



Exploring community experiences and perceptions of water security in South Africa: a qualitative investigation

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Abstract

Water security remains a significant challenge in the Bojanala District, North West Province, South Africa, where inconsistent access to reliable and clean water impacts community well-being and socio-economic development. Guided by the Social Ecological Model, the article aims to explore local community experiences and perceptions of water security. Employing a qualitative research design, data were collected through purposively selected Focus Group Discussions and Key Informant Interviews and were analyzed thematically with Atlas.ti. Thematic analysis revealed five core challenges: inadequate infrastructure, poor water quality, weak governance, inequitable access, and gendered burdens of water collection, all of which severely impact health and hinder economic development. Findings highlight the disconnect between community realities and institutional responses. The article advocates for inclusive, participatory governance, integration of local knowledge, inclusive decision-making, and gender-responsive policies. It concludes that achieving equitable and sustainable water security in South Africa requires targeted infrastructure investment and stronger governance frameworks.

Keywords: Community Perceptions; Water Governance; Water Security; Water Quality; South Africa

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1. Introduction

Water security in South Africa remains a critical issue, particularly in rural and peri-urban areas, such as the Bojanala District in the North West Province, where communities struggle to access reliable, clean water. The district, which is home to a diverse population, encompasses both rural and peri-urban areas, characterized by significant socio-economic disparities. In some municipalities, such as Moretele, only 21.1% of households have access to piped water inside their dwelling or yard, while other areas, like Rustenburg, fare better with 53% coverage (Department of Water and Sanitation, 2020). The disparities highlight the regional variations in water access, which have significant implications for public health and economic development. Given the diverse socio-economic conditions of the district, water insecurity is perceived differently across these communities. In rural areas, for instance, water access is often unreliable, and many people use unsafe sources (Mokone, 2023). In contrast, although peri-urban areas are closer to urban infrastructure, they still face issues related to water quality and management. The differing perceptions of water security in the district are shaped by local factors, including income, gender roles, and agricultural dependence (Kosovac et al., 2023). In addition, despite the National Water Act (NWA) (1998) and the National Water Resource Strategy (DWA, 2013), both emphasizing equitable and sustainable management of water resources, the challenges faced by communities in the Bojanala District reveal a persistent gap between these policies and the lived experiences of the population.

Water security in South Africa, particularly in the Bojanala District of the North West Province, remains a pressing challenge, characterized by inconsistent access to reliable water and ongoing issues with water quality and governance. While much of the discourse has focused on technical solutions, a significant gap remains in understanding how local communities perceive and experience water security. The gap in understanding community perspectives on water security limits policymakers' and water authorities' ability to design contextually relevant and effective interventions. Therefore, this article aims to address these gaps by exploring how community members experience and perceive their role in water security, as well as how local knowledge can inform sustainable and participatory water governance. By providing insights into how community members experience and perceive water security, the article offers valuable information that can inform the development of targeted, context-specific water management policies.

The article is guided by the Social Ecological Model (SEM), which emphasizes the importance of examining the interactions between individual behaviors, community norms, and institutional structures (Bronfenbrenner, 1989). The SEM helps contextualize the water security challenges in Bojanala by looking at how local knowledge, governance, and community practices contribute to the broader issue of water insecurity. Through this lens, the article aims to explore the unique perspectives of community members, uncovering the variations in their experiences and perceptions of water access, quality, and governance. This approach provides insights into how water security issues are framed at the community level and how such perspectives can inform more inclusive and effective water management strategies.

The article is organised as follows; after the current introduction, follows the conceptual and theoretical issues, materials and methods, findings and discussions, and conclusion and recommendations.

2. Conceptual and theoretical issues

2.1. Water security: a conceptual framework

Water security is a multidimensional concept that encompasses the availability of water, its quality, and the conditions under which it is accessed and managed (Gain et al., 2016; UN-Water, 2013). The Community-Based Water Security Improvement Planning (CWSIP) initiative defines water security as the ability for a

village to safeguard the sustainable availability of, access to, and use of a safe, reliable, and resilient quantity and quality of water for the health and well-being of everyone in the village (Water Centre, 2023). In this study, water security is conceptualized primarily at the household and community levels, with emphasis on reliable access to sufficient water of acceptable quality for everyday domestic use. At the household level, the focus is on domestic use, such as drinking, cooking, bathing, washing and sanitation. At the community level, attention is given to the shared infrastructure and resources that enable water distribution and management for broader communal purposes. These dimensions—access, availability, and quality—constitute the central analytical focus of the study and guide the interpretation of the empirical findings.

The integration of water security into the SDGs (United Nations, 2015) indicates that, besides supply challenges, water management also demands addressing the challenges of meeting the growing human need for water while ensuring sustenance for both ecological and economic requirements. In a water-scarce country like South Africa, this challenge becomes particularly critical, as the country is expected to have a growing population, combined with strong industrialization and agricultural activities that significantly strain its already limited water resources (Mutamba, 2019). Governance, infrastructure, and resource management reforms that ensure equitable access to water, improve water use efficiency, and control pollution are necessary for achieving SDG 6 (Enqvist and Ziervogel, 2019). South African water policies provide a framework for addressing these issues. For instance, policies outlined in the National Water Security Framework (NWSF) align with the SDGs by emphasizing integrated water management to meet human development needs and environmental sustainability requirements (Nepfumbada and Seetal, 2020).

While water security is often discussed alongside governance capacity, infrastructure performance, and institutional effectiveness, this article treats these dimensions as contextual and enabling dimensions rather than as alternative definitions of water security. Governance refers to the regulatory systems and institutional mechanisms that shape water distribution and service delivery (Sershen et al., 2016). Therefore, in this article, water security is empirically defined as the consistent and reliable access to adequate and safe water supplies. Enabling factors, such as governance, infrastructure, and institutions, are considered in terms of their effect on achieving this access. In the South African context, the National Water Security Framework (NWSF) outlines a multi-level governance approach in which national, regional, and local actors play essential roles in enabling access to clean, potable water (Nepfumbada and Seetal, 2020). Through this system, the article considers how these enabling factors, both directly and indirectly, affect households' ability to secure water.

Nevertheless, difficulties such as corruption, limited institutional capacity, and deteriorating infrastructure continue to constrain effective water management (Mutamba, 2019). For instance, a 2018 report from the South African Department of Water and Sanitation found that approximately 37% of municipal water systems nationwide experienced losses due to leaks and illegal connections, exacerbating water scarcity. Data from the same report indicated that localities with stronger regulatory structures demonstrated more efficient water distribution, pointing to the key role of well-maintained infrastructure management. As a result, these governance and infrastructural conditions are examined insofar as they influence household and community experiences of water access and quality, rather than as standalone measures of water security. This differentiation supports the maintenance of conceptual uniformity while recognising the importance of socio-economic and political conditions in forming water security outcomes, including links concerning broader development goals such as food availability and economic growth (Marcatelli and Büscher, 2019; Sershen et al., 2016).

2.2. Community perception of water security in South Africa: challenges and opportunities

South Africa's water access is uneven, with rural areas facing far greater challenges than cities. Tshona et al. (2025) report that 19% of the rural population lacks a dependable water source and 33% lacks basic

sanitation services. In areas where secure sources of water are lacking, some media and industry sources describe reliance on untreated groundwater and associated health risks (NuWater Solutions, 2023). Media reporting has described situations such as Hammanskraal on the outskirts of Pretoria, where weak water infrastructure is linked with long waits for water deliveries and public frustration (AP News, 2024). The lack of reliable water sources not only poses a danger to public health but also limits economic opportunities, especially in farming, where sustainable access to water is always needed. Some industry reporting frames unreliable water supplies as a threat to health and local economic activity, particularly in farming communities that rely on stable supplies (NuWater Solutions, 2023). This ongoing water crisis traps many rural communities in poverty, as poor infrastructure hinders development and the use of safe water, which in turn causes illness, lowers work productivity, and raises healthcare costs.

Water quality is another significant issue. Many communities drink contaminated, salty water unfit for human consumption unless treated (Monyai et al., 2022; Odiyo and Makungo, 2012). This is widely perceived nationwide, especially in rural areas where water sources are usually shared with animals. The problem does not just exist in rural settings; it also manifests in urban areas, where poor solid waste management and inadequate water treatment systems have led to widespread dissatisfaction with government services (Kosovac et al., 2023). In cities like Cape Town, water sources, including reservoirs and groundwater, are often polluted due to poor waste disposal, illegal dumping, and sewage leaks (City of Cape Town, 2018). The contamination frequently causes outbreaks of waterborne diseases. The long-held view that water is dirty and unsafe highlights larger, more deeply rooted systemic governance failures in water management, where even well-established infrastructure systems are either outdated or poorly maintained. The constant failure to address water contamination continues to harm vulnerable populations, particularly children and the elderly, who are more susceptible to illnesses from contaminated water (Abaasa et al., 2023). Unsafe drinking water and inadequate sanitation remain major contributors to waterborne diseases, particularly affecting young children in low- and middle-income settings (World Health Organization, 2021). In practice, water governance falls short of the requirements of the National Water Act 1998, as infrastructure remains antiquated and insufficiently maintained.

Water security challenges continue to marginalize local communities in decision-making processes around water management (Kosovac et al., 2023). However, this does not negate the fact that community-driven solutions can strengthen government initiatives toward sustainable resource management. For instance, within the Lower Olifants River catchment, collaborative water management strategies between authorities and local farmers have led to increased efficiencies in water usage and resource allocation (Pollard et al., 2023). Local knowledge about natural resource management is essential in such initiatives, but larger issues, such as inadequate infrastructure, weak governance structures, and inconsistent policy implementation, often block it. Over 60% of wastewater treatment plants in South Africa are in poor disrepair, which can seriously compromise water security (Department of Water and Sanitation, 2020). Post-apartheid reforms have not adequately mainstreamed Indigenous knowledge systems into water governance structures, limiting the effectiveness of community-driven solutions (Ngema et al., 2024). Without sufficient government support and infrastructure investment, the potential of these solutions remains untapped, hindering local communities from effectively and sustainably managing their water resources.

Additionally, the role of gender in water supply and management is crucial and should not be overlooked. In many rural areas, it is mainly women and girls who bear the responsibility of fetching water, which not only affects their time and energy but also hinders their participation in educational activities or income-generating tasks (Ngema et al., 2024). For example, fetching water from rivers and wells can account for up to one-third of a woman's time. Additionally, they are exposed to health hazards such as diseases contracted through waterborne pathogens and physical strain due to carrying heavy loads over long distances (Department of Water and Sanitation, 2020). Water collection is a gendered activity that intersects with other forms of inequality. For example, in the context of economic inequality, water collection exacerbates

the situation in historically marginalized Black communities because, in addition to the already constrained infrastructure and resource capacity, women's economic participation is further constrained (Department of Water and Sanitation, 2020; Ngema et al., 2024). The effects of apartheid, combined with ongoing patriarchal cultural norms, still create unequal access to resources between genders. Such inequality limits women's chances for economic growth, education, health, and overall social advancement (Human Sciences Research Council, 2023). For policies to effectively address water security, they must be gender-responsive—that is, they must ensure that the needs and roles of women and girls are integral components of water management strategies. When women are empowered through better access to water, their health outcomes improve, they attain more education, and their economic engagement increases. In short, development and well-being improve for rural communities (United Nations, 2022).

2.3. Theoretical framework

The theoretical Social Ecological Model (SEM) guides the study. The SEM was developed in the 1970s by Urie Bronfenbrenner to explain how the behaviors of individuals are shaped by interactions at different levels of their environment, ranging from immediate social settings (such as family and peer groups) to broader societal and policy contexts. The SEM emphasizes that behavior cannot be understood in isolation but must be viewed in relation to the various environmental systems that influence an individual. As a result, this theory applies very appropriately to complex issues, such as water security, because actions on use, access, and conservation are either promoted or limited by various levels of influence, ranging from individual knowledge to community norms and broader policies (Falkenmark, 2020). Notably, SEM has been applied in water security studies to understand how local knowledge, community norms, governance structures, and policy frameworks shape access to water and sustainable water practices. For example, Bohensky (2006) applied the SEM to water management in South Africa, highlighting how involving communities and using participatory governance helps sustain water resources.

On the other hand, Falkenmark (2020) argue that building water supply infrastructure alone does not guarantee water security; instead, it requires integrated aspects involving various levels of influence, from individual conservation to institutional governance and policy-making. This application is significant for the Bojanala District, where poor infrastructure, governance issues, and inconsistent supply exacerbate water insecurity. In this context, the SEM facilitates an understanding of how local communities' water behaviors are shaped by interactions across multiple levels—from individual practices to national policy.

Compared to other frameworks, such as the Social-Ecological Systems (SES) framework, the SEM focuses more on individual behaviour and local interactions. In contrast, the SES framework adopts a broader perspective, emphasizing the intricate relationships between human and ecological systems (Ostrom, 2009). Both frameworks are useful for studying water security. For instance, the SES framework frequently emphasizes the dynamics between ecosystems and communities on a global scale. At the same time, the SEM focuses more on the local, everyday practices that contribute to or hinder water security at the community level. Put differently, the SEM's focus on individual, community, and institutional layers provides a holistic perspective. This multi-level perspective is especially valuable for understanding water security in the Bojanala District.

The Social-Ecological Model (SEM) is directly applicable to understanding water security challenges in the Bojanala District of South Africa. Factors in the district that complicate water security extend through a complex web spanning multiple levels of SEM (Mokone and Gumede, 2024). At the individual level, personal knowledge and attitudes are essential for sustainable water practices. However, individual behaviors are primarily influenced by interactions within the family, such as discussions on how to conserve water or social networks promoting water-efficient behaviors. Norms and practices related to water management at the community level are essential, especially in rural settings where managing water resources is a

community affair with minimal external assistance. The organizational level comes into play with local authorities and water management institutions enacting policies that either foster or hinder sustainable water use. Ultimately, the policy level influences water access through national water policies and regulations that govern the allocation and management of water nationwide. Each level interacts with and affects the others, highlighting the need for unified, multi-level approaches to water safety (Falkenmark, 2020; García-Díaz and Olaya, 2018). The SEM as depicted in *figure 1* is beneficial in this respect because it illustrates how these different layers interact to achieve water security outcomes within the Bojanala District. Ultimately, the SEM highlights the necessity for interventions that simultaneously target multiple levels and promote water access and conservation awareness at the household level (Bazaanah and Mothapo, 2024; Gittins et al., 2021). *Figure 1* presents the Social Ecological Model.

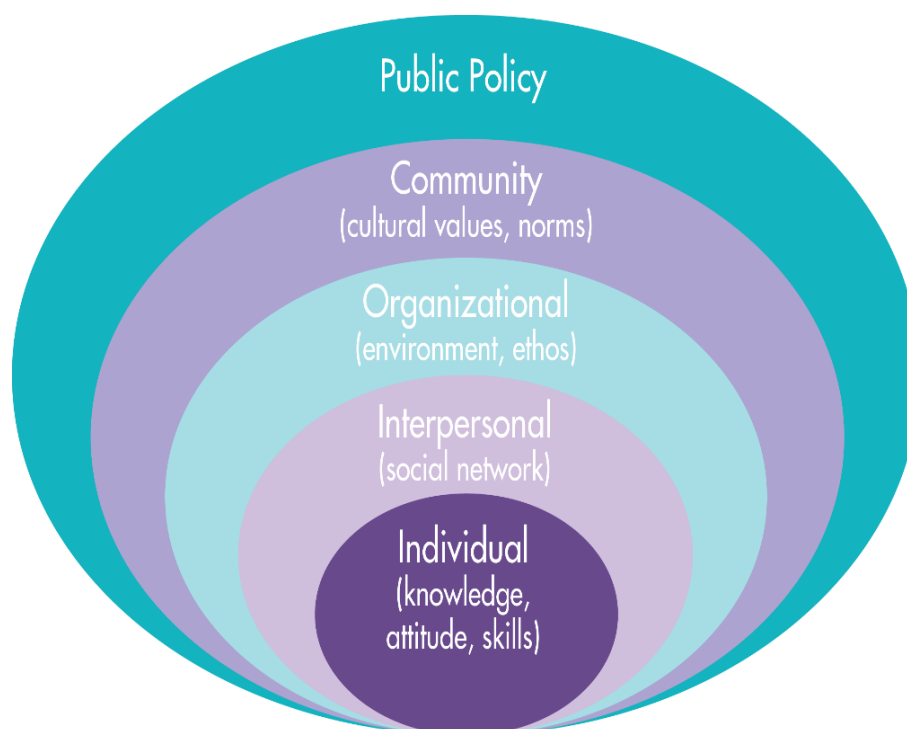


Figure 1. The Social Ecological Model (SEM) (Source: Bronfenbrenner, 1989)

3. Materials and methods

A qualitative research design was used to investigate community experiences and perceptions regarding water security in Bojanala District, South Africa. Qualitative research enables the collection of in-depth information on individuals' experiences, beliefs, and perceptions, providing valuable insights into complex and contextual issues such as water security (Baxter and Jack, 2008; Creswell and Poth, 2018). In addition, qualitative methods enable investigators to access local knowledge and community-based solutions that can inform policies and programs of intervention in water management (Flick, 2018).

3.1. Study area

The article focuses on the communities within the Bojanala District, located in the North West Province of South Africa, at approximately 25.6628° S latitude and 27.2525° E longitude (Statistics South Africa, 2013).

The district comprises five local municipalities: Rustenburg, Madibeng, Moretele, Moses Kotane, and Kgetleng Rivier Local Municipality as shown in *figure 2*. The communities in these areas are diverse, encompassing both rural and peri-urban populations. These include agricultural households in rural areas, as well as urban and peri-urban residents in municipalities like Rustenburg and Madibeng. These communities face significant inequalities in water access, with varying levels of infrastructure and service provision. For instance, only 21.1% of households in Moretele have access to piped water inside their dwelling or yard; it is 53.0% in Rustenburg (Department of Water and Sanitation, 2020). Similarly, Madibeng, Moses Kotane, and Kgetleng Rivier experience varying levels of water access, with some communities facing unreliable supply and poor water quality. These differences highlight the importance of understanding how people in the district experience and perceive water availability, reliability, and quality in relation to water security. This study area was chosen due to its ongoing issues with water scarcity, inadequate and dilapidated infrastructure, water quality concerns, governance challenges, and the social and economic impacts of limited access to water.

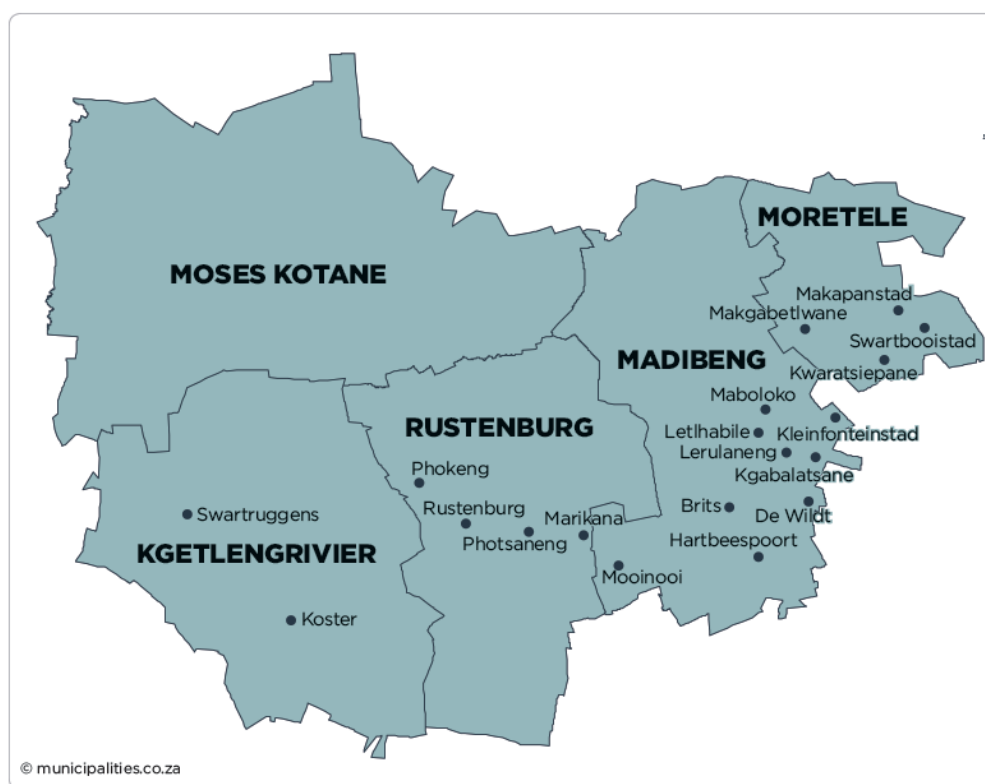


Figure 2. Map showing the study area (Source: Statistics South Africa, 2013)

3.2. Data collection methods

3.2.1. Focus group discussions (FGDs)

FGDs are widely used in qualitative research to explore group norms and shared experiences and perceptions (Krueger and Casey, 2014).

Data collection was undertaken across all five local municipalities in the Bojanala District: Rustenburg, Madibeng, Moretele, Moses Kotane, and Kgetleng Rivier. A total of 14 FGDs were carried out, with between

two and three FGDs conducted in each municipality. The number of FGDs in each area was determined based on factors such as population size, diversity metrics, and settlement characteristics (rural or peri-urban). Larger settlements or those with diverse characteristics required more groups to ensure adequate representation. Each FGD consisted of 8-12 participants. The sample sizes were deemed appropriate to capture a wide range of perspectives and experiences regarding water security in the District. Equally, given the diversity of the District, the sample size was sufficient for adequate representation. The FGD discussions were facilitated by the lead researcher, who has prior training and experience in qualitative data collection. The discussions were conducted in English with occasional use of Setswana where participants preferred. The researcher is fluent in both languages. Audio recordings were transcribed in English. Transcripts and translations were checked repeatedly against the recordings to ensure accuracy. Meanings were clarified to retain participants' original intent. The selection of participants was based on purposive sampling to capture variation in age, gender, livelihood, and geographic location. This method was employed because it allows for in-depth exploration of how specific groups perceive and experience water security, ensuring that those most affected by the issue were represented (Palinkas et al., 2015). Participants were identified through local community leaders (councillors, traditional leaders, religious leaders, civic associations, and activists) and community-based organizations in general. However, to reduce the risk of hand-picked participants, clear inclusion criteria were applied. The participant demographic included a balanced representation of male and female members, with an age range from 18 to 65 years. This approach was designed to capture a wide range of experiences and perceptions of water security, reflecting the varying challenges faced by different communities in the District. Diverse community members were represented, including agricultural households, peri-urban residents, and urban dwellers, as water security challenges often differ across the region. FGDs were held in public community spaces, and leaders were not present during discussions. This approach is consistent with qualitative best practices for minimizing gatekeeper bias in community-based settings (Palinkas et al., 2015; Krueger and Casey, 2014).

Data collection was concluded in early 2022. Each FGD lasted between 45 and 90 minutes, a duration deemed adequate to collect in-depth information from the respondents without making them unduly tired, which may affect the quality of data (Patton, 2002). Consent forms were sought from the respondents. This was to ensure that they fully understood their role in the study, its purpose, and how their information would be used. Semi-structured interview guides were used to allow flexibility and depth, ensuring key themes related to access, quality, governance, and community coping strategies were explored. The interview guide is attached as appendix A. The questions were designed to facilitate discussion and provide insights into the lived experiences of the participants.

Because FGDs were held across all five local municipalities, a simple within-district comparison was conducted during analysis. After coding, the lead investigator reviewed whether each theme appeared consistently throughout municipalities and whether some issues were emphasised more strongly in particular settings. This was used to highlight meaningful variation where it was repeatedly reported, without treating the study as a ranked or fully comparative municipal assessment.

3.2.2. Key informant interviews

Fourteen (14) key informants were selected using a criterion, ensuring that participants had significant expertise in water governance and management within the Bojanala District. Criterion sampling was used to focus on individuals who held key positions or had extensive experience in water-related issues, as this ensures the inclusion of relevant expert knowledge (Edmonds and Kennedy, 2017). The Key informants comprised officials from provincial and local governments, water management authorities, and representatives of state-owned enterprises. They were conducted to complement the FGDs and provide expert insights into water governance and policy response. Moreover, they provided specialized knowledge

that is not easily accessible from the perspective of community members alone. Notably, they were selected based on their professional expertise and involvement in water management, as this enables a more in-depth understanding of both technical and policy aspects.

Data collection for the KIIs was also completed in early 2022. On average, the interviews lasted between 45 and 60 minutes, with semi-structured questions focused on water access, quality, governance, and policy. This approach allowed key informants to elaborate on their expertise and provide valuable contextual information about institutional and governance issues that affected water security in the district. The data gathering process continued until the saturation point was reached. Data saturation was assessed during the data collection process for both FGDs and KIIs. For the FGDs, saturation was reached when discussions across groups began to yield similar responses and no new themes emerged. In the case of KIIs, saturation was judged when interviews with officials and experts yielded repetitive information, and no additional insights emerged. At this point, saturation ensured that the collected data were comprehensive and that no new information was emerging, signaling that further data collection would not add value (Given and Saumure, 2008; Guest et al., 2006; Saunders et al., 2018).

3.3. Data analysis

Data were analysed inductively using the thematic analysis procedures described by Braun and Clarke (2006). Initial coding proceeded without predefined categories, enabling themes to emerge directly from participants' experiences. Once final themes were established, they were mapped onto the Social Ecological Model (SEM) to facilitate interpretation and organisation of findings across individual, community, institutional, and policy levels (Henderson and Baffour, 2015). The SEM functioned as an interpretive framework rather than a coding guide and did not influence the initial inductive analysis.

For easier analysis, data were transcribed and imported into Atlas.ti, which is among several popular software programs used for qualitative data analysis. Initially, the data were transcribed and reviewed multiple times to ensure familiarity with the content. Systematic coding was then conducted using Atlas.ti focusing on key themes such as water access, availability, and governance. These codes were grouped into broader themes that reflected common issues, such as community concerns and policy gaps, before being interpreted in relation to the research questions, the local context, and existing literature. This process enabled a rigorous and nuanced understanding of water security challenges in the Bojanala District, with the flexibility to adapt to emergent themes from the data (Bazeley, 2013; Friese, 2019). The presentable analysis process is shown in *Table 1*. All participant quotes were anonymised to ensure confidentiality, and any potentially identifying information was removed. Moreover, quotes were coded to safeguard confidentiality, meaning, and inflection of participants' responses. Sensitive statements were included only when directly pertinent to the research objectives. Quotes were minimally edited for clarity. No substantive alterations were made to participants' intended messages, consistent with established qualitative reporting standards (Braun and Clarke, 2006; Kvale and Brinkmann, 2009).

Quotation labels such as *[FGD 1]* or *[FGD 5]* refer to specific focus group discussions and are used solely to distinguish data sources while protecting participant anonymity. Each FGD represents a separate group conducted in a different community within the Bojanala District, including both rural and peri-urban settings. Key Informant Interviews are labelled as *[KII]* followed by a number to differentiate institutional respondents. The labels show the breadth of data sources across the study sites.

To convey the spread of findings without reducing the analysis to numerical counts, the findings show how widely themes appeared across the dataset using descriptive terms. For instance, themes are described as emerging across "most FGDs," "several rural and peri-urban groups," or "across the municipalities and institutional interviews." This method embodies common qualitative reporting practices that emphasize

pattern recognition and analytic depth rather than frequency alone (Braun and Clarke, 2006). *Table 1* present the steps involved in thematic analysis process.

Table 1. Steps involved in thematic analysis process

Steps	Description
Familiarization	Transcribing and reading through the data multiple times to become deeply familiar with the content.
Coding	Systematically coding the data based on key themes such as water access, infrastructure, and governance.
Theme Development	Grouping the codes into broader themes that reflect common issues, such as community concerns and policy.
Interpretation	Interpreting the identified themes in relation to the research questions, local context, and existing literature (Clarke and Braun, 2017).

Trustworthiness was improved by using approaches commonly recommended in qualitative research (Lincoln and Guba, 1985). Data triangulation involved systematically comparing results from FGDs and KIIs to see where community and institutional perspectives matched or differed. Peer debriefing consisted of regular meetings with experienced qualitative researchers. They reviewed the coding process and emerging themes weekly. During these sessions, we examined the application of codes in transcripts and clarified theme definitions to ensure consistency and minimize bias in our interpretations. Credibility was enhanced by remaining involved with the data and by reviewing transcripts multiple times during analysis, which helped identify and clarify any ambiguities in participant responses. The researcher practiced reflexivity by realizing their role as the primary data collector and analyst and by staying aware of how their background and familiarity with the context could affect interpretation. This involved keeping a reflective journal detailing the researcher's thoughts and feelings, which were regularly discussed during peer debriefing sessions to mitigate potential biases.

Ethical approval for this study was obtained from the University of South Africa College of Human Science Ethics Committee (*reference number 37346423_CRE_CHS_2021*). The study was conducted in accordance with the University's Research Ethics standards and guidelines. Before participation, all focus group and key informants were provided with informed consent to ensure that they understood the study's purpose and their rights regarding confidentiality and voluntary participation. Ethical considerations also included maintaining participant anonymity and confidentiality in data handling. Overall, ethical guidelines were adhered to in order to protect the rights and welfare of participants.

4. Findings and discussions

This section presents the main themes emerged from data collected through Focus Group Discussions (FGDs) and Key Informant Interviews (KIIs) in the Bojanala District. The empirical claims in this section are limited to what participants and key informants described in this setting. *Table 2* provides a descriptive summary of the key informants, and *Table 3* presents a summary of the key themes identified from the FGDs and KIIs

Table 2. Descriptive Summary of Key Informants

Respondent No	Age	Gender	Qualifications	Years of Experience	Position
1	38	Male	B-Tech Civil Engineering	12	Acting Director
2	42	Male	B-Tech Civil Engineering	18	Acting Director
3	38	Male	Diploma Civil Engineering	15	Acting PMU Manager
4	38	Male	B-Tech Civil Engineering	15	Director
5	38	Male	Diploma Civil Engineering	12	PMU Manager
6	37	Male	Masters Civil Engineering	17	General Manager (Acting)
7	59	Male	MSc & MBA	32	General Manager (Acting)
8	39	Male	Masters in Science	19	Director
9	61	Male	Honours Education	34	Deputy Director
10	50	Male	MBA	21	Director
11	45	Female	MSc	16	Assistant Director
12	39	Female	MBA	14	Assistant Director
13	58	Male	MBA & B-Tech Agric	16	Assistant Director
14	61	Male	BA Agric	24	Assistant Director

4.1. Theme 1: Water access challenges (individual and community levels)

A pressing concern that emerged across nearly all FGDs both rural and peri urban communities was the difficulty of accessing water. At the individual level, residents described daily struggles marked by long travel distances, queuing, irregular supply, and inequitable distribution of resources.

“Residents travel long distances and stand in queues to fetch water” [FGD 1- rural], while others, such as FGD 4 [peri-urban], emphasized that: “we only get water twice a week, and sometimes not at all. At the community level, inequitable distribution patterns and prioritization of industrial users exacerbate shortages, as highlighted by KIIs. For instance, KII 5 reported, “the bulk of the water is directed to the mines, leaving the households with serious shortages,” and KII 1 highlighted that “boreholes are drying up due to dropping groundwater levels.”

The participants’ accounts suggest that water scarcity in Bojanala is experienced not only as a logistical challenge (distance, queues, irregular supply) but also as a matter of fairness and responsiveness in local service delivery. The experiences described by participants are consistent with observations reported by Du Plessis (2019) and Tshona et al. (2025) who show that infrastructural inadequacies, population pressure, and prioritizing industrial development systematically push rural households aside when accessing reliable water sources.

4.2. Theme 2: Water quality concerns (individual, community, and institutional level)

At the individual level, dissatisfaction with water quality was raised in most FGDs across rural and peri-urban settings. Participants frequently described the water as discoloured, odorous, and health-compromising. One participant explained:

“The water is often reddish or brownish, smelly, and causes diarrhea” [FGD 1-rural], while another participant noted, “The water is salty and makes us vomit” [FGD 5-rural].

At the community level, shared reliance on contaminated sources increases collective health risks. These experiences were reinforced at the institutional level, where key informants across the district reveals systemic causes. For instance, one official stated that:

“sewage spillage transcending to the river and pit latrines contaminate groundwater” [KII 4], while another added that: “Asbestos pipes are degrading the water quality” [KII 9]

Taken together, the Bojanala accounts illustrate how local behaviors, community reliance on shared sources interact with institutional failures to increase concerns about safety and trust in water services. Similar linkages between infrastructure decline, contamination risks, and coping responses are discussed by Kosovac et al. (2023), and are cited for contextual support.

4.3. Theme 3: Infrastructure and maintenance issues (community and institutional levels)

Beyond access and quality, the participants and key informants repeatedly pointed to ageing and poorly maintained infrastructure as a major driver of supply interruptions in Bojanala. The issue was raised across most FGDs and echoed in several KIIS from local municipalities within the district. At the community level, participants from FGDs described leaking pipes, damaged components, and long delays before repairs were made. Participants' descriptions suggest that repair delays and maintenance responsiveness were not experienced homogeneously across the district. Several KIIs also pointed to operational constraints, namely limited storage, slow procurement processes, and maintenance backlogs that officials said made on-time repairs difficult. One participant noted:

“Water infrastructure is old and leaking... some components are stolen” [FGD 1-rural]. Similar frustrations were expressed in peri-urban settings, with another participant explaining that “Sometimes, we have taps but no water comes out at all” [FGD 6- peri-urban]

At the institutional level, KIIs linked such community experiences to structural capacity constraints within the district. For instance, some KIIs pointed to lack of storage facilities, maintenance capacity, and poor planning. For instance, KII 4 opined that:

“The municipality does not have a dedicated warehouse for storing tools, spare parts, and materials required to respond to infrastructure breakdowns.” Similarly, KII 9 reported that:

“80% of old asbestos water pipes must be replaced due to frequent leaks.”

Viewed through the SEM, the Bojanala data suggest that community-level service failures are closely tied to institutional shortcomings in infrastructure management. Participants and key informants described ageing infrastructure, limited funding, and slow repairs as drivers of interruptions and uneven access within the district. Bazaanah and Mothapo (2024) and Mokone and Gumede (2025) also report maintenance

backlogs and infrastructure deterioration; however, these are cited only to situate the Bojanala findings within broader literature, not to substantiate any claim of national representativeness.

4.4. Theme 4: Governance and accountability (institutional and policy levels)

A critical and recurring theme was the perception of poor governance and lack of institutional oversight. This was raised in several FGDs across communities and reinforced by KIIs conducted at the municipal and provincial levels, drawing attention to a persistent governance gap. For instance, most participants described weak accountability and slow response times, and some alleged favouritism and corruption in how services were prioritized. KIIs also referred to institutional constraints (including purchasing procedures and staffing), which officials said contributed to delays. These governance concerns varied throughout municipalities: in some FGDs, the emphasis was on responsiveness and communication, while in others, it was on perceived fairness in service prioritisation. One participant explained:

“The government is fully aware of the poor governance issue... yet nothing has been done until such a time that communities start to protest.” Worse, political connections determine who gets water. For instance, some comrades have their water delivered to their homes through water tankering, while others of us wait for water at the designated water point all day [FGD 3 – rural].

At the institutional and policy level, KIIs acknowledged systemic constraints within governance systems, especially related to slow procurement and the absence of effective water policies. The issue was raised across multiple KIIs, with officials stating that:

“The supply chain process takes too long to process purchase orders... even urgent tools cannot be procured quickly. The delays from the supply chain have an impact on addressing service delivery issues” [KII 3], and that “there is no functional or active water policy in place” [KII 8].

Across the Bojanala dataset, participants and officials often explained the same service problems in different ways. This divergence between community interpretations and institutional explanations illustrates a significant governance gap. Many participants interpreted delays and uneven supply as a sign that institutions were not responding or not being held to account, and some described what they saw as neglect, favouritism, and corruption. Officials, in contrast, most often pointed to procedural delays and capacity shortages as the reasons for the inaction. From the SEM perspective, these findings highlight the cascading effect from policy gaps to institutional dysfunction, ultimately leading to household-level water insecurity. The researcher presents this as an interpretation grounded in the Bojanala material and draws on the governance literature only to frame the discussion (Marcatelli and Büscher, 2019; García-Díaz and Olaya, 2018).

4.5. Theme 5: Gendered roles and community burden (individual and community levels)

Gendered burdens related to water collection were raised in several FGDs, particularly in rural communities, where women and girls bear the greatest burden of water collection for household use. At the individual level, participants described carrying heavy containers over long distances and managing caregiving responsibilities, which affects their health and socio-economic opportunities. One participant expounded:

“We travel far for water, carry heavy containers... it affects our health. Also, caring for the elderly or chronically ill without water amplifies physical and emotional stress” [FGD 1 – rural].

In contrast, gender-related concerns were absent from KIIs, even though they were consistently raised in the FGDs. This absence is notable as Ngema et al. (2024) show that water-related burdens limit women's participation in education and economic life. Viewed through the SEM, the failure to explicitly recognize this within institutional discourse indicates a missed opportunity for gender-sensitive intervention.

4.6. Theme 6: Community coping mechanisms (individual and community levels)

Community coping strategies were described in many FGDs across both rural and peri-urban settings, reflecting how households adapt to persistent water shortages. At the individual level, participants explained that they rely on boiling water, harvesting rainwater, purchasing water from neighbours with boreholes. Also they walk to nearby villages when water tanker services fail. As participants explained:

"We boil the water... rely on rainwater... and buy water from neighbours with boreholes" [FGD 2 – rural], while others added that "when there is no water tanker, we walk to other nearby villages for water" [FGD 3 - rural].

Although these tactics demonstrate resilience and adaptability, they also point to the normalization of scarcity. At the community level, shared coping mechanisms indicate adaptive social norms rather than temporary responses. However, insights from institutional respondent's caution that these strategies remain unsustainable and fail to address systemic causes of water insecurity in the district. One key informant noted that:

"These strategies are temporary and unhealthy... they do not address the root causes" [KII 2].

Viewed through the SEM, the Bojanala findings highlight that household-level coping practices, community dynamics, institutional performance, and policy arrangements interact in ways that shape day-to-day water insecurity. Put differently, participants described coping methods as essential for daily life, while key informants cautioned that these practices do not resolve the underlying service and governance problems that produce recurring shortages. This supports a simple interpretation: household-level resilience can lessen immediate harm, but it cannot substitute for reliable service delivery and accountable maintenance. Similar arguments appear in the wider water-governance literature, but they are used here only as contextual support (Enqvist and Ziervogel, 2019).

4.7. Theme 7: Policy recommendations and stakeholder engagement (institutional and policy levels)

Calls for more inclusive and participatory water governance were raised in several FGDs and consistently supported across KIIs, highlighting shared concern across community and institutional actor.

At the community level, participants emphasized the need for meaningful involvement in planning and effective accountability mechanism. One participant stated:

"Communities must participate in planning... and hold the ward councillors accountable" [FGD 1 – rural]. Equally, another participant added that "the government must involve industries and companies since they have resources to help" [FGD 7 – peri-urban].

At the institutional and policy levels, KIIs echoed these views, emphasizing that stakeholder engagement is significant for sustainable water governance. These perspectives were expressed across multi KIIs, with one official noting that:

“We are developing a water master plan... but without community engagement, it will not succeed” [KII 4]. Another emphasized the importance of collaboration beyond government, stating that:

“Engaging stakeholders like Magalies Water and the mines around the district is important” [KII 6].

These calls for participation and accountability can be read alongside the National Water Security Framework’s emphasis on inclusive governance (Nepfumbada and Seetal, 2020; Falkenmark, 2020). The framework is referenced to situate the Bojanala recommendations within existing policy principles; the data do not evaluate national implementation. In SEM terms, the Bojanala evidence points to the need for unified action across individual, community, institutional, and policy levels rather than separate technical interventions.

Table 3. Summary of the key themes identified from the FGDs and KIIs

	Theme	Summary of Findings	Key References	Data Source	SEM Level	Policy Implication
1	Water Access Challenges	Long travel distance, irregular water supply, and prioritization of industrial use over households	Du Plessis (2019); Tshona et al. (2025)	FGDs and KIIs	Individual & Community Levels	Prioritize equitable water access and rural infrastructure investment
2	Water Quality Concerns	Discoloured, smelly, and unsafe water leading to health issues; contamination from sewage and aging pipes	Kosovac et al. (2023)	FGDs and KIIs	Individual, Community & Institutional Level	Improve water treatment and monitoring systems in rural areas
3	Infrastructure and Maintenance issues	Old and leaking infrastructure, lack of maintenance, and frequent system failures due to poor planning	Bazaanah and Mothapo (2024); Mokone and Gumede (2025)	FGDs and KIIs	Community & Institutional Levels	Invest in infrastructure maintenance and replacement of aging systems
4	Governance and Accountability	Perceptions of neglect and corruption; delays in procurement and lack of clear water policies.	Marcatelli and Büscher (2019); García-Díaz and Olaya (2018)	FGDs and KIIs	Institutional / Policy	Enhance governance transparency, streamline procurement processes
5	Gendered Roles and Community Burden	Women and girls disproportionately affected by the physical and emotional burden of water collection.	Ngema et al. (2024)	Primarily FGDs	Individual & Community Levels	Develop gender-responsive water policies and reduce burden on women

	Theme	Summary of Findings	Key References	Data Source	SEM Level	Policy Implication
6	Community coping mechanisms	Communities use rainwater, boil water, or purchase from neighbors; these are unsustainable long-term.	Friese (2019); Kumar (2020)	FGDs and KIIs	Individual & Community Levels	Support sustainable, long-term community water access strategies
7	Policy Recommendations and Stakeholder Engagement	Desire for inclusive decision-making, community involvement, and multi-stakeholder collaboration.	Nepfumbada and Seetal (2020); Falkenmark (2020)	FGDs and KIIs	Institutional & Policy Levels	Promote inclusive water governance and stakeholder collaboration

4.8. Comparative perspectives and broader implications

This subsection draws on external literature to place the Bojanala themes in context; it does not present new findings. In Bojanala, communities frame the water crisis in moral and rights-based terms. In other words, the communities perceive water insecurity as a violation of human rights and as the state not caring for them. On the other hand, officials blame financial obstacles, procurement delays, and poor interdepartmental coordination. This gap highlights a substantial disconnect between lived experiences and institutional narratives. Similar gaps are discussed by Sershen et al. (2016) and Makaya et al. (2020), and are cited to compare patterns, not to claim national representativeness. Generally, findings show that water insecurity is complex in Bojanala; they reflect what the Social Ecological Model emphasized: influences at the individual, community, organizational, and policy levels.

Although the same broad themes were raised across the district, the FGDs and KIIs suggest that water insecurity is not experienced in exactly the same way in every municipality. In some settings, participants focused more on basic access and distance to collection points, while in others the discussion centred more on intermittent supply, repair delays, and trust in water quality. These differences indicate variation in local infrastructure, settlement form (rural/peri-urban), and how households depend on communal versus household connections.

The patterns are not presented as a “ranking” of municipalities. Instead, they are used to show that the district picture is composed of distinct local realities. Where a concern was repeatedly raised in a municipality’s FGDs and echoed by KIIs, it was signalled directly in the theme discussion.

5. Conclusion and recommendations

Finally, the article brings to the fore how participants and key informants in the Bojanala District of South Africa perceive water insecurity as limited and unreliable access, inadequate water quality, decaying infrastructure, and weak governance and accountability. In most cases, women bear the brunt of water collection. Participants reported coping methods such as storing water, using alternative sources, or purchasing water—that they felt were necessary, but that may also carry costs and health risks. Overall, the results underline the urgent need for targeted infrastructural developments, inclusive and gender-sensitive governance, improved water quality management, and strengthened multi-stakeholder collaboration for equitable and sustainable water security. Because this is a qualitative, perception-based study, the findings should be read as locally grounded accounts that suggest patterns and possible relationships rather than

proving causal pathways. In other words, the evidence is local: it comes from FGDs and KIIs in one district. National and global narratives are used to situate the case and to compare themes reported elsewhere, not to extend the Bojanala findings into national claims. While the article provides valuable insights into local experiences and institutional perspectives, its scope was limited to one district and specific stakeholder groups, indicating the need for broader research across diverse contexts and more in-depth exploration of gender dynamics to inform effective, context-sensitive interventions. Therefore, future research should expand to other districts or provinces facing similar water security challenges to validate and compare findings across contexts.

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Author Contributions

Neo Mokone conceptualized the study, developed the research methodology, designed the data collection instruments, and conducted the data collection process, performed data analysis, and interpreted the findings, drafting the manuscript, and managed revisions based on peer review feedback and approved the final version for publication.

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Institutional Review Board Statement

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Data Availability Statement

The data presented in this study are available on request from the corresponding author. The data are not publicly available due to privacy.

Conflicts of Interest

The author declares no conflict of interest.

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Appendix A

FGD Guide

FGD facilitator: _____

FGD site/location: _____

Start time: _____

End time: _____

Signature: _____

1. What is the current status of water security in the study area?
2. What is the quality of water consumed in the community?
3. How is the government made aware of water problems in the study area?
4. How is water shortage affecting the life of residents?
5. What are the challenges facing the residents in accessing water?
6. Which household needs are most affected by water shortages?
7. What can the government do to help (ensure water availability)?
8. How can the communities influence the government to address water shortages rapidly?
9. Why is it necessary for the government to engage other stakeholders such as industries/companies/water users in addressing water security?
10. How do the communities perceive the occurrence of water shortages?
11. What is the coping mechanism adopted by the residents in the study area?
12. How can the provision of water security be improved efficiently?
13. What is the municipality doing to enhance sustainable water security in the community?
14. Has there been any water-related assistance rendered to the study area in the past?
15. Which major factors influence water shortages in the community?

Thank you for your participation and time!

Key Informant Interview Guide

Background Information

Code of the interviewee: _____

Sex: _____

Age: _____

Educational level: _____

Office: _____

City: _____

Position: _____

Work experience: _____

1. What is the current status of water security in the district?
2. What is the current water quality provided by the institution within the district?
3. Is the institution aware of the water problems within the district? If yes, what are the problems and what are you doing about them?
4. What are the specific challenges that the government encounters in providing access to water in the study area?
5. What interventions are required to address the existing water problems?
6. How efficient is the government's process of addressing the current water shortages?
7. What future mechanisms are planned to ensure that communities have proper access to water and sanitation?
8. Is SDG 6 achievable in the study area?
9. Does the institution have specific policies on access to safe drinking water? If yes, are they achieving their objectives?
10. What is the institution doing to enhance sustainable water security in the community?
11. How can the affected communities influence the institution to address water shortages rapidly?
12. Which major factors influence water shortages within the district?

Thank you for your participation and time!