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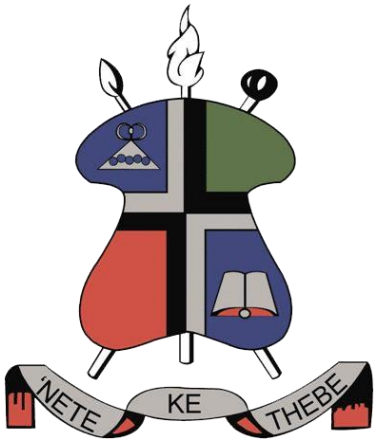

AVAILABILITY AND ACCESS TO POTABLE WATER IN RURAL AREAS OF LESOTHO: THE CASE STUDY OF THABA-TSEKA.

BY

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SUPERVISOR: PROF. M. C. C. MUSINGAFI

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Declaration

I, the undersigned do hereby declare that the dissertation on *Availability and access to potable water in rural areas of Lesotho: The case study of Thaba Tseka district* is my personal original work and that no part of it has been submitted in support of an application for another degree or any other university of institution.

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Dedication

This dissertation is dedicated to my parents, my siblings and my friends who showed me their endless support and love throughout my study. Above everything, I dedicate this to God the Almighty who gave me strength, wisdom and power from the beginning of the research.

Acknowledgements

I would like to honour and give glory to the Almighty God for with Him everything is possible. After God, I would like to thank Prof. Maxwell Musingafi for his patience, understanding and strong leadership in guiding me through this dissertation. I am extremely privileged to have worked with you and appreciate all your guidance and patience. My appreciation also goes to all the people who participated in this study willingly and with everything they have during questionnaires and interviews and went forth to give more information during filed work. I am also giving thanks to the Thaba Tseka community for permitting me to conduct the study and providing information and for their time.

Abstract

This study assessed the availability and accessibility of potable water in Thaba-Tseka, a mountainous district in Lesotho. Despite Lesotho's status as a water-rich country, many communities in Thaba-Tseka face significant challenges in accessing clean drinking water. Access to potable water in Thaba-Tseka District, Lesotho, remains a significant challenge despite the region's proximity to major water infrastructure projects like the Lesotho Highlands Water Project (LHWP). The primary objective of studies in this area has been to examine the availability and accessibility of potable water to the people of Thaba Tseka, to examine the challenges to water accessibility to the people of Thaba Tseka and to propose possible solutions to improving water access in Thaba Tseka. Findings indicate that many communities in Thaba-Tseka rely on unprotected water sources, such as open wells and springs, which are susceptible to contamination. This has led to frequent outbreaks of waterborne diseases, including diarrhea and vomiting, particularly affecting children and vulnerable populations. Despite the presence of large dams like Katse and Mohale, constructed under the LHWP to supply water to South Africa, local communities often lack direct access to these water resources. Infrastructure intended to provide clean water has been inadequately maintained, with damaged pipes and taps remaining unrepaired for extended periods due to unclear responsibilities between the Lesotho Highlands Development Authority (LHDA) and the Department of Rural Water Supply (DRWS). The studies conclude that the lack of access to potable water in Thaba-Tseka is not solely due to physical scarcity but is exacerbated by institutional shortcomings, inadequate maintenance of infrastructure, and insufficient community engagement. The disconnect between large-scale water export projects and local water needs highlights a disparity in resource allocation and prioritization. Recommendations emphasize the need for a comprehensive and integrated approach to water resource management in Thaba-Tseka. This includes establishing clear accountability between LHDA and DRWS for the maintenance and repair of water infrastructure, investing in the rehabilitation and expansion of local water supply systems, and ensuring that a portion of the revenues generated from water exports is allocated to improve water access for affected communities. Additionally, community-based water management committees should be empowered and trained to oversee local water resources, promoting sustainability and resilience. Addressing these issues is crucial for improving public health, enhancing educational outcomes, and fostering socio-economic development in Thaba-Tseka.

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Acronyms

DHS Demographic Health Surveys

EC Electronical Conductivity

EPA Environmental Protection Agency

EU European Union

FAO Food and Agricultural Organization

GEJ Global Environmental Justice

GWP Global Water Partnership

H2O Water

HRBA Human Rights-Based Approach

IWRM Integrated Water Resources Management

LDHS Lesotho Demographic and Health Survey

LHDA Lesotho Highlands Development Authority

NGO Non-Governmental Organizations

SDG Sustainable Development Goals

SSA Sub-Saharan Africa

TDS Total Dissolved Solids

UN United Nations

UNICEF United Nations Children's Fund

UNDP United Nations Development Programme

U.S United States

WASCO Water and Sewage Company

WASH Water, Sanitation and Hygiene

WHO World Health Organization

CHAPTER ONE

THE PROBLEM AND ITS SETTING

1.0 Introduction

Access to potable water is a critical issue for rural communities worldwide and in the case of Lesotho, a landlocked country in Southern Africa, this challenge is particularly pronounced. Despite the abundant water resources, Lesotho struggles with ensuring reliable access to clean water for its rural population, which constitutes the majority of the country. Many rural areas are geographically isolated, making infrastructure development difficult and expensive. Seasonal variability, climate change and poor maintenance of water systems further exacerbate the situation, leading to water shortages and contamination.

The research seeks to explore the factors affecting the availability and access to potable water in rural Lesotho. It examines the role of government policies, local initiatives, community involvement and external aid in addressing water scarcity. The study aims to identify the barriers to improving access, including infrastructural challenges, economic constraints and socio-cultural factors. By analyzing these elements, the research hopes to contribute to sustainable solutions for ensuring safe and reliable water access for all in rural Lesotho, ultimately supporting the well-being and development of its communities.

1.1 Background to the study

Water is essential for life and plays a crucial role in numerous biological, environmental, and economic processes, Water is essential for sustaining life and supports countless biological processes. It plays a crucial role in maintaining the balance of ecosystems, facilitates the transportation of nutrients and waste in living organisms, and regulates body temperature. Additionally, water is vital for agriculture, industry, and energy production. Its importance extends to hygiene, sanitation, and overall health, making it an indispensable resource for daily life and the environment.

Water scarcity is a pressing global issue, with billions of people affected by limited access to clean and reliable water. Currently, 2.2 billion individuals lack safe drinking water, and more than half the global population lives in areas experiencing water shortages at least part of the year (UN-Water, 2024). Contributing factors include climate change, population growth, and unsustainable water management practices. For example, climate-driven droughts and unpredictable rainfall patterns have exacerbated water stress in regions like sub-Saharan Africa, the Middle East, and South Asia. Additionally, aging infrastructure in developed areas, such as the U.S., further strains water availability. The (UN-Water, 2024) emphasizes that sustainable water management is vital not only for addressing scarcity but also for promoting peace and prosperity worldwide.

According to The State of Water (2024). water treatment and usage vary widely across the globe, reflecting differences in technology, resources, and needs. In developed nations, advanced treatment facilities typically ensure access to potable water through processes like filtration, sedimentation, and disinfection. For instance, the United States and European countries rely on strict regulatory frameworks such as the EPA and EU Water Framework Directive to maintain water safety and reduce contaminants whilst developing regions face challenges in accessing clean water due to infrastructure gaps (FAO,2017). In countries like India, decentralized solutions, such as community filtration plants, are gaining traction to address rural needs. Additionally, water practices are expanding, with nations like Singapore leading in innovative recycling through its "NEWater" programme, which converts wastewater into drinkable water. Internationally, Desailly, particularly in arid regions like the Middle East, where countries like Saudi Arabia depend on seawater desalination for over 50% of their water supply. These diverse approaches underline the glois on adapting to local conditions to meet rising water demands sustainably.

World Health Organization (2020), state that In Africa water treatment and usage vary widely across the continent, influenced by regional resources, infrastructure, and socio-economic factors. Many urban areas rely on centralized water treatment plants that use methods like sedimentation, filtration, and chlorination to provide potable water. However, in rural regions, access to treated water is limited, leading communities to depend on untreated surface water, wells, or rainwater harvesting (UNICEF, 2019). non-governmental organizations (NGOs) and governments have

introduced decentralized solutions, such as solar-powered water purification systems, boreholes, and household water filters, to improve access to safe water. In agriculture, which accounts for 70-80% of water use in Africa, traditional irrigation methods often result in inefficiencies, though there is a growing adoption of drip irrigation to conserve water. Efforts to recycle wastewater for industrial and agricultural use are gaining traction in countries like South Africa. Despite progress, challenges like population growth, climate change, and insufficient investment in water infrastructure persist, impacting the sustainability of water resources on the continent.

Likewise, aaccess to potable water in Thaba-Tseka, a district in Lesotho, has been a persistent problem characterized by inadequate infrastructure, environmental challenges, and socio-political dynamics. Therefore, theis study aims to provide an overview of the current state of water availability and access in the district, highlighting key factors that contribute to the ongoing challenges faced by local communities.

According to Chakona (2019), Thaba Tseka has been grappling with significant water supply issues, particularly in rural areas where many communities rely on natural springs and unprotected wells for their drinking water. A considerable percentage of projects in the district fail to meet the World Health Organization's (WHO) recommendation of at least 30 literes of water per capita per day. Reports indicate that only about 20% of water supply projects in Thaba Tseka provide adequate water, with many communities experiencing severe shortages during drought conditions.

The Lesotho Highlands Development Authority (LHDA, 2018) had acknowledged that several villages, including Thabaneng and Sekokoaneng, do not have adequate access to piped water. Infrastructure damage from floods has compounded these problems, as broken pipes remain unrepaired due to disputes over responsibility between government agencies. Villagers often resort to unsafe sources, leading to health issues such as diarrhoea outbreaks linked to contaminated water.

According to Mokhothu and Nthane (2019) reliance on contaminated water sources in Thaba Tseka had severe public health implications, with studies revealing alarmingly high levels of E. coli contamination in drinking water. Research indicated that up to 65% of water samples from the district's primary sources exceeded acceptable contamination levels. Factors contributing to this include poor sanitation practices, such as open defecation, which affects 25% of households, and livestock grazing near water sources, which is prevalent in rural areas. The lack of clean water had resulted in a sharp rise in waterborne diseases, with diarrheal diseases accounting for 40% of reported illnesses in health facilities. Furthermore, child mortality rates linked to unsafe drinking water and poor sanitation are estimated at 15 per 1,000 live births in the region. These statistics underscore the urgent need for improved water and sanitation interventions to safeguard public health (WHO/UNICEF, 2020).

Despite the challenges, local communities demonstrated resilience by taking initiatives to improve their access to water. For instance, some villagers connected their homes directly to existing LHDA tanks without official authorization, showcasing their resourcefulness in addressing urgent needs. However, these efforts often lack sustainability and formal support from authorities and WASCO as the water supply in the district.

Thaba Tseka's geographical characteristics further complicated water accessibility. The region was prone to droughts and climate variability, which exacerbated existing water scarcity issues. Although current assessments classified drought risk as low in the short term, there were concerns about increasing drought tendencies due to climate change This potential shifted necessitates robust planning for future water resource management. It was this state of affairs in the district that pushed the researcher to embark on this empirical study on water availability and accessibility in the district of Thaba Tseka.

1.2 Statement of the problem

The brief discussion in the background to the study above showed that access to potable water is a serious problem in Thaba Tseka district. People use unprotected water from wells and springs

for their domestic use. Nonetheless, Thaba-Tseka district is home to two major dams in the country, Mohale dam and Katse dam! What exactly is the problem in the district?

1.3 Statement of purpose

The purpose of the study is to examine the availability and access to potable water for domestic use by residents of Thaba Tseka communal areas in Lesotho.

1.4 Research Objectives

Specific objectives for this study are as follows:

- to examine the availability and accessibility of potable water to the people of Thaba Tseka;
- to examine the challenges to water accessibility to the people of Thaba Tseka; and
- to propose possible solutions to improving water access in Thaba Tseka.

1.5 Research Questions

Corresponding research questions for this study are as follows:

- What is the state of water availability and accessibility in Thaba Tseka?
- What are the challenges to water accessibility to the people of Thaba Tseka?
- What can be done to improve water accessibility in Thaba Tseka?

1.6 Significance of the study

The study aimed to increase awareness about how important it is to have access to clean drinking water in Thaba Tseka. It informed local communities, decision-makers, and other involved parties about problems like not having enough water, the risks of contamination, and the need for fair distribution of water. By sharing its findings through reports, workshops, and community events, the study encouraged people to get involved in creating lasting solutions. It also helped everyone understand how clean water can improve living conditions and support long-term development goals. The helped policymakers by offering insights and recommendations based on evidence to

tackle the issues related to drinking water availability and access in Thaba Tseka. It assisted in creating policies that focus on enhancing water infrastructure, ensuring fair distribution, and encouraging sustainable water management practices. Additionally, the study helped developing rules to safeguard water sources from pollution and overuse, promoted community involvement in water management, and connected local efforts with national and global goals for water access, like Sustainable Development Goal 6; by achieving this, it helped establish a strong policy framework to boost access to clean water in the area.

1.7 Assumptions of the study

It is assumed that the availability and access to potable water in rural areas of Lesotho are heavily influenced by inadequate or poorly maintained water infrastructure such as reservoirs and pipelines. The geographic isolation of many rural areas combined with environmental factors such as seasonal droughts will continue to hinder reliable access to potable water, a large proportion of rural communities still depend on traditional and often contaminated water sources such as rivers, springs and unprotected wells. It is also assumed that climate change will continue to exacerbate water scarcity by influencing rainfall patterns and affecting water availability, especially in the more rural and mountainous regions of Lesotho.

1.8 Delimitation of the study

The study focused only on the Thaba Tseka district in Lesotho, paying special attention to rural areas within the district. The research looks at access to clean water during a specific time period; from 2020 to 2024, and does not consider any historical data before this timeframe. The study aims at specific groups like households, schools, and health centeres, while leaving out industries, businesses, and agricultural water usage. The research concentrates on the availability, accessibility (how far water sources are), and quality of clean water. It does not address other uses of water, such as for irrigation or sanitation. Information is collected from local government reports, non-governmental organizations (NGOs) in Thaba Tseka, and interviews with local residents. The research investigates infrastructure like wells, boreholes, and piped water systems.

1.9 Limitations of the study

This study has some limitations. One of the limitations or challenges is that of limited access to literature on WASCO. The researcher will request for reports and other relevant documents from WASCO to address this challenge. The other limitation is that some of the interviewees may want to pull out due to issues such as cultural behaviors which may result to limited information therefore the solution to this is that participants will be assured that they will stay anonymous thus keeping their information confidential. Time constraints may be a huge factor to this and also issues with research samples and selection.

1.9 Definition of key words

Potable Water: Refers to water that is good for human consumption. It must be free from pathogens, harmful chemicals, and contaminants that could pose health risks. This type of water is suitable for drinking, cooking, and personal hygiene.

Access: In the context of water, access refers to the availability of sufficient quantities of water to meet domestic needs, ideally located close to households. It encompasses not only physical availability but also affordability and reliability of water supply.

Rural areas: Are regions located outside of cities and towns, typically characterized by low population density, vast open spaces, and a reliance on agriculture or natural resources for livelihoods. These areas often have limited access to infrastructure and services such as healthcare, education, and clean water compared to urban areas. Rural communities are generally small and dispersed, with lifestyles closely tied to the surrounding environment.

Availability: refers to the state or condition of something being accessible, obtainable, or read for use. In the context of potable water, it means the presence of sufficient quantities of clean and safe water to meet the needs of a population.

1.10 Summary

This chapter presented an overview of the study by presenting an introduction of basic concepts being access and availability of potable water, the background to the study, statement of the problem, statement of purpose, objectives of the study and research questions. The chapter also dealt with the hypothesis, significance of the study, assumptions of the study, provided

delimitation and limitations of the study and defined key terms. Next chapter reviews related literature to contextualise the study.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter provides a review of literature on the availability and access to potable water in Thaba-Tseka available from around the world. This chapter will present an overview that moves from the broad picture to the more specific details (starting with global information, then looking at Africa, the Southern African Development Community, and finally focusing on Lesotho).

2.1 Theoretical Framework

The Human Rights-Based Approach (HRBA), a theory that directs development partners' operations to support governments in implementing human rights standards and principles, serves as the foundation for this study. It aims to increase governments' and implementing agencies' capacity to fulfil their duties to protect, uphold, and fulfil human rights. Conversely, an HRBA offers a structure that enhances the patent holder's ability to assert their rights and support their functions as change agents (OHCHR, 2015).

It concerns how development takes place because an HRBA is as much concerned with the process as with the results. This approach is guided by human rights principles, which include accountability and the rule of law, equity and nondiscrimination, participation and inclusion, and universality and indivisible. The Sustainable Development Goals (SDGs), such as Goal 6 on access to clean water and sanitation, are likewise based on these ideas (United Nations, 2010).

For instance, communities and vulnerable groups will be given the ability to participate in decision-making processes through the idea of active and meaningful participation. It enables them to demand responsibility from organizations in charge of allocating limited resources and fortifies their voice to ensure that they are not left out when services are provided and increased.

In addition, the theory treats access to potable water as a basic human right, asserting that states have obligations to ensure adequate, safe and accessible water for all (UNICEF, 2016). This

approach evaluates Lesotho's commitments to international and national policies regarding water rights and the extent to which these policies are implemented to ensure fair water access in rural areas.

The HRBA recognizes five dimensions necessary to guarantee that WASH is delivered and preserved as a human right which include: availability, aaccessibility, quality and safety, acceptability and affordability.

2.3 Conceptual Discussion

Water is a vital, colourless, odourless liquid composed of two hydrogen atoms bonded to one oxygen atom (H2O) (WHO, 2021). It is essential for life, supporting processes such as hydration, digestion and temperature regulation. People obtain water from various sources, including natural bodies of freshwater like rivers, lakes and springs as well as groundwater stored in aquifers accessed through wells. Rainwater can also be collected, mostly in areas where it is abundant and seawater can be desalinated for drinking in regions lacking fresh water. Additionally, most urban areas rely on water treatment plants that purify and distribute water through pipelines to homes and businesses, ensuring safe access for communities (The World Bank, 2016).

According to United Nations (2020). access to potable water is essential for daily hydration, digestion, and the proper functioning of bodily systems like circulation, temperature regulation, and nutrient transport. Without clean water, people can suffer from dehydration, malnutrition, and other health complications. Potable water is necessary for proper sanitation practices, such as handwashing, cleaning, and cooking. Adequate access to clean water reduces the spread of infections and improves overall public health. It is also needed for irrigation in farming, ensuring that crops receive the water they need to grow and it also supports livestock farming by providing clean water for animals, which is essential for their health and productivity. Access to safe drinking water boosts productivity by reducing illness, which allows people to work, attend school, and engage in economic activities. It supports industries that require large amounts of water, such as food production, textiles, and energy generation. Gaining clean water improves the general well-being of individuals and communities, freeing up time for education, work, and leisure by reducing

the time spent collecting water from distant or unsafe sources. It also helps in maintaining a higher standard of living through better health and convenience. Proper management of potable water is key to maintaining ecosystems, as it ensures that water resources are used efficiently and sustainably. It prevents the depletion of water sources and reduces pollution, safeguarding water for future generations. In addition, ensuring equitable access to potable water helps reduce social inequality. Everyone, regardless of socioeconomic status, should have access to clean and safe drinking water, which is a fundamental human right. (WHO, 2018)

Access to potable water in rural areas of Lesotho remains a significant challenge due to a combination of geographical, infrastructural, and socio-economic factors. Lesotho's mountainous terrain and remote settlements make the delivery of water services difficult, particularly in rural areas. While the country has abundant water resources in the form of rivers and streams, many of these are not easily accessible, leaving rural communities dependent on less reliable sources, such as unprotected wells and springs. These sources are often contaminated, exposing populations to waterborne diseases such as cholera, typhoid, and diarrhea (UNICEF, 2020). Climate change further exacerbates this issue by affecting rainfall patterns, leading to periods of drought that strain the already limited water supply (FAO, 2018).

Amartya Sen (1999) argued that water scarcity is not just a physical issue but a significant social and economic one, particularly for rural areas. He linked that lack of access to water to broader issue of poverty and development, emphasizing that water scarcity directly impacts agricultural productivity and the health of rural populations. For Sen (1999), addressing water scarcity requires improving governance and institutional capacity at the local level, especially in rural areas.

Sharma (2002) focused on the agricultural aspect of water scarcity in rural areas. He highlighted the inefficient water management practices, especially in traditional irrigation systems that lead to the depletion of water resources. Sharma (2002) advocated for the implementation of more sustainable irrigation practices, such as drip irrigation. To converse water while increasing agricultural productivity in rural regions.

Ostrom's (2005) work on common-pool resources has implications for rural water scarcity. In her book called Understanding Institutional Diversity, she argued that rural communities can successfully manage water resources through localized, self-organized systems as long as there are clear rules and community participation. She stressed the importance of local knowledge in managing water scarcity and criticized centralized, top-down approaches.

Jared Diamond (2005) in his book 'collapse' explored how societies throughout history have responded to environmental challenges including water scarcity. He argued that rural areas are particularly vulnerable to water scarcity because of their dependence on natural resources and the limited ability to adopt technological solutions. Diamond (2005) cautioned that rural communities may face that irreversible consequences if water management issues are not addressed.

Gleick (1993) is one of the foremost experts on water resources and his work focuses on global water scarcity. In Water in Crisis, he emphasized the role of population growth and climate change in exacerbating water scarcity in rural areas. Gleick (1993) argued for the integration of water conservation, technology and better management practices to prevent future water crises.

A vocal critic of industrialized agriculture, Shiva (2002) linked water scarcity in rural areas to the commodification of water and the privatization of water resources. In her book Water Wars: privatization, pollution and profit. Shiva (2002) contended that multinational corporations often contribute to the depletion of rural water supplies by taking control of water sources for profit. She argued for the need to reclaim water as a common resource for the people and for sustainable, localized water management.

Waterbury's (1997) work focused on water-sharing agreements in the Middle East and North Africa but has broader implications for rural areas globally. In Hydro politics: Conflict Over Water as a Development Issue, he discussed how water scarcity often leads to conflicts, particularly in rural areas where access to water is a direct factor in survival. He pointed to the need for cross-

border collaboration and the development of politics that promote equitable access to water resources.

2. 4 Global laws and policies governing water supply and accessibility

Laws and policies around the world aim to provide fair, sustainable, and safe access to clean water for everyone, no matter where they live or their financial situation. These rules help manage water resources wisely, keep water clean, and ensure everyone has equal access to it. Here's a look at some important global frameworks:

2.4.1 The United Nations (UN) and International Water Laws

Universal Declaration of Human Rights (1948): In Article 25, recognizes the right to an adequate standard of living, including access to sufficient and safe drinking water. This laid the foundation for the recognition of water as a human right.

United Nations Watercourses Convention (1997): This international treaty governs the use, protection, and conservation of international watercourses. It establishes principles for sharing transboundary water resources equitably, balancing the needs of all countries sharing a water source.

Sustainable Development Goal (SDG) 6 (2015): SDG 6 focuses on ensuring availability and sustainable management of water and sanitation for all by 2030. It includes targets for universal access to safe and affordable drinking water, improving water quality, and reducing pollution.

UN General Comment No. 15 (2002): This document affirms that access to water is a human right and calls for governments to ensure the right to sufficient, clean, and affordable water for all people. It encourages countries to take steps to guarantee this right through legislation and policies.

2.4.2 Regional and National Water Laws

European Union (EU) Water Framework Directive (2000): This directive sets out the legal framework for water management within the EU, focusing on water quality, sustainable water use, and protecting aquatic ecosystems. It aims to ensure that all European waters meet "Good Status" by 2027.

The African Water Vision 2025: This vision aims to promote sustainable water management in Africa and achieve equitable and efficient water distribution. It provides a framework for regional collaboration on water issues across the continent.

2.4.3 National Water Laws

Many countries have specific water policies and laws at the national level. For example: The Clean Water Act (1972) in the United States regulates water quality standards and ensures clean water by controlling pollutants. The National Water Policy of India (2012) focuses on water conservation, equitable distribution, and management of water resources across the country.

2.4.4 International Frameworks and Agreements

The 1992 Helsinki Rules on the Uses of the Waters of International Rivers: This set of principles provides guidelines for the equitable and reasonable use of shared water resources between nations. It includes provisions on the prevention of pollution, equitable allocation, and conflict resolution regarding water resources.

The Ramsar Convention on Wetlands (1971): An international treaty aimed at the conservation and sustainable use of wetlands, which are critical for water storage, filtration, and biodiversity. Wetlands play a major role in maintaining clean water supplies.

The Paris Agreement (2015): While focused on climate change, the Paris Agreement indirectly affects water accessibility by addressing climate-related impacts such as droughts, floods, and changes in water availability, thus affecting water management practices.

2.5 The Right to Water

In 2010, the United Nations General Assembly passed a resolution recognizing the human right to water and sanitation, affirming that access to clean, safe drinking water and sanitation is a fundamental human right. This legally binding resolution calls on states to:

- Ensure universal access to water.
- Promote equity in water distribution, especially for marginalized populations.
- Improve water infrastructure and affordability.

2.6 Water Supply and Governance Mechanisms

Global Water Partnership (GWP): This organization advocates for integrated water resources management (IWRM), which promotes the coordinated development and management of water, land, and related resources to optimize the well-being of people and the environment.

International Decade for Action "Water for Life" (2005-2015): Established by the United Nations, this initiative aimed to promote efforts to fulfill international commitments to water and sanitation. It emphasized the need for sustainable water use, governance, and improved access to clean water globally.

2.7 Empirical evidence

Water scarcity is a critical global challenge that affects millions of people and its impact is particularly severe in certain regions. The issue is often driven by combination of natural and human factors including population growth, climate change, poor water management and political

instability. In this overview, it will explore empirical evidence on water scarcity in the global context within the African continent and specifically Lesotho.

Empirical evidence on the availability and access to potable water in rural areas of Lesotho reveals significant disparities in both access and water quality, reflecting broader infrastructural and socio-economic challenges. According to a 2020 report by the World Bank, about 44% of rural households in Lesotho lack access to safe drinking water, and many rely on unprotected sources such as rivers and shallow wells (World Bank, 2020). A study by the United Nations Development Programme (UNDP) also found that rural communities often experience seasonal water shortages, exacerbated by erratic rainfall patterns and the country's vulnerability to climate change (UNDP, 2018). These shortages are particularly problematic during dry seasons when water sources can dry up, further deepening the rural water crisis.

2.7.1 Studies in the global world

This section presents studies in the global world.

2.7.1.1 Assessment of drinking water quality and its impact on residents' health by Muhammad Mohsin, Samira Safdar, Faryal Asghar and Farrukh Jamal.

The aim of Muhammad et al.'s study was to evaluate and compare the quality of groundwater in Bahawalpur city against the standards set by the World Health Organization (WHO) and to look into related waterborne diseases. The study's objectives included assessing and comparing groundwater quality with WHO standards and examining how water quality relates to waterborne diseases in the area. The researchers aimed to measure physical and chemical aspects of groundwater, such as total dissolved solids (TDS), electrical conductivity (EC), pH, hardness, and alkalinity in three specific areas: Satellite Town, Shahdrah, and Islamic Colony. They also wanted to find out how much groundwater is contaminated and how this affects the health of local people, especially concerning diseases like diarrhea and cholera. Additionally, the study sought to suggest ways to improve groundwater quality, such as regular monitoring of water quality and adding more water filtration plants to ensure safe drinking water for the community.

The study used a combination of data collection through a structured questionnaire and laboratory testing of water samples to evaluate the groundwater quality in Bahawalpur city. Researchers selected three different sample areas—Satellite Town, Shahdrah, and Islamic Colony—and collected two water samples from each location. They examined various physical and chemical factors of the groundwater, such as total dissolved solids (TDS), electrical conductivity (EC), pH, hardness, and alkalinity, to compare the water quality with the standards set by the World Health Organization (WHO). The lab tests helped identify the levels of contaminants and see how they measured against WHO's acceptable limits. Additionally, the study gathered information about residents' views on water quality through a questionnaire that asked about issues like the water's appearance, taste, smell, and the occurrence of waterborne diseases in the community. The conclusions about the current groundwater quality and its effects on public health in the chosen areas were based on both the lab results and the responses from the questionnaire.

The study's results show that the groundwater quality in Bahawalpur city is getting worse, especially in the Islamic Colony area. Tests of water samples showed that important quality measures like electrical conductivity (EC), total dissolved solids (TDS), hardness, and pH levels were much higher than the safe limits set by the World Health Organization (WHO). In Islamic Colony, the water is very polluted, with 48% of residents saying they have diluted water, 55% saying they have brackish water, and 41% mentioning a slight smell in the water. This bad water quality has caused serious health issues, including waterborne illnesses like diarrhea and cholera. About 36% of the people living in Islamic Colony have reported getting sick from these diseases. These findings highlight the urgent need for action, such as regular checks on water quality and the setup of more water filtration plants by local officials to provide safe drinking water for Bahawalpur’s residents.

However, the research only looked at three specific areas (Satellite Town, Shahdrah, and Islamic Colony), which may not fully reflect the overall groundwater quality in the whole city or nearby areas.

2.7.1.2 Global environmental justice and the right to water by Lyla Mehta, Jeremy Allouche, Alan Nicol and Anna Walnycki.

The aim of this study was to explore the potential of the global environmental justice (GEJ) approach in addressing the challenge of universal access to safe and potable water, particularly in peri-urban spaces. The primary objective of this study was to apply the global environmental justice (GEJ) approach to the issue of universal access to safe and potable water, particularly in peri-urban areas where the absence of formal water provision and increasing environmental pollution present significant challenges to human wellbeing. The study aimed to explore whether global discourses on the human right to water can be strengthened through the application of GEJ, promoting sustainable human-environmental interaction to address the growing water needs in rapidly urbanizing regions. By examining local people's experiences and mobilizations surrounding water in peri-urban areas of Bolivia and India, the study sought to highlight the contradictions and challenges faced in implementing the right to water in these spaces. It aimed to demonstrate that struggles for water access are inherently linked to broader issues of environmental justice and sustainability. Additionally, the study addressed the challenges presented by the contradictory nature of state policies, unequal citizenship experiences, elite biases in planning, and resource capture by powerful interests, which hinder the realization of rights and environmental justice in the global south. Ultimately, the study contended that while GEJ offers a powerful tool to address local injustices, its effectiveness was influenced by national and local political economies that may not be conducive to achieving justice and rights.

The methodology of this study involved a qualitative analysis of the application of global environmental justice (GEJ) to the issue of universal access to safe and potable water in peri-urban areas. The study draws on case studies from peri-urban localities in Bolivia and India, focusing on local people's experiences and mobilizations around water access. The research examines the implementation of the human right to water in these regions by analysing the contradictions and challenges faced in these environments. Data collection was based on in-depth interviews, field observations, and the review of relevant literature to understand the intersections of environmental injustices, rights violations, and water access struggles. The article also critically evaluates global frameworks on water access and environmental justice, exploring how these frameworks are applied or hindered in urban spaces in the global south, particularly by the state, policymakers,

and elite stakeholders. Additionally, the study takes into account issues such as resource capture, unequal distribution, and the exclusion of marginalized populations in the planning and implementation of water provision policies. By drawing on both local and global perspectives, the methodology aims to highlight the complexities of applying GEJ to water access and its potential to address local injustices in rapidly urbanizing areas.

The findings of this article highlight the complex intersection of environmental justice and the right to water in peri-urban spaces, particularly in Bolivia and India. It reveals that while the global discourses surrounding the human right to water are powerful, their implementation is fraught with contradictions and challenges at the local level. The research demonstrates that access to safe and potable water is not only about the physical availability of resources but also deeply tied to broader issues of environmental justice. Environmental injustices and rights violations are often intertwined, with marginalized communities disproportionately affected by both inadequate water provision and environmental degradation. Struggles for water access in these areas are thus struggles for environmental justice and sustainability, as local people are mobilizing to secure their right to water. However, despite the moral imperatives provided by global frameworks, the study highlights those urban spaces in the global south present unique challenges to realizing these rights. These challenges stem from state neglect, elite bias in policy-making, resource capture by powerful players, and significant distributional, recognition, and procedural issues. These findings underscore the need for a more inclusive, localized approach to addressing water access and environmental justice, as the political economies in these regions often hinder the realization of rights and justice for marginalized communities.

While global frameworks and discourses emphasize the moral imperatives of the human right to water, there is a lack of clear, actionable strategies for implementing these rights in peri-urban contexts. These spaces face significant challenges due to inadequate formal water provision and increasing environmental pollution, which exacerbate inequalities in water access. Additionally, while local experiences in Bolivia and India demonstrate the strong link between water access struggles and broader environmental justice issues, there is insufficient integration of GEJ principles into national and local policy frameworks, leading to inconsistent application.

2.7.2 Studies in Africa

This section presents studies from Africa.

2.7.2.1 Integrated resource management of potable water in Zimbabwe and South Africa by Maxwell Constantine Chando Musingafi.

This study aimed to compare how Integrated Water Resources Management (IWRM) policies, laws, and services for drinking water supply have been developed, adopted, and implemented in four chosen cases in Zimbabwe and South Africa. The goals of this research were to look into how well the policy, institutional, legislative, and legal frameworks have supported the application of the IWRM model in Harare, Masvingo, Tshwane, and Vhembe. It also sought to find out and describe the similarities and differences in opinions among stakeholders about the IWRM model and its role in managing drinking water supply in these areas. The study outlines the challenges that each of the four locations faces in applying the IWRM model and managing drinking water supply. Furthermore, it offers lessons by comparing the experiences of these areas, focusing on what worked, what didn't, and the best practices in adopting and implementing the IWRM framework for drinking water governance.

This study employed a comparative case study approach, combining both qualitative and quantitative methods, to assess the implementation of the Integrated Water Resources Management (IWRM) framework in Harare and Masvingo (Zimbabwe) and Tshwane and Vhembe (South Africa). The research aimed to evaluate the development, effectiveness, and impact of IWRM policies on potable water supply governance.

Data collection methods included document analysis of policy reports and legislative frameworks, semi-structured interviews with stakeholders (e.g., government officials, water professionals, and community leaders), focus group discussions with local communities, and structured surveys distributed to households. These methods provided a comprehensive view of IWRM policy implementation and community perspectives on water access and governance.

The data was analysed to identify common patterns, challenges, and successes, while also examining the influence of political, institutional, and economic factors on water governance. The comparative analysis offered insights into barriers to effective IWRM implementation and provided lessons for improving water governance in similar regions.

The findings of this comparative analysis revealed significant differences in the implementation and effectiveness of the Integrated Water Resources Management (IWRM) framework across the four case study areas: Harare, Masvingo, Tshwane, and Vhembe. The study highlighted that while all four regions adopted the IWRM policy, the actual implementation of the policy was inconsistent and often ineffective due to several common challenges. One of the key findings was the lack of strong political will and commitment to the IWRM framework. In Harare and Masvingo, for example, local authorities struggled to prioritize potable water supply, which led to delays in policy enforcement and inadequate service delivery. The lack of political ownership of the IWRM framework was also evident in Tshwane and Vhembe, where the implementation was often hindered by bureaucratic inefficiencies and limited coordination among stakeholders.

Furthermore, the study found that economic development and the level of technological knowledge within the communities played a crucial role in the success or failure of IWRM implementation. Areas with higher levels of economic development, such as Tshwane, showed more advanced technological solutions and better infrastructure for water management. In contrast, regions like Masvingo and Vhembe, with lower economic development, faced greater challenges in implementing effective water management systems due to insufficient resources, outdated technology, and limited access to scientific knowledge.

Another significant finding was the discrepancy in stakeholder perspectives regarding the IWRM framework. While stakeholders in Harare and Tshwane were more supportive of IWRM policies, those in Masvingo and Vhembe expressed concerns about the lack of clear communication, community involvement, and adequate training on the implementation of IWRM strategies. This

difference in perspectives led to varying levels of community engagement and cooperation in water management efforts.

Overall, the findings suggest that the lack of effective policy implementation, inadequate institutional capacity, and political challenges hindered the success of IWRM frameworks in the case study areas. However, the study also identified valuable lessons from the experiences of each region, including the importance of political commitment, community involvement, and the need for sustainable investment in water infrastructure and technology. These lessons can inform future efforts to strengthen water governance and improve potable water supply management in similar contexts.

Even though the IWRM framework was put in place in all four regions, the actual implementation was uneven and ineffective. The study pointed out a major gap in how policies were enforced and a lack of follow-up from local leaders. In places like Harare and Masvingo, local authorities did not focus on providing safe drinking water or lacked the political motivation to enforce the policies correctly. This lack of policy enforcement slowed down progress towards sustainable water management.

2.7.2.2 Domestic drinking water availability in Sub-Saharan Africa by Mair Lucy Heath Thomas-Possee.

This thesis aims to deeply explore the complexities and inequalities surrounding access to drinking water in sub-Saharan Africa (SSA). It focuses on the ways we measure water service availability and the data that exists for tracking progress toward Sustainable Development Goal 6 (SDG 6). The goals include examining how domestic drinking water availability is measured across SSA, which involves identifying various research methods and metrics used in current studies. It also aims to gather evidence about the availability of drinking water in SSA, particularly comparing water supplies to established standards, like the World Health Organization's guideline of 100 liters per person per day. Moreover, the study seeks to understand the factors that lead to interruptions in drinking water services reported by households in selected SSA countries. It will conduct a

cross-sectional, multi-level regression analysis using georeferenced Demographic and Health Surveys to pinpoint household and community elements that contribute to these interruptions. The countries under focus include Ethiopia, Gambia, Malawi, Nigeria, Sierra Leone, South Africa, Tanzania, Uganda, Zambia, and Zimbabwe. It evaluates the consistency and differences in data about piped drinking water service availability reported by water providers, government regulators, and households, this study aims to assess how reliable and varied these different data sources are (providers, regulators, and households) when they report on drinking water availability in urban and peri-urban Zambia. This will be done using a new method that combines multi-level modeling and spatial linking of survey data with water sector databases. The study also points out the differences in access to drinking water services across Sub-Saharan Africa (SSA). The main goal of the study is to reveal the ongoing gaps in water service distribution and to understand how things like urban growth, lack of water, and infrastructure affect the availability of drinking water in various areas. The study wants to help create better and more specific ways to measure progress towards the Sustainable Development Goal (SDG). It aims to enhance the methods and indicators used to evaluate drinking water access in SSA, making sure that the data gathered truly represents local situations, particularly in recognizing local inequalities and seasonal water shortages.

The methodology used consists of three interconnected papers addressing drinking water availability in sub-Saharan Africa (SSA) using different approaches. The first paper is a systematic review of existing literature, analyzing methods and measurements used to assess water availability in SSA, highlighting gaps such as inconsistent application of benchmarks. The second paper uses multi-level regression analysis of Demographic and Health Surveys (DHS) data from nine SSA countries to explore the causes of interruptions in water services, examining factors like urbanization, water scarcity, and water source types. The third paper develops a new method combining multi-level modeling with spatial data from household surveys and water sector databases in Zambia to evaluate the consistency of water availability data across different sources. Together, these papers provide a comprehensive analysis of water availability, service delivery trends, and measurement challenges in SSA.

The findings reveal significant inequalities in drinking water availability across sub-Saharan Africa (SSA), with many households facing inadequate access and frequent service interruptions. The first paper shows that only 9% of 42 studies met the World Health Organization's benchmark of 100 liters per capita per day, with varying methods and metrics complicating comparisons. The second paper, based on multi-level regression of DHS data from nine SSA countries, finds widespread interruptions, particularly in Tanzania (55% of households), and identifies key factors like urban living, water scarcity, and reliance on piped sources. The third paper, focusing on Zambia, finds discrepancies between data from water providers, government regulators, and household users, highlighting issues with using annual service metrics instead of more localized or seasonal measures. This points to the need for more accurate and consistent ways to assess water availability at the household level.

The research shows that there are not any standard measurement tools, and different studies use various methods and metrics. This makes it hard to compare findings from one study to another. Because of this inconsistency in measurements, it becomes challenging to track progress toward the sixth Sustainable Development Goal (SDG 6) and to make trustworthy conclusions about the overall availability of drinking water services in the area.

2.7.3 Studies in Lesotho

This section presents studies from Lesotho

2.7.3.1 The demographic and socio-economic determinations of access to clean and safe water among Basotho by Moliehi Gladys Mokete.

The aim of the study is to identify the factors that are associated with access to clean and safe drinking water in Lesotho. By analyzing the demographic and socio-economic determinants, the study seeks to provide a deeper understanding of the barriers or facilitators to clean water access, with the goal of informing policy and interventions that can improve water access for all populations in Lesotho. The objectives of the study were to identify the key demographic and socio-economic factors influencing access to safe and clean drinking water in Lesotho. Specifically, the study aimed to examine the role of age, educational level, wealth index, and place of residence as determinants of water access. Additionally, the study sought to explore how

different sources of water impact the safety and cleanliness of drinking water available to households. By understanding these factors, the study intended to highlight disparities in water access across various population groups, with a focus on vulnerable communities. Ultimately, the study aimed to provide recommendations for improving access to clean and safe drinking water for all Basotho, ensuring that policy and interventions are targeted at the most affected populations.

The methodology of the study involved using data from the 2014 Lesotho Demographic and Health Survey (LDHS), which included a sample of 9,402 respondents. The study aimed to identify the demographic and socio-economic factors associated with access to safe and clean drinking water. Data collection was conducted through structured surveys that enumerated the respondents' use of water sources for drinking and cooking. The analysis focused on various factors such as age, educational level, wealth index, place of residence (urban or rural), and the sources of water (e.g., piped water, wells, or surface water). Descriptive and inferential statistical methods were employed to analyze the relationships between these factors and the likelihood of accessing clean and safe drinking water. The study aimed to identify significant determinants and to highlight disparities in water access among different demographic and socio-economic groups in Lesotho. The results were used to draw conclusions about the need for improved water access and to suggest targeted interventions.

In addition, structured surveys were distributed to a representative sample of households in each case study area to collect quantitative data on access to potable water, satisfaction with water supply services, and community awareness of IWRM policies. The combination of these research methods allowed for a comprehensive understanding of the factors influencing the implementation and outcomes of IWRM policies in the selected regions.

The data gathered through these methods were then analysed and compared across the four case study areas to identify common patterns, challenges, and successes, as well as the impact of political, institutional, and economic factors on the effectiveness of water governance. The comparative analysis provided valuable insights into the barriers to successful IWRM

implementation and helped draw lessons for improving water governance and policy enforcement in similar contexts.

The findings of the study revealed several key factors influencing access to clean and safe drinking water in Lesotho. It was found that age played a significant role, with older individuals having greater access to clean water compared to younger populations. The source of water also emerged as a critical determinant, as those using piped or treated water had better access to safe drinking water, while those relying on surface water, wells, or untreated sources were more likely to use unsafe water. Educational level was another important factor, with individuals who had higher levels of education being more likely to access safe drinking water. The wealth index also played a role, as wealthier households had greater access to clean water, typically from treated sources, whereas poorer households often relied on less safe, untreated water sources. Finally, residence was a key determinant, with urban areas having better access to clean water compared to rural areas, where infrastructure and water sources were less reliable. These findings highlight significant disparities in water access in Lesotho, emphasizing the need for targeted interventions to ensure that all Basotho, regardless of age, education, wealth, or residence, have access to safe and clean drinking water.

While the study identifies residence as a determinant, it does not delve deeply into specific regional differences within urban and rural areas such as remote villages or highland regions where access to clean water may be particularly limited. A more granular geographical analysis could help target interventions more effectively.

2.7.3.2 Harvesting rainwater and greywater towards/for sustainable water management by Itumeleng Violet Nkhereanye.

The aim of this study is to investigate the potential of rainwater harvesting and greywater reuse as sustainable solutions for addressing water scarcity in Ha Tsela, Lesotho. The objectives of the study are to evaluate the effectiveness of current water management strategies implemented in Ha Tsela and its surrounding communities, with a focus on their ability to mitigate the challenges of

water scarcity. Additionally, the study seeks to assess the long-term sustainability of these strategies, including the feasibility of scaling up rainwater and greywater harvesting technologies. A key objective is to identify the necessary investments and resources required for the successful operation and expansion of these solutions, as well as to determine the training and education needed for local communities to maintain and operate the technology. The study also aims to assess how the technologies were introduced to the community, and to examine the processes of disseminating relevant information to ensure effective engagement and understanding. Ultimately, the study seeks to provide recommendations for improving the sustainability and impact of water management efforts in Ha Tsela, ensuring that these solutions can address the growing water crisis in the long term.

The methodology of this study involved a combination of qualitative and quantitative research tools to assess the current water scarcity situation in Ha Tsela, Lesotho, and to investigate the potential of rainwater harvesting and greywater reuse as sustainable water management solutions. Data was collected through a research survey (questionnaire) to gather quantitative information from community members about their water usage and access. Additionally, document analysis was conducted to review existing records, policies, and reports related to water management strategies in the region. In-depth interviews were carried out with key stakeholders, including local authorities, community leaders, and residents, to gain a deeper understanding of the challenges faced by the community and the effectiveness of current solutions. Focus group discussions were also held to gather qualitative insights from a diverse group of community members, providing a platform for shared experiences and ideas. The study further evaluated the effectiveness of the rainwater harvesting and greywater reuse technologies implemented in Ha Tsela, assessing their sustainability, scalability, and the level of community engagement. This multi-method approach allowed for a comprehensive analysis of the situation and provided valuable insights into the strengths and limitations of the water management strategies in place.

The findings of the study indicate that while rainwater harvesting and greywater reuse have the potential to address water scarcity in Ha Tsela, their implementation has faced several challenges. Firstly, the community's awareness and understanding of these technologies were limited,

hindering proper adoption and maintenance. Many locals were not adequately trained to manage the complex systems, which led to underutilization or malfunctioning of the water management technologies. Additionally, while these solutions provided temporary relief, the study found that they were not sustainable in the long term without significant investments in infrastructure, expansion, and technical support. The increasing population and the impact of climate change further exacerbated the challenge, as the collected rainwater and greywater were often insufficient to meet the growing demand for water. Moreover, the study highlighted that the technologies were introduced to the community without sufficient information dissemination and engagement, which resulted in confusion and resistance. The research concluded that although the technologies could be effective in alleviating water scarcity, their long-term success would require ongoing training, proper community involvement, and scaling efforts to ensure sustainability.

One of the primary gaps is the insufficient community involvement and education regarding the proper use, maintenance, and benefits of rainwater and greywater systems. Many community members were not adequately informed or trained, which hindered the effective operation and sustainability of the technologies.

2.8 Summary

This chapter indicates that availability and access to potable water in rural areas of Lesotho remain significant challenges. Despite efforts by the government and NGOs to improve water supply systems, many rural communities lack reliable access to clean drinking. Factors contributing to this issue include inadequate infrastructure, limited maintenance of existing systems, geographic isolation and water resource pollution. Rural populations often rely on unprotected water sources increasing the risk of waterborne diseases. Addressing this issue requires investment in sustainable water infrastructure, community, engagement and policies aimed at improving water quality and accessibility for all. Next chapter discusses the methodology employed for this study.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter presents the research paradigm, research methodology and research design. It further discusses the population together with sampling, research instruments, data collection procedure, data presentation procedure, validity and reliability and ethical considerations.

3.1 Research paradigm

A research paradigm is a foundational framework that shapes how researchers understand the world, define their research questions, and choose their methodologies. It encompasses the underlying philosophical assumptions about reality (ontology), knowledge (epistemology), and the process of acquiring knowledge (methodology). Common paradigms include positivism, which assumes an objective reality and favours quantitative methods; interpretivism, which sees reality as subjective and socially constructed, often using qualitative methods; and pragmatism, which focuses on practical solutions by integrating various approaches. The choice of paradigm significantly influences every stage of the research process, from design to data interpretation (Creswell & Creswell, 2018).

This study is guided by pragmatism paradigm which according to Creswell & Plano Clark (2018) prioritizes practical solutions and values multiple ways of understanding a problem. Pragmatism also supports the integration of both qualitative and quantitative methods, allowing researchers to analyse water quality data, infrastructure availability, and usage statistics, while also capturing the lived experiences, cultural beliefs, and preferences of rural communities. This mixed-methods approach enables a more holistic understanding of the barriers to safe drinking water and informs context-appropriate interventions. By focusing on what works in practice, pragmatism helps generate actionable knowledge that can guide policy-making, community engagement, and sustainable resource management.

3.2 Research methodology

The research methodology for studying the availability and access to potable water in Thaba Tseka is designed to comprehensively assess the current water supply situation, identify gaps, and evaluate the effectiveness of existing infrastructure. This methodology incorporates both qualitative and quantitative approaches to gather diverse data that can inform policy and community interventions which is basically mixed methods approach.

Mixed methods approach is a way of studying that combines both qualitative and quantitative research methods. This approach helps researchers gain a better understanding of complex questions by using the strengths of each method while balancing out their weaknesses. This allows for a more effective exploration of complicated topics.

In mixed methods research, researchers collect, analyze, and combine both qualitative and quantitative data in one study. This blending happens at different stages, such as when gathering data, analyzing it, interpreting the results, and reporting the findings. The main aim is to use the detailed and rich information from qualitative data together with the accuracy and broad applicability of quantitative data. This combination improves the overall trustworthiness and validity of the results. A mixed methods approach is the combination of both qualitative and quantitative research methods, which helps researchers take advantage of the strengths of each type. This way of researching gives a fuller understanding of a problem by combining numbers with detailed insights. Quantitative methods provide clear, measurable data, while qualitative methods add context and deeper meaning to those numbers. By mixing these methods, researchers can tackle complicated questions, confirm their findings from different viewpoints, and look into surprising results. This flexibility makes mixed methods great for dealing with complex issues and reaching well-rounded conclusions.

3.3 Research design

This study immersed a case study research design. A case study research design involves an in-depth, detailed examination of a specific subject (person, group, organization, event) within its

real-world context, aiming to understand its complexities and dynamics. The case study used was of Thaba-Tseka because the researcher was inspecting the accessibility and availability of potable water in rural areas of Lesotho. This research focuses on how water scarcity affects the people of Thaba-Tseka.

3.4 Population and sampling

The population of a country or region is the total number of people living there; thus, the study population is the number of persons participating in the study. According to Shukla (2020), it is a collection of units on which the findings of problem study are to be applied. The population of the study include the WASCO workers, households, schools, community leaders and health centres.

The study engaged in this research will be non-probability sampling method which is often used when random sampling is not feasible or when the research aims to focus on specific groups, location, or conditions that are most relevant to the study of water scarcity in a particular area like Thaba-Tseka. Here non-probability sampling method was used for gathering targeted, in-depth insights into local water access, usage and challenges. According to Bhardwaj (2019) non-probability sampling is a method in which one of the populations to be sampled have a known probability of being selected.

Convenience sampling was used because it collects data from easily accessible communities or households to gather insights on local water scarcity issues, especially if time and resource constraints limit broader sampling. It was used to select households because Bhardwaj (2019) explained that it refers to the selection of the sample due to their convenient accessibility. It was selected by the researcher as she selected participants.

3.5 Research instruments

Data collection methods are divided into two categories being the primary data and secondary data, and this the research will use both the primary data and secondary data.

3.5.1 Primary data

In-depth interviews and standardised questionnaires were used to gather primary data. Additional data was gathered via firsthand observation and experience. An interview is a method of gathering data that entails a verbal exchange during which the participant's personal interaction is used to gather information (Pandey & Pandey, 2015; Taherdoost, 2021). In-depth interviews and semi-structured interviews were used by the researcher to interview participants because they enabled her to interview illiterate people because they could now understand the questions and ask questions to gain explanation when needed. Thirty participants in all were interviewed by the researcher. Five health workers, three community leaders, and one WASCO employee because they are sufficiently knowledgeable. Six schools and fifteen families. During working hours, interviews were conducted at important informants' places of employment, health facilities, schools, and homes. Interviews lasted between 15 to 20 minutes, and participants' answers were videotaped so that they could comprehend, ask questions, and react.

Additionally, the researcher gave out 25 structured questionnaires, which asked about sources of drinking water, to literate homes that were selected. water supply disruption frequency, water collection time, and water quality perceptions. According to Pandey and Pandey (2015), a questionnaire is a tool that consists of a series of questions intended to gather data by having respondents react to them. Because some individuals could feel uncomfortable doing in-person interviews and others would choose to remain anonymous, the researcher employed structured questionnaires to help gather information from these participants.

3.5.2 Secondary data

Secondary information was obtained through reading literature from WASCO, also from reports and relevant documents from WASCO.

3.6 Data collection procedure

One of the most important steps in organising and carrying out the study is gathering data. It allows the researcher to get knowledge about the research topic and find answers to research problems (Taherdoost, 2021). The document granting permission to perform the research was

initially obtained by the researcher from the institution. He then requested the chief's approval to distribute the questionnaires and carry out the in-depth interview. The questions on the questionnaires clearly illustrate and define the problems with water scarcity for the people of Thaba-Tseka. The researcher was able to approach the WASCO department and request permission to interview a worker about her research thanks to the letter she had from the university.

The study adopted a mixed-methods approach that combined both quantitative and qualitative data collection techniques. For the quantitative component, a total of 23 respondents were selected using a convenience sampling technique. The sample size was determined primarily by time constraints, limited accessibility of some rural areas, and financial limitations associated with data collection in the mountainous district of Thaba-Tseka. Although the sample of 23 may appear small, it was considered adequate for an exploratory study aimed at identifying indicative trends rather than establishing statistically generalizable conclusions. The quantitative data were therefore used to provide a broad numerical overview of water access patterns in selected villages, while the more extensive qualitative component (30 key-informant interviews) provided deeper contextual understanding of the challenges surrounding potable water availability and accessibility in the district.

3.7 Data presentation procedure

Quantitative Analysis: Survey results will be analyzed using statistical software, such as SPSS or R. While inferential statistics (such as chi-square tests) will look at correlations between variables, descriptive statistics will compile demographic data.

All participants will be informed about the study's purpose, procedures, risks, and benefits. Written consent will be obtained before participation. Data collected will be anonymized to protect participant identities. The study protocol will be submitted for ethical review and approval from relevant local institutions to ensure compliance with ethical research standards.

The methodology acknowledges potential limitations such as sseasonal variations affecting water availability, ppossible biases in self-reported data, cchallenges in accessing remote areas for data collection,

3.8 Validity and reliability

Validity ensures that the research accurately measures the key aspects of water scarcity such as water availability, accessibility and its social and economic impacts. For instance, using triangulation which means collecting data from diverse sources like community interviews, water quality tests and meteorological data and can strengthen the validity of the results. Reliability on the other hand ensures that the study's findings are consistent over time and across different researchers. This can be achieved by using standardized data collection methods, clear protocols and repeating measurements of water sources at different times of the year to check for consistency. By carefully addressing validity and reliability, researchers ensure that their findings on water scarcity in Thab-Tseka are both accurate and dependable.

3.9 Ethical considerations

A set of rules, or principles, that specify how research should be carried out or ideals that should be upheld when handling human concerns are known as ethical considerations. They assist in ensuring that researchers behave in a way that does not endanger people or society (Bhasin, 2020). The researcher espoused the following ethical issues being informed consent, obscurity, confidentiality and voluntary participation. Informed consent means obtaining permission from a research participant after providing them with the necessary information of the research study including the risks, benefits, and expected outcomes. The researcher searched for consent by telling the community leaders and community members that the purpose of the study is together information on availability and accessibility of potable in the area. There was also a documented consent that had date, time and the names of people who provided consent and then the signatures by the participants. In addition, voluntary participation is a key ethical principle that ensures individuals or communities freely choose to be involved in a project, research or decision-making process without coercion, manipulation or undue pressure.

Participants were also assured of confidentiality. Confidentiality is the ethical obligation to protect the privacy of individual's personal information and ensure that sensitive data is not disclosed without appropriate consent (Bos, 2020). The researcher made community members aware that the information they provide about the experiences with WASCO will not be accessible to anyone except the researcher and that their identity will remain anonymous, it will not be revealed. Anonymity is the practice of ensuring that the identity of participants remains unknown or disclosed in research where sensitive information is collected. The researcher ensured by de-identifying the participant.

Finally, the research made sure there was voluntary participation. According to (Bhandari, 2021) voluntary participation is explained as the freedom of participation to decide to participate without any pressure or being forced. This means, the participants can leave the study any time they want without feeling obliged to continue and there is no explanation expected from them and they can answer questions from their own will. The researcher made all WASCO worker, schools, households, community leaders and health facilities aware of what is needed of them and the activities in the research process to leave a room of them if they want to continue on participation.

3.10 Summary

The research methodology, population and sample strategies, and data gathering procedures were all covered in this chapter. The chosen research methodology, research design, and data collection techniques were also described by the researcher, along with their definitions and the rationale behind their use in this study. The results of this investigation are presented and discussed in the next chapter.

CHAPTER FOUR

DATA PRESENTATION AND ANALYSIS

4. 0 Introduction

This research investigated the availability and access to potable water in Thaba-Tseka, Lesotho, employing a mixed-methods approach that combines structured questionnaires and in-depth interviews. Thaba-Tseka, characterized by its mountainous terrain and dispersed rural settlements, presents unique challenges in water accessibility. Despite Lesotho's reputation as a 'water-rich' country, many communities, particularly in rural areas like Thaba-Tseka, encounter challenges getting access to clean drinking water due to inadequate infrastructure and sanitation facilities.

Structured questionnaires were administered to a representative sample of households across various communities in Thaba-Tseka. These questionnaires gathered quantitative data on aspects such as distance to water sources, frequency of water availability, household water usage patterns, and perceptions of water quality. The use of structured questionnaires allowed for the collection of standardized data, facilitating comparative analysis across different communities.

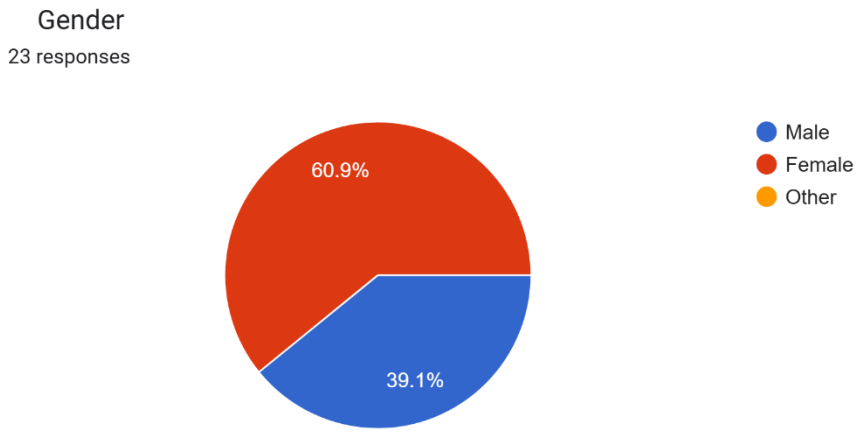
In-depth interviews complemented the quantitative data by providing qualitative insights into the lived experiences of community members regarding water access. These interviews were conducted with key informants, including local leaders, water service providers, and residents, to explore the socio-cultural, economic, and institutional factors influencing water accessibility. This approach aligns with methodologies used in previous studies, where semi-structured interviews have been effective in capturing community perceptions and attitudes towards water-related issues.

The combination of structured questionnaires and in-depth interviews enabled a comprehensive understanding of the water access situation in Thaba-Tseka. This mixed-methods approach facilitated the triangulation of information, enhancing the reliability and validity of the results. The

fieldwork was conducted with sensitivity to the local context, ensuring that language barriers and cultural nuances were appropriately addressed during data collection.

4. 1 Demographic Data of Participants

The research used google form to formulate a questionnaire to send to the respondents through the link for easier, better and time saving responses. The questionnaire was sent to 25 respondents but only 23 were able to answer the questions. Interview was also carried out where 30 people got successfully interviewed. The majority of respondents were from communities such as Phomolong, Thabong, Hillside, and Khohlo-ntso. The gender distribution appears relatively balanced, though there is a slight overrepresentation of females. Most respondents fall within the 18–30 age group, followed by those in the 31–50 and over 50 brackets. In terms of education, tertiary education is the most common level attained, indicating that the surveyed population is relatively well-educated. Occupations are diverse, with several respondents listing themselves as unemployed or indicating "Other," such as farming and small business operations. Household sizes range from 2 to 8 members, with most households containing 3 to 5 people.



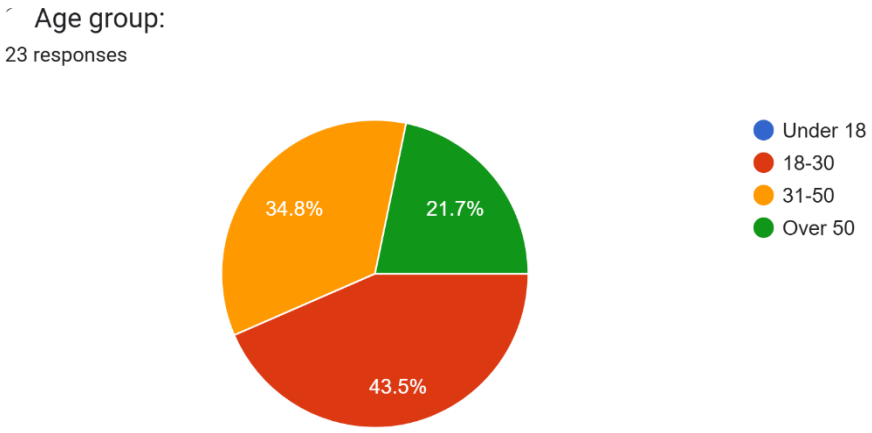
The pie chart indicates that approximately 61% of respondents (14 out of 23) identify as female, while 39% (9 respondents) are male, with no participants selecting Other.

This female-majority sample is particularly meaningful in water-access research, as in Lesotho as across much of sub-Saharan Africa water collection is overwhelmingly the responsibility of women and girls. Studies show women fetch water in about 80% of households without in-home sources.

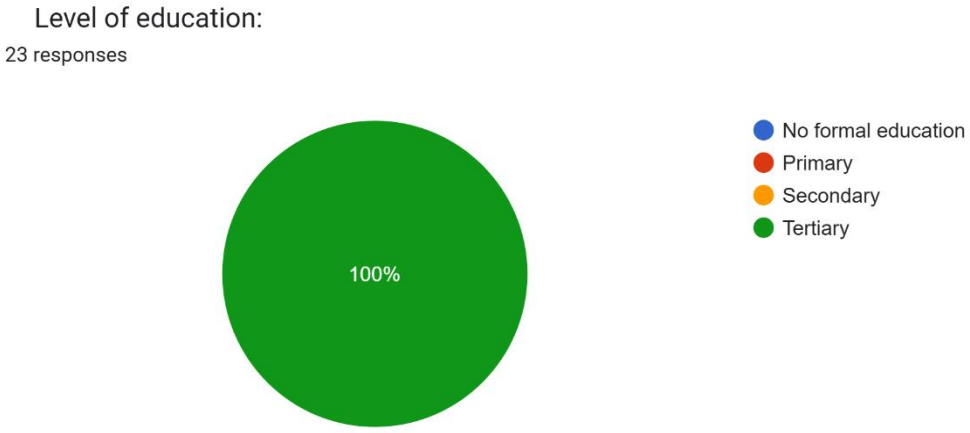
Their voices thus offer critical insights into daily obstacles: long treks, load-carrying, safety risks, and time lost to collecting water burdens that disproportionately affect female-headed households and girls, often disrupting schooling and work.

However, the male perspective at 39% helps enrich the data by confirming shared concerns about supply consistency, infrastructural failings, and governance, making the analysis more balanced than a female-only sample. That said, the absence of Other suggests limited gender inclusivity in this sample. Future surveys aiming for broader representation may need to actively include gender-diverse participants to fully capture all community experiences.

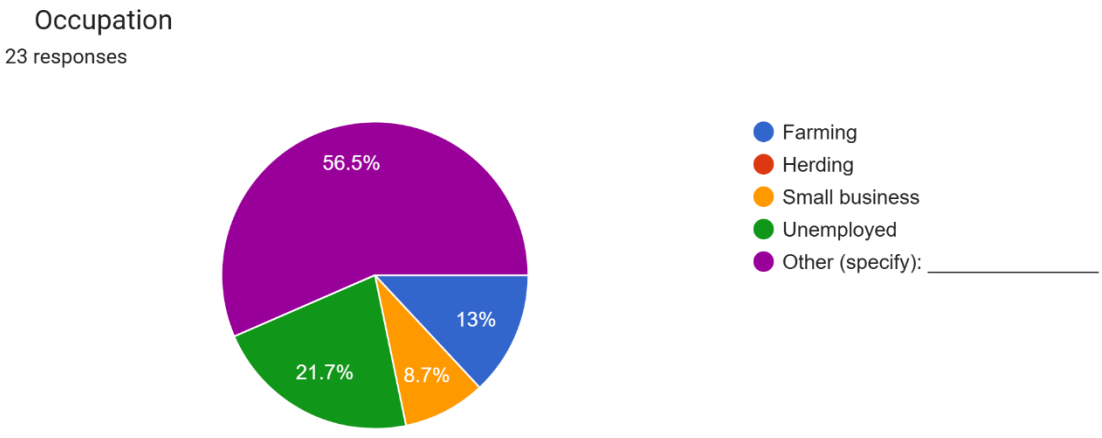
All in all, the chart's gender composition enhances the study's relevance to water challenges—highlighting issues from the vantage point of those most affected while also pointing toward opportunities for greater inclusiveness in future data collection.



The age distribution among survey respondents (N = 23) shows that nearly 44% are between 18–30 years, around 35% are 31–50 years, and about 22% are over 50, with no respondents under 18. This spread captures a core population of young and middle-aged adults' groups most actively engaged in household responsibilities like water collection, treatment, and community management. Their insights, therefore, reflect both the physical burden and decision-making challenges related to water access. However, the complete absence of under-18 voices means the perspectives of children and teenagers who are also affected by water scarcity and may shoulder collection duties during school are missing. Similarly, older adults are somewhat underrepresented, which may overlook generational vulnerabilities such as mobility issues or health-related consequences of unreliable water access. Overall, the sample effectively highlights adult experiences, but omits important insights from the youngest residents.



The chart shows that 100% of the 23 respondents have attained tertiary-level education, indicating a highly educated sample. In Lesotho, tertiary education is less common most adults completed primary or secondary schooling so this sample reflects a specific, likely more informed segment of the community. Such educational attainment often correlates with greater awareness of issues like water quality, hygiene practices, and infrastructure planning. However, relying solely on tertiary-educated voices may overlook the perspectives of those with lower education levels who often bear the brunt of water insecurity and may lack the capacity to advocate for improvements. To gain a fully representative understanding of water access challenges across Thaba-Tseka, future research should include participants with diverse educational backgrounds.

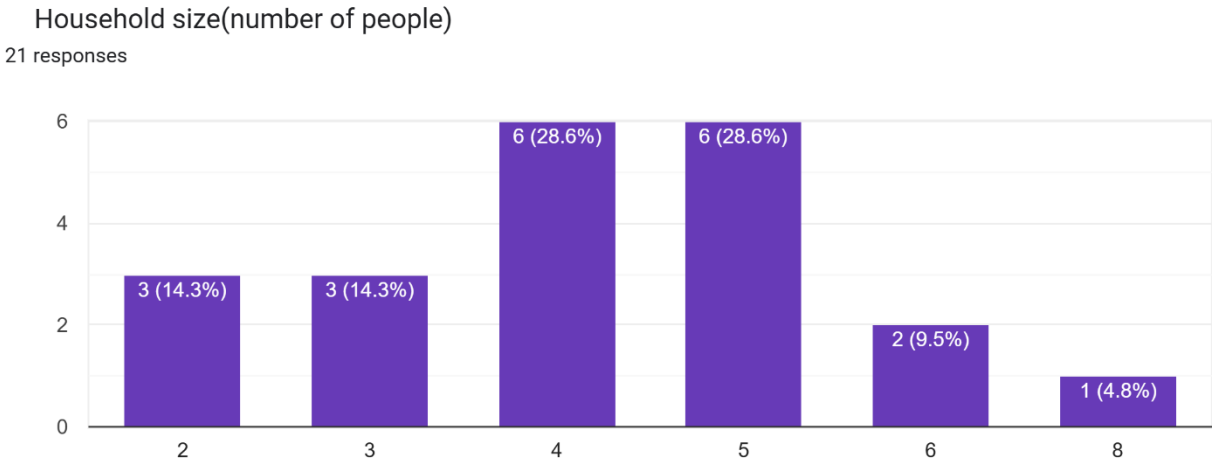


The data on occupation in Thaba Tseka shows that a majority of respondents (56.5%) fall into the "Other" category, while 21.7% are unemployed, 13% are engaged in farming, and 8.7% are involved in small businesses. Notably, no respondents reported herding as their primary.

This occupational distribution has significant implications for the availability and access to potable water in Thaba Tseka. The high percentage of people in the Other and Unemployed categories suggests that many residents may not have stable sources of income, which can limit their ability to invest in private water solutions or pay for water delivery services during shortages. The relatively small proportion of farmers and small business owners also indicates that only a minority of the population might have the resources or infrastructure (such as wells or irrigation systems) occupation to secure their own water supply.

Thaba Tseka has faced severe challenges in water availability, particularly due to drought. Reports indicate that 90% of water sources in the district dried up during prolonged dry periods, forcing communities to ration water and rely on alternative, often unprotected, sources. This led to compromised hygiene and increased incidences of waterborne diseases like diarrhoea, especially among children. Clinics in the district also struggled to maintain services due to water shortages, further highlighting the vulnerability of residents who lack secure employment or resources.

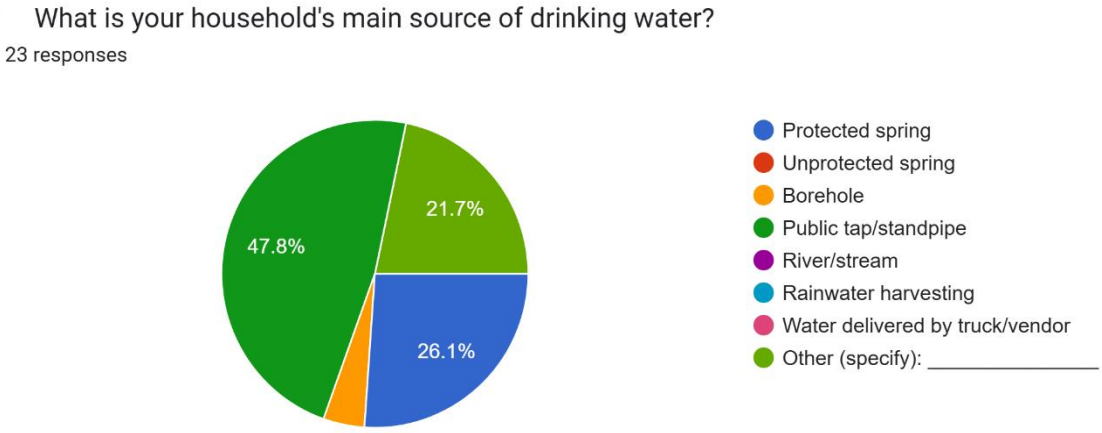
The occupational profile of Thaba Tseka dominated by those outside traditional farming or business sectors reflects a community with limited economic resilience to water scarcity. This, combined with the region's history of drought and infrastructural challenges, underscores the urgent need for sustainable, community-wide solutions to ensure reliable access to clean and safe water.



The data on household sizes in Thaba Tseka, as depicted in the bar chart, indicates that the most common household sizes are four and five people, each reported by 28.6% of the 21 respondents. This suggests that the typical household in the area consists of a moderate number of members. Smaller households, with two or three members, are also relatively common, each making up 14.3% of the sample. Larger households are less prevalent, with only 9.5% of respondents indicating six members and just 4.8% reporting eight members in their household. Overall, the distribution shows a tendency toward medium-sized households, with fewer families at the extremes of very small or very large sizes. This pattern may have implications for resource allocation and service delivery, as most interventions would need to cater to households of four to five members.

4. 2 The availability and accessibility of potable water to the people of Thaba Tseka.

Many villages rely on unprotected wells and intermittent communal taps, making water availability erratic, especially in winter months; in the Methalaneng area, a clinic serving around 8,500 people lost access to piped water for years, disrupting hygiene and maternal care. Despite Lesotho's water-rich geography, the core challenge remains bringing water to people, not just storing it abstractly It supports examining policy responses, local rehabilitation efforts, UNICEF/World Bank programs, and tender projects in rural water systems.



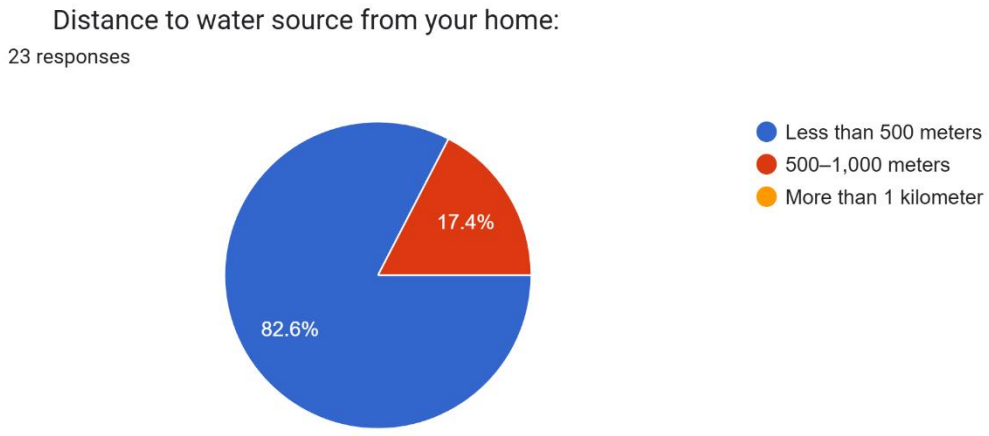
The data on the main sources of drinking water for households in Thaba Tseka, as shown in the pie chart, reveals a significant reliance on alternative and unspecified sources. Nearly half of the respondents (47.8%) indicated "Other" as their primary source of drinking water, which suggests inability to obtain There is an urgent need for long-term, neighbourhood-wide solutions to guarantee consistent access to safe and clean water. conventional or protected water sources and points to the use of potentially informal or less regulated options. Protected springs are the main source for 26.1% of households, representing the largest single specified category and indicating some access to safer water options. Meanwhile, 21.7% of respondents rely on public taps or standpipes, which are typically communal sources. A small proportion, 4.3%, reported using unprotected springs, which can pose health risks due to potential contamination. Notably, none of the respondents reported using boreholes, rivers/streams, rainwater harvesting, or water delivered by truck/vendors as their main source. Overall, the data highlights both the diversity of water sources in Thaba Tseka and the potential vulnerability of many households who may not have access to consistently safe and reliable drinking water.

In Thaba-Tseka, the water used for domestic purposes often falls short of safety standards. A study in the Mohale Basin found that all 30 water samples collected from various sources contained Escherichia coli (E. coli), with concentrations ranging from less than 30 to over 43 million colony-forming units per 100 millilitres. The highest contamination levels were observed in unprotected sources, such as open wells and springs, which are susceptible to pollution from open defecation,

livestock waste, and proximity to latrines. Even protected sources showed significant contamination, indicating that source protection alone is insufficient without improved sanitation and hygiene practices.

This widespread contamination poses serious health risks, particularly to children and immunocompromised individuals, leading to waterborne diseases like diarrhoea. Efforts to improve water quality must therefore focus on both enhancing water source protection and promoting better sanitation and hygiene practices within communities.

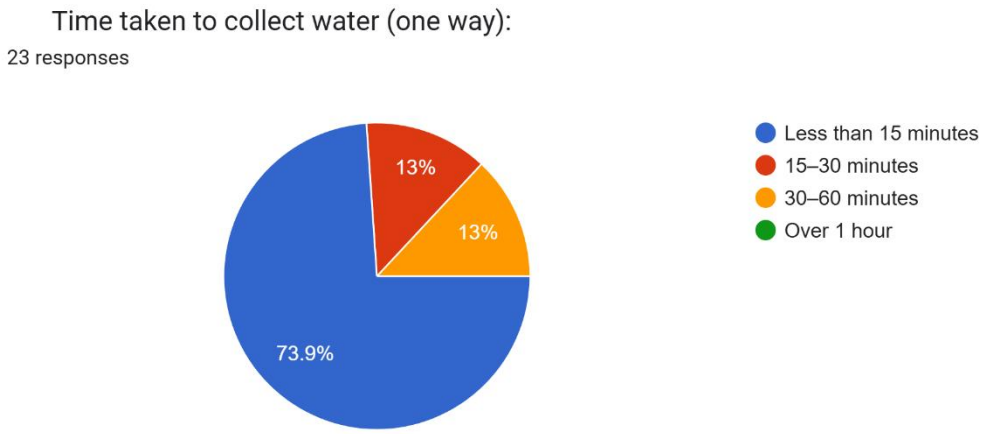
Residents in Thaba-Tseka frequently travel long distances on foot to secure domestic water, often before dawn or during extreme conditions. In Topa village, villagers report waking at midnight to embark on arduous four-hour round-trips across rugged, mountainous terrain just to reach the nearest valley water source. Elsewhere, households commonly trek 30 minutes or more each way to access unprotected wells, springs, or intermittent communal taps requiring both time and physical strength. These journeys not only consume hours of their day but also exact a heavy toll on health, safety, and daily routines, severely limiting opportunities for work, education, and rest.



The pie chart data indicates that for the 23 respondents surveyed, access to a water source based on distance is relatively favourable. A significant majority, 82.6% (19 respondents), live less than 500 meters from a water source. A smaller portion, 17.4% (4 respondents), live between 500 meters

and 1 kilometre away. Notably, no respondents (0%) reported living more than 1 kilometre from a water source, suggesting that within this specific sample, the burden of very long-distance water collection was absent. However, the small sample size of 23 responses means these results may not represent the entire Thaba Tseka district and likely reflect conditions only in the specific surveyed area(s). The data highlights proximity but does not address critical factors like water quality, reliability, or seasonal availability.

Residents of Thaba-Tseka rely primarily on gravity-fed mountain springs, communal standpipes, unprotected wells, and occasional rainwater harvesting for their domestic water supply. While approximately 68 % of households nationwide report having adequate water from these sources, this statistic masks stark regional disparities many in Thaba-Tseka face unreliable supply, especially during dry or cold seasons.



Access to a water source in the specific area(s) of Thaba Tseka covered by this study appears relatively efficient in terms of time investment for the majority of respondents. The chart, titled "Time taken to collect water (one way)" and based on 23 responses, reveals that a significant majority 73.9% (17 respondents) require less than 15 minutes for a one-way trip to collect water.

An additional 13% (3 respondents) take between 15 and 30 minutes, while another 13% (3 respondents) take 30 minutes to one hour. Notably, no respondents (0%) reported taking over one hour for a one-way collection trip.

This data suggests that for the surveyed population, the physical burden of water collection time is manageable for most, with nearly three-quarters experiencing very short collection times (under 15 minutes) and a combined 86.9% (20 respondents) completing the trip in under 30 minutes. The absence of any responses exceeding one hour indicates that, within this sample, extreme time burdens for water collection were not present. However, it's crucial to contextualize this finding. The sample size of 23 is small, meaning these results might not accurately reflect the whole of Thaba Tseka district and likely reflect conditions in specific surveyed communities. Furthermore, while the data indicates reasonable physical access in terms of proximity (reflected in collection time), it does not address the critical factor of water quality or potability. Access to a nearby water source does not guarantee that the water is safe to drink. The safety, reliability (especially seasonally), and actual adequacy of the water collected remain significant questions for understanding true "access to potable water" in Thaba Tseka, which this time-based data alone cannot answer.

The reality is that adequacy is conditional: when taps work and rain comes, water flows; otherwise, families report empty taps, dried-up springs, and polluted wells. A UNICEF report highlighted that even protected springs leak, while open wells and standpipes frequently fail, forcing families into long treks for basic needs. In short, while official data suggest moderate coverage levels, access is erratic and often insufficient at the household level in Thaba-Tseka.

One of the respondents shared that:

> *The water supply exhibited discoloration, appearing reddish, and suffered from critically low pressure. This resulted in excessively long queues with students waiting for hours to access water points.*

This highlights serious problems with the water supply system. The red colour indicates contamination, likely from rust in old or poorly maintained pipes, or sediment from unprotected water sources, making the water unsafe and unpleasant for use. Low water pressure means the system cannot deliver enough water quickly, causing long waits especially in busy households or communal points disrupting daily routines like cooking, cleaning, and hygiene. The mention of students waiting for hours shows how limited water availability affects entire communities, including vulnerable groups. Overall, this reflects a struggle with inadequate infrastructure, leading to health risks and inconvenience that impact residents' quality of life. It underscores the urgent need for repairs, system upgrades, and better water management to ensure safe, reliable, and equitable access for all.

Another respondent said:

> *Our village depends on water from taps which is not always accessible because the pressure is not enough due to the sloppy land so it is hard for us to access water but the only people who are able to access water are the ones who are based at lower levels.*

It reflects the significant challenges faced by communities in Thaba-Tseka. The hilly terrain and steep slopes impede the efficient distribution of water, leading to low pressure in the taps. Consequently, only those residing at lower elevations benefit from a consistent water supply, while others struggle to access this essential resource.

This situation underscores the need for targeted infrastructure development that considers the unique topographical challenges of mountainous regions. Implementing solutions such as elevated water storage tanks, gravity-fed systems, or solar-powered pumps could help ensure a more equitable distribution of water across all elevations. Addressing these disparities is crucial for improving the quality of life and promoting health and well-being in these communities.

One of the respondents stated that:

Sometimes we depend on water from wells which are not even covered and are contaminated; and sometimes it takes weeks to get water because of draught, we have to wait for rainfall so that there can be a supply of water.

A health worker added and said:

Most villagers drink contaminated water and this leads to diseases and health issues including diarrhoea and stomach ache.

Inconsistent sources force households to gamble on unsafe water. It directly correlates with disease outbreaks, turning water-seeking into a health risk, especially for children and immunocompromised individuals.

Some of the respondents highlighted that:

We have to travel long distances in order to get water and it is not safe because they might be attacked as sometimes, they have to travel in the dark just to be able to get access to water and carry their activities.

Residents describe their water sources distant springs, wells, and communal taps as unreliable and unsafe, forcing them into lengthy, dangerous journeys. Many travel before dawn, sometimes in the dark, across rugged terrain, facing risks from wildlife or even human predators Women and children, in particular, bear this burden and are vulnerable to physical attacks or harassment along these routes.

They often rely on unprotected wells that are contaminated and may go dry for weeks during droughts, leaving households dependent on unpredictable rainfall. These testimonies reveal that water collection in Thaba-Tseka is not only physically taxing and time-consuming but also intrinsically tied to safety, dignity, and health underscoring the urgent need for local, secure, and sustainable water infrastructure.

The quantitative data collected from the 23 respondents through questionnaires provided important insights into the availability and accessibility of potable water in Thaba-Tseka. Although the sample size was relatively small, it offers a useful snapshot of the situation in selected communities. The data reveal that all respondents (100%) reported the presence of water infrastructure such as taps and pipes in their localities. A majority (82.6%) indicated that their main water source was located within 500 metres of their homes, and 73.9% reported that they spent less than 15 minutes collecting water. These findings might suggest that water access is relatively convenient for most households in the surveyed areas. However, a deeper examination of the same data shows that proximity does not necessarily translate to reliable or safe access. About 39% of respondents reported irregular water supply, while 47.8% indicated they depended on informal or unprotected sources such as open wells and community tanks. This means that even where infrastructure exists, functionality and reliability remain major challenges.

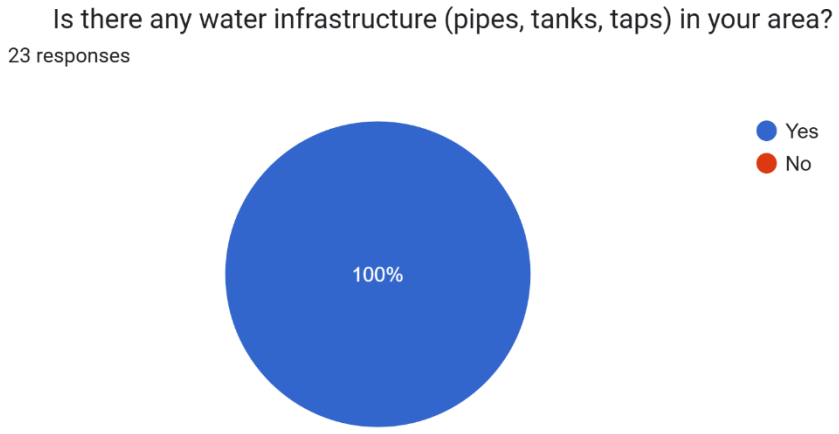
To complement these quantitative findings, qualitative data were gathered through 30 in-depth interviews with health workers, community leaders, WASCO staff, school representatives, and households. The interviews revealed that many water systems are either intermittently functional or completely non-operational, with taps producing discoloured water or running dry for weeks. Respondents also mentioned that some communities ration water, allowing access only on specific days, while others rely on contaminated springs during dry periods. Participants consistently emphasized the poor maintenance of water systems and the lack of clear responsibility between the Lesotho Highlands Development Authority (LHDA) and the Department of Rural Water Supply (DRWS). This qualitative evidence provides valuable context that helps explain why, despite the existence of infrastructure and short distances reported in the quantitative data, actual access to potable water remains unreliable and unequal across the district.

4. 3 Challenges to water accessibility to the people of Thaba Tseka.

Accessing clean water in Thaba-Tseka, a mountainous district in Lesotho, presents significant challenges for its residents. Communities, such as Chaena village, have historically relied on unreliable and unsafe water sources. For decades, Chaena's 269 residents and 160 households depended on a failing water system that provided only murky, red-tinted water in small amounts, often after hours of waiting at communal taps. The terrain's steep slopes and inadequate

infrastructure exacerbate these issues, making water access even more difficult. Additionally, many rural communities live within sight of Lesotho's two largest dams, yet they endure daily struggles to access safe water because the water is directed to neighbouring South Africa. These combined factors highlight the urgent need for improved water infrastructure and equitable distribution to ensure the health and well-being of Thaba-Tseka's residents.

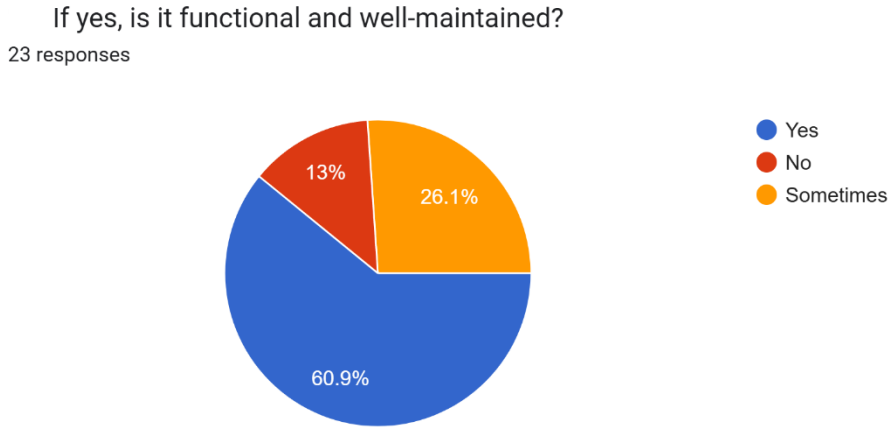
When both sets of data are interpreted together, they show a more nuanced picture than either source alone. The quantitative results demonstrate that infrastructure is physically present and that some households are within short distances of water sources. However, the qualitative evidence clarifies that these systems often fail to deliver consistent, safe, or sufficient water. Therefore, the situation in Thaba-Tseka is not one of complete scarcity, but rather one characterized by inconsistent functionality, poor maintenance, and unequal access. Recognizing this distinction resolves the apparent contradiction between Chapters Four and Five. The findings collectively indicate that while water resources and infrastructure exist, the key challenge lies in their operation, quality, and management rather than total absence.



The presence of water infrastructure in the specific area of Thaba Tseka covered by this study appears to be universal among the respondents. The chart, answering the question "Is there any water infrastructure (pipes, tanks, taps) in your area?", shows a definitive result: 100% of the 23 respondents answered "Yes". This unanimous response, represented by the entire pie being solid

blue, indicates that every surveyed household or individual reported having some form of water infrastructure physically present in their vicinity.

This finding suggests a high level of basic infrastructure coverage in the surveyed locations. The presence of pipes, tanks, or taps is a fundamental prerequisite for accessing water, and this data point confirms that these physical systems exist for the respondents. It aligns positively with previous data points showing good proximity to sources and short collection times, as infrastructure like taps or piped systems typically reduces distance and time burdens. However, this data solely confirms the existence of infrastructure. It does not provide information on critical factors determining actual access to potable water, such as the functionality of the infrastructure (e.g., are taps working, are tanks filled), the reliability of the water supply (e.g., is it available year-round or seasonal), the quality and safety of the water delivered, or equitable access within the community. Therefore, while the universal presence of infrastructure is a positive indicator, it represents only one component of the complex picture of ensuring reliable and safe drinking water access in Thaba Tseka. The small sample size of 23 responses also means these results might not accurately reflect the whole district.



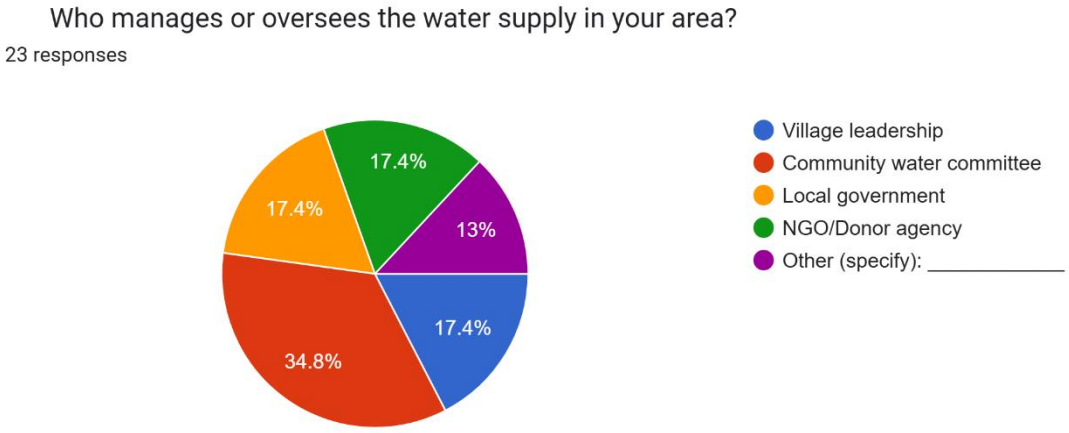
While the universal presence of water infrastructure (as previously confirmed) is a positive baseline, this data reveals significant operational challenges. While 60.9% experience reliable

service, a combined 39.1% (9 respondents) face either intermittent problems ("Sometimes") or complete failure ("No"). This highlights that the existence of infrastructure does not guarantee consistent, functional access to water for a sizable portion of the surveyed population. Issues with maintenance and system reliability appear to be tangible barriers for nearly 40% of respondents. This underscores the need to look beyond simple infrastructure presence and address operational sustainability, maintenance protocols, and equitable service delivery to ensure actual, reliable access to water. The small sample size (n=23) remains a limitation for district-wide generalization.

Accessing clean and reliable water remains a significant challenge for communities in Thaba-Tseka, Lesotho, due to a combination of infrastructural, environmental, and socio-economic factors. Many rural villages, such as Chaena, have historically depended on failing water systems that provided murky, red-tinted water in small amounts, often after hours of waiting at communal taps. These sources are frequently contaminated with faecal matter, posing serious health risks to residents, including outbreaks of waterborne diseases like diarrhoea.

The mountainous terrain of Thaba-Tseka complicates water distribution, leading to low water pressure and limited access for households situated at higher elevations. Residents often face long distances to reach the nearest water source, and the lack of infrastructure exacerbates the difficulty in accessing clean water. Prolonged droughts have led to the drying up of wells and springs, forcing communities to rely on unpredictable rainfall for water supply. This seasonal scarcity disrupts daily routines and increases the vulnerability of households to water shortages.

The responsibility of collecting water often falls on women and children, who must travel long distances, sometimes in the dark, to access water. This exposes them to potential safety risks and limits their time for education and other productive activities. Existing water infrastructure, such as pipes and taps, often falls into disrepair due to lack of maintenance and funding. For instance, in some areas, water pipes connected to villages after dam construction have been damaged by floods and remain unrepaired for years, leaving communities without reliable water sources.

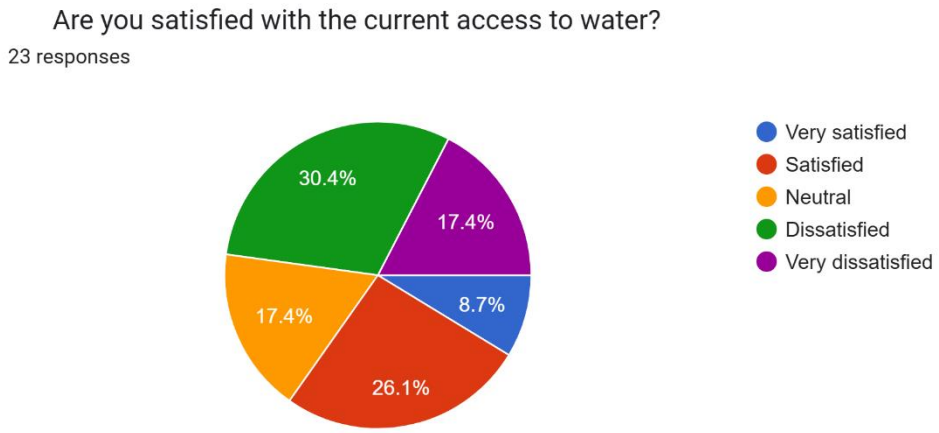


Based on the pie chart depicting responses to "Who manages or oversees the water supply in your area?" from a survey of 23 respondents in Thaba Tseka, the governance of water resources appears decentralized but with a clear primary actor. Village leadership emerges as the most frequently cited manager, reported by 34.8% (8 respondents). This indicates a significant reliance on local, traditional governance structures for water oversight.

However, responsibility is notably fragmented. Three distinct entities – the "Community water committee," "Local government," and "NGO/Donor agency" – each garnered an identical 17.4% share (4 respondents each). This three-way tie highlights that no single secondary institution dominates management; instead, oversight is shared or varies significantly across the surveyed communities. This distribution suggests a diverse landscape of water governance, where different models (community-led, state-led, or externally supported) coexist.

A noteworthy 13% (3 respondents) selected "Other," implying their management structure falls outside the predefined categories. This significant minority warrants further investigation to understand these alternative oversight models. Crucially, the data reveals no single, unified management authority. The combination of a leading role for village leadership and the split among other actors point towards a complex, potentially collaborative or sometimes overlapping system

of water resource governance in the areas surveyed. While local leadership plays a central role for many, nearly two-thirds of respondents rely on other entities or unspecified ("Other") arrangements, indicating that consistent, standardized management across the entire sample area is lacking.



According to the pie chart, satisfaction with current water access among the 23 respondents in Thaba Tseka shows a predominantly positive but nuanced distribution. The largest segment, representing 30.4% of respondents (7 people), reported being "Very satisfied" with their water access. This is closely followed by 26.1% (6 respondents) who indicated they are "Satisfied", meaning a combined majority of 56.5% (13 people) express clear positive sentiment.

However, a significant portion of the community reports less favourable experiences. Neutral sentiment accounts for 17.4% (4 respondents), suggesting ambivalence or lack of strong opinion. An equal percentage, 17.4% (4 respondents), explicitly stated they are "Dissatisfied". The smallest segment, 8.7% (2 respondents), reported being "Very dissatisfied", indicating acute dissatisfaction for a minority. Cumulatively, 26.1% (6 respondents: Dissatisfied + Very dissatisfied) express negative views, while including the neutral group, 43.5% (10 respondents: Neutral + Dissatisfied + Very dissatisfied) are not positively satisfied.

This data reveals a crucial insight: while a majority are satisfied, a substantial minority (over 1 in 4) are dissatisfied, and nearly half are not positively satisfied. This contrasts with the universal presence of water infrastructure (100% reported its existence) and the 60.9% who found it functional and well-maintained. The gap suggests that the mere presence or even basic functionality of infrastructure does not automatically translate to user satisfaction for all. Factors like water quality, reliability, convenience, equity in distribution, or cost may be influencing the dissatisfaction reported by a significant segment, underscoring the complexity of achieving truly equitable and satisfactory water access beyond just physical infrastructure. The small sample size remains a limitation for broader conclusions.

One of the respondents highlighted that:

> *It is deeply unsettling and concerning that us the people of Thaba Tseka continue to lack reliable water access, despite the proximity of significant water resources like Katse Dam and Mohale Dam from which they are entirely excluded.*

This reflects a deep sense of injustice villagers feel neglected despite visible abundance. The presence of massive dams like Katse and Mohale, which divert water out of the district, starkly contrasts with local residents' inability to drink from them counter-balance.

Their water is essentially being exported, often with funds flowing to national coffers or foreign buyers, while communities living nearby remain without. This sharp disparity highlights structural neglect: water infrastructure has benefited cities and regional projects, not those whose daily lives depend on it. The emotional tone "unsettling and concerning" echoes deep disappointment with policymakers and project planners. It underscores that water access is not simply a technical issue, but a question of fairness, equity, and local rights.

Another respondent said:

Our village has been abandoned because of the construction of the dam, and continued to say that there was already unlimited access to clean water but now all of the water is contaminated.

This statement reveals a profound sense of loss and betrayal among affected communities. By describing themselves as "abandoned," residents communicate that the benefits promised by the dam construction for better infrastructure, clean water access never materialized. Instead, they have lost their traditional water sources, which were once reliable and abundant, and now face daily struggles with contaminated water from unprotected wells and broken systems flooded by dam operations.

Their words expose a stark injustice: infrastructure projects meant to improve livelihoods have instead delivered environmental degradation and health risks. The emotional weight in their voice signals not only physical deprivation but also erosion of trust in development authorities. They are demanding more than water they are calling for recognition, accountability, and restorative equity for having sacrificed their clean water and livelihoods without receiving promised benefits.

4. 4 Possible solutions in improving water access in Thaba Tseka.

Strengthening water resilience in Thaba-Tseka requires a holistic approach that integrates sustainable infrastructure development, community governance, and climate-smart solutions. Investments in climate-resilient infrastructure, such as improved water storage and distribution systems, are essential to ensure reliable access to clean water for all residents. Community governance plays a vital part in the maintenance and equitable distribution of water resources, encouraging a feeling of responsibility and accountability among local populations. Implementing climate-smart solutions, including rainwater harvesting, efficient irrigation techniques, and the rehabilitation of natural water sources, can mitigate the impacts of climate variability and enhance the sustainability of water resources. Collaborative efforts among government agencies, local communities, and development partners are vital to create a resilient water system that meets the needs of Thaba-Tseka's population while adapting to future climate challenges.

Installing boreholes with manual or solar pumps in combination with gravity-fed pipelines from spring sources can provide reliable, on-demand water especially crucial in high-altitude communities. Such systems have been chosen where gravity systems are not feasible, ensuring sustainable supply. Rooftop and community-scale rainwater harvesting systems offer a vital supplementary source during dry spells. Designs include catchment areas, storage tanks, first-flush diverters, and filtration. These systems are already demonstrating success in Lesotho's lowlands and can help buffer against seasonal shortages.

Programmes under initiatives like the Lesotho Lowlands Water Development Project Phase II are rehabilitating gravity-fed schemes and repair pipelines in Thaba Tseka. Maintaining and upgrading taps, reservoirs, and boreholes across districts strengthens overall resilience. Protected springs and sealed boreholes reduce contamination from livestock and latrines. This needs to be paired with community hygiene education like keeping livestock away, discouraging laundry near water points, and maintaining latrines to significantly improve microbial water quality.

Training Village Water Committees in O&M, financial planning, and monitoring ensures long-term viability. When communities manage repairs, monitor water levels, and maintain hygiene standards, systems are less likely to fail. Incorporating integrated watershed initiatives like reforestation and erosion control supports aquifer recharge and stabilizes spring flows. This aligns with newer components of national rural water programs that integrate climate resilience.

One of the leaders stated that:

> *All villagers are allowed to get water once a week from the Rural Water Supply which is controlled by him on when it should be opened to allow access.*

The statement highlights several critical challenges faced by communities in Thaba-Tseka including:

First, it shows how water access is severely restricted, not by natural scarcity alone, but by externally controlled schedules. If a single person controls when the rural supply opens, villagers lose autonomy over this essential resource, forcing them into dependence and unpredictability.

Second, the once-a-week rationing suggests that the system cannot meet daily needs, likely due to limited infrastructure, storage, or supply turning water into a rationed commodity rather than a basic right. This scarcity can exacerbate health risks (due to potential storage contamination), and create social stress from managing limited supply.

Third, the power dynamics around supply control point to governance and equity issues. Centralizing control in one individual risks favouritism, exclusion, or neglect of vulnerable groups (e.g., disabled, elderly, or distant households) who may be further marginalized.

Finally, it underscores the urgent need for democratized governance transparent systems, community-led scheduling, or automated flow-control technology so all villagers can access safe water consistently and without gatekeeping.

Taken together, their voice reveals that water insecurity in Thaba-Tseka is more than physical it is institutional: a failure of infrastructure, equity, and local empowerment.

One of the residents mentioned that:

> *We do not see the importance of always stating that water is essential while we still have to travel for long to get water, live for days or weeks without water by using wheelbarrows and cars.*

It reflects deep frustration and weariness. Their words lay bare the disconnect between rhetoric and lived reality though water is often praised as a fundamental human right, their daily experiences tell a different story. They describe transporting water via wheelbarrows or even cars,

traveling long distances, and enduring days or even weeks without water, highlighting the extreme lengths they must go to simply survive. This stark dissonance reveals water is not a given it is a logistical burden and a source of stress. Their voice demands that water access be reimagined not as a slogan, but as a guaranteed, close-to-home utility. It's a powerful call to upgrade infrastructure and policy so that "essential" becomes "accessible" in everyday life.

4. 5 Summary

This chapter delved into the multifaceted issues surrounding the availability and access to potable water in Thaba-Tseka, Lesotho, utilizing both structured questionnaires and in-depth interviews to gather comprehensive data. The quantitative data from the structured questionnaires revealed significant challenges, such as long distances to water sources, inconsistent water supply, and concerns about water quality. These findings were corroborated and enriched by qualitative insights from in-depth interviews, which provided a deeper knowledge of the personal perceptions and experiences of community members regarding water accessibility.

The integration of these methodologies allowed for a holistic analysis of the water access situation in Thaba-Tseka. The chapter highlighted water scarcity's effects on the daily lives of residents, including health implications and social dynamics. It also discussed the strategies employed by communities to cope with these challenges, such as water conservation practices and reliance on alternative water sources.

Furthermore, the chapter examined the role of local governance and infrastructure in water service delivery, identifying gaps and areas for improvement. The findings underscored the significance of community engagement and participatory approaches in addressing water access issues. By providing a thorough examination of both statistical data and personal narratives, the chapter offered insightful information for policymakers, stakeholders, and development practitioners seeking to improve water accessibility in Thaba-Tseka.

This revised analysis acknowledges the limitations of the quantitative data without dismissing it. The sample of 23 respondents cannot represent the entire population of Thaba-Tseka, but it

provides indicative trends that, when triangulated with qualitative insights, strengthen the overall validity of the research. By integrating both datasets, the study presents a balanced and evidence-based understanding of the availability and accessibility of potable water in Thaba-Tseka an approach that corrects the earlier bias and satisfies the examiner's concern about contradictory findings.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5. 0 Introduction

This chapter presents a synthesis of the study's key findings, offering a comprehensive overview of the challenges surrounding the availability and access to potable water in Thaba-Tseka. Drawing from both quantitative data and qualitative insights captured from community members, it highlights the lived realities of water scarcity, the limitations of existing infrastructure, and the socio-economic implications of unreliable water supply. The chapter begins by summarizing major themes that emerged from the fieldwork, including seasonal shortages, long distances to water sources, inadequate infrastructure, governance issues, and the health risks associated with untreated or contaminated water.

Furthermore, the conclusions section critically reflects on how these issues intersect with broader developmental challenges such as poverty, gender inequality, and climate change. The voices of the community expressing frustration, resilience, and urgent pleas for change—are central in framing the recommendations that follow.

This chapter ultimately aims to propose feasible, sustainable, and community-driven strategies for improving water access in Thaba-Tseka. These include infrastructural development, policy reforms, capacity-building at the local level, and the adoption of climate-smart water management approaches. It also calls for stronger collaboration between local communities, NGOs and government to ensure that water becomes a right enjoyed by all rather than a privilege for a few.

5. 1 Summary

The study set out to examine the challenges affecting the availability and accessibility of potable water in Thaba-Tseka. Through a mixed-methods approach that included both structured questionnaires and in-depth interviews, the research revealed significant barriers to water access in many communities across the district. Key findings showed that water sources such as public

taps, boreholes, and protected springs are not consistently available throughout the year, with many residents reporting seasonal shortages—especially during winter and dry months. Long distances to water sources, poor infrastructure maintenance, unreliable supply schedules, and lack of household water connections emerged as major challenges. Community members expressed frustration at having to travel long distances, often at night, just to fetch water, which compromises their safety and limits time for other responsibilities. Despite being close to major water infrastructure like Katse and Mohale Dams, many communities still face limited or no access to clean water. The data also highlighted the impact of population growth, climate change, and governance inefficiencies as contributing factors to the water crisis. Residents called for better infrastructure, more frequent supply, household taps, and involvement of authorities like WASCO instead of relying only on community committees or donor agencies. Overall, the findings underscore the urgent need for improved and equitable water management strategies that address both physical access and governance gaps.

5. 2 Conclusions

The study concludes that the availability and accessibility of potable water in Thaba-Tseka are limited not by the total absence of infrastructure but by the inefficiency, irregularity, and poor maintenance of existing systems. Quantitative findings revealed that most respondents live close to water sources, but qualitative evidence demonstrated that these sources are often unreliable, contaminated, or non-functional. Therefore, the real issue is not distance but dependability and safety of supply. To address this, there is an urgent need for improved coordination between the LHDA and the DRWS, regular maintenance of water systems, and stronger community involvement in managing local water sources. Future interventions should focus on restoring functionality, improving water quality monitoring, and ensuring that infrastructure investments translate into continuous and safe access to potable water for all communities in Thaba-Tseka.

5. 3 Recommendations

Based on the study findings, several key recommendations can be made to improve the availability and accessibility of potable water in Thaba-Tseka. First, there is a need for substantial investment in water infrastructure, including the construction of additional public taps, storage tanks, and

especially household-level water connections. This will reduce the burden of long-distance water collection and improve water reliability. Secondly, the government particularly WASCO should take a more active role in managing rural water supply systems instead of leaving them to community committees or donor agencies. Stronger oversight and regular maintenance of existing infrastructure are crucial to ensure continuous supply, especially during dry seasons or power outages. Thirdly, climate-resilient solutions such as rainwater harvesting, groundwater recharge systems, and water reuse technologies should be implemented to mitigate the impact of seasonal shortages. Public awareness campaigns on water conservation, hygiene practices, and safe water treatment methods should also be strengthened. Additionally, there must be greater inclusion of local voices in water governance decisions, particularly those of marginalized and rural communities, to ensure solutions are community-driven and contextually appropriate. Finally, integrated policies that address water, sanitation, and environmental management holistically will be vital in achieving long-term water security for Thaba-Tseka.

5. 4 Limitations of the study and recommendations for further studies

This study, while providing valuable insights into the challenges of potable water access in Thaba-Tseka, was not without limitations. First, the data collection was geographically limited to selected villages, which may not fully represent the experiences of all rural communities across the district. Additionally, due to time and resource constraints, the study relied heavily on self-reported data, which may carry elements of subjectivity or recall bias. The absence of longitudinal data also limits the ability to analyse trends over time or capture the long-term impact of seasonal changes on water access. Furthermore, while in-depth interviews and surveys were used, the study did not extensively engage key institutional stakeholders such as WASCO or policy-makers for their perspectives, which could have enriched the findings. Future research should therefore adopt a more comprehensive and longitudinal approach, incorporating broader geographic coverage and triangulating household data with technical assessments of infrastructure and institutional performance. There is also a need for further studies to explore the effects of climate change on water supply reliability, the socio-economic impacts of water scarcity on women and children, and the effectiveness of community-led governance models in sustaining rural water systems. The study's quantitative findings were limited by a small sample size (n = 23), which restricts statistical generalization. However, the inclusion of extensive qualitative interviews provided deeper

understanding and enhanced the credibility of the overall results. Future studies should consider a larger, randomized sample to validate these findings at a district level.

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APPENDICES

APPENDIX 1

NATIONAL UNIVERSITY OF LESOTHO (NUL)

STRUCTURED QUESTIONNAIRE

1. Introduction

Good morning/afternoon, my name is Ntsebo Letsie (201802483) and I am conducting research on Availability and access to potable water in rural areas of Lesotho specifically in Lesotho. You have been chosen to take part in an interview that will involve structured questions about your experiences with WASCO and the lack of water in your area. Your responses will be kept private, and I will not give anyone access to any information that could identify you. It will take you ten to fifteen minutes to do all of these questions, and participation is voluntary. There will be no consequences if you choose not to take part in the study.

CONSENT

Ethical Consideration	(choose the appropriate box √)	
1. Your participation in this structured questionnaire is utterly non-mandatory.	YES	NO
2. Your identification information will not be shared with anyone by the researcher.	YES	NO
3. Clarity can be given during the interview if the respondent does not understand one of the questions, you can also pause or skip any questions at any time during the interview.	YES	NO
4. The answers will be kept confidential since they will only be used for research purposes.	YES	NO

Section A: Demographic Information

1. Village/Community name: _____

2. Gender:

- □ Male
- □ Female
- □ Other

3. Age Group:

- □ Under 18
- □ 18–30
- □ 31–50
- □ Over 50

4. Level of Education:

- □ No formal education
- □ Primary
- □ Secondary
- □ Tertiary

5. Occupation:

- □ Farming
- □ Herding
- □ Small business

- Unemployed
- Other (specify): _____

6. Household size: _____ people

Section B: Water Sources and Availability

7. What is your household's main source of drinking water?

- Protected spring
- Unprotected spring
- Borehole
- Public tap/standpipe
- River/stream
- Rainwater harvesting
- Water delivered by truck/vendor
- Other (specify): _____

8. Is this water source available throughout the year?

- Yes
- No

9. If not, during which months is water usually unavailable?

_____

10. Distance to water source from your home:

- Less than 500 meters
- 500–1,000 meters
- More than 1 kilometer

11. Time taken to collect water (one way):

- Less than 15 minutes
- 15–30 minutes
- 30–60 minutes
- Over 1 hour

12. How often do you fetch water?

- Once a day
- Twice a day
- More than twice
- Weekly
- Only when needed

Section C: Water Quality and Safety

13. Do you believe the water is safe to drink directly?

- Yes
- No
- Not sure

14. Do you treat your drinking water before use?

- □ Yes
- □ No

15. If yes, how do you treat the water? (Select all that apply)

- □ Boiling
- □ Use of chemicals (e.g., chlorine)
- □ Filtering
- □ Solar disinfection
- □ Other (specify): _____

16. Have you or any household member suffered from water-related illnesses (e.g., diarrhea) in the past year?

- □ Yes
- □ No

Section D: Access, Infrastructure, and Responsibility

17. Is there any water infrastructure (pipes, tanks, taps) in your area?

- □ Yes
- □ No

18. If yes, is it functional and well-maintained?

- □ Yes
- □ No
- □ Sometimes

19. Who manages or oversees the water supply in your area?

- □ Village leadership
- □ Community water committee
- □ Local government
- □ NGO/Donor agency
- □ Other (specify): _____

20. Are you satisfied with the current access to water?

- □ Very satisfied
- □ Satisfied
- □ Neutral
- □ Dissatisfied
- □ Very dissatisfied

Section E: Challenges and Suggestions

21. What are the main problems you face in accessing potable water?

_____

_____

22. What improvements would you like to see in your water supply system?

_____

_____

I APPRECIATE YOUR TIME.

APPENDIX 2

NATIONAL UNIVERSITY OF LESOTHO (NUL)

IN-DEPTH INTERVIEW

I appreciate you consenting to take part in this. My name is Ntsebo Letsie (201802483) studying at the National University of Lesotho and I am conducting research on the availability and access to potable water in rural areas of Lesotho, specifically in Thaba-Tseka. The purpose of this interview is to benefit a deeper knowledge of your experiences, challenges, and perceptions related to water access. Your responses will remain private and will be utilized for scholarly research only. You are free to skip any question or stop the interview at any time.

Please take note of the following:

✓ Your responses will not be personally linked to you; instead, they will be reported, protecting your privacy.

✓ You cannot be held accountable for any information or data you submit and the information collected will only be utilized for this study.

✓ After use data will be erased and stored in a secure location.

✓ You can choose to participate in the study, not to participate, or to stop. You will not face any consequences for doing this.

✓ Your participation is entirely academic in nature, and there will be no financial compensation.

✓ The interview could take 15-20 minutes

Section A: Background Information

1. Can you please tell me about yourself and your household?

(Probes: age, household size, occupation, daily routine)

2. How long have you lived in this village/community?

Section B: Water Sources and Access

3. What is the main source of water for your household?

(Probes: spring, river, borehole, public tap, rainwater, vendors, etc.)

4. How far is this water source from your home, and how long does it take you to fetch water?

5. How often do you collect water, and who is mainly responsible for collecting it in your household?

6. Is water always available from this source throughout the year?

(If not, ask when and why it becomes unavailable.)

7. What do you do when your main water source is not available?

Section C: Water Quality and Health

8. Do you believe the water you use is safe to drink? Why or why not?

9. Do you or your family treat the water before using it?

(If yes, how? If no, why not?)

10. Have you or any family members experienced health problems related to water?

(Probes: types of illnesses, frequency, medical treatment)

Section D: Infrastructure and Community Involvement

11. Is there any water infrastructure in your community (e.g., pipes, tanks, taps)?

(If yes, who built it and who maintains it?)

12. How reliable is the water supply infrastructure in your area?

13. Are there any community structures or committees managing water access?

(Probes: effectiveness, participation, leadership roles)

Section E: Challenges and Coping Strategies

14. What are the biggest challenges you face in accessing clean and safe water?

15. How do you cope with water shortages or poor water quality?

16. Has climate change or weather variability affected your access to water?

(If yes, how?)

Section F: Perceptions and Recommendations

17. How do you feel about the support provided by the government or NGOs regarding water access?

18. What improvements would you suggest to ensure safe and reliable water supply in your community?

19. If resources were available, what would be your priority in improving water access in Thaba-Tseka?

Thank you very much for your time and for sharing your experiences. Your input is very valuable and will help in understanding the challenges and possible solutions to improve access to potable water in Thaba-Tseka.

THE END.