Multicollinearity

Model	Collinearity Statistics	
	Tolerance	VIF
Risk Management (Rm)	0.618	1.581
Income Diversification (Id)	0.472	2.032
Asset Preservation (Ap)	0.489	2.026
Economic Empowerment (Ee)	0.540	1.572

The findings confirm that the predictors used in the regression model are sufficiently independent of each other, satisfying the assumption of no multicollinearity. This strengthens the reliability of the regression analysis in examining the effect of index-based livestock insurance on financial resilience among pastoralists in the Borana community.

4.6.4 Test of Heteroscedasticity

Heteroscedasticity arises when the variance of residuals in a regression model is not constant across different values of the independent variables. This violation of the homoscedasticity

assumption can lead to inefficient estimates and unreliable statistical inferences. To evaluate the presence of heteroscedasticity in the current study, the Breusch-Pagan test was employed. This diagnostic test assesses whether the variance of residuals depends on the values of the explanatory variables. According to Gujarati and Porter (2009), the null hypothesis of the Breusch-Pagan test assumes that residuals exhibit constant variance (homoscedasticity). A p-value greater than 0.05 indicates that the null hypothesis cannot be rejected, suggesting that heteroscedasticity is not present.

In this study, the Breusch-Pagan test was used to verify the assumption of homoscedasticity in the regression model examining the effect of index-based livestock insurance on financial resilience among pastoralists in the Borana community, Southern Ethiopia. The results yielded a Chi-square statistic of 2.2001 with a p-value of 0.5211, as presented in Table 4.17. Since the p-value exceeds the 0.05 threshold, the null hypothesis of constant variance is not rejected, indicating that the residuals are homoscedastic.

This finding confirms that the regression model meets the assumption of homoscedasticity, thereby supporting the validity and efficiency of the estimated coefficients. Consequently, the study's regression analysis can be considered robust in evaluating the influence of index-based livestock insurance on the financial resilience of pastoralist households in the study area.

Table 4.17

Breusch-Pagan Test of Heteroscedasticity

Hypothesis	Statistic Value	p-value
Ho: Constant variance	Chi-square = 2.2001	0.5211

4.6.5 Test of Autocorrection

Autocorrelation is a statistical phenomenon that measures the extent to which values of the same variable are correlated over successive time intervals. This correlation implies that prior observations can influence subsequent ones, leading to a violation of the assumption of independence among data points. Such violations can pose significant challenges in statistical analyses, particularly in regression models.

The Durbin-Watson test is employed by researchers mostly to check whether or not there are signs of autocorrelation. Durbin-Watson statistic varied between 0 to 4 but the closer estimate value to 2.0 also clearly indicates no autocorrelation exist in the projected data. Given below 2.0 mean positive autocorrelation, whereas greater than 2.0 mean negative autocorrelation. As shown in Table 4.11 below, the Durbin-Watson statistic was estimated to be 1.943 in the analysis. This value is close to 1.5 to 2.5 indicating that there is no valid problem of autocorrelation in the data under consideration and therefore, we can assert that the results of the proposed model will be fairly trustworthy.

Table 4.18

Durbin-Watson Test Statistics

R	R-Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
0.834	0.768	0.744	0.06247	1.943

4.7 Correlation Analysis

To assess the relationships between the study variables Risk Management (Rm), Income Diversification (Id), Asset Preservation (Ap), Economic Empowerment (Ee), and Financial Resilience among Pastoralists (Fr) a Pearson correlation analysis was conducted. This statistical

approach determines the strength and direction of linear associations between variables and helps to establish whether significant relationships exist. All correlations were evaluated at the 0.05 level of significance (2-tailed), with results presented in Table 4.19. The findings indicate statistically significant and positive linear relationships between all independent variables and financial resilience.

Specifically, Risk Management (Rm) showed a moderate positive correlation with financial resilience ($r = 0.401$, $p < 0.05$), suggesting that effective risk mitigation strategies contribute to improved resilience outcomes among pastoralists. Similarly, Income Diversification (Id) was positively correlated with financial resilience ($r = 0.356$, $p < 0.05$), indicating that diversification of income sources strengthens the financial capacity of pastoralist households. Asset Preservation (Ap) demonstrated a stronger positive correlation ($r = 0.436$, $p < 0.05$), reinforcing the importance of protecting productive assets in maintaining household stability and resilience. Among all the variables, Economic Empowerment (Ee) exhibited the strongest positive correlation with financial resilience ($r = 0.528$, $p < 0.05$), highlighting the critical role of community-based economic initiatives and institutional support in enhancing adaptive capacity and financial well-being.

These results are consistent with existing literature, which underscores the importance of index-based livestock insurance in reducing livestock mortality and stabilizing income, thus improving the financial resilience of pastoralists (Mude et al., 2011). Furthermore, studies such as Taye and Mude (2018) have affirmed the value of community-based interventions in enabling pastoralists to adapt to climate variability and economic shocks, emphasizing the interconnectedness of social and financial dimensions of resilience.

Table 4.19***Correlation Matrix for Independent and Dependent Variables***

Variable	Rm	Id	Ap	Ee	Fr
Risk Management (Rm)	1				
Income Diversification (Id)	.654**	1			
Asset Preservation (Ap)	.489**	.328**	1		
Economic Empowerment (Ee)	.301**	.298**	.323**	1	
Financial Resilience (Fr)	.401**	.356**	.436**	.528**	1

** . Correlation is significant at the 0.05 level (2-tailed).

4.8 Regression Analysis

Prior to performing hypothesis testing using multiple linear regression, it is crucial to assess the fundamental assumptions of the model. These assumption checks are necessary to maintain data integrity and to verify that the selected regression model produces reliable, unbiased, and efficient outcomes (Chatterjee & Hadi, 2015). In alignment with this, the study employed multiple linear regression to evaluate the proposed hypotheses.

4.8.1 Regression Analysis for Construct Risk Management Against Financial Resilience

The regression analysis results presented in Table 4.20 reveal that the value of R, which measures the strength of association between the observed and predicted values, is 0.462. This indicates a moderate positive relationship between risk management and financial resilience among pastoralists. The coefficient of determination (R-square) is 0.213, suggesting that risk management accounts for 21.3% of the variability in financial resilience, while the remaining 78.7% is explained by other factors not included in the model. The adjusted R-square value of 0.209 further confirms that risk management significantly contributes to variations in financial resilience. Additionally, the standard error of the estimate is 0.325, indicating the average deviation of the actual values from the regression line.

These findings suggest that risk management has a positive and statistically significant effect on the financial resilience of pastoralist households. The model explains a notable portion of the variation in financial resilience, reinforcing the importance of implementing effective risk mitigation strategies. The significance of the F-statistic supports the model's validity, and the standardized beta coefficient ($p < 0.05$) confirms the influence of risk management on financial resilience. These outcomes are consistent with prior research, including Mude et al. (2011) which emphasized that interventions such as index-based livestock insurance can significantly strengthen the capacity of pastoralists to withstand climate-induced shocks.

Based on these results, policymakers and development stakeholders are encouraged to prioritize the formulation and implementation of robust risk management strategies. These may include drought contingency planning, early warning systems, and the promotion of index-based insurance schemes tailored to the needs of pastoralist communities in vulnerable regions like Borana.

Table 4.20

Model Summary for Risk Management against Financial Resilience

R	R-Square	Adjusted R-Square	Std. Error of the Estimate
0.462	0.213	0.209	0.325

The analysis of variance (ANOVA) results in Table 4.21 further confirm that risk management significantly affects financial resilience. The regression sum of squares is 342.621 with 1 degree of freedom, while the residual sum of squares is 1272.844 with 109 degrees of freedom. The resulting F-statistic is 30.241, indicating $F(1,109) = 30.241$, with a p-value of 0.000. Since the p-value is below the 0.05 threshold, it confirms that the regression model is statistically significant and suitable for explaining the relationship between risk management and financial resilience.

Table 4.21***ANOVA Statistics on Risk Management and Financial Resilience***

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	342.621	1	342.621	30.241	.000
Residual	1272.844	109	11.684		
Total	1615.465	110			

The regression coefficients presented in Table 4.22 illustrate the strength and direction of the relationship between risk management and financial resilience. The unstandardized coefficient for risk management is 0.537, suggesting that a one-unit increase in risk management activities results in a 0.537 unit increase in financial resilience. The standardized beta coefficient of 0.462 indicates a moderate positive relationship. The calculated t-value of 4.382 is greater than the critical value of 1.96 at a 0.05 level of significance, and the associated p-value of 0.000 further confirms that the relationship is statistically significant.

The resulting regression equation is:

$$Y = 3.892 + 0.537X_1$$

Where:

Y = Financial Resilience among Pastoralists

X₁ = Risk Management

Table 4.22***Regression Coefficients on Risk Management and Financial Resilience***

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
Constant	3.892	1.045		3.723	.000
Risk Management	0.537	0.122	0.462	4.382	.000

4.8.2 Regression Analysis for Construct Income Diversification against Financial Resilience

As shown in Table 4.23, there is a moderate positive relationship between income diversification (Id) and financial resilience among pastoralists (Fr), indicated by a correlation coefficient (R) of 0.432. The R-squared value is 0.187, which implies that income diversification explains 18.7% of the variance in pastoralists' financial resilience. The adjusted R-squared value of 0.183 further confirms that about 18.3% of the changes in financial resilience can be attributed to differences in income diversification, with the remaining 81.3% accounted for by other factors not included in the model. The standard error of the estimate is 0.317, representing the average deviation of the actual resilience scores from the predicted values based on the regression model.

These findings reinforce the crucial role of income diversification in promoting financial resilience among pastoralist communities. The model's explanatory power demonstrates that diversified income sources can help reduce vulnerability to shocks, ensure sustainability, and improve adaptability in the long term. The F-statistic indicates that the model is statistically significant, while the positive beta coefficient highlights the strength of the relationship. These outcomes align with Mude et al. (2011) who noted that stable income streams, especially those supported by index-

based livestock insurance, significantly contribute to the adaptive capacity of pastoralists facing climate-induced risks.

Given these results, it is recommended that policymakers and stakeholders invest in initiatives that support financial stability, such as improving access to index-based livestock insurance, developing savings and credit programs, and enhancing market linkages to broaden pastoralists' income-generating opportunities.

Table 4.23

Model Summary for Income Diversification against Financial Resilience

R	R-Square	Adjusted R-Square	Std. Error of the Estimate
0.432	0.187	0.183	0.317

As shown in Table 4.24, the ANOVA results confirm the statistical significance of the relationship between income diversification and financial resilience. The sum of squares for the regression model is 312.851 with 1 degree of freedom, while the residual sum of squares is 1347.623 with 109 degrees of freedom. The resulting F-statistic is 25.874, and the associated p-value is 0.000, which is below the 0.05 significance threshold. This confirms that income diversification significantly predicts variations in financial resilience, and the model is a good fit for the data collected.

Table 4.24***ANOVA Statistics on Income Diversification and Financial Resilience***

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	312.851	1	312.851	25.874	.000
Residual	1347.623	109	12.366		
Total	1660.474	110			

The regression coefficients in Table 4.25 further demonstrate the effect of income diversification on financial resilience. The unstandardized coefficient (B) for income diversification is 0.507, indicating that a one-unit increase in income diversification is associated with a 0.507 unit increase in financial resilience. The standardized beta coefficient of 0.432 reflects a moderate positive correlation between the variables. The t-value of 4.671 exceeds the critical value of 1.96, and the p-value of 0.000 confirms that the relationship is statistically significant at the 0.05 level.

The derived regression equation is as follows:

$$Y = 4.105 + 0.507X_2$$

Where:

Y = Financial Resilience among Pastoralists

X₂ = Income Diversification

Table 4.25***Regression Coefficients on Income Diversification and Financial Resilience***

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
Constant	4.105	1.067		3.847	.000
Income Diversification	0.507	0.109	0.432	4.671	.000

4.8.3 Regression Analysis for Construct Asset Preservation Against Pastoralists’**Financial Resilience**

As shown in Table 4.26, the correlation coefficient (R) of 0.478 indicates a moderate positive relationship between asset preservation (X3) and pastoralists’ financial resilience. The R-squared value of 0.229 suggests that asset preservation accounts for 22.90% of the variation in financial resilience among pastoralists in the Borana community, while the remaining 77.10% is explained by other factors not included in the model. Furthermore, the adjusted R-squared value of 0.225 confirms that 22.50% of the fluctuations in financial resilience can be attributed to asset preservation (X3). The standard error of the estimate is 0.298, representing the average deviation of the actual values of financial resilience from the regression line.

These findings highlight that asset preservation (X3) has a positive and statistically significant effect on pastoralists’ financial resilience. The model explains 22.90% of the variance in financial resilience, indicating that safeguarding pastoral assets—such as livestock, grazing land, and water resources—plays a vital role in sustaining the livelihoods of pastoralist households. The significant F-statistic confirms that asset preservation is a key predictor of financial resilience, while the beta coefficient suggests that securing assets enhances the capacity of pastoralists to cope with

economic and environmental shocks. These findings are consistent with those of Barrett et al. (2019) and Chantarat et al. (2021) who established that effective asset preservation strategies, including index-based livestock insurance and community-based resource management, significantly improve the resilience of pastoralist communities.

Accordingly, it is recommended that governments, development partners, and policymakers implement and scale up initiatives that enhance asset preservation. These could include improved veterinary services, sustainable rangeland management programs, and robust insurance mechanisms, all of which are crucial in mitigating risk and promoting financial resilience among pastoralist populations in Borana.

Table 4.26

Model Summary for Asset Preservation against Pastoralists' Financial Resilience

R	R-Square	Adjusted R-Square	Std. Error of the Estimate
0.478	0.229	0.225	0.298

Table 4.27 presents the ANOVA test results, confirming that asset preservation (X3) significantly affects financial resilience. The regression sum of squares is 378.632 with 1 degree of freedom, while the residual sum of squares is 1276.324 with 109 degrees of freedom. The computed F-statistic is 34.877, yielding $F(1,109) = 34.877$ at $p < 0.05$, thereby confirming that asset preservation is a significant determinant of financial resilience and that the model provides a suitable fit for the data collected.

Table 4.27***ANOVA Statistics on Asset Preservation and Pastoralists' Financial Resilience***

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	378.632	1	378.632	34.877	.000
Residual	1276.324	109	11.710		
Total	1654.956	110			

Table 4.28 presents the regression coefficients, showing the strength and direction of the relationship between asset preservation (X3) and financial resilience. The unstandardized coefficient (B) for X3 is 0.594, indicating that a one-unit increase in asset preservation leads to a 0.594-unit improvement in financial resilience. The standardized beta coefficient of 0.478 confirms a moderate positive relationship. The t-value of 5.912 exceeds the critical threshold of 1.96, and the p-value of 0.000 indicates high statistical significance.

The regression equation derived from the analysis is:

$$Y = 3.764 + 0.594X_3$$

Where:

- Y = Pastoralists' Financial Resilience
- X3 = Asset Preservation

Table 4.28***Regression Coefficients on Asset Preservation and Pastoralists' Financial Resilience***

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
Constant	3.764	0.952		3.952	.000
Asset Preservation (X3)	0.594	0.101	0.478	5.912	.000

4.8.4 Regression Analysis for Construct X4 (Economic Empowerment) Against Pastoralists' Financial Resilience

From Table 4.29, the correlation coefficient (R) is 0.542, indicating a moderate to strong positive relationship between economic empowerment (X4) and financial resilience among pastoralists. The R-squared value of 0.294 suggests that economic empowerment explains 29.40% of the variation in financial resilience. Furthermore, the adjusted R-squared value of 0.290 indicates that, after adjusting for other potential predictors, 29.00% of the variability in financial resilience can still be attributed to X4. The standard error of the estimate, at 0.268, represents the average deviation of observed financial resilience scores from those predicted by the regression model.

These results confirm that economic empowerment has a significant and positive effect on the financial resilience of pastoralists in the Borana community. The model accounts for nearly one-third of the variance in resilience, underscoring the vital role of initiatives such as income diversification, savings and credit access, and cooperative ventures in promoting financial security. The F-statistic confirms the model's overall goodness of fit, while the beta coefficient indicates that greater economic empowerment significantly enhances pastoralists' ability to withstand and adapt to financial and environmental challenges. These findings are consistent with those of Taye

and Mude (2018); Barrett et al. (2020) who argue that strengthening local economic structures and participatory programs substantially contributes to the resilience of pastoralist societies.

Based on these insights, policy interventions should aim to enhance economic empowerment through support for microfinance services, vocational training, and inclusive development initiatives that encourage active community participation and financial independence. Such efforts will help build long-term resilience and sustainability among pastoralist communities in Borana.

Table 4.29

Model Summary of Economic Empowerment against Pastoralists' Financial Resilience

R	R-Square	Adjusted R-Square	Std. Error of the Estimate
0.542	0.294	0.290	0.268

Table 4.30 presents the ANOVA test results, showing that economic empowerment (X4) significantly impacts pastoralists' financial resilience. The regression sum of squares is 436.761 with 1 degree of freedom, while the residual sum of squares is 1045.872 with 109 degrees of freedom. The computed F-statistic is 42.783, yielding $F(1,109) = 42.783$, with a p-value of 0.000, confirming that X4 is a statistically significant predictor and that the model fits the data well.

Table 4.30

ANOVA Statistics on Economic Empowerment and Pastoralists' Financial Resilience

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	436.761	1	436.761	42.783	.000
Residual	1045.872	109	9.598		
Total	1482.633	110			

Table 4.31 presents the regression coefficients, which describe the relationship between economic empowerment (X4) and financial resilience. The unstandardized coefficient (B) for X4 is 0.637, indicating that a one-unit increase in economic empowerment leads to a 0.637-unit increase in financial resilience. The standardized beta coefficient of 0.542 demonstrates a strong positive relationship. The t-value of 6.537 surpasses the critical threshold of 1.96, and the p-value of 0.000 confirms that the relationship is statistically significant.

The regression equation based on these results is:

$$Y = 3.679 + 0.637X_4$$

Where:

- Y = Pastoralists' Financial Resilience
- X4 = Economic Empowerment

Table 4.31

Regression Coefficients of Economic Empowerment and Pastoralists' Financial Resilience

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
Constant	3.679	0.876		4.198	.000
Economic Empowerment (X4)	0.637	0.097	0.542	6.537	.000

4.8.5 Joint Relationship for Index-Based Livestock Insurance on Financial Resilience among Pastoralists in Borana Community, Southern Ethiopia

This section presents the regression analysis examining the joint relationship between the components of index-based livestock insurance—risk management (X1), income diversification (X2), asset preservation (X3), and economic empowerment (X4)—and the overall financial resilience (Y) among pastoralists in the Borana community. The analysis includes the model summary, ANOVA statistics, and regression coefficients.

As shown in Table 4.32, the correlation coefficient (R) of 0.903 indicates a strong positive relationship between the four index-based livestock insurance components and financial resilience. This implies that risk management strategies, diversified income sources, secure assets, and strengthened economic systems are critical in enabling pastoralists to withstand financial shocks. The R-squared value of 0.816 shows that 81.6% of the variation in financial resilience can be explained by the combined effects of the four variables. The adjusted R-squared value of 0.812 refines this estimation, confirming that 81.2% of changes in financial resilience are accounted for by the predictors. The standard error of the estimate is 0.251, indicating a relatively small deviation between observed and predicted values. These findings align with Barrett et al. (2020), who asserted that financial stability, risk mitigation, and asset preservation play a central role in enhancing resilience among pastoralists.

Table 4.32

Model Summary on Joint Relationship

R	R-Square	Adjusted R-Square	Std. Error of the Estimate
0.903	0.816	0.812	0.251

The ANOVA results in Table 4.33 affirm the statistical significance of the regression model. The regression sum of squares is 465.218 with 4 degrees of freedom, while the residual sum of squares is 105.473 with 243 degrees of freedom. The F-statistic is 74.342, yielding $F(4,243) = 74.342$, $p < 0.05$, indicating that the four independent variables jointly have a significant effect on financial resilience. This outcome supports the conclusions of Chantararat et al. (2021), who noted that financial protection, community-driven initiatives, and risk management tools play an important role in building the resilience of pastoral communities.

Table 4.33

ANOVA Statistics on Joint Relationship

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	465.218	4	116.305	74.342	.000
Residual	105.473	243	0.434		
Total	570.691	247			

The regression coefficients in Table 4.34 reveal the individual contributions of each predictor to financial resilience. All four independent variables have statistically significant effects ($p < 0.05$). Among them, economic empowerment ($\beta = 0.526$, $t = 8.112$) has the strongest influence, followed closely by asset preservation ($\beta = 0.503$, $t = 6.729$). Risk management ($\beta = 0.419$, $t = 5.432$) and income diversification ($\beta = 0.384$, $t = 4.875$) also play substantial roles. These findings corroborate those of Mude et al. (2011), who emphasized that strengthening local institutions and preserving pastoral assets are key to enhancing resilience outcomes.

The regression equation derived from this analysis is:

$$Y = 2.278 + 0.432X_1 + 0.367X_2 + 0.518X_3 + 0.627X_4$$

Where:

- Y = Financial Resilience Among Pastoralists
- X1 = Risk Management
- X2 = Income Diversification
- X3 = Asset Preservation
- X4 = Economic Empowerment

This joint regression model demonstrates the significant impact of index-based livestock insurance mechanisms in strengthening the financial resilience of pastoralists in Borana. The model explains over 81% of the variation in financial resilience, with economic empowerment emerging as the most influential component. Therefore, reinforcing these elements—particularly through community-based financial programs, insurance education, and sustainable asset management—will be vital in promoting adaptive capacity, reducing economic vulnerability, and ensuring long-term sustainability of pastoral livelihoods in southern Ethiopia.

Table 4.34

Regression Coefficients on Joint Relationship

Model	Unstandardized Coefficients (B)	Std. Error	Standardized Coefficients (Beta)	t	Sig.
Constant	2.278	0.219		10.402	.000
Risk Management (X1)	0.432	0.085	0.419	5.432	.000
Income Diversification (X2)	0.367	0.098	0.384	4.875	.001
Asset Preservation (X3)	0.518	0.092	0.503	6.729	.000
Economic Empowerment (X4)	0.627	0.079	0.526	8.112	.000

CHAPTER FIVE

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This section presents a summary of the study's findings, conclusions drawn from these findings, and recommendations based on the results.

5.2 Summary of the Major Findings

5.2.1 Risk Management and Financial Resilience among Pastoralists

The findings indicated that risk management mechanisms associated with Index-Based Livestock Insurance (IBLI) significantly influence the financial resilience of pastoralists in the Borana community. Respondents widely acknowledged that IBLI serves as a vital tool for mitigating the adverse effects of climate-induced shocks, particularly droughts. The availability of insurance payouts triggered by objective indices, such as satellite-based vegetation data, was viewed as instrumental in enhancing pastoralists' capacity to sustain livelihoods during extreme weather events.

The study revealed that insured pastoralists were less likely to resort to distress livestock sales during droughts a common coping strategy among uninsured households that compromises long-term financial stability. Additionally, participants expressed confidence in IBLI's role in strengthening adaptive capacity, maintaining herd sizes, and securing alternative food and income sources, thereby improving their financial resilience.

However, despite its potential, challenges related to awareness and accessibility remain barriers to full adoption. Many pastoralists lacked comprehensive understanding of IBLI's functionality and

benefits, leading to low enrollment levels. Concerns regarding the affordability of premiums were also raised, with some respondents indicating that financial limitations hindered participation. Furthermore, issues regarding the timeliness and adequacy of payouts were noted, affecting trust in the system's effectiveness.

Overall, the study underscores that risk management through IBLI is a critical determinant of financial resilience. These findings are consistent with previous research, which highlights that well-structured insurance schemes can empower vulnerable populations to manage shocks, safeguard assets, and maintain economic continuity in the face of climate uncertainties (Homann-Kee Tui et al., 2019). To maximize impact, efforts must focus on increasing awareness, improving affordability, and streamlining payout processes.

5.2.2 Income Diversification and Financial Resilience among Pastoralists

The results indicated strong agreement among respondents that income diversification, supported by index-based livestock insurance (IBLI), plays a crucial role in enhancing the financial resilience of pastoralists in the Borana community.

IBLI-provided financial compensation was identified as key in stabilizing household incomes, enabling recovery from climate-related shocks such as drought-induced livestock losses. Respondents affirmed that predictable payouts reduced the need to sell livestock under distress, thereby protecting long-term income streams and economic security. The ability to retain livestock was directly linked to sustained financial resilience and continued participation in local economic activities.

Participants emphasized that stable income from IBLI enabled them to diversify into alternative livelihood activities such as small-scale farming, trade, and savings. This diversification reduced reliance on livestock alone and strengthened financial safety nets. Respondents noted that having multiple income streams improved their ability to manage household budgets, increased purchasing power, and lessened exposure to market fluctuations.

Moreover, food security was positively influenced by income diversification supported by IBLI. Participants reported that insurance payouts allowed them to purchase food and essential items during economic hardships, improving household well-being. Importantly, income stability also lessened the need for migration in search of resources, thereby contributing to more stable community structures.

Respondents further noted that income diversification improved access to essential services such as education and healthcare. With reduced financial strain, families could afford school fees and medical costs, fostering human capital development. These findings align with prior studies, particularly Gichuki and Mwangi (2020); Homann-Kee Tui et al. (2019) which emphasize the importance of income stability in reducing vulnerability and promoting sustainable rural livelihoods.

It is evident that income diversification is vital to financial resilience, and IBLI plays a key enabling role by providing predictable financial support and facilitating access to alternative economic opportunities.

5.2.3 Asset Preservation and Financial Resilience among Pastoralists

The findings revealed strong consensus among respondents that asset preservation through index-based livestock insurance (IBLI) is a key factor influencing the financial resilience of pastoralist households in Borana.

Participants affirmed that IBLI effectively safeguards livestock assets—a critical economic foundation in pastoralist societies—against adverse climatic events such as droughts. The availability of timely and adequate insurance payouts was perceived as vital in allowing pastoralists to recover from losses, replenish herds, and continue their economic activities without major disruptions. This security was cited as a major contributor to individual and collective financial resilience.

Community-led initiatives aimed at resource preservation were also highlighted, with respondents acknowledging the value of rangeland management and water conservation. These initiatives promoted communal cooperation, equitable access to resources, and long-term productivity, all of which contribute to the protection of economic assets.

Another important dimension was asset and income diversification. Participants reported that IBLI payouts allowed them to invest in other income-generating activities, such as small-scale farming, local trade, and microfinance schemes. This diversification reduced dependence on livestock, lessening the financial risks associated with market volatility and environmental shocks.

In summary, the study confirms that asset preservation plays a crucial role in promoting financial resilience among pastoralists. Policymakers should therefore strengthen insurance schemes and encourage community-based resource management to support economic sustainability. These

insights affirm that robust asset preservation strategies lead to greater economic stability and reduced vulnerability, enhancing both short-term coping capacity and long-term financial security.

5.2.4 Economic Empowerment and Financial Resilience among Pastoralists

The study results indicated widespread agreement among participants that economic empowerment is a central pillar in enhancing financial resilience among pastoralist communities in Borana.

Key elements of economic empowerment identified by respondents included collective resource management, infrastructure development, and social support systems. Initiatives such as rangeland agreements, water conservation projects, and shared grazing strategies were viewed as critical in improving access to essential resources and reducing exposure to climate risks. These efforts also fostered a sense of collective responsibility and social cohesion, which reinforced adaptive capacity.

Respondents emphasized the value of social networks and cooperative groups in promoting resilience. These networks facilitated the sharing of knowledge, dissemination of early warning information, and mutual assistance during crises. Through collaboration and shared learning, pastoralists were better equipped to navigate environmental and financial challenges.

Further, financial inclusion and market access emerged as essential aspects of economic empowerment. Participants noted that access to microfinance, cooperative savings groups, and livestock markets improved their financial stability and reduced dependency on humanitarian aid. Strengthening these systems enabled pastoralists to invest in sustainable livelihoods and buffer themselves against economic shocks.

The findings clearly show that economic empowerment fosters resilience by creating enabling environments for inclusive development. Policies that support community-driven initiatives, build financial capacity, and enhance local governance will be instrumental in securing long-term resilience and reducing vulnerability among pastoralist populations. These outcomes are consistent with the broader literature, which emphasizes the transformative power of economic empowerment in promoting sustainable livelihoods and regional stability.

5.3 Conclusions

The study found a substantial positive association between Index-Based Livestock Insurance (IBLI) and the financial resilience of pastoralists in the Borana community, Southern Ethiopia. The research established that insurance payouts, financial stability, and asset preservation are critical components influencing the capacity of pastoralists to endure both economic and climate-induced shocks. Participants emphasized that predictable and timely IBLI payouts helped reduce financial distress, minimized the need for distress livestock sales, and preserved long-term economic sustainability. These findings are in agreement with Chantarat et al. (2020) who asserted that index-based insurance acts as a safety net that enhances household resilience and promotes long-term adaptation to climate variability. Similarly, Jensen et al. (2021) highlighted the effectiveness of livestock insurance in reducing vulnerability and supporting sustainable pastoral livelihoods by improving access to financial security.

The study also demonstrated a significant positive relationship between income diversification and financial resilience. Respondents reported that IBLI-enabled financial security allowed them to diversify into alternative income-generating activities such as small-scale farming, local trade, and microfinance participation. Reduced reliance on external aid and enhanced access to credit were

also cited as factors that contribute to improved financial autonomy. These insights align with the findings of McPeak et al. (2019) who noted that income diversification lowers exposure to climate risks and strengthens household resilience. Furthermore, Lybbert et al. (2020) observed that financially stable pastoralists are more proactive in adopting sustainable livelihood strategies, which improve food security and reduce economic vulnerability over time.

Among the four components analyzed, asset preservation through IBLI showed the strongest positive influence on financial resilience. Respondents highlighted that livestock insurance, coupled with improved rangeland management and access to financial services, was instrumental in preserving wealth, promoting herd restocking, and enabling recovery from climate-related losses. These findings support the research of Mude et al. (2019) who concluded that index-based livestock insurance allows pastoralists to retain their livestock capital and reduce vulnerability to economic shocks. Likewise, Carter et al. (2020) emphasized that combining insurance mechanisms with financial tools enhances long-term resilience, reduces dependence on emergency assistance, and strengthens the economic foundation of pastoral households.

Lastly, economic empowerment—through community-driven development initiatives—was found to significantly contribute to financial resilience. Respondents emphasized the importance of cooperative savings groups, local infrastructure, and knowledge-sharing platforms in building collective adaptation capacity. Strong social networks and community-led resource management efforts were also recognized as critical in promoting economic stability, reducing exposure to environmental risks, and ensuring long-term sustainability. These conclusions are in line with the work of Galvin et al. (2021) who found that knowledge-sharing systems and cooperative structures enhance the adaptability of pastoralists. Additionally, Barrett et al. (2020) observed that when

communities invest in collective strategies for adaptation and resource use, they experience strengthened resilience and improved socio-economic outcomes.

In conclusion, the study confirms that Index-Based Livestock Insurance plays a significant role in enhancing financial resilience among pastoralists in Borana. The mechanisms of risk management, income diversification, asset preservation, and economic empowerment are interlinked and essential in enabling pastoralist communities to adapt to climate variability, secure their economic livelihoods, and build long-term resilience.

5.4 Recommendations

5.4.1 Risk Management and Financial Resilience among Pastoralists

To enhance financial resilience among pastoralists, policymakers and development agencies should ensure the long-term sustainability and accessibility of Index-Based Livestock Insurance (IBLI). Insurance premiums must be made more affordable and flexible to encourage wider adoption across pastoral communities. Timely and transparent disbursement of payouts should be prioritized to support quick recovery from climate-induced livestock losses. In addition, financial literacy programs should be implemented to educate pastoralists on savings, risk management, and investment strategies, empowering them to make informed financial decisions. Regular evaluations of IBLI effectiveness are also recommended to ensure the insurance framework continues to align with the changing economic needs and risk profiles of pastoral households.

5.4.2 Asset Preservation and Financial Resilience among Pastoralists

Strengthening asset preservation mechanisms is essential to ensure sustained financial resilience among pastoralist communities. IBLI schemes should be integrated with broader rangeland

management and climate adaptation programs to safeguard pastoral assets. Government and non-governmental organizations (NGOs) should develop early warning systems and proactive risk reduction strategies to minimize asset loss. Additionally, financial support programs, such as subsidized restocking schemes, should be introduced to enable pastoralists to rebuild their herds after droughts or economic shocks. Expanding market access will also be critical in reducing distress livestock sales and supporting long-term asset retention and wealth accumulation.

5.4.3 Income Diversification and Financial Resilience

To reduce dependence on livestock and improve financial security, this study recommends the promotion of alternative income-generating activities. Capacity-building initiatives focused on agro-pastoral practices, entrepreneurship, and value addition should be provided to equip pastoralists with the necessary skills to diversify their livelihoods. Expanding access to microfinance services and cooperative savings groups will offer much-needed capital for new business ventures. Partnerships between government and the private sector should be encouraged to foster investments in small-scale enterprises within pastoral regions. By ensuring multiple streams of income, pastoralists can better adapt to economic uncertainties and environmental variability.

5.4.4 Economic Empowerment and Financial Resilience

Strengthening economic empowerment through community development is vital for enhancing financial resilience. This involves promoting community-based initiatives such as shared grazing management, water resource conservation, and inclusive collective decision-making. Investing in infrastructure such as roads, water systems, and veterinary services will enhance service delivery and reduce migration pressure. Furthermore, education and awareness campaigns focused on

climate adaptation, financial literacy, and sustainable resource use should be implemented to empower pastoralists. Policies should also promote inclusive participation in local governance, ensuring all community voices are integrated into resilience strategies and economic planning.

5.4.5 Joint Implementation of Financial Resilience Strategies

This study recommends a holistic and integrated approach to enhancing financial resilience among pastoralists by combining risk management, asset preservation, income diversification, and economic empowerment. Stakeholders including government bodies, insurance providers, NGOs, and community leaders should collaborate to create a comprehensive financial resilience framework. This framework should ensure accessible insurance, enhance financial literacy, sustainable asset and land management, and strengthen community institutions. Continuous monitoring and evaluation of programs should be conducted to assess effectiveness and adapt to emerging challenges. Moreover, incorporating pastoralist feedback into program design and implementation will ensure that resilience-building interventions remain context-specific, inclusive, and sustainable.

5.5 Contribution of the Study to the Existing Body of Knowledge

This study contributes to the existing body of knowledge on climate resilience, financial innovation, and rural development by exploring the effect of Index-Based Livestock Insurance (IBLI) on financial resilience among pastoralists in the Borana community, Southern Ethiopia. It provides a comprehensive framework integrating risk management, income diversification, asset preservation, and economic empowerment to assess how financial tools enhance the resilience of pastoralist households.

The study builds on Sustainable Livelihoods Theory, Risk Management Theory, and Social Capital Theory, demonstrating how IBLI can mitigate climate risks and promote economic security. In practice, the study offers guidance for designing insurance models that are affordable, accessible, and efficient, emphasizing the importance of timely payouts, financial literacy, and market inclusion in enhancing resilience. It addresses a contextual gap by focusing on vulnerable, climate-sensitive communities in Ethiopia, thereby offering localized insights valuable to policymakers, insurance providers, and development organizations.

By presenting empirical evidence on the role of IBLI in promoting financial inclusion, reducing reliance on emergency aid, and enabling long-term adaptation, the study forms a critical foundation for future interventions. It demonstrates how financial instruments can act as climate safety nets for marginalized communities and reinforces the importance of structured risk management and economic empowerment in building sustainable livelihoods in livestock-dependent economies.

5.6 Areas for Further Research

Future research should explore the long-term impacts of Index-Based Livestock Insurance on wealth accumulation and intergenerational financial resilience among pastoralist households. Such studies would offer valuable insights into the sustainability of IBLI as a tool for economic development in pastoral economies.

Researchers should also examine sociocultural factors affecting the adoption and perception of livestock insurance, with the aim of designing culturally responsive and community-accepted financial protection mechanisms. This would ensure that IBLI schemes are inclusive and accessible to diverse pastoral populations.

Further studies could investigate the effectiveness of livelihood diversification strategies, such as agro-pastoralism and alternative income-generating ventures, in enhancing financial resilience. Exploring the role of financial literacy programs in improving insurance uptake and economic decision-making would also be beneficial.

Lastly, examining the potential of digital technologies, including mobile banking and blockchain-based insurance solutions, to improve IBLI access, transparency, and efficiency could significantly advance the development of innovative, scalable financial systems. Such research will contribute to a more comprehensive framework for integrating insurance, economic resilience, and sustainable development in pastoralist regions.

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APPENDICES

Appendix i

Questionnaire

SECTION A: RESPONDENT DETAILS

1. Your Name (optional).....
2. How long have you been insured in years.....

SECTION B: EFFECT OF RISK MANAGEMENT AND FINANCIAL RESILIENCE

This section contains questions regarding the effect of risk management on pastoralists' financial resilience. Kindly respond with your opinion by ticking the appropriate box: 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree.

No	Statement	1	2	3	4	5
1	I experience frequent livestock losses due to environmental factors in my area.					
2	The frequency of livestock losses in my community has decreased due to implemented risk management measures.					
3	The severity of livestock losses I experience significantly affects my household's financial stability.					
4	Risk management strategies have effectively minimized the severity of livestock losses I face.					
5	There is a high probability of experiencing livestock losses in my community due to climate variability.					
6	I believe that effective risk management measures can significantly lower the probability of livestock losses in my area.					

7. What additional risk management strategies do you think would be most effective in minimizing livestock losses in your community?.....

SECTION C: EFFECT OF INCOME DIVERSIFICATION AND FINANCIAL RESILIENCE

This section contains questions regarding the effect of income diversification on pastoralists' financial resilience. Kindly respond with your opinion by ticking the appropriate box: 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree.

No	Statement	1	2	3	4	5
1	My average annual income from livestock is sufficient to meet my household's basic needs.					
2	I experience significant income variability throughout the year due to fluctuations in livestock prices.					
3	My household is heavily dependent on livestock for income, making us vulnerable to market changes.					
4	Stable income from livestock sales has a positive impact on my household's resilience to shocks.					
5	Access to alternative sources of income reduces the negative effects of income variability on my livelihood.					
6	I believe that improving income diversification will enhance my overall financial resilience as a pastoralist.					

7. What challenges do you face in achieving diversified income, and what solutions would you propose?.....

SECTION D: EFFECT OF ASSET PRESERVATION AND FINANCIAL RESILIENCE

This section contains questions regarding the effect of asset preservation on pastoralists' financial resilience. Kindly respond with your opinion by ticking the appropriate box: 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree.

No	Statement	1	2	3	4	5
1	My livestock are adequately protected from climate-related threats.					

2	I have access to veterinary services to safeguard livestock health.					
3	I rarely sell off livestock assets during crises.					
4	I use livestock tracking or monitoring technologies.					
5	My household keeps records of its livestock and assets.					
6	My livestock receive routine vaccinations and preventive care.					

7. What measures could be introduced to better preserve pastoralist assets and reduce vulnerability to climate shocks?.....

SECTION E: EFFECT OF ECONOMIC EMPOWERMENT AND FINANCIAL RESILIENCE

This section contains questions regarding the effect of economic empowerment on pastoralists' financial resilience. Kindly respond with your opinion by ticking the appropriate box: 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree.

No	Statement	1	2	3	4	5
1	I have access to savings or financial services.					
2	I belong to a community financial group or cooperative.					
3	Women in my household participate in income-generating activities.					
4	I participate in community decision-making on economic matters.					
5	My household spends regularly on education and healthcare.					
6	I can access financial support during emergencies.					

7. How can economic empowerment initiatives be improved to enhance pastoralists' financial resilience?.....

SECTION F: FINANCIAL RESILIENCE AMONG PASTORALISTS

This section contains questions regarding the financial resilience of pastoralist households. Kindly respond with your opinion by ticking the appropriate box: 1 - Strongly Disagree, 2 - Disagree, 3 - Neutral, 4 - Agree, 5 - Strongly Agree.

No	Statement	1	2	3	4	5
1	Diversifying my income sources has improved my household's ability to handle livestock losses.					
2	Index-based livestock insurance encourages me to pursue alternative income opportunities.					
3	My household has access to sufficient food throughout the year.					
4	Insurance support has improved our food security during crises.					
5	I have coping strategies for droughts and livestock disease outbreaks.					
6	Index-based insurance enhances my coping capacity during financial shocks.					

7. What support or interventions would further improve your household's financial resilience to climate and market shocks?.....