




# Thirsting for solutions: Unpacking inadequate water provision in rural communities



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**Background:** In South Africa, access to water is not equally spread across the population. As a result, 19% of those living in rural areas lack access to a dependable water source and 33% lack basic sanitation services.

**Aim:** This study aimed to identify obstacles municipalities face in delivering water services to rural communities and challenges surrounding water scarcity.

**Setting:** This study focused on the rural areas of the Amathole District Municipality in the Eastern Cape province, South Africa.

**Methods:** A qualitative research approach was employed, with a case study design and an interpretivism paradigm. The data collection process utilised semi-structured interviews and a thematic analysis to interpret the findings comprehensively.

**Results:** Findings reveal that ageing infrastructure, ineffective governance structures, limited financial resources, and uneven distribution of water resources exacerbate the problem.

**Conclusion:** Part of the recommendations is that significant investment is needed in upgrading water infrastructure, particularly in rural areas, and governance structures should be strengthened to ensure effective management and equitable distribution of water resources.

**Contribution:** Through delineating strategic recommendations, this study identified the root causes behind insufficient water provision within rural communities. This contributes to the direction of policymaking efforts and expands its impact on future researchers within the field of public administration. Moreover, to bridge the gap between ensuring adequate water provision and promoting efficient water utilisation, it makes strategic proposals for improving water management and distribution, which will affect policymaking and future public administration research.

**Keywords:** governance; infrastructure; local government; rural communities; water provision.

## Introduction

The issue of insufficient water provision remains a matter of critical concern within the African continent, including South Africa. The problem of water scarcity is important and requires quick action throughout Africa, particularly in South Africa. The nation's present constitutional framework emphasises the critical role of local governments in revitalising indigenous communities and natural environments, to foster a democratic and harmonious society. Local governance's decentralised structure gives municipal authorities the freedom to independently administer local matters by the demands of its constituents as highlighted in the study of Ramodula (2020).

Various municipalities still find it difficult to carry out their developmental duties despite improvements in local administration procedures (Munzhedzi & Phago 2020; Nel & Binns 2018). There are currently differences in infrastructure services such as roads, water, sewage and electricity in rural areas because of the historical legacy of apartheid, which promoted urban development (Todes & Turok 2018; Turok & Visagie 2018).

A key objective of a programme aimed at generating community-based evidence for policymaking and planning has been cultivating local insights into health priorities within rural communities (Hove et al. 2019). However, the rural communities of the Amathole District Municipality remain subject to inadequate water provision, making them a pertinent focal point for this study's critical examination of the principal causes behind water scarcity in these settings.

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Effective water and sanitation provision is still lacking, particularly in black townships with noticeable infrastructure deficiencies, despite the constitutional right to access clean and safe water (Section 27[1][b] of the Constitution of the Republic of South Africa 1996; South African Human Rights Commission 2018).

A history of segregation service delivery, exacerbated by inadequate financial, performance and project management, has contributed to persistent project delays and unmet targets, as highlighted by both the South African Human Rights Commission and the Auditor-General (Toxopeus 2019). The incongruity between current water supplies and escalating demand for domestic, industrial and agricultural purposes underscores South Africa's designation as a water-stressed nation.

The period spanning 2014–2019, marked by a severe drought, was declared a national catastrophe, and had far-reaching consequences, particularly within the Eastern Cape (Botai et al. 2020). Despite the significance of drought events in Southern Africa, holistic analyses incorporating biophysical, socioeconomic and historical dimensions, particularly within the context of governance, remain limited (Weber, Krogman & Antoniuk 2012).

As shown in the Monthly State of Water Bulletin (2024), as of March 2024, the national dam levels were 85.8% of full supply capacity (FSC), down from 93.2% at the same time the previous year. About 22% of dams had an FSC above 100%, 69% had an FSC between 50% and 100%, 9% had an FSC between 10% and 50%, and 1% had a critically low FSC of less than 10%. Many areas are suffering from moderate to severe drought conditions, including the Northern Cape and portions of the Eastern Cape. El Niño worsened drought conditions by bringing below-normal rainfall to most parts of the country.

Fluoride concentrations in surface water are typically low ( $\leq 0.4$  mg/L), although some regions, such as the Ga-Selati River in Limpopo and the Elands River in the Eastern Cape, have been shown to contain greater quantities. These regions' high fluoride levels are related to both natural geological features and mining activity. Water losses in municipalities have been substantial because of badly maintained infrastructure; Durban has lost 58% of its water, Johannesburg 48.2% and Gqeberha 48% (Monthly State of Water Bulletin 2024).

The infrastructure and bulk water supply problems in the Eastern Cape require about R120 billion to fix, underscoring the enormous investment needed to increase water reliability. Furthermore, because of the ongoing El Niño phenomena, the Sarah Baartman District has had a moderate to severe drought for the past 24 months, which has been made worse by below-average rainfall (Ellis & Jubase 2023).

In addressing the pressing issue of insufficient water provision in rural areas of the Eastern Cape, this research endeavours to achieve several key objectives:

- The main objective of this study is to identify challenges faced by municipalities in providing water to rural communities.
- To determine the main cause of insufficient water provision by municipalities to rural communities.
- To provide strategies and recommendations to improve sufficient water provision to rural communities.

Therefore, this article is divided into seven sections, which include the problem, literature review, methodology, ethical considerations, results, discussion of results and findings, strategies and recommendations.

## The problem

With a semi-humid environment, South Africa is home to 51 million people, 60% of whom live in cities and 40% in rural areas. Access to water is not evenly distributed, though. Seventy-four per cent of rural populations rely on groundwater, 19% do not have a dependable water source and 33% do not have access to basic sanitary services because of inadequate water infrastructure (Water Access in South Africa 2017). Many authorities lack the resources and capacity to effectively meet community needs, despite legislative and policy commitments to water rights, cooperative governance and public engagement (Hove et al. 2019; Jury 2021; Masiangoako, Khunou & Potter 2022; Takacs 2016).

The study will look at the municipal-interrelated problems that are causing the difficulty of supplying rural areas with water. Being a major global issue, water shortage impacts food production and security and has sparked a lot of studies into potential remedies. Reliance on imported food underscores the severe effects of water shortages on agriculture and the economy in South Africa, one of the world's most water-scarce countries (Zuma & Nojiyeza 2019). This emphasises how vital it is to handle water scarcity in the context of agriculture and the socioeconomic system.

In South Africa, rural communities usually face the financial burden of running and maintaining their water infrastructure. This situation exacerbates the problem of insufficient water supply, which is a considerable difficulty for small localities. The disparate tax collection techniques suggest a lack of evidence-based models or policy consensus. Notwithstanding Section 27(1)(b) of the Constitution, which guarantees the right to clean and safe water, effective water and sanitation services are still insufficient, particularly in black townships with underdeveloped infrastructure (South African Human Rights Commission 2018).

## Literature review

This section looks at the theoretical and conceptual frameworks that support the insufficient water provision in

rural communities which provides an extensive exploration of the underlying factors contributing to inadequate water delivery by municipal bodies.

## Theoretical framework

The research identifies the difficulties encountered by municipalities in supplying water to rural populations by applying a human rights-based theory. According to Broberg and Sano (2017), this theory places a strong emphasis on making sure that vulnerable communities have fair access to basic services including healthcare, water, sanitation and education. Donnelly (2019) also supports that human rights are vital to justice, emphasising the significance of recognising water as a core human right. The study emphasises the importance of equal access to water services, particularly for marginalised and disadvantaged communities.

The primary causes of inadequate water supply in rural populations were determined, and plans to increase water access were developed, through surface water flow theory. Owen (2021) emphasises how crucial it is to comprehend how river flow is impacted by groundwater recharge. Surface water is crucial to agriculture and drinking in rural areas. Compared to urban populations, rural residents are less likely to have access to water (World Bank 2020).

## Conceptual framework

This section discusses the main concepts that make up the article on the identification of the challenges faced by municipalities in providing water to rural communities. These concepts include the status of local government in South Africa, insufficient water provisions in South African municipalities, drought in the Eastern Cape province, the impact of climate change in South Africa, ageing and debilitating water infrastructure in South African municipalities, financial constraints because of ageing and debilitating water infrastructure, poor water quality and pollution and a lack of community participation in key decision-making structures.

### The status of local government in South Africa

As a result of apartheid, South Africa has experienced unequal access to basic services, such as clean drinking water, particularly in rural regions (Shikwambane 2017). Black communities are most impacted by these discrepancies. Even with government initiatives to increase access to water, over 38% of rural residents live in poverty and frequently cannot afford these services. To address pre-1993 concerns, the administration that came to power before 1994 started implementing revolutionary changes, such as the 1997b White Paper and the Batho Pele principles of 'putting people first'.

Notwithstanding advancements, South African municipal governments continue to face significant challenges related to unemployment, poverty and inequality, which hinder the efficacy of community-based programmes

(Bundy 2020; Narsiah 2021). Policy impacts are further limited by the apartheid era structural injustices that still exist. There are obstacles in the way of programmes that seek to empower communities through self-sufficiency (Olara 2018; Raja et al. 2021). Furthermore, the rural poor frequently experience unexpected impacts from the free basic water distribution.

Despite great progress in resolving historical injustices, Mosala, Venter and Bain (2017) found that persisting challenges of poverty, inequality and unemployment continue to impair local government performance. A thorough analysis of these initiatives shows that solving these pervasive issues calls for significant advancements in infrastructure and sustainable resource management in addition to legislative modifications.

### Insufficient water provisions in South African municipalities

The 30th driest nation in the world, South Africa, experiences high evaporation and little precipitation, which is made worse by climate change (Pengelly et al. 2017). The region's food, energy and water security have been impacted by this increased competition for water among metropolitan areas, agriculture, ecosystems, industry and energy production (Woodhouse & Muller, 2017). The *National Water Act (1998)* and the White Paper on National Water (1997b), which established a legislative framework for strategic water management, were created in response to these issues. Although these ideas provide a strong foundation for equitable water distribution, putting them into practice is still quite difficult.

The increased exploitation of resources has significant negative consequences on the ecosystem and raises concerns about the sustainability of resources like water. Uhlenbrook et al. (2022), Zaveri, Damania and Engle (2023) contend that excessive consumption of water can impede economic growth. This overuse draws attention to a significant discrepancy between practice and policy. The ongoing pressures of climate change and economic demands, coupled with insufficient enforcement, frequently result in the practical management of water resources falling short of legislative efforts.

Even though the *National Water Act* and the White Paper on National Water were significant steps in the direction of equitable water management, more effective and adaptable management strategies are still required considering the continued challenges posed by climate change, resource overexploitation and sectoral competition. Strong legislative frameworks, efficient execution and ongoing adaptation to shifting socioeconomic and environmental situations are necessary to address these concerns (Khavhagali et al. 2023).

### Drought in the Eastern Cape province

From 2015 until the beginning of 2020, the Eastern Cape region experienced a severe drought, which led the

government to declare it a 'disaster area' in October 2019 (Archer et al. 2022; Mahlalela et al. 2020). The economically impacted outlying areas in the Karoo, such as Graaff-Reinet, were particularly heavily struck by droughts (Walker et al. 2018). The Eastern Cape province of South Africa was severely affected by the drought, which also increased food prices and made it more difficult for small and medium-sized agricultural enterprises to cultivate and harvest fresh goods for local markets. Hitachi (2017) and Dolo (2019) draw attention to the difficulties in reacting to the drought while pointing out supply delays.

Aid delays, despite the area being designated as a 'disaster area', highlight inadequacies in disaster management, exacerbating financial losses and highlighting the necessity of more robust procedures. The short-term economic effects outweigh the long-term societal effects on the impacted areas, as seen by the R6.4 billion loss in the cattle business. Food insecurity and protracted economic distress after the drought era are predicted by rising food costs and difficulties facing agricultural enterprises.

### **The impact of climate change in South Africa**

The negative consequences of climate change are referred to as a threat multiplier, according to Froese and Schilling (2019), with disadvantaged and economically vulnerable sections of society suffering disproportionately from increased susceptibility. This viewpoint emphasises how urgent it is to address climate change because it makes it harder to accomplish the 2030 Sustainable Development Goals (SDGs) by exacerbating pre-existing vulnerabilities like poor health and malnourishment. After more than 50 years of development work, the Eastern Cape region is under serious risk from climate change, which might undo all these accomplishments (Archer et al. 2022).

Heat waves brought on by climate change seriously harm freshwater resources such as rivers, dams and aquifers (Srivastava & Srivastava 2020). Excessive greenhouse gas emissions further affect streams, putting ecosystems and public health at risk. Storms and earthquakes inflict damage to water delivery systems, leading to increased water scarcity (Huntington Bancshares Incorporated 2018). Although studies frequently draw attention to the direct consequences on the environment, they frequently ignore the long-term socioeconomic effects on the impacted communities.

Deteriorating water infrastructure has an impact on not just the present water supply but also on long-term community resilience and economic stability. To address these concerns, research on the socioeconomic effects of climate change, thoughtful infrastructure design, effective mitigation strategies and focussed community support are all required.

### **Ageing and debilitating water infrastructure in South African municipalities**

The South African public infrastructure network is in danger of collapse, and natural disasters such as floods are expected to cause significant casualties, infrastructure damage and costly rehabilitation costs (Gumede 2022). For rural areas to continue receiving water services, infrastructure integrity is crucial. Poor infrastructure limits the economic opportunities available to rural populations, exacerbating issues with water supply and increasing the pace of urban migration.

The main cause of South Africa's water scarcity is antiquated infrastructure, which results in substantial water losses from leaks and uses up over 37% of the country's freshwater reserves each year (Dolo 2019). The expense of upkeep and restoration of infrastructure, however, exacerbates the problems with equal water availability. Furthermore, the durability and robustness of water-related infrastructure are further compromised by inept contractors (Gumede 2022).

A critical assessment indicates the need for more thorough research on the long-term socioeconomic repercussions of climate change. A multifaceted strategy including careful planning of the infrastructure, efficient mitigating techniques and focussed assistance for the most vulnerable communities is needed to address these problems.

### **Financial constraints because of ageing and debilitating water infrastructure**

Financial constraints make it difficult to provide potable water services in rural areas (Malima 2020). Municipalities suffer financial shortages when rural areas are unable to pay, which impedes the provision of services (Malima 2020). Governments depend on tax revenue and service fees. One of the key problems, particularly in developing countries, is the lack of accountability and transparency in the financing of rural water delivery, operations and maintenance (Cord et al. 2022). Insufficient financial planning and budget allocation result in resource imbalances and unresolved technical concerns (Kuhlengisa 2022).

These studies indicate financial issues and serious deficiencies in resource management and distribution. Municipalities' reliance on tax revenue and service fees exposes them to economic swings, while a lack of transparency and accountability impedes effective financial management and equitable resource allocation.

According to Filho et al. (2022), a lack of water causes food shortages, worse health and greater poverty, all of which exacerbate underdevelopment. Limited access to social and infrastructure services is a problem for many South African municipalities (Dlamini 2018). About 30% of households in the Amathole District Municipality (ADM) did not have piped water, according to the 2017 Integrated Development Plan (IDP). Additionally, there were 240 000 impoverished households as of 2019. Even though they qualified for assistance programmes, more than 25 000 impoverished



households (13%) did not have access to clean drinking water in 2017–2018 (Kuhlengisa 2022).

Critically, the research frequently overlooks the larger socioeconomic ramifications in favour of concentrating on pressing financial and infrastructure issues. For example, a chronic lack of access to clean water not only compromises food security and health but also perpetuates cycles of poverty and underdevelopment. The significant proportion of impoverished households lacking access to potable water underscores the necessity for more focussed and long-term financial approaches.

### **Poor water quality and pollution**

Contamination of water supplies causes unpleasant tastes, colours and smells, making it a serious health risk (United Nations 2015). Efficient water distribution is made more difficult in rural areas by the inconsistent and unpredictable potable water supply (Shayamano 2020). In many rural areas, just one-third of the community taps are in use at any given moment (Hurlbert & Diaz 2013; Shayamano 2020). The safety and functionality of community taps are put at risk by mismanaged investments (Kuhlengisa 2022).

These studies show important gaps in the management and upkeep of water resources, even as they draw attention to the pressing problems of infrastructure dependability and water quality. The complaints of pollution and irregular water supplies highlight how urgently better infrastructure upkeep and water quality monitoring are needed. Nonetheless, the community taps' ongoing operational problems point to structural problems with resource allocation and investment efficacy.

Critically, the literature frequently overlooks the larger socioeconomic and health ramifications in favour of concentrating on the operational and technological difficulties. For example, the effect of low water quality on the health and welfare of the population is an important topic that needs further investigation. The high percentage of community taps that are not working indicates the need for coordinated strategies that take socioeconomic and technical factors into account.

### **Lack of community participation in key decision-making structures**

Involving rural communities in the decision-making processes related to water management presents inherent difficulties. In rural settings, a significant proportion of community constituents may display a reluctance to participate in meetings about service delivery, often driven by the perception that such engagements yield no tangible outcomes. This sentiment is characterised by a prevailing belief that committee members and municipal officials invest their time in vain, as substantive alterations to the status quo seldom materialise following a series of these gatherings.

Nevertheless, it remains imperative to consistently engage the community in these deliberations. This imperative is

grounded in the democratic principles that underpin South Africa, emphasising community involvement and the dissemination of information to local populations regarding water projects. These measures are considered instrumental in fostering the long-term sustainability of water management initiatives.

A common cause of participation aversion is mistrust and a lack of faith in engagement strategies. This emphasises the need for improved communication strategies and mechanisms to guarantee that community views are acknowledged and considered. As a reflection of South Africa's democratic values, regular community involvement and information exchange about water projects are crucial. The long-term viability of water management initiatives depends on these measures.

## **Research methods and design**

An exploratory research design was selected considering the limitation of available data on insufficient water supply in rural South Africa. To fully comprehend the experiences of rural communities dealing with water constraints, the study employed a qualitative methodology. The goal of this strategy was to investigate the different causes that lead to water scarcity. For incorporating many viewpoints from primary and secondary sources, the interpretivism paradigm was essential (Clarke 2022).

Five participants were selected for the study using purposive sampling and a non-probability selection technique: two members of the Amatola Water Board and three representatives of the municipal manager's office in the Amathole District Municipality. Data were gathered using semi-structured open-ended interviews, enabling in-depth and complex answers. The objective was to comprehend the difficulties municipalities encounter in supplying rural populations with water services and pinpoint the primary causes of insufficient water supply.

All five interviews, which lasted approximately 45 min for each participant, were recorded and transcribed verbatim. The transcriptions were verified for accuracy, resulting in a trustworthy dataset for analysing the challenges of delivering water services to rural populations and determining the causes of low water supply based on the participants' statements.

The study highlighted individual perceptions inside a descriptive interpretive paradigm by using thematic analysis. The use of cross-referencing aided in locating and confirming links between themes. Researchers organised the data logically in a Word document, entered implications consistently to maintain impartiality and dependability, and assured relevance by cross-referencing with the study's goals and research questions, filtering out extraneous material.

The study's focal point was drawn from three key directorates pivotal to its objectives: the Department of Engineering & Infrastructure (55), the Department of

Community Services (64) and Amatola Water Board Officials (45). Additionally, the Municipal Manager's Office comprises 35 employees. Consequently, the collective employee count across these three directorates aggregates 164, constituting the targeted population. The theoretical benchmark for determining and evaluating qualitative data sets is data saturation. This study's sample size was determined using the principle of saturation. This section also outlines the key components of saturation. The following processes were undertaken to establish the sample size for this study:

- **Base size:** To ascertain saturation, the researcher(s) matched the complete dataset to fresh data. Researchers investigated base sizes of 4, 5 and 6 conversations to ascertain the number of distinct subjects because base size refers to restricting the amount of data utilised as a denominator in the saturation ratio. Each data-collecting event served as the unit of analysis for the base size, and distinct codes reflecting themes were employed as analysis items.
- **Run length:** A run is an assortment of connected events or observations, in this case, interviews. The term 'run length' refers to the number of interviews researchers conduct to gather and compute fresh data. Here, the unit of analysis is the data collection event, and the objects of analysis are distinct codes.
- **New information threshold:** To ascertain data saturation, the researchers established two levels of new information: one with less than or equal to 5% new information and the other with 0% new information. These criteria represent the point at which the researchers believed data saturation had occurred throughout the data collection process.

Data saturation is a theoretical criterion for determining and evaluating qualitative data sets. To ascertain data saturation for their sample, the researchers combined base size, run length and new information thresholds (Guest, Namey & Chen 2020). To determine the ultimate number of interviews, a base size of 30 was selected and then used the saturation model. After five interviews, data saturation was reached, giving freedom and assurance in the methodology. For the selection of participants, a deliberate non-probability selection strategy was used. As a result, this article's data were gathered through semi-structured open-ended interviews with a sample of five participants. The sampling size for this investigation was established using the saturation principle. Table 1 provides more information on the sample.

Because data saturation occurs when no new information or themes emerge from the data, implying that more interviews will not yield more insights (Guest et al. 2020), this study determined saturation using a systematic methodology, with a base size of 30 and precise thresholds for new information. After five interviews, the researchers discovered that no new themes were developing, indicating that saturation had occurred. The researchers validated data saturation by

**TABLE 1:** Profiles of participants.

Participants	Population group	Included in the study	Interview length
Participant 1	Amathole District Municipality	Yes	20:01
Participant 2	Amathole District Municipality	Yes	20:08
Participant 3	Amathole District Municipality	Yes	20:12
Participant 1	Amatola Water Board	Yes	20:00
Participant 2	Amatola Water Board	Yes	20:15

Note: Primary data from the current study by researchers.

methodically analysing the responses from five interviews for common themes and patterns. When no new themes emerged and the information became repetitious, they concluded that more interviews would not bring additional insights, confirming the data's comprehensiveness and sufficiency.

The semi-structured, open-ended interviews enabled in-depth study of participants' perspectives, resulting in rich, detailed data. Thematic analysis and cross-referencing boosted the findings' robustness and trustworthiness. Researchers employed theme analysis and cross-referencing to guarantee that their findings were strong and trustworthy. They detected and interpreted data patterns, assuring relevance by matching themes to the study's objectives. This organised approach ensured consistency and accuracy, while extensive documentation exhibited transparency and rigour, increasing the study's reputation. The study displayed transparency and rigour by outlining the saturation process and criteria, justifying the sample size and bolstering confidence.

## Ethical considerations

This research followed ethical guidelines for conducting social science research to ensure that it is ethically justifiable through an ethical clearance from the Inter-Faculty Human Research Ethics Committee (IFHREC) at a South African university. No direct contact was made with animals or human subjects. The ethical protocols for social science research were followed in this research, with ethical approval obtained from the IFHREC of the University of Fort Hare with ethics clearance number: 270710-028-RA Level 01 and project number: 201716016-SSSt-SL, thereby ensuring ethical justification. The data gathered for the study will only be utilised for academic research, and the information obtained from participants will be stored on a cloud school account.

## Key results

The study sought insights from the three members of the Amathole District Municipality's manager's office and two officials from the Amatola Water Board. The objective was to understand the challenges faced by municipalities in providing water services to rural communities and the primary factors contributing to inadequate water provision by municipalities. The collected data aligned with the following key research objectives:

- To explore the obstacles confronted by municipalities in delivering water services to rural communities.
- To scrutinise the primary determinants of inadequate water provision by municipalities.

## Analysis of challenges faced by municipalities in providing water to rural communities

This section of the article scrutinises the challenges faced by municipalities in providing water to rural communities. The initial thematic focus arising from the investigation pertained to the primary objective of the study, which aimed to discern the challenges confronting municipalities in delivering water services to rural communities. These challenges include damaged infrastructure, financial constraints, a lack of resources for repairs and illegal connections which are discussed next:

### Damaged infrastructure

The South African government has put mechanisms in place to guarantee water sustainability and distribution, although many rural regions lack access to safe drinking water, as shown by the research of Bazaanah and Mothapo (2023) and Malima (2020). Masiangoako et al. (2022) stress that local communities, the government, corporations and private residents are all involved in managing the country's water supply. Together, these groups ensure that water is affordable, readily available and of high quality by advocating for water conservation, building infrastructure and supporting appropriate water management techniques. However, damaged infrastructure is still an issue in rural areas as one of the participants from the municipality indicated:

'Damage to our municipality's water system presents serious issues. The water supply is regularly interrupted due to many systems and pipes being old. The maintenance and repair procedures are frequently poor and slow, even with the engagement of multiple stakeholders and the efforts of the government. This means that our communities go for extended periods of time without access to clean water. To properly address these infrastructural challenges, we desperately need greater resources and faster response times.' (Participant 1, Age 42, Male)

Emanating from the participant's statement, this study has found that despite government efforts to remedy pre-1994 infrastructure deficiencies, backlogs still exist in low-income, informal settlements and rural communities. Maintaining and updating South Africa's water infrastructure is difficult because of antiquated systems, high demand, inefficient operations, pollution and inadequate maintenance methods (Dolo 2019). Another participant added that:

'The dry, rocky, and uneven terrain makes it difficult to deliver water supplies and makes building pipelines and taps tough. The elderly are especially impacted because many residents must fetch water from far-off, frequently hazardous rivers, putting them at risk for health problems and criminal activity. Limited financial resources and a lack of precipitation, particularly during the winter, exacerbate the situation. More effective solutions and support are desperately needed to solve these problems and provide access to clean, dependable water.' (Participant 2, Age 35, Female)

Another participant from the Amatola Water Board highlighted that:

'We are aware of the worries expressed by our residents who feel neglected. Collecting and storing rainwater is a problem for many individuals, especially those who live in small homes with

small roofs. Regardless of unique conditions, we are dedicated to resolving these inequities and are developing methods to guarantee that all communities receive sufficient water supplies.' (Participant 1, Age 42, Male)

The study emphasises how inadequate funding for infrastructure maintenance results in rural areas being ignored. These areas have expensive infrastructure maintenance, which is made worse by contractors with insufficient expertise. The participants conveyed apprehension regarding the chronically insufficient water supply in the rural areas of Raymond Mhlaba, mostly because of degraded infrastructure. The major damage to Ntoleni's Stocks Dam, a vital water supply that supplies nearby communities including Nobanda, Mlalandle and Ndaba, has severely impacted the availability of water.

The municipality's problems with water service have become worse because of damaged pipes that prevent the dam from providing water to neighbouring rural regions. Maintaining and restoring failing infrastructure is costly, which complicates equal water availability. The lifetime and durability of water infrastructure components, such as reservoirs and pipelines, are adversely affected when contractors with insufficient skills are used for these projects. According to Gumede (2022), this problem is particularly acute in rural locations where it is particularly difficult to supervise construction activity.

### Financial constraints

The National Treasury has significantly increased its financial support for local municipalities since the creation of comprehensive local municipalities in 2000. This grant is to increase access to basic facilities and enhance the quality of services. Several municipalities have reported notable increases in the number of free basic water consumer units getting this essential service, according to Statistics SA from 2013. However, one of the verbatim responses about the challenges faced by the municipality in providing water to rural communities shows that:

'Providing water to rural communities is a challenge for municipalities, encompassing logistical, economic, social, and environmental dimensions. The vast and dispersed nature of rural settlements often complicates the establishment and maintenance of water infrastructure. The need for extensive pipeline networks and the associated high costs poses financial burdens on municipalities with limited budgets. The municipality does receive grants to fix infrastructure, roads in the rural areas but the problem is the population that keeps on growing making it difficult for the municipality to provide basic services like water.' (Participant 1, Age 38, Male)

This reveals that the provision of potable water services in rural areas faces significant challenges, primarily stemming from financial limitations as has also been shown in the study of Tantoh and Simatele (2018). The lack of transparency and accountability in financing rural water supply, maintenance and operational expenses is further corroborated, particularly within the context of developing

nations (Hofstetter, Bolding & Van Koppen 2020). Consequently, this disparity in resources arises because of inadequate financial planning and budget allocation, leading to unresolved technical issues stemming from a lack of funding (Kuhlengisa 2022). Another official from the Amatola Water Board highlighted that:

'The National Treasury has boosted its financial support, but it is still insufficient to fulfil the expanding demands of rural areas. Increasing population and scarce resources make it difficult to deliver reliable water supplies. Efforts are made more difficult by the financial distribution's lack of accountability and openness. To solve these problems, better budget allocation and careful financial planning are required. To ensure the efficient and transparent use of financial resources for improving water services, collaboration with all stakeholders is important.' (Participant 1, Age 38, Male)

### **Insufficient number of personnel**

This study has found that insufficient staffing and funding further strain municipalities, leaving positions vacant and hindering service delivery. In rural areas, maintaining infrastructure is costly, exacerbated by the involvement of unskilled contractors. One of the municipal officials raised an issue of being short-staffed by indicating that:

'The Amathole District municipality has a challenge of short staff of 470 vacancies in water services personnel additionally the Municipality has limited access to water services vehicles, tools, materials which makes it difficult for the staff to render services to the rural communities.' (Participant 2, Age 35, Female)

However, according to the 2019 final report on the State of Staff Turnover and Retention in South African municipalities, all funded vacant positions within the staff establishment are required to be filled within a 6-month period from the time of becoming vacant. Municipalities are obligated to formulate a strategy aimed at expeditiously filling funded vacancies and reducing the turnaround times for occupying such posts.

A post must be budgeted for and approved by a municipal manager or other designated staff member before it can be filled. But even with this condition, there are still a lot of unfilled positions because of a lack of money. Because of this financial limitation, vacant positions are very common in municipalities. A lack of finance is not an acceptable reason; hence posts must be properly funded and advertised to guarantee that they are filled immediately.

The persistent existence of numerous vacant positions poses a risk of overburdening existing staff, compromising their ability to effectively carry out their responsibilities. To ensure the seamless functioning of a municipality, it is imperative that the staffing level is sufficient, and vacancies are promptly filled. In support of this, another municipal official participant claimed that:

'Economic constraints in rural areas may hinder residents' ability to afford water services. The cost of infrastructure development and maintenance must be balanced with the socioeconomic realities of these communities. Adequate funding mechanisms

and subsidy programs are essential for ensuring equitable access to water services.' (Participant 3, Age 40, Male)

Because water is necessary for life to exist, it has long been a crucial worldwide concern. Water scarcity has become more noticeable recently and is a problem in many parts of the world. Increased resource extraction has a negative influence on the ecosystem and casts doubt on how long resources will last. This is particularly true for naturally occurring resources, such as water, which are frequently overused and may restrict economic activity (Takter 2023).

The study draws attention to the financial constraints that rural communities must overcome for municipal authorities to provide water services, which results in extended times without direct access to water. This ongoing problem has not been solved over time. Budgetary restrictions frequently make it difficult to develop and repair high-quality infrastructure completely, which keeps rural communities' taps from providing clean water.

### **Analysis of the primary determinants of inadequate water provision by municipalities**

This section of the study addresses the second research objective, which aims to identify the primary cause of inadequate water supply in the rural areas of Raymond Mhlaba Local Municipality. According to the participants, a prevalent issue is the unauthorised tapping into the main water pipe by a significant number of residents in these regions. However, the primary determinants of inadequate water provision by municipalities are explained in this section.

#### **The status of local government within the context of South Africa**

Shikwambane (2017) argues that South Africa has long experienced unequal access to essential services like clean drinking water, especially in its rural regions, a problem that traces its roots back to the apartheid era. These disparities encompass insufficient provisions of clean water for black communities. Despite the government's attempts to expand water services, approximately 38% of South Africa's rural population is impoverished and often incapable of affording this essential service (Shikwambane 2017). Based on the context of this study, one of the participants from the Amathole District Municipality indicated that:

'The status of local government in South Africa is in decline and unfortunately, most municipalities including our Amathole District Municipality which is failing to provide basic services like clean drinking water to rural communities.' (Participant 1, Age 42, Male)

Another official from the municipality shared the same sentiment by indicating that:

'The municipality is still addressing the backlog in some rural areas that have nothing, which makes it difficult to upgrade the damaged infrastructure. The state of Local governance is crumbling due to a lack of coordination between citizens and



local authorities. The municipalities have been tasked to provide services to all citizens and not group and select few, but the local government still have a long way to go to ensure that the state of local government is in a desired state.' (Participant 3, Age 40, Male)

In the same way, another municipal official added that:

'The municipality does receive grants to fix infrastructure, roads in the rural areas but the problem is the population that keeps on growing making it difficult for the municipality to provide basic services like water.' (Participant 2, Age 35, Female)

The assertions concur that the condition of local governance in South Africa is distressing, and there have been no discernible improvements to date, particularly for residents in rural areas. South African municipalities continue to grapple with numerous challenges in delivering essential services to citizens. Participants in the discourse observe that municipalities are exerting efforts to ameliorate the situation through the grants at their disposal. In addition to what has been highlighted by the participants, another municipal official alluded to another key issue:

'The unauthorised households' tapping into the main water pipes presents a problem. This affects the infrastructure and interrupts the water flow, which causes more issues and higher repair costs. The municipality is developing plans to deal with these unauthorised connections and enhance the administration of water resources. The expanding population and financial limitations, however, nevertheless present formidable obstacles. We are dedicated to coming up with long-term fixes to guarantee that every local has access to safe and dependable water.' (Participant 2, Age 35, Female)

However, these grants prove inadequate for rural areas because of the emergence of unplanned settlements daily, impeding the provision of essential services such as water and sanitation, infrastructure and electricity. Moreover, the available grants are primarily directed towards addressing pre-existing infrastructure damage in certain rural areas.

Notwithstanding the achievements of South Africa's democratic era, a significant amount of the population is affected by poverty, inequality and unemployment, which pose serious difficulties to local governance (Murray 2019). With regard to rural development, the Eastern Cape falls behind neighbouring provinces because of limited infrastructure and poor service delivery. The design and implementation of water infrastructure in these places is extremely poor, owing mostly to ineptitude and nepotistic appointments (Dolo 2019). Pointing from this, another municipal official touched on their challenge as the municipality by adding that:

'The difference in rural development between the Eastern Cape and other provinces is one of our main problems. Rural communities frequently have poor infrastructure along with inadequate water system design and execution. The efficiency of our efforts is weakened by problems like incompetence and nepotistic appointments, which exacerbate this. Furthermore, substantial financial resources that could be utilised to build new infrastructure in underserved rural areas are diverted by the

ongoing maintenance requirements of aged infrastructure in urban areas. Even with our greatest efforts, we are unable to guarantee a consistent water supply due to the incompetence of our maintenance crews.' (Participant 1, Age 42, Male)

According to Dolo (2019), the primary cause of water supply delays in impoverished rural communities is the deterioration and malfunction of urban infrastructure. The need for ongoing maintenance of outdated water infrastructure takes a large financial toll that may be avoided by investing in modern infrastructure. Even with continuous repair, water problems still exist because maintenance teams are not very skilled. This makes it more difficult to guarantee a steady supply of water.

### Illegal connections

Socio-economic challenges drive criminal activities like illegal connections. According to the participants, a prevalent issue is the unauthorised tapping into the main water pipe by a significant number of residents in these regions. One of the participants from the Amatola Water Board indicated that:

'The insufficiency of official water provision has compelled certain individuals to resort to the installation of unauthorized connections. This practice raises equity concerns, as it disadvantages those who lack the financial means to engage in such illicit connections. Moreover, when the municipality initiates the release of water directly from the taps, individuals with legal connections swiftly fill their Jojo Tanks and drums. Consequently, the unauthorized connections exacerbate the problem of insufficient water supply.' (Participant 2, Age 35, Female)

Another participant from the Amatola Water Board supported the claim by asserting that:

'An additional complication contributing to water inadequacy in these rural areas is the non-professional installation of these illegal connections. The lack of proper installation results in leakages whenever the municipality activates the water taps. Approximately 80% of the water is wasted due to these substandard connections. This further complicates the municipal authorities' efforts to devise effective solutions to address the prevailing water supply challenges in the area.' (Participant 1, Age 42, Male)

Despite its status as the second-largest economy in Africa, South Africa continues to confront enduring challenges about water scarcity in municipalities. Since the year 1994, the South African government has been engaged in comprehensive reforms and has embarked upon a trajectory of policy transformation. This restructuring initiative scrutinises water governance frameworks at various hierarchical levels, as elucidated by Mosala et al. (2017).

The quest for legal water access frequently gets in the way of the objective of providing enough water, which encourages illegal activity relating to water. Many people in the neighbourhood dig personal wells because they have inadequate access to sanitary facilities and safe drinking water. Unfortunately, investigations by Krishnan (2019) and Murei et al. (2022) have indicated that the water from these wells is frequently untreated and causes health hazards.

## Discussion and recommendations

The study identifies many major obstacles that South African municipalities must overcome to supply water to rural areas: deteriorated infrastructure, limited funding, insufficient resources and illicit connections. The problem is made worse by the lack of public involvement initiatives, which keep rural residents' opinions out of the solution-finding process. The lack of water has a severe influence on agriculture, which in turn affects food security, production and leads to poverty in rural economies, particularly in developing countries.

Because rural communities are typically in charge of maintenance and repairs, they should take the initiative to address South Africa's water problems. Their understanding of the area can aid in creating workable solutions. Funding and information exchange require collaboration between local leaders, government representatives and communities. To improve community capacity and flexibility, specific initiatives include forming water management organisations, holding community events and offering information on sustainable water management.

Academic research by Takacs (2016) and Masiangoako et al. (2022) backs up the idea that citizen engagement in decision-making processes is essential because it gives communities the power to take charge of projects that directly impact them. It also guarantees that policies and programmes are more responsive to the needs and interests of the communities they serve by promoting collaboration between the public and the government. Therefore, legislators and local governments should set up official avenues for the public to participate in agricultural support and water management, such as participatory budgeting, open forums and community advisory boards.

These tactics will guarantee that the opinions of rural people are considered during the decision-making process, enhancing the effectiveness and durability of programmes while bolstering rural communities. In conclusion, the study emphasises how difficult it is to provide water, support agriculture and engage the community in rural areas. It also emphasises the necessity for comprehensive strategies that include all relevant parties to successfully address these urgent problems.

To harness different knowledge and resources, collaborations between governments, non-governmental organisations (NGOs) and the corporate sector are critical. Local communities must be involved in the planning process to benefit from their knowledge about water sources and usage patterns. Community engagement can aid in accurately assessing water requirements and priorities. By involving citizens in decision-making, they gain a sense of ownership, which strengthens their commitment to the successful implementation of solutions.

Incorporating community participation is critical for uncovering concerns that municipal planners may overlook

while guaranteeing transparency and confidence. Effective plans should be based on this feedback, and enlisting residents in volunteer or fundraising initiatives can assist in alleviating water supply issues while also ensuring that community needs are taken into account in decision-making.

Because of their provision of financing and vital information, municipal authorities and other government stakeholders play a critical role in addressing the issue of inadequate water provision. A comprehensive and interdisciplinary approach is necessary to address the issues municipalities have in providing water to rural populations. To create resilient and sustainable water systems in rural regions, it is essential to address practical, financial, social and environmental issues while encouraging community involvement and leveraging partnerships.

## Limitations

This study focused solely on water provision by local governments in the public sector. The findings are generic and limited to this setting, excluding the private sector.

The study's concentration on Amathole District Municipality may limit its ability to represent other places. Semi-structured interviews and qualitative methodologies provided deep insights, but may not have given quantifiable or generalisable results. This study tries to improve access to water by examining its provision.

## Conclusion

The study aimed to identify obstacles to supplying water to remote settlements in the Amathole District, determine the causes of inadequate water supply, and propose remediation measures. It was found that insufficient access to water in Raymond Mhlaba led to frustration, illicit connections and strained relationships between the community and the town. The situation was exacerbated by unemployment, corruption and limited financial resources. The study emphasised the critical role that water plays in daily life and economic activity, highlighting the urgent need for infrastructural improvements and financial support to ensure sustainable water availability.

The study examined the challenges municipalities face in supplying water to rural areas, including broken infrastructure, limited funding and unauthorised connections. It highlighted the lack of public engagement initiatives and inadequate funding for repairs, focussing on unplanned areas while neglecting the needs of rural communities. The cost of maintaining infrastructure is exacerbated by contractors with insufficient expertise. Socioeconomic issues contribute to illegal connections, and the lack of water adversely affects agriculture, further deepening poverty in rural areas.

Insufficient staffing and funding further strain municipalities, resulting in vacant positions and hindering service delivery. Public engagement is vital for effective planning, as it draws on local knowledge and fosters transparency. Culturally

sensitive solutions are essential, along with stakeholder participation in decision-making. Proposed strategies include improving infrastructure, involving communities in planning, donating water tanks and filling vacant positions promptly. Vigilant monitoring and evaluation ensure the effectiveness of interventions, contributing to sustainable outcomes.

The study influences future public administration research by identifying the underlying causes of inadequate water availability in rural regions and supporting policymaking initiatives. By presenting calculated suggestions for enhancing water distribution and management, it aims to close the gap between sufficient water supply and effective use. These recommendations will impact future research and policymaking.

This research contributes to public administration by identifying the primary causes of insufficient water delivery in rural areas, thereby guiding policy decisions. It recommends making strategic adjustments to the management and distribution of water to bridge the gap between availability and efficient use. It emphasises the importance of community involvement and strategic actions in ensuring a reliable water supply. Future studies should explore the challenges of water provision, consider community engagement and climate change, and integrate both quantitative and qualitative methodologies for comprehensive insights. Additionally, assessing practical barriers to policy implementation and the role of the private sector could enhance recommendations, along with monitoring changes in infrastructure and policy over time.

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The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

### Authors' contributions

S.S.T. and S.L. contributed to the development and writing of the research. S.S.T. conducted the research as part of her honours treatise under the supervision of S.L. The corresponding author of the work is L.M.

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### Data availability

The data that support the findings of this study are available from the co-authors, S.S.T. and S.L., upon reasonable request.

### Disclaimer

The views and opinions expressed in this article are those of the authors and are the product of professional research. It

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