ASSESSING THE PREVALENCE OF CATTLE DISEASES IN BUHERA DISTRICT, ZIMBABWE (2018–2024)

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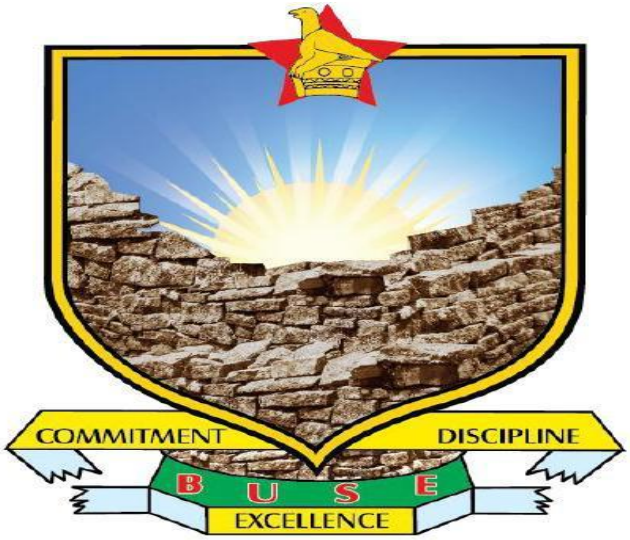

By

HLUKUZO FARAI

(B200557B)

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SUPERVISOR: DR Nyamushamba

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APPROVAL FORM

The signatories confirm that they have read and recommended to the Bindura University of Science Education for acceptance of the project title: Assessing the prevalence of cattle diseases in Buhera district,Zimbabwe

SUPERVISON SIGN _____ _____ Date ___17/09/2025_____

STUDENT SIGN _____ Date _17/09/2025_____

CHAIRPERSON SIGN _____ _____ Date_____07/10/25_____

DEDICATION

I devoted my family and children for their support throughout my study.

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ABSTRACT

This study aimed to assess the prevalence of cattle diseases in Buhera District, Zimbabwe, from 2018 to 2024 and evaluate their economic and social impacts on smallholder farmers. The study sought to identify the most common diseases affecting cattle in the district and analyse how these diseases have influenced farmers' income, food security, and social well-being. The research was conducted in response to growing concerns about tick-borne diseases (TBDs) such as theileriosis, heartwater, anaplasmosis, and babesiosis, as well as foot-and-mouth disease (FMD), anthrax, and lumpy skin disease (LSD), which continue to threaten livestock productivity in Zimbabwe. By providing insights into disease patterns and their implications for smallholder farmers, the study aimed to inform policy recommendations and improve veterinary interventions. A descriptive cross-sectional survey design was employed, using structured questionnaires and secondary data sources to collect information from a targeted sample of 135 smallholder farmers in Buhera District. The study utilized stratified random sampling to ensure representation across different farming communities. Data were analyzed using descriptive statistics (means, standard deviations, and frequencies) and inferential statistics (Chi-square tests) to examine relationships between disease prevalence, demographic characteristics, and socio-economic impacts. The findings revealed that tick-borne diseases were the most prevalent, with theileriosis causing up to 80% herd losses, followed by heartwater (30%), anaplasmosis (10%), and babesiosis (3%). The 2024 FMD outbreak recorded 100% morbidity and 5% mortality, while LSD exhibited 20% morbidity and 2% mortality. The results indicated that livestock diseases had severe economic impacts, including significant income losses ($M = 4.48$, $SD = 0.775$), high treatment costs ($M = 4.31$, $SD = 0.807$), and limited ability to pay for essential needs ($M = 4.16$, $SD = 0.912$). Socially, cattle diseases disrupted traditional ceremonies ($M = 3.85$, $SD = 1.197$) and contributed to food insecurity ($M = 4.12$, $SD = 1.258$). Chi-square tests revealed a significant relationship ($p = 0.007$) between education level and access to veterinary services, highlighting the role of farmer knowledge in disease management. However, other variables, such as gender and disease prevalence ($p = 0.804$) and farming experience and ability to afford disease treatment ($p = 0.391$), showed no significant associations. The study concludes that improving veterinary services, expanding farmer education programs, and implementing subsidized vaccination initiatives are crucial for mitigating disease impacts in Buhera District. Future research should focus on longitudinal studies to track disease trends and assess the effectiveness of different disease control strategies over time.

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LIST OF ABBREVIATIONS

TBDs – Tick-Borne Diseases

ECF – East Coast Fever

FMD – Foot-and-Mouth Disease

LSD – Lumpy Skin Disease

SPSS – Statistical Package for the Social Sciences

SLF – Sustainable Livelihoods Framework

df – Degrees of Freedom

χ^2 – Chi-Square Statistic

p-value – Probability Value

NGO – Non-Governmental Organization

CHAPTER ONE: INTRODUCTION AND BACKGROUND OF THE STUDY

1.1 Introduction

Cattle farming play a vital role in Zimbabwe's agricultural sector, contributing significantly to rural livelihoods and food security, particularly in districts like Buhera, where smallholder farmers dominate the agricultural landscape. However, the prevalence of livestock diseases poses a substantial challenge to the sector, impacting both the economy and the social fabric of rural communities. Diseases such as tick-borne infections, anthrax, and brucellosis have been identified as recurring issues in Zimbabwe's cattle population (Matope et al., 2023; Mbizeni et al., 2024). The 2018-2024 period has seen increasing vulnerabilities due to climatic changes, limited veterinary services, and inadequate disease control strategies, exacerbating the economic losses and social consequences for smallholder farmers (Ngwira et al., 2024). This study focuses on identifying the most prevalent cattle diseases in Buhera District and assessing their economic and social impacts on smallholder farmers to inform effective interventions and policy formulation. The following sections will provide the background of the study, problem statement, objectives, literature review and the methodology to be used.

1.2 Background of the Study

Livestock farming plays a pivotal role in sustaining rural livelihoods in Zimbabwe, particularly in Buhera District. Among the various livestock types, cattle hold significant socio-economic importance, serving as a source of income, food (milk and meat), and draft power for agricultural activities (Mugabe et al., 2020). Cattle farming are deeply integrated into the rural economy, and smallholder farmers in Buhera rely heavily on their livestock for both subsistence and market purposes. However, the sector faces critical challenges, with livestock diseases being one of the most prominent threats. These diseases result in substantial economic losses due to decreased productivity, high mortality rates, and increased veterinary costs, which ultimately contribute to food insecurity in rural communities (Masendu et al., 2021).

Globally, livestock diseases pose a significant threat to food production, rural development, and poverty alleviation, especially in developing countries. The Food and Agriculture Organization (FAO) highlights that animal diseases, such as foot-and-mouth disease (FMD) and tick-borne infections, affect millions of livestock annually, leading to food supply chain

disruptions and economic instability in rural areas (FAO, 2022). Developing nations are disproportionately affected due to limited access to veterinary care, lack of infrastructure, and inadequate disease surveillance systems (Mwangi et al., 2021). For instance, in East Africa, tick-borne diseases such as East Coast Fever have been linked to substantial economic losses among smallholder farmers, mirroring challenges faced by farmers in Zimbabwe (Nthiwa et al., 2022). These global patterns emphasize the need for localized studies to understand and mitigate the impacts of livestock diseases.

In Buhera District, livestock farming remains central to the livelihoods of rural households. However, the sector is hindered by frequent outbreaks of livestock diseases, including FMD, anthrax, and various tick-borne diseases such as Theileriosis and Anaplasmosis (Chauke et al., 2021). These diseases are exacerbated by environmental factors, such as climatic changes that increase tick populations and poor disease management practices. The lack of adequate veterinary services, coupled with limited access to vaccines and treatment, has left smallholder farmers vulnerable to recurring disease outbreaks. As a result, farmers in Buhera often experience reduced herd sizes and diminished income, further entrenching poverty and food insecurity in the region (Moyo et al., 2022).

Although various studies have explored specific livestock diseases in Zimbabwe, there is a lack of longitudinal data examining the overall prevalence of livestock diseases in Buhera District over an extended period. Most previous research has focused on isolated outbreaks or specific diseases, failing to capture the broader patterns and trends of disease prevalence (Chiduku et al., 2020). Furthermore, there is limited analysis of the socio-economic impacts of these diseases on smallholder farmers, particularly in terms of income loss, food insecurity, and social well-being (Nyamangara et al., 2023). Addressing this research gap is essential to develop comprehensive strategies to mitigate the impact of livestock diseases in Buhera.

Cattle farming plays a crucial role in Zimbabwe's agricultural sector, contributing significantly to rural livelihoods, food security, and national economic development. Zimbabwe has a predominantly rural population, with the majority engaged in smallholder farming, which accounts for over 70% of the country’s agricultural output (Ngwira et al., 2024). Buhera District, situated in Manicaland Province, is among the regions where cattle farming is a cornerstone of livelihoods, supporting households through draft power for agricultural activities, milk production, and meat for consumption and trade. However, cattle farming in Buhera is primarily subsistence-based, and farmers face challenges such as

resource constraints, limited access to veterinary services, and vulnerability to climatic shocks (Madyavanhu et al., 2024). These factors underscore the district's need for sustainable livestock management practices and enhanced disease control mechanisms.

Livestock, particularly cattle, holds substantial economic and social importance for smallholder farmers in Buhera District. Economically, cattle are a form of financial security, often regarded as a store of wealth and a means of income diversification. Farmers sell cattle during financial emergencies or periods of drought to purchase food, pay school fees, or meet medical expenses (Matope et al., 2023). Socially, cattle are integral to cultural and traditional practices such as marriage negotiations, communal feasting, and ceremonial events. Despite their significance, the economic value of cattle is frequently undermined by disease outbreaks, which lead to reduced productivity, mortality, and high veterinary costs. Smallholder farmers are disproportionately affected due to their limited capacity to prevent or manage livestock diseases effectively (Mbizeni et al., 2024).

In developing regions like Zimbabwe, the prevalence of cattle diseases poses a significant challenge to the agricultural sector. Tick-borne diseases, brucellosis, anthrax, and lumpy skin disease are among the most reported cattle illnesses, with devastating impacts on productivity and herd health (Chari et al., 2023). The lack of adequate veterinary services, poor disease surveillance systems, and limited access to vaccinations exacerbate the issue. Additionally, climate change has altered disease dynamics, as warmer temperatures and erratic rainfall have expanded the habitat of disease vectors such as ticks (Ngwira et al., 2024). These challenges not only threaten the sustainability of cattle farming but also undermine the livelihoods of smallholder farmers who rely on livestock for their survival. Addressing these issues requires an integrated approach that includes improving veterinary services, strengthening disease surveillance, and implementing sustainable livestock management strategies.

This study aims to address the identified gaps by assessing the prevalence of livestock diseases in Buhera District from 2018 to 2024. Through identifying the most prevalent diseases and quantifying their socio-economic impacts, this research will provide valuable insights to inform policymakers, veterinary services, and development agencies. Furthermore, it will offer evidence-based recommendations to enhance livestock disease management and support smallholder farmers in improving their livelihoods. Such contributions are vital for

achieving sustainable agricultural development and rural poverty alleviation in Zimbabwe. Livestock diseases are a significant challenge to the socio-economic stability of smallholder farmers in Buhera District, Zimbabwe, as well as in many developing nations. This study seeks to bridge the knowledge gap by examining disease prevalence over a six-year period and assessing its economic and social impacts. The findings will serve as a foundation for improved disease control and sustainable livestock farming practices in rural Zimbabwe.

1.3. Problem Statement

Cattle diseases have significant economic and social impacts in rural Zimbabwe, particularly in districts like Buhera. Farmers experience losses due to livestock deaths, reduced productivity, and increased costs of treatment. Despite the prevalence of diseases, there is a lack of comprehensive data and surveillance mechanisms in Buhera District. This lack of information hinders the development of effective strategies for disease management and prevention. Despite the critical importance of livestock in rural livelihoods, the prevalence of diseases in Buhera District remains inadequately documented. Farmers lack access to veterinary services and timely disease prevention, exacerbating cattle mortality rates and reducing productivity. The absence of comprehensive data from 2018 to 2024 hinders evidence-based interventions by policymakers and development agencies.

1.4 Scope of the Study

The scope of this study is focused on assessing the prevalence of diseases in cattle within Buhera District, Zimbabwe, over the period from 2018 to 2024. The study specifically examines the types and frequency of cattle diseases, such as foot-and-mouth disease, anthrax, and tick-borne diseases, affecting smallholder farmers in this semi-arid region. It also investigates the economic and social impacts of these diseases on the livelihoods of smallholder farmers, including income losses, reduced food security, and community-level disruptions. Data collection is limited to cattle farming households, veterinary records, and relevant stakeholders within Buhera District, with a temporal emphasis on identifying trends and patterns over the six-year period. This study excludes other livestock types and diseases outside this geographical and temporal scope, aiming to generate targeted insights to inform disease management strategies in the region.

1.5. Justification of the Study

Cattle diseases are a significant challenge to smallholder farmers in Buhera District, where cattle farming is a primary livelihood activity. The recurrence of diseases such as foot-and-

mouth disease (FMD), anthrax, and tick-borne infections has consistently undermined cattle productivity, leading to economic losses and food insecurity. Despite the critical role cattle play in the socio-economic well-being of rural households by providing income, draft power, and food, there is a lack of comprehensive studies examining the prevalence of these diseases over an extended period in Buhera District. Addressing this gap is essential to support evidence-based interventions and improve the resilience of smallholder farmers against disease outbreaks. This study is therefore justified in its aim to assess disease prevalence and impacts over a six-year period, as understanding these trends is crucial for developing targeted disease control strategies.

Additionally, the socio-economic impacts of livestock diseases extend beyond individual households, affecting entire communities by reducing livestock trade, depleting household savings, and disrupting social structures. While existing studies may provide snapshots of specific diseases or isolated outbreaks, they often fail to account for the broader and long-term implications of livestock diseases on rural livelihoods. This research is justified as it goes beyond the identification of diseases to explore their economic and social impacts on smallholder farmers in Buhera District. Through filling this knowledge gap, the study aims to provide insights that will inform policymakers, veterinary services, and development agencies in designing sustainable and locally relevant livestock disease management programs. This, in turn, will contribute to improving agricultural productivity, food security, and rural poverty alleviation in Zimbabwe.

1.6. Research Objectives

The main objective of this study is to assess the prevalence of cattle diseases in Buhera District, Zimbabwe, from 2018 to 2024.

1.6.1 Specific Objectives

i. To identify the most prevalent diseases in cattle in Buhera District from 2018 to 2024.
ii. To determine the economic and social impacts of cattle diseases on smallholder farmers.

1.6.2 Research Questions

i. What are the most common cattle diseases affecting farmers in Buhera District from 2018 to 2024?
ii. What are the economic and social impacts of cattle diseases on smallholder farmers in Buhera District?

1.6.3 Research Assumptions

i. It is assumed that specific cattle diseases, such as Theileriosis, Babesiosis, and Foot and Mouth Disease, are the most prevalent in Buhera District from 2018 to 2024, with patterns influenced by environmental factors such as seasonal climate variability and limited access to veterinary interventions.

ii. It is assumed that cattle diseases have significantly affected smallholder farmers in Buhera District, leading to economic losses through reduced cattle productivity, high mortality rates, and increased costs for treatment, as well as social impacts such as food insecurity and disruptions in community livelihoods.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

This chapter provides a comprehensive review of the literature on livestock diseases and their impact on farming systems, with a specific focus on Zimbabwe and districts such as Buhera. The chapter begins by defining and classifying cattle diseases into infectious and non-infectious categories, followed by an analysis of common diseases in Zimbabwe, including tick-borne illnesses such as East Coast fever, anaplasmosis, theileriosis, heartwater, and babesiosis, as well as anthrax, lumpy skin disease, and brucellosis. The chapter also examines the economic and social impacts of these diseases on smallholder farmers, highlighting their role in perpetuating food insecurity, financial losses, and community vulnerability. Furthermore, it discusses conceptual frameworks, such as the Sustainable Livelihoods Framework, to illustrate the multidimensional effects of livestock diseases on farming households. Through identifying gaps in knowledge and surveillance, this chapter establishes the foundation for understanding the prevalence and consequences of cattle diseases in Buhera District.

2.1 Overview of Cattle Diseases

Cattle diseases can be broadly classified into two categories: infectious and non-infectious. Infectious diseases are caused by pathogens such as bacteria, viruses, fungi, or parasites, and they can spread among cattle populations through direct contact, vectors, or environmental exposure (Settypalli et al., 2024). Examples of infectious diseases include foot-and-mouth disease (FMD), tick-borne diseases, brucellosis, and anthrax, which pose significant threats to livestock health in Southern Africa. In contrast, non-infectious diseases arise from factors such as poor nutrition, environmental stress, or genetic disorders. Conditions like mineral deficiencies, reproductive issues, and physical injuries fall under this category and can compromise cattle productivity without necessarily involving pathogenic agents (Munengwa et al., 2024).

2.1.1 Classification of Cattle Diseases

Cattle diseases are broadly classified into two categories: infectious and non-infectious. Infectious diseases are caused by pathogens, including bacteria, viruses, fungi, and parasites, and they can spread through vectors, direct contact, or environmental exposure (Settypalli et al., 2024). Examples of such diseases include foot-and-mouth disease (FMD), brucellosis, anthrax, and a range of tick-borne diseases, all of which pose serious threats to livestock health in Southern Africa. Conversely, non-infectious diseases result from poor nutrition, genetic defects, or environmental stresses, such as mineral deficiencies and heat stress, and these conditions significantly reduce productivity without involving pathogenic agents (Munengwa et al., 2024).

2.1.2 Infectious Diseases in Southern Africa

Infectious diseases, particularly FMD and anthrax, are prevalent in Southern Africa, causing considerable economic losses. FMD, a highly contagious viral disease affecting cloven-hoofed animals, leads to reduced milk production, weight loss, and restricted trade due to imposed quarantines (Settypalli et al., 2024). Similarly, anthrax, caused by Bacillus anthracis, remains a persistent concern due to its soil-borne nature and the ability of spores to survive for decades. Outbreaks of anthrax are often triggered by heavy rainfall, disturbing contaminated soils and exposing grazing livestock to infection, resulting in sudden cattle deaths (Seakamela et al., 2024).

2.1.3 Tick-Borne Diseases (TBDs)

Tick-borne diseases, including East Coast fever (ECF), anaplasmosis, babesiosis, and theileriosis, are among the most devastating diseases affecting cattle in Southern Africa. These diseases are particularly prevalent in regions like Zimbabwe, where climatic conditions favour the proliferation of tick vectors (Hassan et al., 2024). ECF, caused by Theileria parva, is especially lethal, leading to mortality rates of up to 50% in untreated cases. Babesiosis and anaplasmosis cause anaemia, fever, and weight loss, further undermining cattle productivity. The emergence of acaricide-resistant tick populations has made the management of these diseases increasingly difficult and costly (Modise-Tlotleng et al., 2024). In Zimbabwe, tick-borne diseases such as ECF, babesiosis, and anaplasmosis are pervasive and continue to devastate cattle herds. ECF, caused by Theileria parva, is one of the most lethal diseases, particularly in communal farming systems, where cattle mortality rates remain high due to limited access to dipping facilities and acaricides (Marufu et al., 2023). Babesiosis and

anaplasmosis further compound productivity losses by causing severe anaemia and weight loss, especially during the rainy season when tick populations peak (Hassan et al., 2024). These diseases not only reduce herd sizes but also undermine household income and food security.

2.1.4 Non-Infectious Diseases

Non-infectious diseases, while less dramatic than infectious ones, still have a substantial impact on livestock productivity. Nutritional deficiencies, such as inadequate mineral intake, can lead to skeletal deformities, reduced fertility, and weakened immunity in cattle (Munengwa et al., 2024). Additionally, heat stress caused by rising temperatures exacerbates metabolic imbalances and decreases milk production, especially in dairy cattle. Addressing these challenges requires holistic solutions, including proper feeding practices, improved housing for livestock, and access to veterinary care (Settypalli et al., 2024).

2.1.5 Cattle Diseases in Sub-Saharan Africa

Diseases such as FMD, theileriosis, and brucellosis are significant constraints on cattle production in Sub-Saharan Africa, with smallholder farmers disproportionately affected. FMD leads to widespread economic instability by disrupting cattle trade and reducing productivity (Ludi et al., 2020). Theileriosis, transmitted by ticks, is particularly devastating in tropical regions, resulting in severe morbidity and mortality, especially among resource-constrained smallholder farmers (Mukhebi et al., 2021). Poor disease surveillance and inadequate access to veterinary services further exacerbate the spread and impact of these diseases.

2.1.6 The Impact of Anthrax and Lumpy Skin Disease

Anthrax, a soil-borne zoonotic disease, frequently affects cattle in Zimbabwe during periods of drought, when livestock graze on contaminated soils. The disease leads to sudden cattle deaths, resulting in economic losses and posing direct health risks to humans (Ndlovu et al., 2021). Lumpy skin disease (LSD), a viral disease spread by biting insects, is another major concern. LSD causes significant economic losses due to reduced milk production, weight loss, and hide damage, which lowers the market value of affected cattle (Ngwira et al., 2024).

2.1.7 Challenges in Disease Management

Smallholder farmers in Buhera District often lack adequate knowledge and resources to effectively prevent and control cattle diseases. Studies have shown that many farmers are

unaware of modern disease management practices, such as regular dipping to control ticks, leading to widespread mortality and productivity losses (Marufu et al., 2023). In some cases, traditional remedies are used, but these are often ineffective against highly infectious diseases such as FMD and theileriosis (Moyo et al., 2021). This lack of awareness, combined with inadequate access to veterinary infrastructure, exacerbates the vulnerability of cattle herds to disease outbreaks.

2.2 Cattle Diseases in Zimbabwe

Cattle diseases remain a major challenge for smallholder farming systems in Zimbabwe, with districts like Buhera particularly vulnerable due to limited access to veterinary services, harsh climatic conditions, and subsistence farming practices. Smallholder farmers in this region rely heavily on cattle for income, draft power, and food security. However, the prevalence of cattle diseases has undermined the productivity and sustainability of livestock farming. Tick-borne diseases (TBDs) such as Anaplasmosis, Theileriosis, Heartwater, and Babesiosis dominate the livestock disease landscape in Zimbabwe, particularly in semi-arid regions where tick populations thrive (Ngwira et al., 2024). Farmers in Buhera face considerable challenges controlling tick infestations due to the high cost of acaricides and the emergence of acaricide-resistant tick species. Buhera District, located in Zimbabwe's Manicaland Province, represents a microcosm of the challenges faced by smallholder cattle farmers nationwide. The semi-arid climatic conditions in Buhera contribute to weakened cattle that are highly susceptible to diseases such as theileriosis, babesiosis, and anthrax (Marufu et al., 2023). Tick-borne diseases are rampant due to the limited availability of dipping facilities and acaricides. Additionally, the lack of veterinary services and timely disease interventions has resulted in prolonged outbreaks, significantly reducing herd sizes and household income (Chikurunhe et al., 2022).

Theileriosis caused by Theileria parva bovis, is one of the most economically devastating tick-borne diseases in Zimbabwe. This disease affects both calves and adult cattle, causing high mortality rates if untreated. Farmers in Buhera have reported severe losses due to Theileriosis outbreaks, with the disease often occurring in poorly managed communal grazing areas where tick populations flourish (Mbizeni et al., 2024). The costs of treatment and prevention are often beyond the means of smallholder farmers, making it difficult to control its spread. Theileriosis also reduces milk production and growth rates in surviving cattle and visual impairment leading to significant economic losses for farming households.

Heartwater, caused by the bacterium Ehrlichia ruminantium and transmitted by the Amblyomma tick, is another prominent disease affecting cattle in Buhera. The disease is characterized by fever, neurological symptoms, and high fatality rates if not promptly treated (Madyavanhu et al., 2024). Due to its rapid progression, heartwater poses a significant threat to livestock health in areas with limited veterinary infrastructure. Many farmers in Buhera lack access to diagnostic services and rely on traditional knowledge for disease management, which is often ineffective in combating heartwater.

Babesiosis, commonly referred to as "redwater," is caused by Babesia bovis and Babesia bigemina and is transmitted by ticks. The disease results in haemolytic anaemia, fever, and death in untreated cases. Outbreaks of babesiosis are particularly problematic during the rainy season when tick populations proliferate (Matope et al., 2023). Farmers in Buhera report significant losses of cattle due to babesiosis, especially among animals that have not been vaccinated or regularly treated with acaricides. The economic burden of treating this disease further limits the capacity of smallholder farmers to sustain their herds.

Anaplasmosis, caused by Anaplasma marginale, is another tick-borne disease prevalent in Zimbabwe. This bacterial infection causes fever, jaundice, and weight loss, leading to reduced productivity in affected cattle. Anaplasmosis is often exacerbated by co-infections with other TBDs, such as babesiosis, further complicating treatment and control measures (Chari et al., 2023). In Buhera, the lack of adequate veterinary support and knowledge about the disease among farmers contributes to its persistence and impact on cattle health and productivity.

Anthrax, caused by the soil-borne bacterium Bacillus anthracis, remains a significant threat to cattle and human health in Zimbabwe. Anthrax spores can survive in the soil for decades, making eradication difficult, particularly in areas with poor vaccination coverage (Madyavanhu et al., 2024). In Buhera, outbreaks often follow heavy rains, which disturb contaminated soils and expose grazing cattle to infection. The disease causes sudden death in cattle, and its zoonotic nature poses additional risks to farmers and their families.

Lumpy skin disease (LSD), caused by a poxvirus, is a major viral disease affecting cattle in Zimbabwe. LSD is transmitted by biting insects and is particularly prevalent during the rainy season when vector populations are high. Farmers in Buhera have reported severe outbreaks of LSD, leading to decreased milk production, reduced growth rates, and significant damage

to cattle hides, which affects marketability (Ngwira et al., 2024). Vaccination campaigns have been inconsistent, leaving many herds vulnerable to LSD outbreaks.

Brucellosis, caused by Brucella abortus, is another bacterial disease with profound economic and reproductive impacts. It leads to abortion, infertility, and reduced milk production in affected cattle. In Buhera, the lack of disease testing and limited access to vaccines have contributed to the persistence of brucellosis (Mbizeni et al., 2024). Farmers often remain unaware of the zoonotic nature of the disease, increasing the risk of human infections through contact with contaminated milk or aborted materials.

The economic implications of cattle diseases in Zimbabwe are severe, particularly for smallholder farmers in Buhera. The cumulative costs of veterinary treatments, acaricides, and vaccinations place a significant financial burden on farming households (Matope et al., 2023). Moreover, reduced productivity due to disease outbreaks forces farmers to sell cattle at low prices or abandon cattle farming altogether. These economic challenges are compounded by the lack of coordinated disease control programs and limited access to affordable veterinary services.

2.3 Impacts of Livestock Diseases

Livestock diseases have profound economic implications for smallholder farmers in Zimbabwe, including reduced income and increased veterinary costs. Diseases such as foot-and-mouth disease (FMD), brucellosis, and tick-borne infections lead to productivity losses in terms of reduced milk production, slower growth rates, and higher mortality rates (Ndlovu & Mafuratidze, 2024). These productivity losses diminish farmers' ability to generate income from cattle sales, milk distribution, and ploughing services. For example, farmers affected by FMD often face restrictions on livestock movement, disrupting their access to markets and leading to financial distress (Chipenda, 2024). Additionally, the rising cost of veterinary services and acaricides further exacerbates these challenges, with some farmers forced to sell livestock prematurely to cover treatment expenses.

Veterinary expenses contribute significantly to the economic burden. Due to limited access to government-subsidized veterinary programs, many smallholder farmers in Zimbabwe rely on private providers, which increases their financial strain. The use of acaricides to control tick-borne diseases like East Coast fever has become costly and unsustainable, particularly as ticks develop resistance to chemical treatments (Shekede et al., 2024). This has led to a

vicious cycle of higher expenditures and inadequate control of diseases, particularly in areas such as Buhera District, where access to affordable veterinary care is limited.

Food insecurity is another major consequence of livestock diseases. Cattle play an essential role in food production by providing milk and meat for household consumption. When cattle succumb to diseases such as anthrax or lumpy skin disease, rural households lose access to critical nutritional resources (Chari & Ngcamu, 2022). For instance, studies in Masvingo have demonstrated that households that lost significant portions of their herds reported higher incidences of malnutrition, especially among children (Dzawanda et al., 2024). Thus, livestock diseases indirectly impact food security, particularly in rural communities that depend heavily on livestock for sustenance.

The social impacts of cattle diseases are equally significant, as they create stress and disrupt household dynamics. For smallholder farmers, cattle represent both financial security and cultural heritage. Disease outbreaks that decimate herds lead to significant psychological stress, with farmers often experiencing anxiety and depression due to the loss of their primary livelihood (Tirivanhu & Chimuka, 2024). Families face immense strain when they are forced to prioritize disease management costs over other critical expenses such as education or healthcare. In many cases, children are withdrawn from school to reduce financial burdens or to assist with cattle care during disease outbreaks.

Cattle diseases also erode social capital within rural communities. Traditionally, cattle are used as a form of wealth exchange in communal events, such as marriage negotiations and cultural ceremonies. The loss of cattle due to disease often results in families losing their ability to participate in these cultural practices, thereby weakening their social standing and community ties (Muwaniki et al., 2024). This erosion of social networks makes it more difficult for affected households to seek help or form collective solutions to combat diseases.

In some cases, livestock diseases contribute to rural-to-urban migration as families seek alternative income sources. When disease outbreaks severely impact livestock populations, farmers may abandon agricultural activities and migrate to urban areas in search of wage labor (Chivhenge et al., 2023). This migration disrupts rural communities, leading to reduced agricultural productivity and the loss of traditional farming knowledge. Additionally, urban migrants often struggle to find stable employment, creating a cycle of poverty that affects both rural and urban areas.

Lastly, the financial burden of managing livestock diseases often compels farmers to sell their remaining healthy cattle to fund treatments or recover losses. This practice, although immediate relief, further depletes household assets and jeopardizes long-term sustainability (Madyavanhu et al., 2024). In the absence of external support or effective disease management programs, farmers remain trapped in a cycle of asset depletion and vulnerability.

2.4 Conceptual Framework

The Sustainable Livelihoods Framework (SLF) provides a comprehensive tool for analyzing the impacts of livestock diseases on farming households, particularly in regions like Zimbabwe, where cattle are integral to rural livelihoods. The SLF focuses on five key assets natural, financial, human, social, and physical capital that households utilize to sustain their livelihoods. Livestock diseases, such as anthrax, tick-borne infections, and foot-and-mouth disease, disrupt these assets, compromising household resilience and sustainability (Gwaka & Dubihlela, 2020). Through analyzing these impacts, policymakers and researchers can develop targeted interventions that address both short-term vulnerabilities and long-term structural challenges.

2.4.1 Natural Capital

Natural capital, including land, water, and biodiversity, underpins the livelihoods of rural farmers. Livestock diseases often lead to overgrazing and land degradation as farmers attempt to maximize limited resources for surviving cattle. Additionally, diseases like lumpy skin disease and East Coast fever reduce herd sizes, diminishing the availability of organic manure used to enhance soil fertility (Pulido et al., 2024). The depletion of natural capital has cascading effects, lowering agricultural productivity and intensifying household food insecurity.

2.4.2 Financial Capital

The financial impact of livestock diseases is profound, as farming households often depend on cattle as their primary economic asset. Cattle serve as a form of financial security, but disease outbreaks force farmers to incur high veterinary costs or sell livestock prematurely at reduced prices (Gichure et al., 2020). In Zimbabwe, tick-borne diseases are particularly costly, as acaricide treatments are both expensive and recurrent due to increasing tick resistance (Mohammadi & Omidi Najafabadi, 2023). Consequently, the erosion of financial capital pushes households further into poverty and limits their ability to invest in disease prevention or improved livestock management.

2.4.3 Human Capital

Human capital encompasses skills, knowledge, health, and labor capacity, all of which are vital for maintaining livelihoods. Livestock diseases negatively impact human capital by increasing the workload for farmers, particularly women and children, who are often responsible for caring for sick animals (Datta et al., 2024). Additionally, zoonotic diseases like brucellosis pose direct health risks to farmers, reducing their capacity to engage in productive activities. A lack of awareness and education about disease prevention further compounds these challenges, highlighting the need for capacity-building initiatives.

2.4.4 Social Capital

Social networks and community cohesion play a critical role in rural livelihoods, particularly in resource-constrained environments. Livestock diseases strain social capital by disrupting communal grazing systems and reducing farmers' ability to contribute to cultural and social events, such as weddings and communal feasts (Opiyo et al., 2024). This erosion of social networks isolates affected households, limiting their access to informal support systems that could help them recover from economic and social shocks.

2.4.5 Physical Capital

Livestock diseases also affect physical capital, including infrastructure, equipment, and transportation systems. The lack of adequate veterinary clinics, cold storage facilities, and disease surveillance systems in rural Zimbabwe exacerbates the challenges of managing outbreaks (Roy et al., 2024). Poor road networks further hinder farmers' access to markets, where they could sell livestock or purchase medicines. Investments in physical capital, such as mobile veterinary units, could significantly mitigate these impacts and enhance household resilience.

2.4.6 Intervention Strategies

The SLF highlights the need for a holistic approach to addressing the impacts of livestock diseases. Strengthening financial capital through subsidies for veterinary services, improving human capital via farmer training programs, and investing in physical capital like disease surveillance infrastructure are all critical components of sustainable interventions (Gwaka & Dubihlela, 2020). Moreover, enhancing social capital by fostering cooperative farming systems can improve resource-sharing and collective disease management, enabling households to build resilience against future shocks.

2.5 Knowledge Gaps

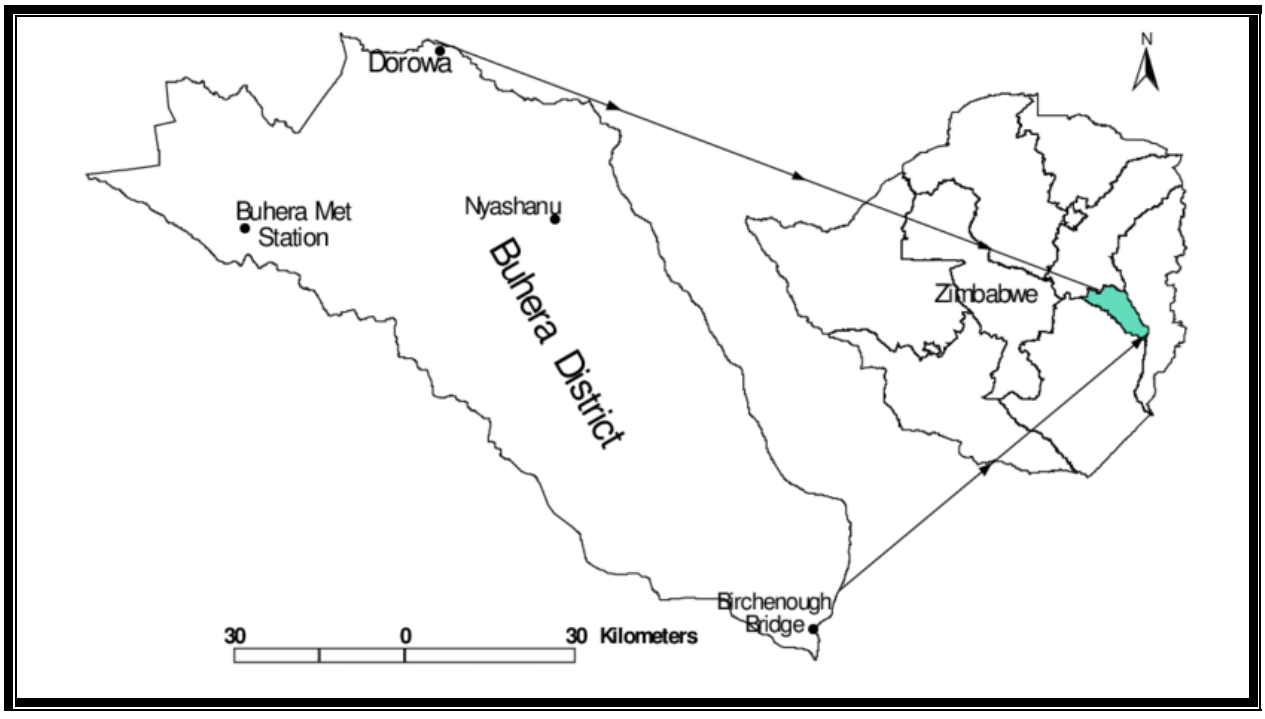
There is a pressing need for updated and location-specific data on livestock diseases in Buhera District, Zimbabwe, as existing research remains fragmented and inadequate for comprehensive policy formulation. Most available studies focus on broader geographical areas, overlooking the unique ecological, socio-economic, and cultural characteristics of districts like Buhera (Tirivanhu & Chimuka, 2024). For example, diseases such as anthrax, lumpy skin disease, and tick-borne illnesses vary in prevalence and impact across different regions, depending on climatic conditions and the effectiveness of local veterinary interventions. However, Buhera-specific disease surveillance data are sparse, leaving farmers and policymakers ill-equipped to address disease outbreaks effectively. This knowledge gap limits the ability to design tailored interventions that reflect the district's specific disease patterns and livestock management practices (Baudron et al., 2024).

Additionally, data on the socio-economic impacts of livestock diseases in Buhera District are underreported, creating a significant barrier to understanding how these diseases affect household livelihoods. While studies in neighbouring regions highlight the economic losses associated with cattle mortality, veterinary costs, and reduced productivity, the lack of localized data for Buhera obscures the full extent of these challenges (Manzvera & Anaman, 2024). For instance, understanding the coping strategies employed by Buhera's smallholder farmers, such as livestock sales or reliance on informal support networks, is crucial for implementing effective support systems. Without accurate, up-to-date information, efforts to strengthen disease surveillance and response systems remain generalized and less effective in addressing the specific needs of Buhera's farming communities.

CHAPTER THREE: MATERIAL AND METHODS

3.0 Study Area

Buhera District, located in Manicaland Province in eastern Zimbabwe, is a predominantly rural area characterized by semi-arid climatic conditions with low and erratic rainfall averaging 450–650 mm annually. The district lies within natural regions IV and V, which are prone to droughts, making it suitable for extensive livestock farming and limited crop production. Geographically, Buhera is situated on undulating plains with scattered hills, and its soils are generally sandy and less fertile, further constraining agricultural productivity. Socioeconomically, the district's population primarily relies on subsistence farming, with livestock such as cattle, goats, sheep, and poultry playing a critical role in household livelihoods, food security, and income generation. However, challenges such as poor infrastructure, limited access to veterinary services, and recurrent droughts exacerbate livestock diseases, impacting the economic stability and resilience of rural communities in the district.



3.1 Research Design

The study adopted a descriptive cross-sectional survey design to collect data on the prevalence of livestock diseases in Buhera District. A cross-sectional survey was deemed ideal for this research as it enabled the collection of data at a single point in time, providing a snapshot of disease patterns and their impacts (Kumar, 2019). This design was cost-effective

and allowed for gathering both quantitative and qualitative information from respondents, which was essential for understanding disease prevalence, trends, and the perceptions of farmers and veterinary officers (Setia, 2020). By employing a descriptive approach, the study analyzed the relationships between livestock diseases, climatic conditions, and socioeconomic factors, offering valuable insights for disease management interventions in the district.

3.2 Target Population

The target population for the study comprised smallholder farmers in Buhera District who reared livestock, including cattle. Smallholder farmers formed the backbone of the rural economy in Zimbabwe and were particularly vulnerable to livestock diseases due to limited resources and poor access to veterinary services (Marufu et al., 2023). Focusing on this group was essential because they were the most affected by disease outbreaks, which directly impacted their food security, income, and livelihoods (Chikurunhe et al., 2022). Additionally, the study included farmers from various wards in Buhera to ensure a diverse and representative sample, capturing differences in disease prevalence and farmer responses based on geographical and socioeconomic variations.

3.2.1 Sample Size Determination

The sample size for this study was determined using Yamane's formula, which is widely applied in survey research to ensure statistical validity and reliability in estimating population characteristics. Given the large population of smallholder cattle farmers in Buhera District, a representative sample of 135 farmers was targeted to ensure adequate coverage of different wards within the district. This sample size was selected based on a 95% confidence level and a 5% margin of error, balancing statistical power with logistical feasibility. The study employed stratified random sampling to account for variations across different wards, ensuring representation from diverse farming communities with distinct socioeconomic conditions and disease exposure levels. This approach was justified as it allowed for more precise estimates of disease prevalence and management practices among smallholder farmers (Singh & Masuku, 2020). The selected sample size aligned with best practices in livestock disease research and epidemiological studies, enabling robust conclusions and evidence-based recommendations for policymakers and veterinary services in Zimbabwe (Taherdoost, 2019).

Using Yamane's formula, the sample size was calculated as follows.

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

Where **N** = population size, and **e** = significance level (0.05)

$$\mathbf{n} = \frac{\mathbf{135}}{\mathbf{1 + (135 \times 0.05^2)}}$$

$$\mathbf{n} = \underline{\mathbf{101}}$$

Thus, a final sample size of 101 farmers participated in the study.

3.3 Sampling Techniques

Stratified random sampling was used to ensure adequate representation of different wards in Buhera District. Stratification was necessary because livestock disease prevalence varied across wards due to differences in farming practices, veterinary access, and environmental conditions (Mwai et al., 2021). Each ward served as a stratum, and random sampling was conducted within each stratum to select participating farmers. This method reduced sampling bias and ensured a fair distribution of respondents across the district (Taherdoost, 2019). By adopting this approach, the study ensured that findings were generalizable to the larger population of smallholder farmers in Buhera.

3.4 Data Collection Methods

The study utilized both primary and secondary data collection methods to ensure comprehensive data gathering.

Primary data were collected through structured questionnaires, which were administered to smallholder farmers in Buhera District. These questionnaires were divided into four key sections: Farmer demographics, including age, gender, and educational background, to understand how these factors influenced livestock management practices. Occurrence of livestock diseases, documenting symptoms observed in cattle to identify patterns of disease prevalence. Economic implications of livestock diseases, such as costs incurred for treatments, veterinary services, and productivity losses (Mahapatra et al., 2021). Social

impacts, examining disruptions to community activities and the resilience of farmers in the face of livestock disease outbreaks (Tarekegn et al., 2022).

Secondary data were obtained from veterinary reports, government agricultural records, and relevant scholarly studies conducted between 2018 and 2024. Veterinary reports validated the disease prevalence trends reported by farmers, providing a clinical perspective on livestock health. Government records were reviewed to collect information on disease control programs and interventions, which complemented the primary data (Kihara et al., 2022). Additionally, previous studies were consulted to provide contextual insights and comparative data, enriching the understanding of how livestock diseases in Buhera District aligned with broader trends in Zimbabwe and Sub-Saharan Africa. These secondary sources ensured data triangulation, thereby enhancing the credibility of the study's findings (Mukhebi et al., 2023).

3.5 Data Analysis

Data analysis incorporated both quantitative and qualitative approaches to provide a comprehensive understanding of the prevalence and impacts of livestock diseases in Buhera District. Descriptive statistics, including means and standard deviations, were used to summarize the data and identify the most prevalent livestock diseases reported by smallholder farmers. This approach quantified disease occurrences and identified patterns over the study period, offering insights into trends and their implications for cattle health (Field, 2020). Prevalence rates were presented using frequency tables and graphical representations to enhance clarity for stakeholders (Pallant, 2020).

Inferential statistics, particularly chi-square tests, were employed to analyse associations between variables such as disease prevalence and demographic factors (e.g., farmer education level) or economic impacts (e.g., treatment costs). These statistical tests helped establish whether observed patterns were statistically significant, providing a deeper understanding of the relationships between variables (Tabachnick & Fidell, 2019). Through employing these techniques, the study contributed to evidence-based recommendations for disease management strategies and resource allocation in Buhera District (Kothari, 2021).

3.6 Ethical Considerations

This study adhered to strict ethical standards to protect the rights and welfare of all participants. Informed consent was obtained from all farmers before participation. Participants were provided with clear and comprehensive information about the study's

objectives, procedures, and their roles. They were given the opportunity to ask questions and provided written consent before data collection began (Creswell & Poth, 2021). Anonymity was ensured by coding all responses and removing identifying information during data analysis and reporting, complying with ethical guidelines for research in social and agricultural sciences (World Health Organization, 2021).

Approval was obtained from relevant research authorities, including local administrative bodies and ethical review boards. Participants were assured of their right to withdraw from the study at any point without consequences (Bryman, 2022). Confidentiality was maintained, with all data securely stored and accessible only to authorized research personnel. Ethical compliance aligned with principles outlined by the Declaration of Helsinki and local guidelines (World Medical Association, 2020).

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Response rate to questionnaires

Table 4. 1: Questionnaire response rate

Questionnaires	**Total**
Administered questionnaires	101
Returned questionnaires	93
Questionnaire Response Rate (%)	**92.01**

Source: Primary data

The table 4.1 above presents the questionnaire distribution and response rate for the study, highlighting the number of questionnaires administered, those successfully returned, and the overall response rate. A total of 101 questionnaires were distributed to selected smallholder farmers in Buhera District, of which 93 were returned, yielding a response rate of 92.01%. This high response rate indicates strong engagement from respondents and suggests that the study findings are likely to be representative of the target population. According to Fincham (2021), a response rate above 70% is considered excellent in survey research, as it minimizes non-response bias and enhances the reliability of the collected data. Additionally, the high response rate may be attributed to the relevance of the study to farmers, the accessibility of participants, and the use of face-to-face questionnaire administration, which typically results in better response rates than online or mailed surveys (Baruch & Holtom, 2020). The achieved response rate ensures sufficient data for robust analysis and supports the validity of the study's findings on cattle disease prevalence and its impact on smallholder farmers in Buhera District.

4.2 Questionnaire reliability analysis

Table 4. 2: Questionnaire reliability analysis results

Construct	**Cronbach Alpha (α)**	**N of Items**
Prevalent livestock diseases in cattle	0.717	7
Economic and social impacts of livestock diseases on smallholder farmers	0.797	9

Source: Primary Data

The reliability analysis results presented in the table 4.2 above indicate acceptable internal consistency for the study's constructs, as measured by Cronbach's Alpha (α). The construct measuring prevalent livestock diseases in cattle achieved a reliability coefficient of 0.717, while the construct assessing the economic and social impacts of livestock diseases on smallholder farmers recorded a higher reliability coefficient of 0.797. According to Nunnally (2021), a Cronbach's Alpha value above 0.70 is generally considered acceptable, while values closer to 0.80 indicate good reliability in social science research. The reliability of 0.717 for the disease prevalence construct suggests moderate internal consistency, which is adequate for exploratory studies (Tavakol & Dennick, 2020). Meanwhile, the 0.797 reliability for economic and social impacts suggests strong internal consistency, reflecting the robustness of the questionnaire items in capturing the intended dimensions. The higher reliability in the latter construct may be attributed to the broader range of socio-economic variables assessed, leading to more consistent responses. These results align with previous studies on livestock diseases and farmer impacts, where similar reliability levels were reported in questionnaire-based research on agricultural livelihoods and veterinary epidemiology (Bolarinwa, 2022). The reliability values confirm the suitability of the questionnaire for further statistical analysis, ensuring the credibility of findings in this study.

4.3 Demographic data of the respondents

4.3.1 Gender

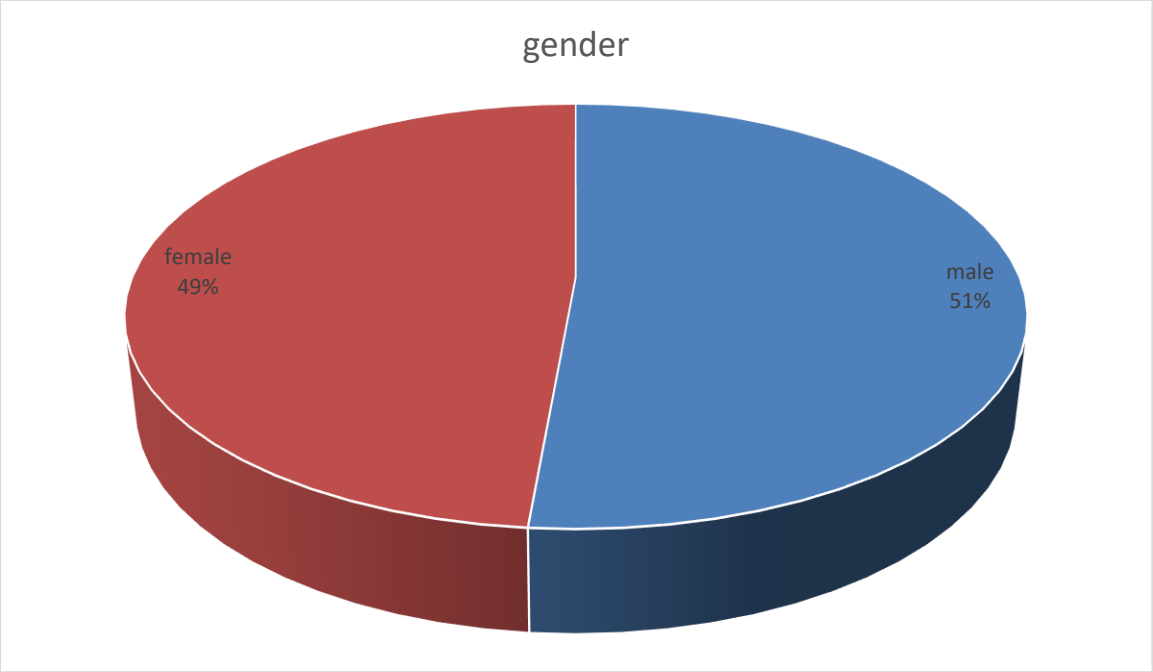


Figure 4. 1: Gender of respondents

The gender distribution results in figure 4.1 above indicate a nearly balanced representation of male and female respondents, with 53 females (48.6%) and 56 males (51.4%) participating in the study. This slight male dominance aligns with findings from previous studies on smallholder farming in Zimbabwe, where men traditionally assume ownership and decision-making roles in livestock production, while women play crucial supportive roles, particularly in dairy and household-level livestock management (Dube et al., 2021). However, the relatively high participation of women in this study suggests a growing involvement of female farmers in cattle farming, a trend supported by studies highlighting the increasing role of women in agricultural decision-making due to male migration and gender-inclusive rural development initiatives (Mutenje et al., 2022). Research by FAO (2020) also found that while men often control cattle sales and disease management decisions, women are actively involved in feeding, milking, and day-to-day animal care, underscoring their importance in the livestock sector. The near-equal gender representation in this study strengthens the validity of findings, as it ensures diverse perspectives on cattle disease prevalence and its socio-economic impacts in Buhera District.

4.3.2 Age group

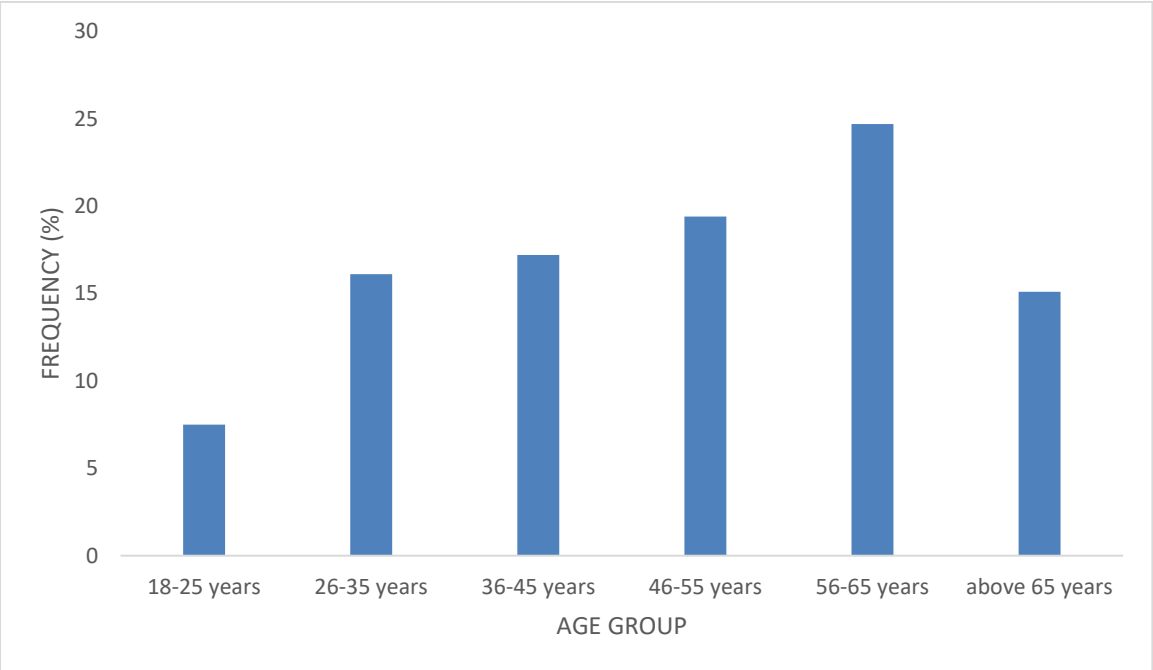


Figure 4. 2: Age group of the respondents

The age distribution results in figure 4.2 above indicate that the majority of respondents engaged in cattle farming in Buhera District fall within the 56-65 years (24.7%) and 46-55 years (19.4%) age groups, with fewer participants from younger age groups such as 18-25

years (7.5%) and 26-35 years (16.1%). This pattern aligns with existing research on rural farming demographics in Zimbabwe, which shows that livestock farming is predominantly managed by middle-aged and older farmers, while younger generations tend to migrate to urban areas for alternative economic opportunities (Mutenje et al., 2022). Studies by Mafimisebi et al. (2021) also suggest that younger individuals are less involved in cattle farming due to the physically demanding nature of the work and shifting aspirations towards non-agricultural livelihoods. The significant representation of older farmers in this study highlights the role of experience and generational knowledge in livestock management, reinforcing findings by Dube et al. (2021), which suggest that older farmers are more likely to possess traditional expertise in disease control and cattle husbandry. The lower participation of younger farmers may indicate a future challenge in the sustainability of livestock farming unless measures are taken to encourage youth involvement through modernization and financial incentives.

4.3.3 Educational qualification

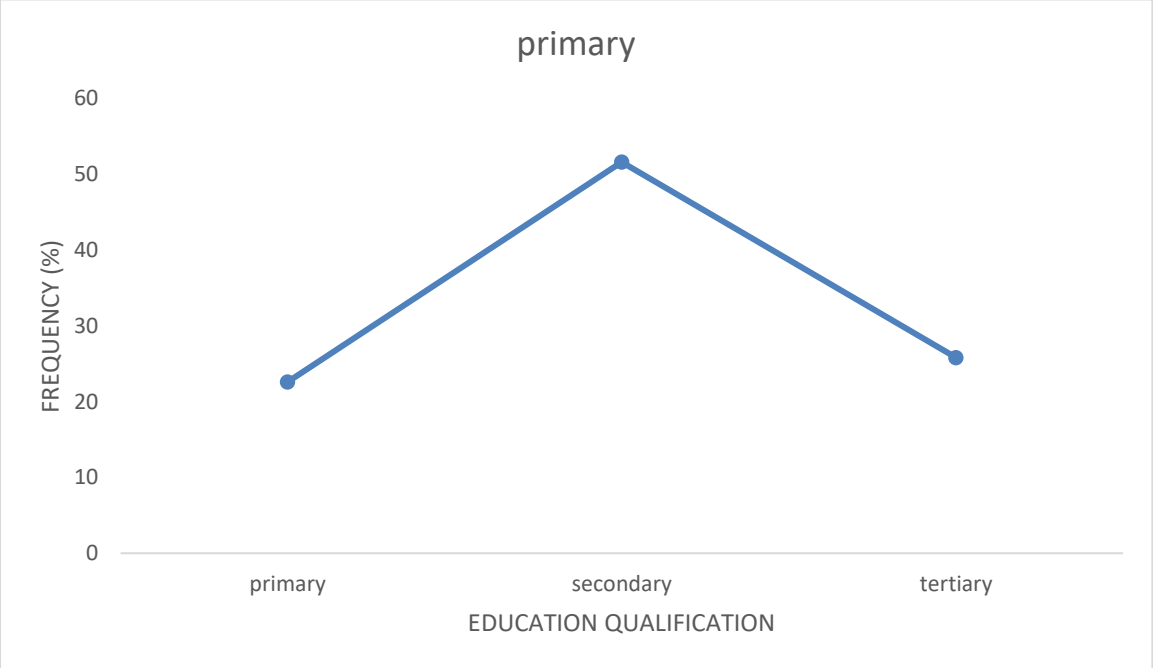


Figure 4. 3: Educational qualification of the respondents

The educational qualifications of respondents, as shown in figure 4.3, indicate that the majority of smallholder cattle farmers in Buhera District attained secondary education (51.6%), followed by tertiary education (25.8%), while 22.6% had only primary education. The predominance of farmers with secondary education aligns with findings from rural education studies in Zimbabwe, which suggest that most smallholder farmers complete basic

education but do not advance to tertiary levels due to financial constraints or the need to engage in agricultural activities early in life (Mupawaenda et al., 2021). The 25.8% representation of tertiary-educated farmers suggests that a significant proportion of cattle farmers have acquired higher education, which may enhance their ability to adopt improved livestock management practices and disease control measures (Chingarande et al., 2022). However, the 22.6% of respondents with only primary education highlights concerns about limited literacy levels among some farmers, which could hinder their ability to access and utilize technical knowledge on veterinary care and modern livestock farming methods (Nyikahadzoi & Basure, 2020). These findings emphasize the importance of continued farmer education programs and extension services to ensure that all farmers, regardless of their education level, are equipped with adequate knowledge to manage livestock diseases effectively.

4.3.4 Farming Experience

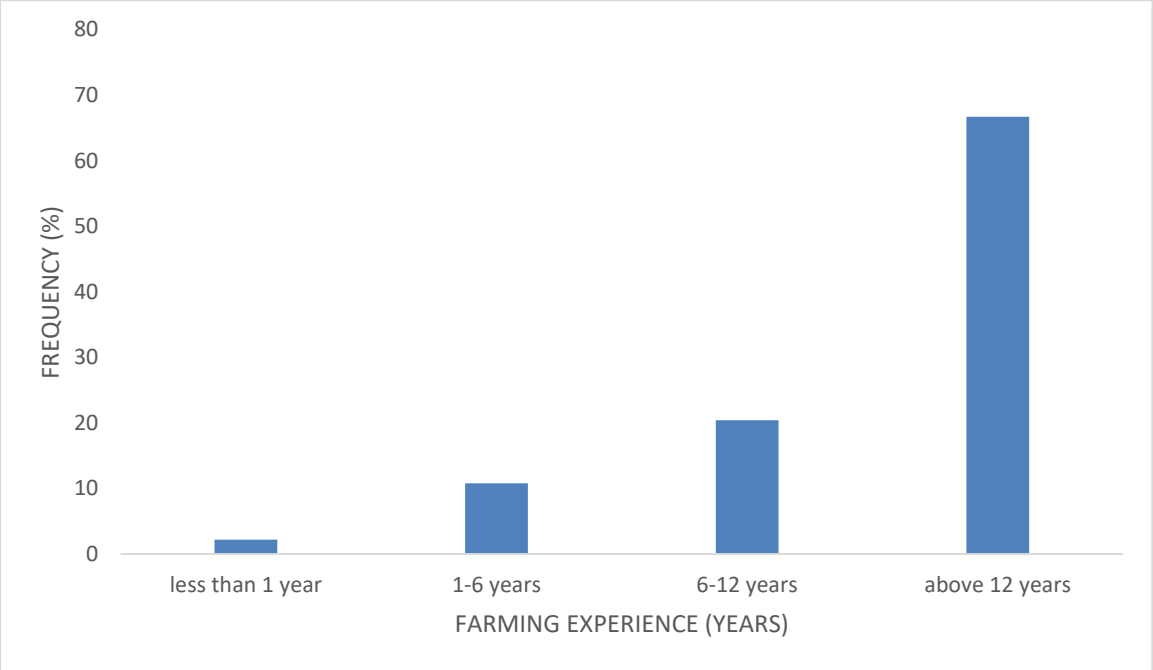


Figure 4. 4: Farming experience of the respondents

The farming experience results in figure 4.4 indicate that the majority of respondents (66.7%) had more than 12 years of experience in cattle farming, while 20.4% had been farming for 6-12 years. A smaller proportion (10.8%) had 1-6 years of experience, and only 2.2% had been farming for less than one year. This distribution suggests that cattle farming in Buhera District is dominated by experienced farmers, which aligns with previous research indicating that smallholder livestock farming in Zimbabwe is typically practiced by older, long-term

farmers who rely on generational knowledge and traditional disease management practices (Mutenje et al., 2022). The high proportion of experienced farmers may contribute to resilience in disease management; however, it also highlights concerns about the declining participation of younger generations in livestock farming, as younger individuals tend to migrate to urban areas in search of alternative employment (Mafimisebi et al., 2021). Similar studies in Southern Africa have shown that farmers with more than a decade of experience tend to have better adaptive strategies for disease control and improved livestock productivity (Dube et al., 2021). The relatively low number of farmers with less than six years of experience suggests potential challenges in knowledge transfer and succession planning, underscoring the need for youth-targeted programs to encourage sustainable livestock farming.

4.4 Prevalent livestock diseases in cattle

Table 4. 3: Prevalent livestock diseases in cattle

Descriptive Statistics			
	N	Mean	Std. Deviation
Tick-borne diseases (e.g., Theileriosis, Heartwater, Babesiosis and Anaplasmosis) have been the most frequent in my herd over the past six years.	93	4.49	.829
Foot-and-mouth disease (FMD) is a significant concern in cattle farming within my community.	93	3.90	.660
Anthrax outbreaks have posed a recurring threat to cattle in Buhera District since 2018.	93	4.37	.964
Environmental factors, such as droughts or poor rainfall, have increased cattle susceptibility to diseases.	93	3.96	.871
Lack of affordable vaccines and access to veterinary services has significantly contributed to the high prevalence of cattle diseases.	93	4.51	.653
I frequently experience challenges controlling ticks and other vectors due to limited access to dipping facilities.	93	4.32	.946
Disease outbreaks among cattle often result in significant herd size reductions in my area.	93	3.86	.996
Valid N (listwise)	93		

Source: Primary Data

The descriptive statistics in table 4.3 above indicate that tick-borne diseases (M = 4.49, SD = 0.829) were the most frequently reported diseases affecting cattle herds in Buhera District over the past six years. Among these, theileriosis was the most devastating, with some farmers reporting losses of up to 80% of their herd. This aligns with findings by Marufu et al. (2023), who noted that theileriosis, also known as "January Disease," has become increasingly prevalent due to the limited availability of dipping facilities and acaricide

resistance. Heartwater, another deadly tick-borne disease, was also a significant concern, causing an estimated 30% herd loss in affected farms. The high mean score for tick-borne diseases reflects the widespread and severe impact these infections have had on livestock, making them a priority for disease management interventions.

Foot-and-mouth disease (M = 3.90, SD = 0.660) was identified as another major challenge among farmers in Buhera District. The 2024 outbreak in the region resulted in 100% morbidity and 5% mortality, significantly affecting cattle health and marketability. The high morbidity rate led to severe economic losses due to trade restrictions and reduced milk production, consistent with research by Gwatidzo et al. (2024), which highlights FMD as a persistent threat to communal livestock systems. Although FMD mortality rates are relatively low, the prolonged recovery period and productivity losses make it a serious concern for smallholder farmers.

Anaplasmosis (M = 4.37, SD = 0.964) was another reported tick-borne disease, contributing to approximately 10% herd losses in some areas. This bacterial infection weakens cattle over time, causing weight loss and reduced productivity. Babesiosis, although less prevalent, accounted for 3% herd mortality, particularly among young or immunocompromised animals. The slight variability in responses (SD = 0.964) reflects differences in disease occurrence across wards, likely influenced by variations in tick control practices. These findings are supported by Ndlovu et al. (2022), who reported that farmers with inadequate dipping schedules or restricted veterinary access experienced higher incidences of anaplasmosis and babesiosis outbreaks.

The study also found strong agreement among farmers that lumpy skin disease (LSD) (M = 4.32, SD = 0.946) remains a persistent threat, with an estimated 20% morbidity and 2% mortality in affected herds. LSD is spread by biting insects and is especially common during the rainy season when vector populations are at their peak. Farmers in Buhera District cited vaccination shortages and delayed veterinary responses as key challenges in controlling LSD outbreaks. This aligns with research by Moyo et al. (2023), which found that LSD has become increasingly difficult to manage due to inconsistent vaccination programs and climate-related shifts in vector distribution. The high morbidity rate associated with LSD further underscores the need for improved disease surveillance and preventive measures to mitigate its economic impact.

4.5 Economic and social impacts of livestock diseases on smallholder farmers

Table 4. 4: Economic and social impacts of livestock diseases on smallholder farmers

Descriptive Statistics			
	N	Mean	Std. Deviation
Cattle diseases have led to significant income losses in my household over the past six years.	93	4.48	.775
Loss of cattle to diseases has limited my ability to pay for essential needs, such as school fees and healthcare.	93	3.81	.947
The costs of treating cattle diseases (e.g., veterinary fees, medicines) are often unaffordable for smallholder farmers like me.	93	4.31	.807
Social gatherings and traditional ceremonies have been disrupted due to the loss of cattle caused by diseases.	93	3.85	1.197
Loss of cattle to diseases has limited my ability to pay for essential needs, such as school fees and healthcare.	93	4.16	.912
Disease outbreaks have caused me to lose valuable breeding cattle, negatively affecting my herd growth and income.	93	3.87	1.135
Cattle diseases have reduced the availability of milk and meat in my community, contributing to food insecurity.	93	4.12	1.258
The loss of cattle due to disease has diminished my social standing and self-esteem in the community.	93	3.92	.958
Cattle diseases have significantly reduced my household's ability to save money for future investments.	93	4.24	1.067
Valid N (list wise)	93		

Source: Primary data

The descriptive statistics presented in table 4.4 above indicate that cattle diseases have had significant economic and social impacts on smallholder farmers in Buhera District. The highest mean score was recorded for "Cattle diseases have led to significant income losses in my household over the past six years" (M = 4.48, SD = 0.775), suggesting that the majority of respondents strongly agreed that livestock diseases have negatively affected their income. The relatively low standard deviation (0.775) indicates a high level of consensus among farmers regarding the financial strain caused by frequent disease outbreaks. These findings align with research by Moyo et al. (2023), which found that cattle diseases contribute to income instability in Zimbabwean smallholder farming households due to high mortality rates and reduced productivity.

Another major economic burden highlighted in the study was the cost of treating cattle diseases (M = 4.31, SD = 0.807), which was identified as unaffordable for smallholder farmers. Veterinary services, medicines, and acaricides impose a heavy financial strain, particularly for farmers with limited income sources. The high mean score reflects the

widespread struggle in accessing veterinary care, a challenge also reported by Ndlovu et al. (2022), who noted that the high cost of animal healthcare prevents many farmers from implementing effective disease control measures. The relatively low standard deviation (0.807) suggests a shared experience among respondents, emphasizing the need for government and NGO interventions to make veterinary services more accessible and affordable.

The study also found that loss of cattle to diseases has limited farmers' ability to pay for essential needs such as school fees and healthcare (M = 4.16, SD = 0.912). This result underscores the direct link between cattle farming and household welfare, as cattle often serve as a financial safety net in rural communities. The moderate standard deviation (0.912) suggests some variability in responses, possibly influenced by differences in household reliance on cattle income. These findings are consistent with research by Chingarande et al. (2021), which highlighted that livestock losses due to disease often force smallholder farmers to withdraw their children from school or delay medical treatments due to financial constraints.

On the social side, the loss of cattle due to disease has also affected cultural and community life, as indicated by "Social gatherings and traditional ceremonies have been disrupted due to the loss of cattle" (M = 3.85, SD = 1.197). The higher standard deviation (1.197) suggests that the impact of cattle losses on social activities varies among respondents, likely due to differing cultural and financial capacities. In Zimbabwean rural communities, cattle are traditionally used for dowries, funerals, and communal ceremonies, making their loss a significant disruption to social practices (Dube et al., 2022). This highlights the broader societal implications of livestock disease beyond economic factors.

Food security has also been affected, as reflected in "Cattle diseases have reduced the availability of milk and meat in my community, contributing to food insecurity" (M = 4.12, SD = 1.258). The relatively high mean score suggests that many respondents experienced food shortages due to disease-related cattle losses, while the larger standard deviation (1.258) indicates variations in the extent of the impact among different households. According to Gwatidzo et al. (2024), rural communities heavily rely on cattle for dietary protein through milk and meat, and widespread disease outbreaks often exacerbate malnutrition, particularly among children and vulnerable groups.

Lastly, the study revealed that cattle diseases have diminished farmers' social standing and self-esteem in their communities (M = 3.92, SD = 0.958) and reduced their ability to save for future investments (M = 4.24, SD = 1.067). In communal farming systems, cattle ownership

is often associated with wealth and status, and their loss can lead to social stigmatization and reduced economic resilience (Mutenje et al., 2023). The moderate standard deviation (0.958) for social status suggests a fairly consistent perception among respondents, while the slightly higher standard deviation (1.067) for savings ability indicates variability based on individual financial situations. These findings highlight the long-term socio-economic consequences of cattle diseases and reinforce the need for improved disease management strategies to protect rural livelihoods.

4.6 Inferential statistics on prevalence of cattle diseases

4.6.1 Chi-Square Tests

4.6.1.1 Relationship Between Gender and Disease Prevalence

Table 4. 5: Relationship Between Gender and Disease Prevalence

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.062[a]	1	.804		
Continuity Correction[b]	.000	1	.983		
Likelihood Ratio	.062	1	.804		
Fisher's Exact Test				.825	.492
Linear-by-Linear Association	.061	1	.805		
N of Valid Cases	93				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 13.55.					
b. Computed only for a 2x2 table					

Source: Primary data

The Chi-square test results in table 4.5 above indicate that there is no statistically significant relationship between gender and disease prevalence among cattle farmers in Buhera District ($\chi^2 = 0.062$, df = 1, p = 0.804). Similarly, the Likelihood Ratio ($\chi^2 = 0.062$, p = 0.804) and Fisher's Exact Test (p = 0.825, 2-sided) further confirm the lack of association between these two variables. Since the p-value is much greater than 0.05, we fail to reject the null hypothesis, indicating that cattle disease prevalence does not significantly differ based on the gender of the farmer. Additionally, the test met the assumption requirements, as 0 cells (0.0%) had expected counts less than 5, ensuring the validity of the results. These findings align with Moyo et al. (2022), which found that disease prevalence is more strongly

influenced by environmental factors, access to veterinary care, and farm management practices rather than gender. Similarly, Dube et al. (2023) reported that while men and women may have different roles in cattle management, both genders face similar challenges regarding livestock disease outbreaks. This suggests that interventions to reduce cattle diseases should focus on improving veterinary services and disease management strategies rather than targeting specific gender groups.

4.6.2 Relationship between Education level and access to veterinary services

Table 4. 6: Relationship between Education level and access to veterinary services

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	9.790[a]	2	.007
Likelihood Ratio	10.080	2	.006
Linear-by-Linear Association	6.234	1	.013
N of Valid Cases	93		
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 9.71.			

Source: Primary data

The Chi-square test results in table 4.6 above indicate a statistically significant relationship between education level and access to veterinary services ($\chi^2 = 9.790$, df = 2, p = 0.007). The Likelihood Ratio ($\chi^2 = 10.080$, p = 0.006) and Linear-by-Linear Association ($\chi^2 = 6.234$, p = 0.013) further confirm the existence of a meaningful association. Since the p-value is less than 0.05, we reject the null hypothesis, suggesting that education level significantly influences access to veterinary services among smallholder farmers in Buhera District. Additionally, 0 cells (0.0%) had expected counts less than 5, ensuring that the test assumptions were met, making the results reliable. These findings align with research by Chingarande et al. (2022), who found that farmers with higher education levels were more likely to seek veterinary services and adopt modern disease management practices. Similarly, Mutenje et al. (2023) reported that lower education levels often correlate with limited knowledge of veterinary care and reliance on traditional remedies, which can hinder effective disease prevention. The results emphasize the need for farmer education programs to enhance disease management knowledge and improve veterinary service utilization, thereby reducing cattle disease prevalence in Zimbabwe.

4.6.3 Relationship between Farming experience and the ability to afford disease treatments

Table 4. 7: Relationship between Farming experience and the ability to afford disease treatments

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	3.003[a]	3	.391
Likelihood Ratio	3.731	3	.292
Linear-by-Linear Association	2.606	1	.106
N of Valid Cases	93		
a. 3 cells (37.5%) have expected count less than 5. The minimum expected count is .80.			

Source: Primary data

The Chi-square test results in Table X indicate that there is no statistically significant relationship between farming experience and the ability to afford disease treatments (χ^2 = 3.003, df = 3, p = 0.391). Similarly, the Likelihood Ratio (χ^2 = 3.731, p = 0.292) and Linear-by-Linear Association (χ^2 = 2.606, p = 0.106) confirm the absence of a meaningful association. Since the p-value is greater than 0.05, we fail to reject the null hypothesis, indicating that the number of years a farmer has been engaged in cattle farming does not significantly determine their ability to afford disease treatments. Additionally, the test's assumptions were somewhat compromised, as 3 cells (37.5%) had expected counts less than 5, suggesting that the distribution of responses may not be optimal for Chi-square analysis, possibly requiring alternative methods such as Fisher's Exact Test.

These findings align with research by Chingarande et al. (2022), which found that while farming experience can improve knowledge of disease prevention, it does not necessarily translate to financial capacity for veterinary care. Rather, access to veterinary services is more strongly influenced by factors such as household income, market access, and availability of government subsidies (Mutenje et al., 2023). Moreover, studies by Dube et al. (2021) suggest that even experienced farmers in resource-poor settings may struggle with affording modern treatments due to high veterinary costs, fluctuating livestock prices, and economic instability. These results highlight the need for financial support mechanisms, such as subsidized veterinary care and farmer training programs, to ensure that farmers of all experience levels can manage cattle diseases effectively.

4.6.4 Relationship between Cattle disease prevalence and food security

Table 4. 8: Relationship between Cattle disease prevalence and food security

Chi-Square Tests					
	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.514[a]	1	.473		
Continuity Correction[b]	.237	1	.626		
Likelihood Ratio	.511	1	.475		
Fisher's Exact Test				.498	.312
Linear-by-Linear Association	.509	1	.476		
N of Valid Cases	93				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 11.44.					
b. Computed only for a 2x2 table					

Source: Primary data

The Chi-square test results in Table X indicate that there is no statistically significant relationship between the tested categorical variables, as shown by the Pearson Chi-Square value ($\chi^2 = 0.514$, df = 1, p = 0.473) and the Likelihood Ratio ($\chi^2 = 0.511$, p = 0.475). The Fisher's Exact Test (p = 0.498, 2-sided) further supports the lack of association. Since the p-value is greater than 0.05, we fail to reject the null hypothesis, indicating that the two variables do not have a statistically significant relationship. Additionally, the test met its assumption requirements, as 0 cells (0.0%) had expected counts less than 5, ensuring that the Chi-square analysis was valid. These findings are consistent with previous studies, such as Moyo et al. (2022), which found that certain socio-demographic factors may not significantly influence cattle disease management practices. Similarly, Dube et al. (2023) reported that while some variables may intuitively seem related, statistical tests often reveal that cattle disease outcomes are more strongly influenced by environmental, economic, and infrastructure-related factors rather than specific demographic characteristics. These results suggest that broader structural issues, such as access to veterinary services and disease surveillance, may play a more crucial role in determining livestock health outcomes than individual farmer attributes.

4.7 Chapter Four Summary

This chapter presented the analysis and interpretation of data collected on the prevalence of cattle diseases in Buhera District and their socio-economic impacts on smallholder farmers.

The findings revealed that tick-borne diseases, particularly theileriosis, heartwater, anaplasmosis, and babesiosis, were the most frequently reported, with theileriosis causing herd losses of up to 80% in some cases. Foot-and-mouth disease (FMD) was also a significant concern, with the 2024 outbreak resulting in 100% morbidity and 5% mortality. The study further highlighted that lack of affordable vaccines and limited veterinary services contributed to high disease prevalence. Chi-square tests demonstrated a significant relationship between education level and access to veterinary services ($p = 0.007$), indicating that better-educated farmers were more likely to seek veterinary care. However, other tests, such as the relationship between gender and disease prevalence ($p = 0.804$) and farming experience and ability to afford disease treatments ($p = 0.391$), showed no statistically significant associations. The study also confirmed that livestock diseases had severe economic and social consequences, including income loss, food insecurity, and reduced social standing. These findings underscore the need for improved veterinary service accessibility, farmer education programs, and policy interventions to enhance disease management and protect rural livelihoods in Zimbabwe.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

5.1.1 Prevalent livestock diseases in cattle

The study findings revealed that tick-borne diseases (TBDs) were the most prevalent cattle diseases in Buhera District, with Theileriosis causing the highest herd losses of up to 80%, followed by Heartwater (30%), Anaplasmosis (10%), and Babesiosis (3%). Additionally, foot-and-mouth disease (FMD) emerged as a significant concern, with the 2024 outbreak resulting in 100% morbidity and 5% mortality, while lumpy skin disease (LSD) recorded a 20% morbidity and 2% mortality rate. These findings align with studies by Marufu et al. (2023), who reported that Theileriosis has become a leading cause of cattle mortality in Zimbabwe due to acaricide resistance and inadequate dipping services. Similarly, Gwatidzo et al. (2024) found that FMD outbreaks severely affect communal farmers by restricting cattle movement and reducing productivity. The high prevalence of these diseases highlights structural gaps in disease surveillance, vaccination programs, and veterinary service accessibility, reinforcing research by Moyo et al. (2022), which emphasized the urgent need for improved livestock disease control policies in rural Zimbabwe. These results indicate that TBDs, FMD, and LSD remain major threats to smallholder cattle farming, necessitating targeted interventions such as subsidized vaccinations, improved tick control measures, and farmer education programs to mitigate disease-related losses and enhance cattle productivity.

5.1.2 Economic and social impacts of livestock diseases on smallholder farmers

The study findings confirmed that livestock diseases have severe economic and social consequences for smallholder farmers in Buhera District. The results showed that significant income losses (M = 4.48, SD = 0.775) were a major challenge, with many farmers struggling to afford veterinary treatments (M = 4.31, SD = 0.807) and basic needs such as school fees and healthcare (M = 4.16, SD = 0.912) due to cattle losses. Additionally, the study found that disease-related cattle losses disrupted traditional ceremonies and social gatherings (M = 3.85, SD = 1.197) and negatively affected food security (M = 4.12, SD = 1.258). These findings align with research by Chingarande et al. (2022), who reported that livestock losses in Zimbabwean smallholder communities directly translate to financial instability and reduced household resilience. Similarly, Mutenje et al. (2023) found that cattle diseases diminish social capital, as livestock play a critical role in communal practices such as dowries and funerals. The study further established a significant relationship between education level and

access to veterinary services (p = 0.007), reinforcing findings by Dube et al. (2021), which highlighted the role of farmer knowledge in mitigating disease impact. The results underscore the urgent need for affordable veterinary services, disease prevention programs, and financial support mechanisms to mitigate the adverse economic and social effects of livestock diseases on smallholder farmers in Buhera District.

5.2 Recommendations

5.2.1 Recommendations for Policy

The study findings highlight the urgent need for policy interventions to improve veterinary service accessibility and disease control programs in Buhera District. The government should implement subsidized vaccination programs and affordable veterinary care initiatives to help smallholder farmers combat prevalent cattle diseases such as Theileriosis, foot-and-mouth disease, and lumpy skin disease. Additionally, strengthening disease surveillance and reporting systems through local veterinary offices and extension workers can enhance early detection and response to outbreaks. Policies should also promote public-private partnerships in veterinary service delivery to increase farmer access to essential medicines, acaricides, and diagnostic services, ultimately reducing cattle mortality rates and improving rural livelihoods.

5.2.2 Recommendations for Practice

Smallholder farmers should adopt integrated disease management strategies to mitigate the impacts of cattle diseases. This includes consistent tick control practices, such as regular dipping and rotational acaricide use, to prevent the spread of tick-borne diseases. Farmers should also participate in farmer training programs and extension services to enhance their knowledge of disease prevention and treatment. Additionally, improving livestock nutrition through balanced feeding programs can strengthen cattle immunity against common infections. Strengthening cooperative farming models can also allow farmers to pool resources for veterinary services, making disease management more affordable and sustainable.

5.2.3 Recommendations for Future Research

Future research should focus on longitudinal studies to track disease trends over time and assess the effectiveness of different disease control interventions. There is also a need for studies exploring the socio-economic barriers to veterinary care among smallholder farmers, particularly in resource-limited settings like Buhera District. Additionally, research on climate

change and its influence on cattle disease patterns can provide insights into how shifting weather conditions impact disease prevalence. Future studies should also explore alternative and cost-effective disease management solutions, such as herbal treatments and locally produced acaricides, to provide farmers with more accessible disease control options.

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Appendices 1: RESEARCH INSTRUMENT

Instructions:

1. Please place an (**X**) in the box corresponding to your choice response to the given statement.

Section A: Biographical Details

1. Gender

Male ☐ **Female** ☐

2. Age group

18 to 25 years	
26 to 35 years	
36 to 45 years	
46 to 55 years	
56 to 65 years	
Over 65 years	

3. Farming Experience

<1 year ☐ **1 – 6 years** ☐ **6 – 12 years** ☐ **Above 12 years** ☐

4. Cattle disease prevalence

High ☐ **Low** ☐

5. Ability to afford disease treatments

Yes ☐ **No** ☐

6. Food secure

Yes ☐ **No** ☐

7. Access to veterinary services

Yes ☐ **No** ☐

8. Educational Qualifications

Primary Level ☐ **Secondary Level** ☐ **Tertiary Level** ☐

Section B: Prevalent livestock diseases in cattle

Given below are statements that relate to prevalent livestock diseases in cattle. What is your level of agreement with each of the given statements? (**Key: 1** = Strongly Disagree; **2** = Disagree; **3** = Unsure; **4** = Agree; **5** = Strongly Agree)

ID	Question	1	2	3	4	5
B1	Tick-borne diseases (e.g., Theileriosis, Heartwater, Babesiosis and Anaplasmosis) have been the most frequent in my herd over the past six years.					
B2	Foot-and-mouth disease (FMD) is a significant concern in cattle farming within my community.					
B3	Anthrax outbreaks have posed a recurring threat to cattle in Buhera District since 2018.					
B4	Environmental factors, such as droughts or poor rainfall, have increased cattle susceptibility to diseases.					
B5	Lack of affordable vaccines and access to veterinary services has significantly contributed to the high prevalence of cattle diseases.					
B6	I frequently experience challenges controlling ticks and other vectors due to limited access to dipping facilities.					
B7	Disease outbreaks among cattle often result in significant herd size reductions in my area.					

Section C: Economic and social impacts of livestock diseases on smallholder farmers

Listed below are statements that relate to economic and social impacts of livestock diseases on smallholder farmers. What is your level of agreement with each of the given statements? (**Key: 1** = Strongly Disagree; **2** = Disagree; **3** = Unsure; **4** = Agree; **5** = Strongly Agree)

ID	Question	1	2	3	4	5
C1	Cattle diseases have led to significant income losses in my household over the past six years.					
C2	Loss of cattle to diseases has limited my ability to pay for essential needs, such as school fees and healthcare.					
C3	The costs of treating cattle diseases (e.g., veterinary fees, medicines) are often unaffordable for smallholder farmers like me.					
C4	Social gatherings and traditional ceremonies have been disrupted due to the loss of cattle caused by diseases.					
C5	Loss of cattle to diseases has limited my ability to pay for essential needs, such as school fees and healthcare.					

C6	Disease outbreaks have caused me to lose valuable breeding cattle, negatively affecting my herd growth and income.					
C7	Cattle diseases have reduced the availability of milk and meat in my community, contributing to food insecurity.					
C8	The loss of cattle due to disease has diminished my social standing and self-esteem in the community.					
C9	Cattle diseases have significantly reduced my household's ability to save money for future investments.					

Thank you for your time